Foreword

This manual is Hongqi NEW H5 Repair Manual. The chapters of the manual are shown in bold in the table of contents. Find the desired chapter according to the table of contents.

This manual is applicable to the vehicles listed below. The contents of this repair manual include general repair procedures for Hongqi NEW H5 in July 2022.

Applicable model	CA7151HA6T
	CA7150HA6HEVT
	CA7201HA6T
	CA7181HA6T

All information in this manual is subject to the latest product information at the time of release. Maintenance specifications and maintenance procedures are subject to change without notice. If you find any errors in this manual, please inform us using the quality report on the next page.

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Repair Manual Quality Report

To CHINA FAW GROUP IMPORT & EXPORT CO., LTD.

VIN code		Release date of manual	
FAW authorized Hongqi dealer		Reporter	
Subject			
Brief description of the problem			
Correction comments			

Please complete this page and send it by email to: HQservice@faw.com.cn

Note

This manual does not cover all items required for vehicle repair and maintenance. This manual is intended for use by skilled and qualified personnel. If unprofessional or unqualified technicians only refer to this manual or do not use appropriate equipment or tools when making repairs or maintenance, it may cause injury to themselves or people around them and damage to customers' vehicles.

In order to prevent dangerous operation and avoid damage to the customer's vehicle, please observe the following regulations.

- The contents of this manual must be read thoroughly. In particular, fully understand all the contents of the "Precautions" in the "Introduction" section
- The repair methods provided in this manual are very effective for vehicle repair. The specified or recommended tools must be used when following the procedures in this manual for maintenance operations. If tools and repair methods not specified or recommended are used, ensure the safety of the repair technician before starting the operation and ensure that no personal injury or customer vehicle damage will occur.
- If replacement is required, replace with a part with the same part number or an equivalent. Do not use inferior parts.
- If automatic configuration is required for replacing the electronic control module, the automatic configuration procedures are as follows:
- 1. Set the ignition switch to OFF position.
- 2. Connect the HQ-VDS to the DLC2.
- 3. Set the ignition switch to ON position.
- 4. Turn on the HQ-VDS.
- 5. Enter the following menus: System Scan/Module Programming/Auto Configuration/(select the module for Auto Configuration)
- 6. Perform the Auto Configuration according to HQ-VDS prompts.
- It must be noted that in order to effectively avoid possible personal injury during repair or maintenance, as well as hidden dangers such as vehicle damage or vehicle insecurity due to improper operation, items like "Warning", "Caution", "Note" and "Tip" in this manual must be carefully observed. It shall also be noted that the "Warning", "Caution", "Note" and "Tip" sections of this manual are not exaggerated. Violations of these instructions may lead to dangerous consequences.

  1. WARNING: It indicates a dangerous situation, which if not noticed, may cause serious injuries and even death.

  2. Caution: it indicates a dangerous situation which, if you do not pay attention, may cause minor or moderate injuries.

  3. Note: it indicates that if you do not pay attention, the vehicle may be damaged.

  4. Tip: Tips and useful information for some precautions in the operation steps.

How to troubleshoot

1	Send the vehicle into the repair shop

Next step

2	Diagnose and determine symptoms

Next step

3	Check CAN communication system

(a) Use the HQ-VDS to check if the CAN communication system works normally.

Results

Results	Go to
DTC is output	Normal
No DTC is output	Abnormal

Abnormal → Go to Step 5

Normal

4	Check DTC list

Next step

5	Check the circuit

Next step

6	Repair or replace

Next step

7	Clear DTC

Next step

8	Check DTC

(a) Use the HQ-VDS to check if a DTC is output.

Results

Results	Go to
DTC is output	Abnormal
No DTC is output	Normal

Abnormal → Go to Step 4

Normal

9	Confirmation test

Next step

End

Introduction	IN
EMS (2.0 T and 1.8 T)	ES
Engine mechanical system 2.0T and 1.8T	EM
EMS (1.5T)	ES
Engine mechanical system 1.5 T	EM
EMS (HEV)	ES
Lubrication system 1.5 T	LU
Lubrication system 2.0T and 1.8T	LU
Intake system 1.5 T and HEV	IT
Intake system 2.0 T and 1.8 T	IT
Exhaust system 1.5T and HEV	EX
Exhaust system 2.0T and 1.8T	EX
Starting system 1.5T	ST
Starting system 2.0T and 1.8T	ST
Ignition system 1.5T	IG
Ignition system 2.0T and 1.8T	IG
Cooling system 1.5T and HEV	CO
Cooling system 2.0 T and 1.8 T	CO
Low-temperature cooling system	CO
Emission control system	EC
Fuel system	FU
Charging system	CH
8G45B transmission control system	AX
CA7CM270D1 dual clutch transmission	AX
ACM system	AM
EGSM control system	EG

Supplemental restraint system	RS
Seat belt	SB
ATC system	AC
ADV	AD
IFC	CC
DCDC control system	DC
High-voltage harness	HG
DMS	DM
HCU	HC
Motor control system	MC
BMS	PB
Traction battery	HB
Power steering system	PS
Steering column system	SR
T-BOX	TB
T-Box - Overseas	TB
ETC system	TC
Mobile phone wireless charging control system	WM
BCM	BM
Door control system	ED
Door control system (one-drive-two)	ED
Brake control	BC
Brake control (HEV)	BC
Brake system	BR
Seat system	SE
Lighting system	LI

Forward MMW radar system	RA
LCDA	BS
IVI	AV
HUD system	HD
IPC	ME
PDC	PM
PA	PA
AVM	AS
CAN communication system	CA
Suspension	SP
Driving shaft	DS
Instrument panel	IP
Interiors	IR
Exterior	ET
Door lock	DL
Closure system	ED
Horn	HO
Rearview mirror	IM
Sunroof	RF
Anti-theft system	TD
Windshield and window	WS
Wiper and washer	WW
Wheel	TW
Glonass system	GS
Appendix	FL

Introduction

How to use this manual IN-1
General IN-1
VIN and serial number IN-4
Stamping position IN-4
Maintenance Operation Instructions and Precautions IN-6
Service technician qualification requirements IN-6
High voltage safety IN-6
Precautions IN-9
Jack, bracket and support position IN-23
Circuit check methods and procedures IN-27
Terminology in this manual IN-33
Abbreviations IN-33

How to use this manual

General

1. Summary

(a) General maintenance operations can be divided into 3 main steps as follows:

(1) Diagnosis.

(2) Removal, installation, replacement, disassembly, reassembly, check and adjustment.

(3) Final check.

(b) This manual describes "removal, installation, replacement, disassembly, reassembly, inspection and adjustment" but omits "final inspection".

(c) The following basic operations are omitted from this manual, but they must still be implemented in actual operation.

(1) Use a jack or lift.

(2) If necessary, clean the removed parts.

(3) Visual inspection.

2. Preparations

(a) Use appropriate special service tools (SST) according to the maintenance situation. Be sure to use SST and follow the correct operating procedures if necessary.

(b) Please consult the Spare Parts Department for specific details of all SST part numbers in this book.

3. Maintenance procedure

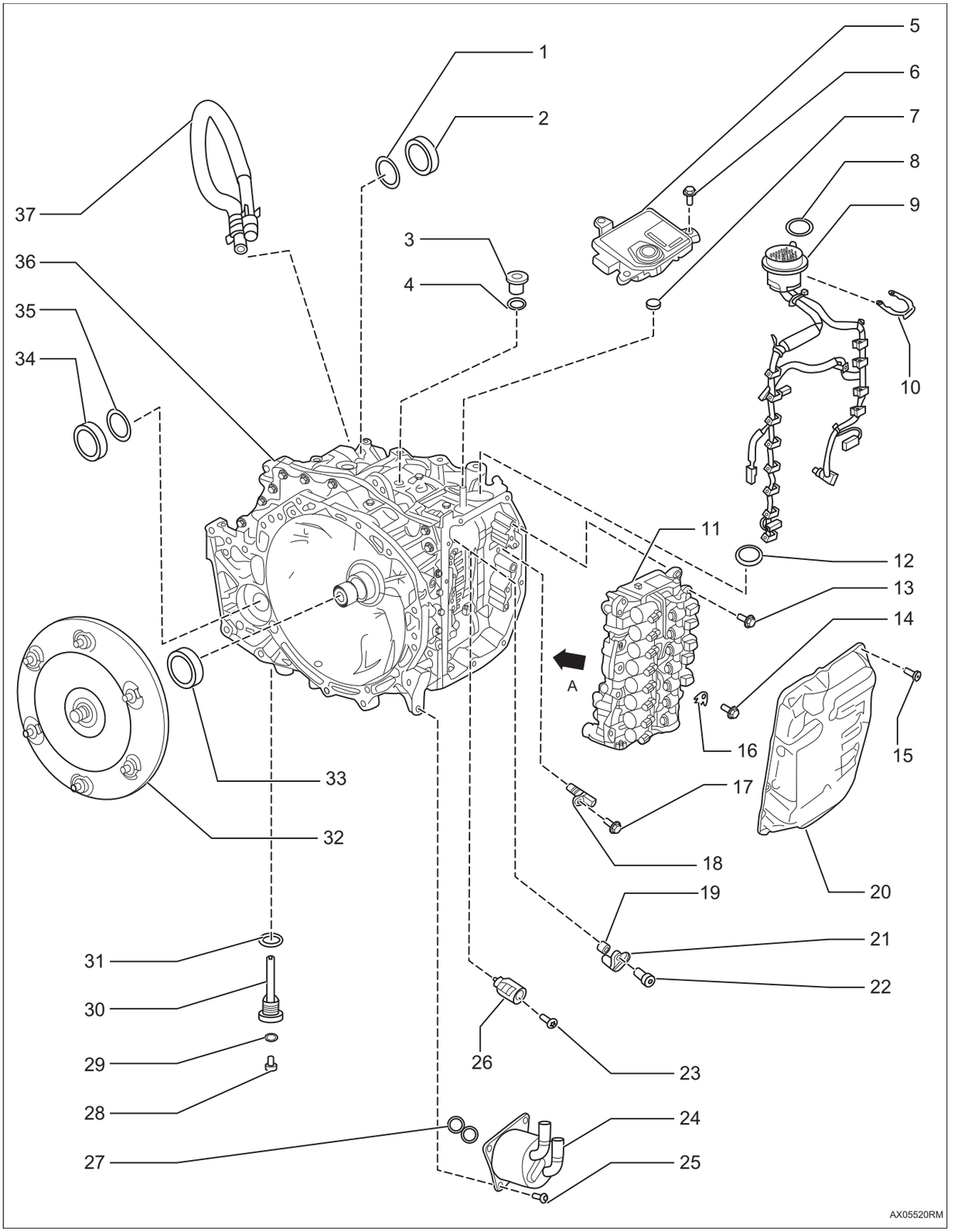
(a) List the component diagrams in each section as required.

(b) Parts catalogs are located in the "Parts Drawings" section to ensure proper understanding of the assembly installation.

(c) The steps of the repair procedure are numbered and the major components involved in the step are additionally illustrated with corresponding numbers. Some instructions also contain important tips or supplementary information for a certain procedure, which should be referred to when repairing relevant parts.

IN

For example:



1. O-ring
2. Left output shaft seal
3. Filler plug
4. O-ring
5. TCU
6. Hexagon flange bolt
   - X3
   - Torque: 19.6～29.4 N·m
7. .....
8. .....

(d) The removal steps and installation steps of the operation items are only described for the important parts.

(e) Only the items indicated are described in the step, and the operating part and content are shown in the illustration. Details such as operating methods, standard values and precautions are described in the instructions.

(f) Due to the same illustrations of similar models, the information provided in this manual may be slightly different from the actual model.

(g) It shall specify how to complete the work and provide other information such as maintenance specifications and precautions.

4. International system of units

(a) The units used in this manual comply with the International System of Units (SI UNIT) standard.

For example:

Torque: 30 N · m

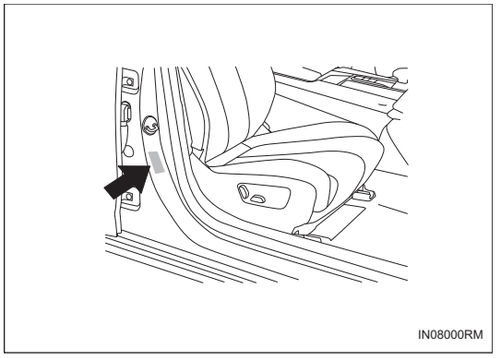
IN

VIN and serial number

Stamping position

1. Manufacturer nameplate

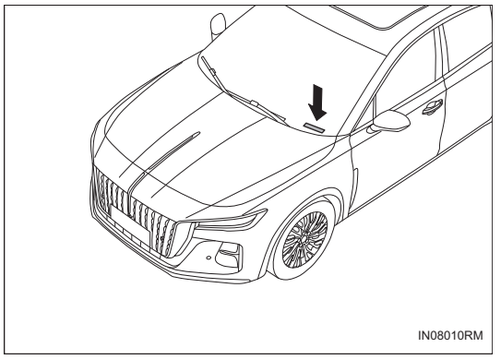
(a) As shown in the figure, the manufacturer nameplate is located on the right B- pillar.


IN08000RM

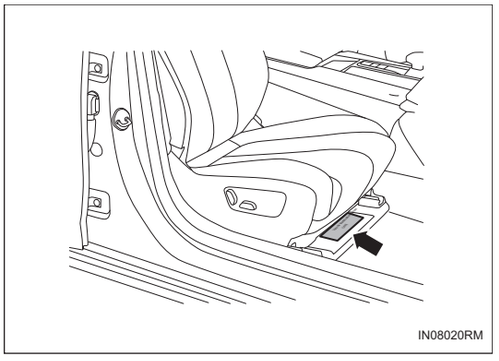
(b) The manufacturer nameplate shall include the following items: country of manufacture, manufacturer, VIN, brand, vehicle model, seating capacity, GVW, engine model, maximum net engine power, engine displacement and production date.

2. VIN

(a) Paste it under the front windshield at the upper left of the instrument panel.

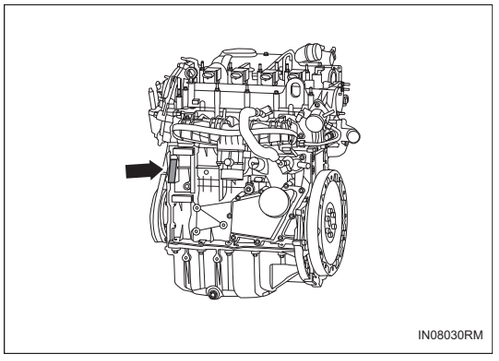

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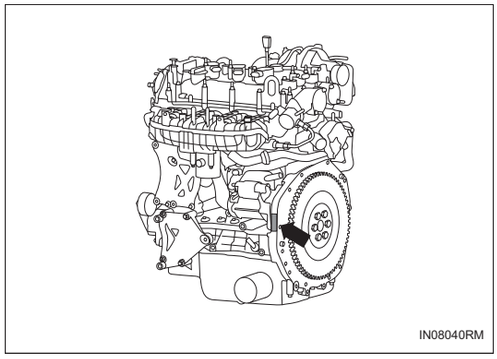
(b) Engrave it below the front passenger seat.


IN08020RM

3. Engine model and factory number

(a) The 1.5T engine number is engraved on the engine cylinder block.


IN08030RM



(b) 2.0T and 1.8T engine numbers are engraved on the engine cylinder block.

IN

Maintenance Operation Instructions and Precautions

Service technician qualification requirements

1. Maintenance procedure

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.



Certificate No.: XXXXXXXXXXXXXXXXX
Name: XXX Gender: male
Operation category: electrician operation
Permitted operation item: low-voltage electrician operation

Initial date: 20170317
Validity period: 20170317-20230316
Review date: 20200317

People's Republic of China
Work Permit for Special Operations

Review records_____
Supervised by the State Administration of Work Safety

IN01000RM

High voltage safety

1. Meaning of high voltage safety

(a) The high-voltage system with class B voltage range on the electric vehicle may bring electric shock risk to driver and passenger and operators during vehicle trial-produce, production, use and maintenance.

(b) High-voltage safety of electric vehicles: prevent electric shock injury to human body caused by high-voltage contact.

2. Basic knowledge of high voltage safety

(a) Electric shock prevention tool -insulating gloves.

(1) Precautions for use of insulating gloves.

- Determine whether insulating gloves of correct type are used.
- Carry out inflation test before use. If any damage is found, do not use them.
- After use, wipe the internal and external dirt clean.

- Store them in a dry place and protect them from acid, alkali, oil and other substances.
- Carry out regular inspection after 6 months of use.

Warning:

Carry out regular inspection after 6 months of use.

3. Electric shock accident handling

(a) Protect the site.

(1) Disconnect the power supply (high-voltage power-off/remove the service switch), check the power-off state and prevent reconnection!

(b) Deal with accident casualties

(1) In case of serious injury, call 120 for emegency services immediately.

(2) In case of "minor injury", treat it immediately and seek medical attention.

(c) Accident analysis.

(1) Inspect the site in a timely manner with the relevant person in charge, safety officer, safety expert and the parties concerned (if possible).

(2) Electrical professionals shall test the vehicle in question prior to reuse.

(3) Please analyze the cause of the accident and prepare the accident report.

4. Electrical fire rescue

(a) Alert the fire department.

(b) Confirm the type of fire.

(1) When thoroughly inspecting the fire, do not contact any high-voltage parts, and always use insulating tools for inspection.

(2) Fire not caused by battery.

- If there is a small fire and the flame does not spread to the high-voltage battery, a carbon dioxide or ABC dry powder extinguisher can be used to extinguish the fire.

(3) Fire caused by battery.

- If a high-voltage battery bends or is broken in a fire, or if a problem with the battery is suspected, a large amount of water shall be used to extinguish the fire.

- It may take 24 hours to completely extinguish battery fire. With thermal imaging camera, it can be confirmed whether the high voltage battery is completely cooled. If there is no thermal imaging camera, it is necessary to monitor whether the battery will reignite. Smoke indicates that the battery is still hot. Even if there is no smoke, it should be monitored for at least another hour.
- To avoid potential battery reburn, it is recommended to place the battery in an open area.

(c) Safety precautions for electric shock.

(1) Always assume that all high voltage components are powered on!

(2) To avoid electric shock, do not directly touch any part of the vehicle, and always use insulating tools.

(3) Cutting, crushing, or contacting high-voltage elements may cause serious electric shock or short circuit accidents.

(d) Other safety precautions.

(1) If the battery is on fire and releases toxic gas, irrelevant personnel must be evacuated.

(2) Have self-protection consciousness, wear protective equipment, and do not inhale toxic smoke.

(3) The inflation bottle, gas column and other components that store gas can reach the extreme temperature of steam explosion caused by expansion of boiling liquid. Before the "hot zone" of the accident is checked, disassemble these components with appropriate fine protection.

(4) Do not use carbon dioxide fire extinguisher to put out the fire on persons, which may cause a risk of suffocation.

5. Precautions for faulty vehicles

(a) Employees wearing medical aid electronic devices shall avoid approaching the faulty vehicle. When the motor is working or the high-voltage system is running, the following medical aid electronic devices may be adversely affected.

- Analgesic pump in the body.
- Implanted defibrillator.

- Cardiac pacemaker.
- Insulin pump.
- Hearing aid.

Precautions

1. Precautions of high-voltage related operations (check and maintenance of high voltage system)

Caution:

The electric vehicle has a high voltage that exceeds the safe voltage for the human body, so it must be inspected and repaired by professionals who have received relevant training and must be operated in the correct way.

When the vehicle is faulty, personnel wearing electronic medical devices such as cardiac pacemaker and insulin pump should not approach the vehicle and operate it.

When operating the vehicle, avoid wearing metal decorations such as watches to avoid short circuit accidents.

(a) Preparations

Preparation item	Content
Dedicated operating site	Irrelevant personnel shall be prohibited from approaching to prevent electric shock accident caused by misoperation of irrelevant personnel.
Insulating gloves/insulating shoes	The insulating gloves shall be rated at not less than 500 VAC/700 VDC to prevent electric shock accidents caused by direct contact with high-voltage live parts.
Insulating tape	The color of the insulating tape is orange and the tape is used to wrap the damaged or exposed high-voltage live parts.
High voltage hazard warning sign	It shall be placed on the roof to prevent irrelevant personnel from approaching the vehicle for misoperation.

(1) High voltage danger warning sign



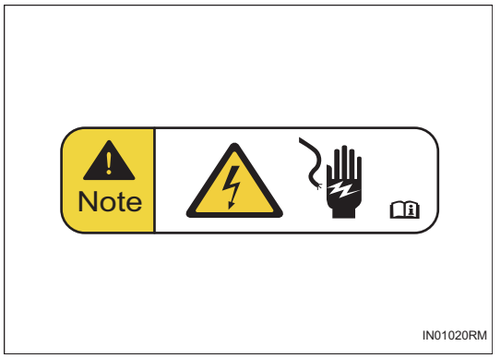
(b) Identification of high voltage components

Warning:

Some high-voltage components may only have the logo of lightning in the triangle.

(1) The high-voltage harness and high-voltage connector are both in orange;

(2) Non-harness high-voltage components are affixed with high-voltage logo, and the identification style is generally shown in the figure.



2. Safe operation steps for disconnecting the high-voltage loop

Caution:

- Failure to properly disconnect the high-voltage loop prior to removal operations on the vehicle may result in serious electric shock accidents or even death.
- Even after the high-voltage loop is disconnected, the high-voltage battery still has high voltage. Do not touch the high-voltage battery housing and its inside with bare hands. The high voltage system may have high voltage. Do not touch the high voltage component with bare hands.

Warning:

- ***The high-voltage capacitors in high-voltage components such as MCU and DC/DC retain some electrical energy after the high voltage system is powered off. The residual electrical energy will be reduced to below 60 VDC within 2 minutes and will be completely released within 5 minutes.***
- ***After unlocking the service switch, placing the ignition switch in the START (READY) position may cause a malfunction.***

(a) Set the ignition switch to OFF position.

(b) Disconnect the negative terminal of the low-voltage battery.

(c) Check the insulating gloves model and confirm that its rated voltage exceeds 500 VAC/700 VDC; Make sure that the insulating gloves are dry and free of dirt and air leakage. Put the sleeves in the gloves when wearing.

(d) Unlock the low voltage service switch and lock the service switch with a safety lock to avoid the risk of electric shock caused by misoperation of others.

(e) Wait for 5 minutes, and wait for the end of the capacitor discharge in the high-voltage loop.

(f) Use insulating devices such as insulating tape to protect the exposed high-voltage live parts in all directions to ensure that the high-voltage live parts cannot be directly contacted.

3. Safe operation steps for restoring high-voltage loop

(a) Check the insulating gloves model and confirm that its rated voltage exceeds 500 VAC/700 VDC; Make sure that the insulating gloves are dry and free of dirt and air leakage. Put the sleeves in the gloves when wearing.

(b) Remove insulating devices such as insulating tape.

(c) Connect the low voltage service switch.

(d) Connect battery -.

(e) Set the ignition switch to START and make the instrument cluster display the Ready state.

4. Airbag and seat belt pretensioner

(a) Cut off the power supply.

(1) After confirming the diagnostic connection line, turn off the ignition switch, remove the battery negative terminal, wait for 60 seconds and then start the operation.

Hint:

Since the airbag pretensioner system is equipped with a standby power supply, the airbag may be deployed if operation is started within 60 seconds after the battery negative terminal is removed.

(b) General precautions.

(1) Use a digital multimeter for electrical check.

(2) Follow the precautions on the label around the system.

(3) Do not disassemble.

(4) Never measure resistance.

(c) Precautions for disposal of airbag and pretensioner (before deployment).

(1) Do not discard in an undeployed state (be sure to deploy it using SST).

(2) Because the deployment sound is loud, please inform the people around you in advance.

(3) Be sure to select a safe and flat place outdoors for deployment, away from residential areas.

(4) When deploying airbag and pretensioner, use SST and leave the airbag and pretensioner 5 meters away.

(d) Precautions for disposal of airbag and pretensioner (after deployment).

(1) Since the temperature of some parts of the airbag and pretensioner are as high as several hundred degrees after deployment, they shall be placed for more than 30 minutes after deployment.

(e) Precautions for driver airbag assembly, front passenger airbag assembly and pretensioner.

(1) During operation, even if they are temporarily removed, they shall be placed with the deployment surfaces facing upward.

(2) Do not overlap the airbags or place other objects on top of them.

(f) Harness and connector.

(1) Most of the harness and instrument panel harness assembly in the system are integrated, and all connector are in standard yellow. If the harness is disconnected or the connector is damaged, repair or replace it immediately.

(g) Vehicle handling after a collision.

(1) When using the electric welder, remove the airbag and seat belt pretensioner before the operation.

(2) The airbag sensor assembly may be impacted. Remove the sensor assembly before operation.

5. High voltage system equipotential and insulation shall be checked after replacement of high voltage components.

6. Equipotential check

(a) High voltage components with equipotential bonding

Name	Method
Traction battery	Bolt
Power motor	Equipotential line
DCDC assembly	Equipotential line
Electric A/C compressor	Bracket

(b) Inspection tools

Tool name	Tool requirements
Micro-ohmmeter	The accuracy shall not be lower than grade 0. 5, and the measuring range shall be ⩾ 100 mΩ
Insulating gloves	Withstand voltage not less than DC 500 V
Torque detection device	—

(c) Operation steps

Caution:

Confirm that the micro-ohmmeter has been verified before check. Confirm that the insulating gloves have been verified and are dry and free of air leakage. Confirm that the battery negative harness and low voltage service switch are disconnected. Each powertrain high-voltage harness should be disconnected before measurement.

(1) Use torque detection device to check the tightening torque of high voltage components.

(2) Adjust the micro-ohmmeter to the milliohm position, apply the Kelvin probe and wear the insulating gloves to measure the resistance between the housing of high voltage component with equipotential bonding and the electrical platform. If the resistance value is greater than 40 mΩ, it does not meet the requirements, and the component shall be returned to the maintenance area for professional treatment.

7. Vehicle insulation resistance check

(a) Operation steps

Caution:

The vehicle has completed the insulation check during the final assembly, and all meet the requirements.

(1) Vehicle has the high voltage turned on and is in "ready" state.

(2) Depress the accelerator pedal to keep the vehicle in a driving state.

(3) After driving at a vehicle speed of more than 5 km/h for 20 s, observe whether the instrument cluster has insulation alarm information.

(4) If there is any high-voltage insulation failure alarm information, the component shall be returned to the maintenance area for handling by professional personnel.

8. DC system insulation resistance check (except traction battery)

(a) Inspection tools

Tool name	Tool requirements
Insulation meter	The measuring range shall not be less than 100 M Ω, the accuracy shall not be less than 5.0, and the test voltage gear shall be 500 V.
Insulating gloves	Withstand voltage not less than DC 500 V

(b) Operation steps

Caution:

Confirm that the insulation meter has been verified; Check whether the probe of the insulation meter and the test lead are in good condition; Check that the actual test voltage output from the insulation meter in 500 V test voltage gear is not lower than DC 495 V. Check that the insulating gloves have been verified; Check that the insulating gloves are dry and free of air leakage. Confirm that the battery negative harness and low voltage service switch are disconnected. The high-voltage harness of each high-voltage assembly is connected before measurement.

(1) Wear insulating gloves.

(2) Set the insulation meter test voltage to DC 500 V.

(3) Measure the insulation resistance between the positive and negative poles of the vehicle DC bus, motor, A/C and DCDC battery terminals and the electric platform respectively, and record them.

(4) Remove the high-voltage connector at the DC bus battery terminal and test by contacting the red probe of the insulation meter with the positive terminal of the connector; Then contact the red probe of insulation meter with the connector negative terminal and the insulation meter negative with the body ground for the test. Be careful not to contact the probe with the internal shielding structure of the connector during the measurement. After the test is completed, insert the connector properly to ensure that the locking mechanism is locked.

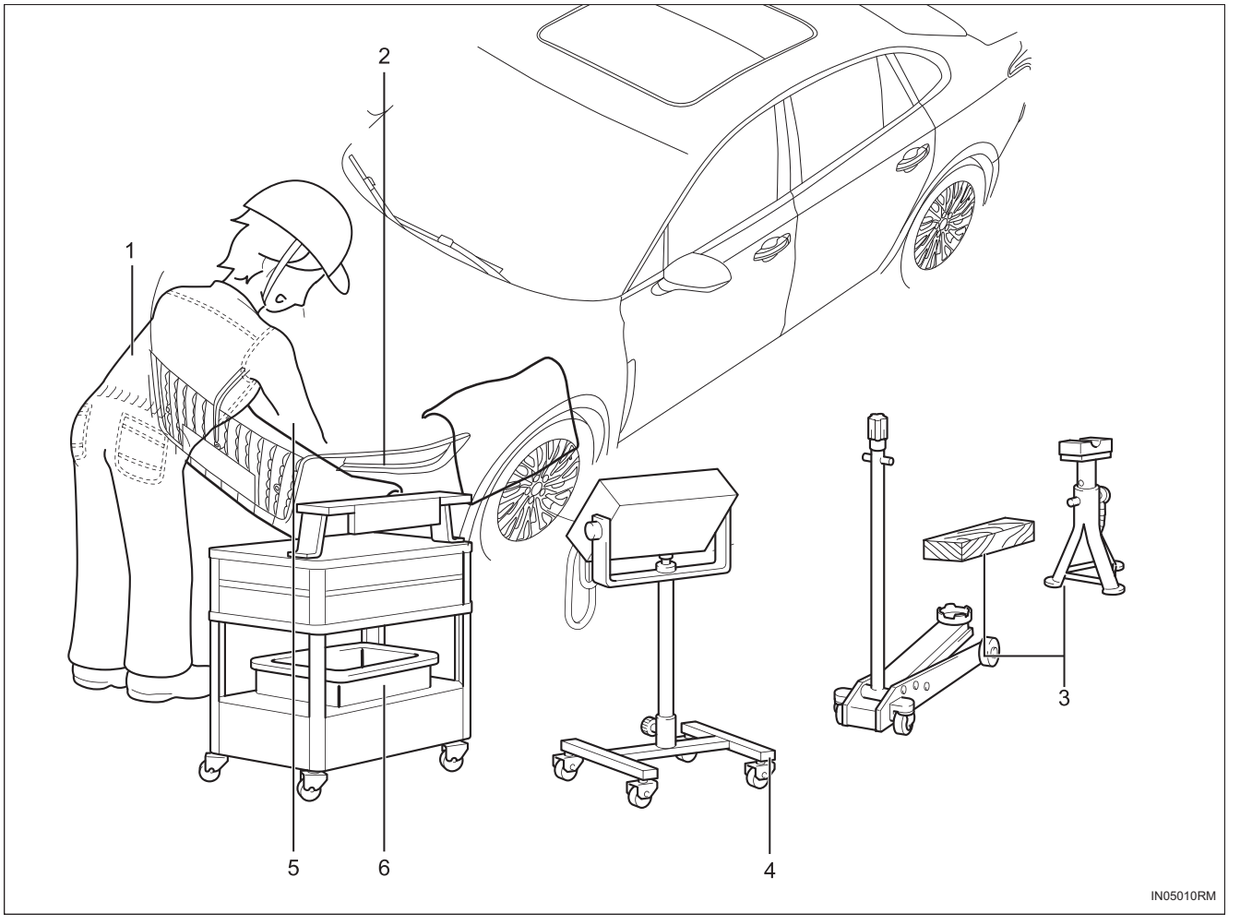
(5) Remove the high-voltage connector at the DC bus DCDC terminal, and test by contacting the red probe of the insulation meter with the positive terminal of the connector and contacting the negative terminal of the insulation meter with the body ground; Then contact the red probe of insulation meter with the connector negative terminal and the insulation meter negative with the body ground for the test. Be careful not to contact the probe with the internal shielding structure of the connector during the measurement.

IN

(6) If the insulation resistance is less than 500 MΩ, it does not meet the requirements (the detection value is generally greater than 2.5 MΩ, and the detection value of the electric drive system is generally greater than 1 MΩ), and it shall be returned to the maintenance area for treatment.

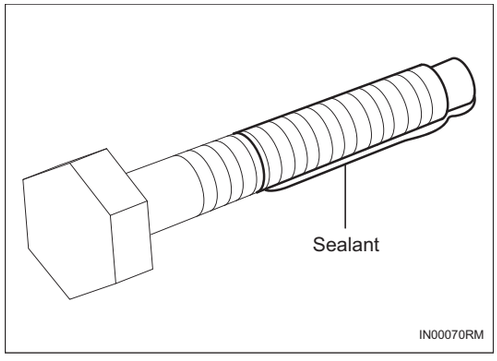
9. Basic matters

(a) Operating Instructions.



1	Wear	• Always wear clean overalls. • Be sure to wear safety helmet and safety shoes.
2	Protection of vehicle	• Place the radiator cover, fender cover, seat cover and floor mat properly before operation.
3	Safe operation	• Secure the vehicle with the wheel stop block. • When two or more people perform operations, they should ensure the safety of each other. • During operation, personal injury caused by high temperature, rotation, swing and vibration should be prevented. • After jacking up, the bracket should be placed in the prescribed position to support the vehicle. • Support with safety device after lifting the vehicle.
4	Preparation of tools and measuring instruments	• Before operation, the tool table, SST, measuring instrument, grease, cotton yarn and replacement parts shall be prepared.

5	Removal, disassembly and assembly operations	• Be sure to carry out effective work after fully confirming the fault symptoms. • When the structure is complex, write a note or make a assembly mark without affecting the function. • Clean removed parts as required and reassemble after check.
6	Removal of the parts	• Do not mess up or dirty the removed parts and place them in order. • For non-reusable parts such as heat insulation pad, O-ring and self-locking nut, please replace them with new ones as instructed. • The replacement parts shall be arranged into boxes and provided to the customer.



(b) Pre-coated part.

(1) Pre-coated parts refer to parts that have been coated with sealant before leaving the factory, such as bolts, nuts, etc.

(2) If the pre-coated part is re-tightened, loosened or removed in any way, it must be re-applied with the specified sealant.

Hint:

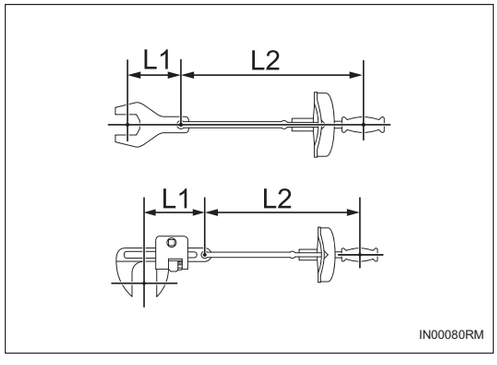
Do torque check with the lower limit of the standard torque range.

(3) When reusing the pre-coated part, remove the old sealant and dry the parts with compressed air. Then apply an appropriate amount of new sealant to the part.

(4) The applied sealant must be conditioned for specified time for installation.

(c) Heat insulation pad.

(1) If necessary, apply the sealant to the heat insulation pad to prevent leakage.



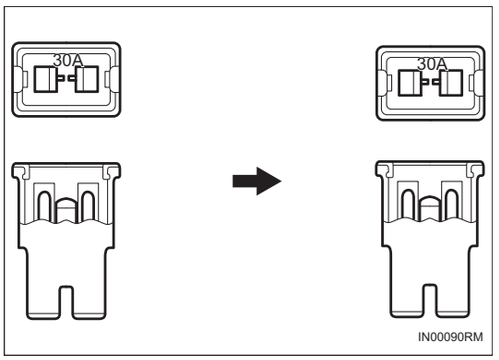
(d) Bolt, nut and screw. All technical specifications for tightening torque must be strictly observed and torque wrench must be used.

(e) Torque when the torque wrench is used in conjunction with the extension tool.

(1) If the extension tool is used in conjunction with the torque wrench and a torque specified in this manual is tightened with a torque wrench, the actual torque will be too large and the parts will be damaged.

(2) Formula: T'=L2/(L1+L2)×T

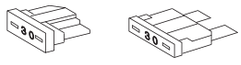
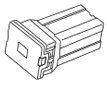
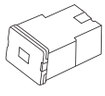
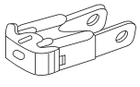
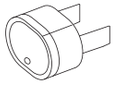
T'	Reading of the torque wrench (N·m)
T	Torque (N · m)
L1	Length of extension tool (cm)
L2	Length of torque wrench (cm)



(f) Replace the fuse.

(1) When checking the fuse, check and confirm that the fuse wire is not damaged.

(2) When replacing the fuse, ensure that the rated amperage of the new fuse is correct. Do not use fuse greater than or less than the rated amperage.

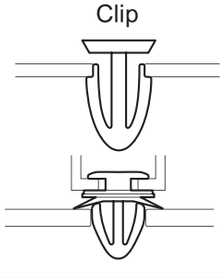
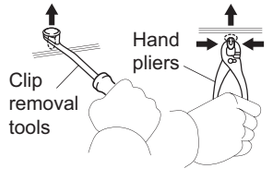
Illustration	Symbol	Part name	Abbreviation
		Fuse	FUSE
		Medium current fuse	M-FUSE
		High current fuse	H-FUSE
		Fuses	FL
		Circuit protector	CB

(g) Clip

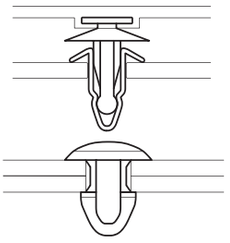
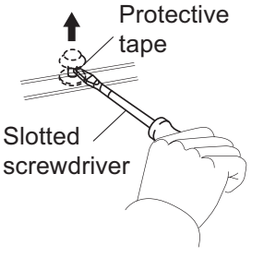
(1) The figure indicates the disassembly and assembly of clip for some parts of the body.

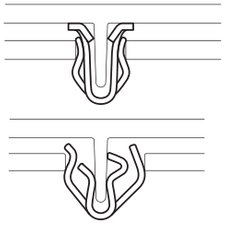
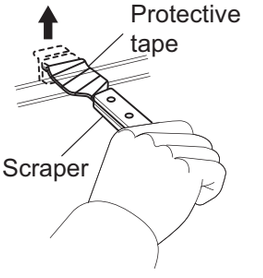
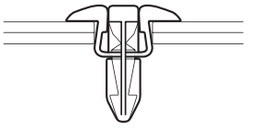
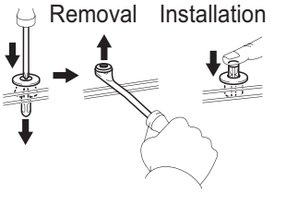
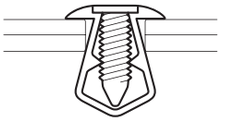
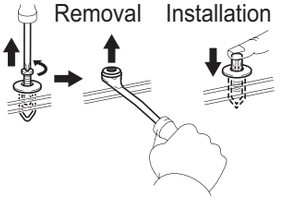
Hint:

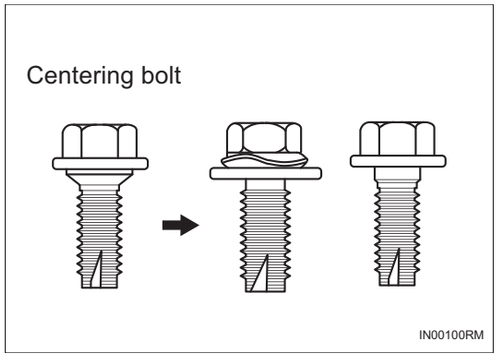
If the clip is damaged during operation, replace it with a new one.

Shape (example)	Removal and installation
	

IN

Shape (example)	Removal and installation
Clip 	

Shape (example)	Removal and installation
Claw 	
Clip 	
Clip 	



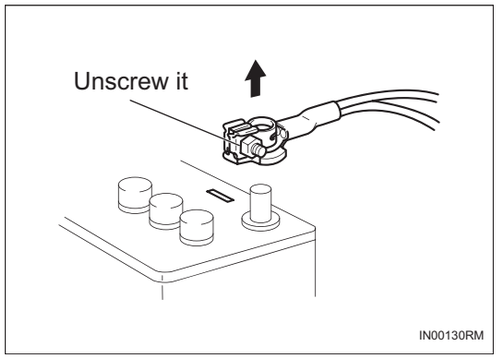
(h) Precautions for gap adjustment.

(1) When the centering bolt is used at the engine hood, door, trunk lid and other hinges and replaced with a spare bolt, the gap shall be adjusted.

(i) Support and raise and lower the vehicle with jack.

(1) The precautions must be observed when supporting and lifting and lowering vehicle with jack.

10. Electrical system



(a) Disassembly of battery terminals.

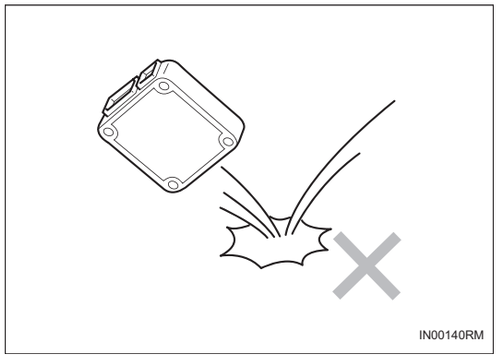
(1) During electrical system operation, the battery terminal shall be removed in advance to prevent burning caused by short circuit.

(2) When disassembling and assembling the battery terminal, turn off the ignition switch and light switch, completely release the terminal nut, and do not pry.

(3) If the battery terminal is removed, the stored information such as clock, radio and diagnosis will be cleared, so the contents should be confirmed in advance.

(b) Calibration during disassembling battery terminal.

System name	Job name
Power window system	Calibration



(c) Disposal of electronic parts.

(1) Do not disassemble the ECU. (If the terminal of the integrated circuit is touched, the integrated circuit may be damaged due to static electricity.)

(2) Do not subject electronic parts such as ECUs, sensors, and relays to impact. If it falls, renew it.

(3) The electronic parts shall avoid the influence of high temperature and high humidity environment.

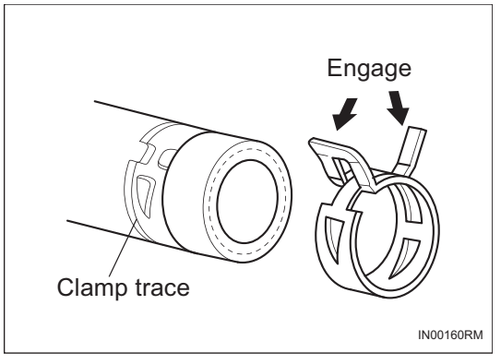
IN

(4) When cleaning the engine compartment with steam, be careful not to let the water directly stick to the electronic parts, air cleaner and other related parts.

(5) Do not touch the terminal of the connector to prevent deformation and static electricity, causing adverse conditions.

(6) Never use impact wrench to remove and install temperature sensor.

11. Handling of hose clamp



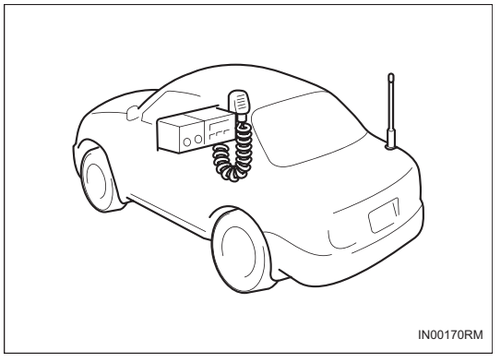
(a) Before removing the hose, confirm the insertion depth and clamp position of the hose so that it can be reset.

(b) If the clamp is deformed or weakened in elasticity, replace it with a new one.

(c) When reusing the hose, install the clamp according to the clamp marks of the hose.

(d) After installing the clamp, close the clamp in the direction shown by the arrow in the figure.

12. Installation of mobile communication equipment

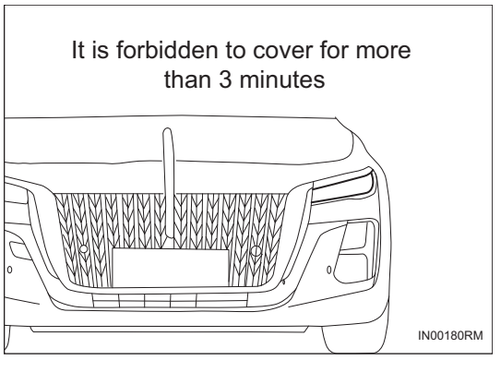


(a) Be sure to install it away from vehicle electronics such as ECUs, sensors, etc.

(b) Relevant accessories shall be installed correctly in accordance with each installation instruction.

(c) Do not install high-power mobile communication equipment.

13. Inspection and maintenance of headlamp



(a) Do not touch the high voltage socket when the headlamp lights up.

(b) When the headlamp is on, do not cover the headlamp for more than 3 minutes.

Hint:

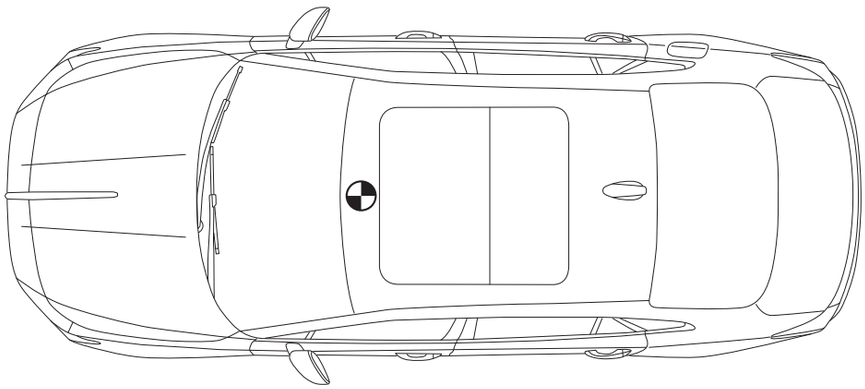
- Headlamp operation precautions shall be strictly observed during inspection and maintenance.
- The external lens of the headlamp is made of resin, so long-term operation will deform it due to overheating.

Jack, bracket and support position

1. Precautions for the vehicle state during vehicle lifting

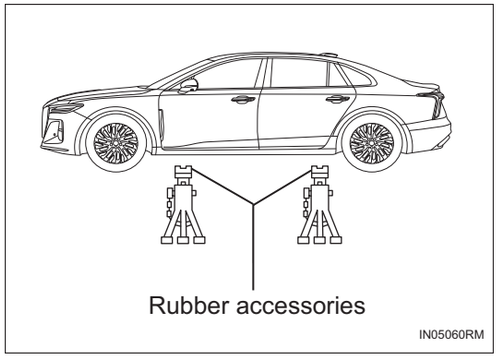
(a) Based on the principle that the vehicle is close to no-load state, do not jack and lift the vehicle when it is loaded with heavy objects.

(b) If heavy parts such as engine and transmission are removed, the center of gravity of the vehicle will move. Therefore, it is necessary to balance the load and not to tilt it.



⊕ ····· Position of center of gravity of vehicle (under no load)

IN05050RM



IN05060RM

2. Precautions for using jack and bracket

(a) Be sure to use stop block when working on flat ground.

(b) Use bracket with rubber accessories.

(c) Support the jack and bracket in the correct positions.

(d) When jacking up the front wheels, release the parking brake and place stop blocks only on the rear side of the rear wheels. When jacking up the rear wheels, place the stop blocks only in front of the front wheels.

(e) When only jacking up the front or rear wheels, place stop blocks on the front and rear sides of the ground wheel.

Hint:

Do not work or park when only the jack supports the vehicle. Be sure to use the bracket support.

(f) When the jack is lowered from the state that only the front wheels are jacked up, the parking brake shall be released, and stop blocks shall be placed on the front and rear sides of the rear wheels. When only jacking up the rear wheels and lowering the jack, the stop block shall be placed on the front and rear sides of the front wheels.

Hint:

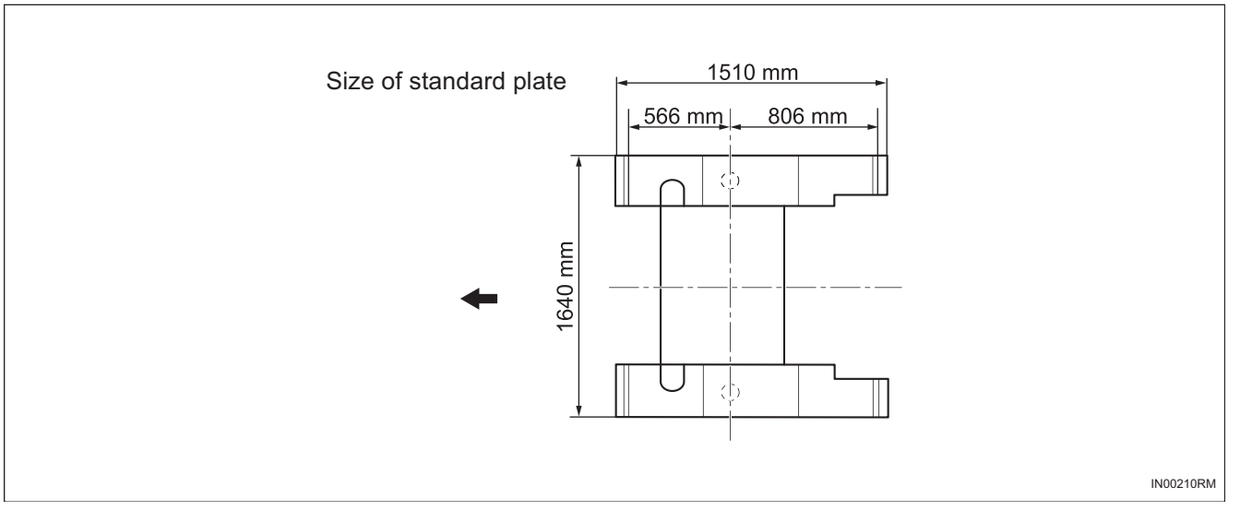
Do not use wheeled jack at oil sump.

3. Precautions for using plate lift

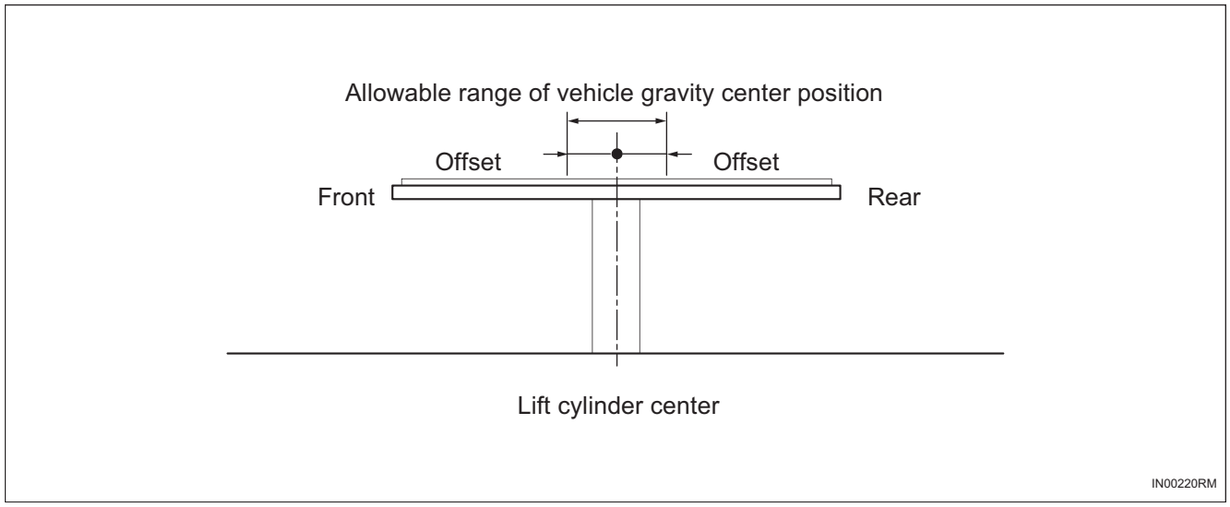
(a) Follow the operating instructions of the lift for safe operation.

Hint:

If the standard plate size is not used or the lift support is improperly positioned and greatly deviated from the center of gravity of the vehicle, the stability of the vehicle will be significantly reduced and the body may be damaged.



(b) When lifting the vehicle with a platform lift, it shall be confirmed that the center of gravity of the vehicle is within the allowable range of the vehicle center of gravity of the lift.

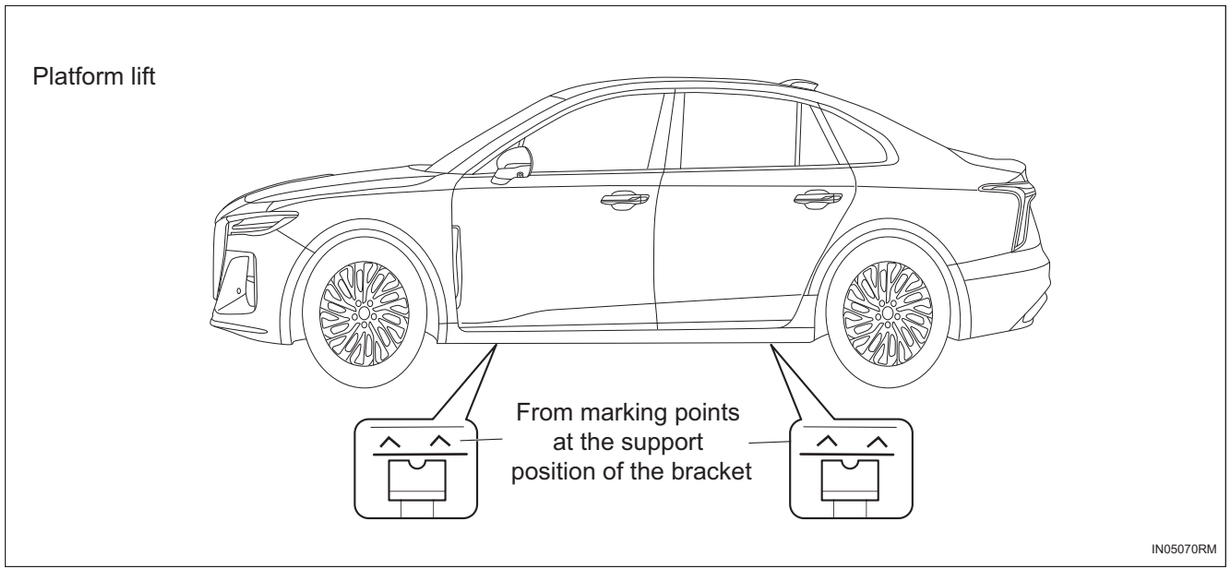


Hint:

- If the center of gravity of the vehicle deviates from the allowable range of the vehicle center of gravity position of the lift, the vehicle will sway during lifting and lowering.
- If you do not know the allowable range of the centre of gravity position of the vehicle, please consult the respective lift manufacturer.

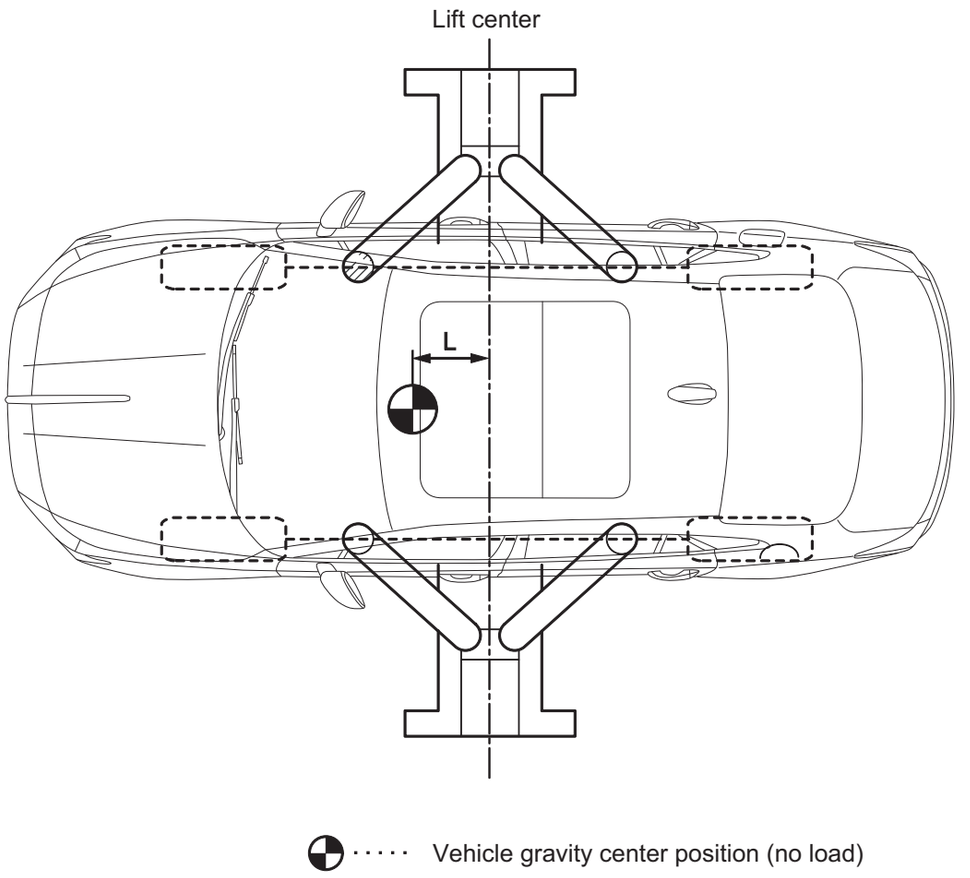
(c) The vehicle must be in the designated location.

(d) Lift the vehicle and shake it to confirm that it is stable.



4. Precautions for using rocker arm lift

Rocker arm lift



(a) Follow the operating instructions of the lift for safe operation.

(b) Use bracket with rubber accessories.

(c) The vehicle should be parked such that the center of the lift is close to the center of gravity of vehicle.

(d) When the vehicle is horizontal, adjust the height of the support part to ensure no collision with the sill molding.

(e) The rocker arm must be locked during operation.

(f) Lift the tire and shake the vehicle slightly to confirm whether the vehicle is stable.

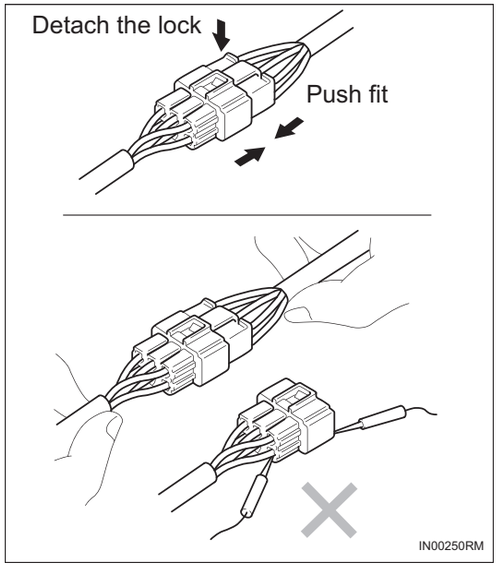
5. Precautions for using 4-post lift and wheel lift

(a) Follow the operating instructions of the lift for safe operation.

(b) Do not damage the tires and wheels with the free wheel skeleton.

(c) Fix the vehicle with a stop block.

Circuit check methods and procedures



1. Basic inspection

(a) Resistance measurement conditions for electronic parts.

(1) Unless otherwise specified, all resistance measurements shall be made at an outside temperature of 20°C. If it is measured immediately after vehicle driving (high temperature), the resistance will exceed the specified value, so it should be measured after the engine has cooled down.

(b) Operation of the connector.

(1) When disconnecting the connector with lock, push the connector fitting part to easily move the claw of the lock and then detach the lock.

(2) When disconnecting the connector, do not pull the harness, and directly hold the connector to disconnect it.

(3) Before connecting the connector, check the connector terminal for deformation, damage and falling off.

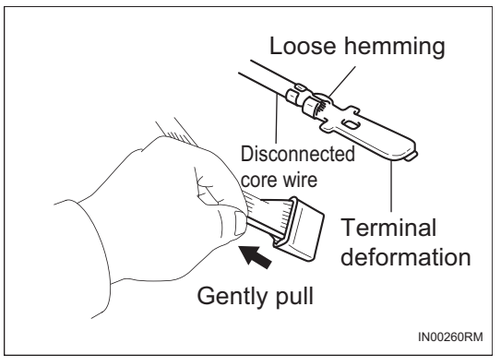
(4) When connecting the connector with lock, insert it firmly until the locking sound is heard.

(5) When checking the connector with digital multimeter, use a micro probe to check from the back (harness side).

Notice:

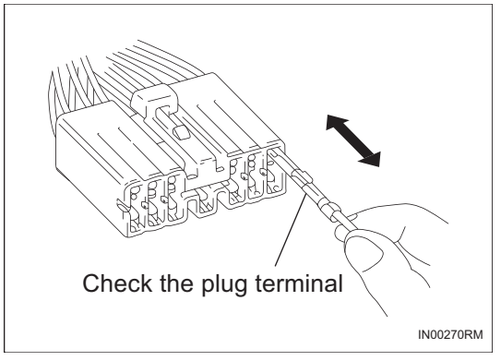
- Do not check the waterproof connector from the back, so check it by connecting auxiliary wires.
- Do not move the inserted probe at will to prevent damage to the terminal.

(c) Connector check methods.

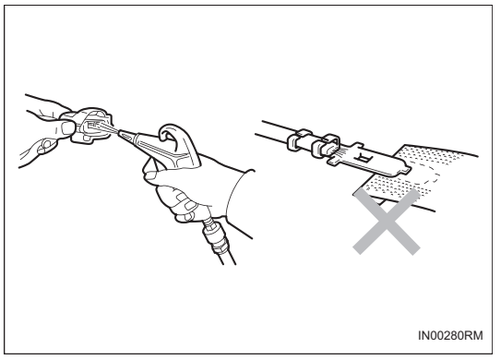


(1) When connecting the connector, hold the connector housing to check whether it is fully inserted and locked. (Fitted state)

(2) When the connector is disconnected, gently pull the harness for checking (terminal falling off, terminal loose hemming, disconnected core wire). Visually check it for rust, metal chips, water or foreign matter and check the terminals for bending, corrosion or deformation.



(3) Prepare a terminal identical to the plug terminal, insert it into the socket terminal, and check the fitting and sliding fit to confirm that the terminal contact pressure is appropriate.



(d) Repair methods for connector terminal.

(1) If there is dirt on the contact point, use the blower gun, rags, etc. to clear it. At this time, do not polish with sandpaper, etc. to prevent damage to the plating layer on the contact point surface.

(2) Replace the socket terminal when the contact pressure is abnormal. If the plug terminal is gold-plated (in gold color), use gold-plated socket terminal; If tinned (in silver color), use tinned socket terminal.

(3) When there is no abnormality in the contact point, clean the contact point with a blower gun and apply connector grease (this method can prevent the contact point from oxidation and wear).

(e) Connector grease.



(1) Apply grease (white) that can prevent terminal from corrosion on the connectors that are easy to get wet, such as connectors of AC alternator and headlamps.

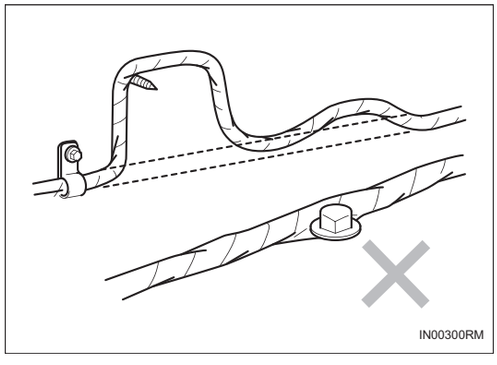
(2) When the grease on the connector is insufficient or the terminal is being repaired, connector grease should be applied to the socket terminal by hand.

Hint:

- Do not get dust.
- Do not apply with tools such as screwdriver.

(3) If grease is applied to the rubber parts (except the O-ring and rubber plug of waterproof connector), it will make them aged and discolored. If this occurs, it should be wiped off immediately.

(f) Operation of the harness.



(1) When removing the harness, check the wiring and clamping conditions before working so that it can be restored to its original state.

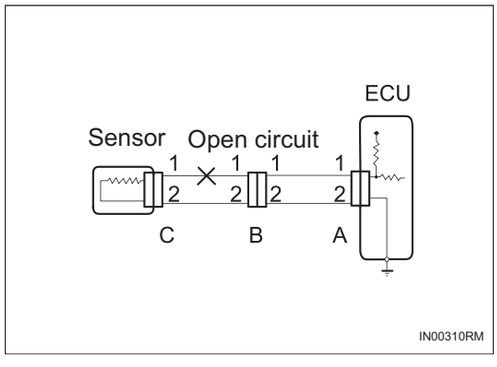
(2) If not necessary, do not twist or stretch the harness.

(3) Do not rotate, slide and vibrate the harness, and keep it away from high-temperature parts and parts with sharp corners (plate ends, screw tips, etc.).

(4) Do not squeeze the harness when installing parts.

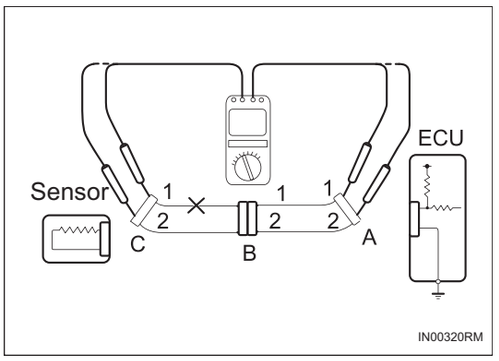
(5) Do not damage the harness cladding. If it is damaged, replace it with a new one or wrap it with vinyl tape.

2. Check open circuit



(a) As shown in the figure, when harness is open, carry out continuity or voltage inspection to locate the open circuit.

(b) Check continuity.



(1) Disconnect the connectors A and C and measure the resistance between them.

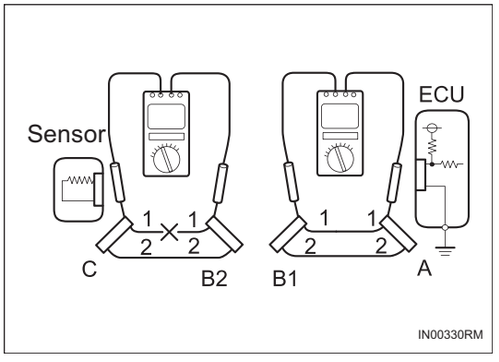
Standard value: below 1 Ω

Hint:

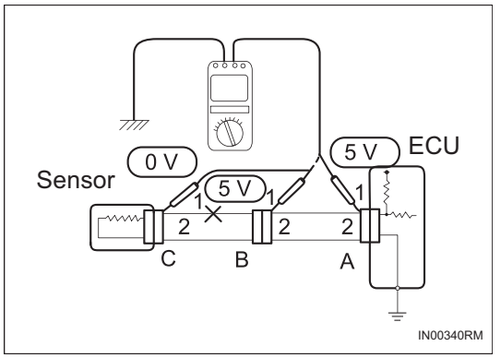
Gently shake the harness up and down, left and right and measure the resistance.

(2) As shown in the figure, there is no continuity (open circuit) between terminal 1 of connector A and terminal 1 of connector C, and there is continuity between terminal 2 of connector A and terminal 2 of connector C. At this time, there is open circuit between terminal 1 of connector A and terminal 1 of connector C.

(3) Disconnect the connector B and measure the resistance between connectors.



(4) As shown in the figure, there is continuity between terminal 1 of connector A and terminal 1 of connector B1, and there is no continuity (open circuit) between terminal 1 of connector B2 and terminal 1 of connector C. At this time, there is open circuit between terminal 1 of connector B2 and terminal 1 of connector C.



(c) Check voltage.

(1) In the circuit with voltage applied to the ECU connector terminal, the open circuit can be determined by voltage check.

(2) As shown in the figure, each connector is connected, and the ECU 5 V output terminal is used to measure the voltage between the body ground and the terminal 1 of connector A, and then the voltage between the terminal 1 of connector B and the terminal 1 of connector C.

(3) The harness between terminal 1 of connector B and terminal 1 of connector C is open-circuited when the following conditions are met.

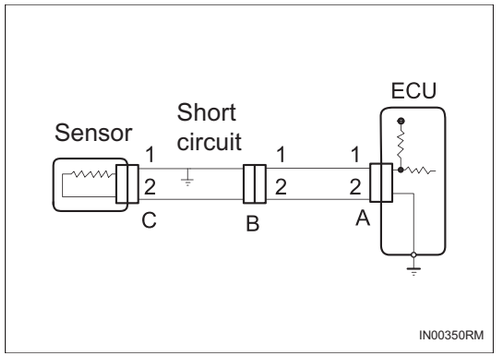
Standard value:

5V voltage between terminal 1 of connector A and body ground

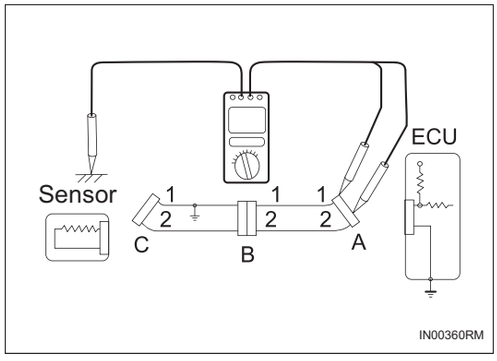
5V voltage between terminal 1 of connector B and body ground

0V voltage between terminal 1 of connector C and body ground

3. Check for short circuit



(a) As shown in the figure, when the harness ground is short circuited, carry out the ground continuity inspection to locate the short circuit.



(b) Continuity check of the ground.

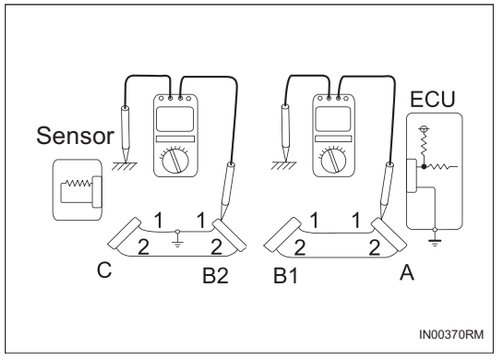
(1) Disconnect the connectors A and C, and measure the resistance between terminals 1 and 2 of connector A and body ground.

Standard value: above 10 kΩ

Hint:

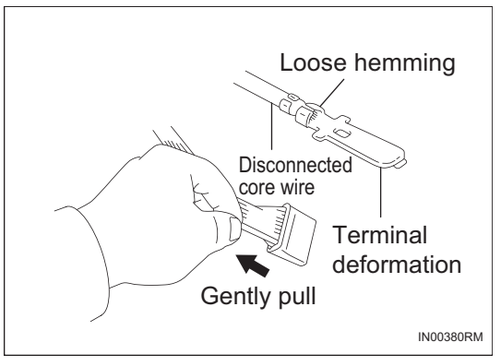
Gently shake the harness up and down, left and right and measure the resistance.

(2) As shown in the figure, there is the continuity (short circuit) between terminal 1 of connector A and body ground, and there is no continuity between terminal 2 of connector A and body ground. At this time, there is short circuit between the terminal 1 of connector A and the terminal 1 of connector C.



(3) Disconnect connector B, and measure the resistance between terminal 1 of connector A and body ground, and between terminal 1 of connector B2 and body ground. If there is no continuity between the terminal 1 of connector A and the body ground, and there is continuity between the terminal 1 of B2 and the body ground (short circuit), it indicates that the circuit between the terminal 1 of connector B2 and the terminal 1 of connector C is shorted.

4. Visual inspection and contact pressure check



(a) Disconnect the connectors at both ends.

(b) Check whether there is rust and foreign matter on the connector terminal.

(c) Confirm whether the crimped part is loose or damaged, and check whether the terminal is firmly fixed in the locking position.

(d) Prepare a plug terminal, insert it into the socket terminal and then pull it out.

Hint:

If the test terminal can be pulled out easily compared with other terminals, the contact is poor.

5. Check and replace ECU

Hint:

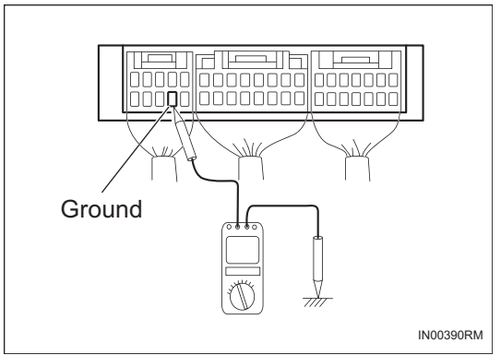
- With the connector and ECU connected, check from the back of the harness connector.
- If no measuring condition is specified, carry out inspection when the engine is stopped and the ignition switch is turned off.

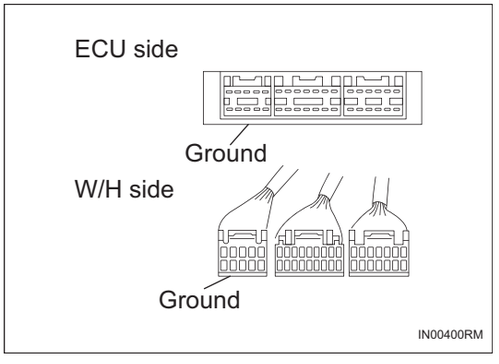
(a) First check the ECU ground circuit, and repair it if there is a fault. If it is normal, the ECU may be faulty. Replace it with a normal ECU, and then check whether the fault symptoms are eliminated.

(1) Measure the resistance between the ground terminal of the ECU and the body ground.

Standard value: below 1 Ω

(2) Disconnect the ECU connector, confirm that the ground terminals of the ECU and the harness are not bent, and check the contact pressure.





Terminology in this manual

Abbreviations

Abbreviations	Meaning
AB	Airbag
ACU	ACU
ACM	ACM
ADB-L	Left IHC
ADB-R	Right IHC
AMP	Power amplifier
Atmosphere Lamp /ALCU	Ambient lamp control unit
ALU	Ambient lamp unit
ATC	ATC
ABS/ESC/ESP	Electronic brake control system
IBC	IBC
AFS	AFS
ASR	Anti-slip regulation
AVM	Panoramic vision
ADV	ADV
AT	AT
B+	Battery +
BCM	Body control module
CAN	Controller area network
CAN-H	High data line
CAN-L	Low data line
Comfort	Comfort
CO	Carbon monoxide
CS	Combination switch
DCP	Sound command switch
DDCU	Driver door control unit
DDCU Switch	Driver door switch
Diagnosis	Diagnosis
DMS	DMS
DP	FCP
DSCU	DSCU
DVR	Driving data recorder
DTC	DTC
EnHost	EnHost
EBS	EBS
ECV	Electronic cooling valve

Abbreviations	Meaning
ECU	Electronic control unit
EGSM	EGSM
EMS	EMS
EPB	EPB
ESCL	Electronic steering column lock
FAC	Front A/C
FUSE	Fuse
GND	Ground
GW/CGW/Gateway	Gateway control module
HeadLamp	Front light control unit
RearLamp	Rear light control unit
HU DISP	EnHost display
HI	High
HQ-VDS	HQ-VDS
IC DISP	Instrument cluster
IG	Ignition signal
IHC	IHC
IGN	Ignition
ISI	Idle speed increase
IFC	IFC
IGR	Intelligent alternator
Information	Informationa
IVI	IVI
LIN	Local Interconnection Network
LFS	Driver seat
LED	Light emitting diode
LF	Left front
LR	Left rear
MFS	Multifunction steering wheel
MAX	Max.
MIL	Malfunction indicator lamp
MIN	Minimum
OBD	On-board diagnostics
OFF	Turning off
ON	Turning on
PA	Parking assist
PDCU	Right door control unit
PSCU	PSCU
PDCU Switch	Front passenger side door switch

Abbreviations	Meaning
PLG	Trunk control system
PEPS	PEPS
PDC	PDC
RAC	Rear A/C
RDCU	Power liftgate
RCP	Rear control panel
RI	Reversing image
RRDCU	RRDCU
RLDCU	RLDCU
RL DISP	Left rear LCD
RFR	RF transceiver
RMAR	Rear center armrest control unit
RSCU	Rear seat control unit
RLS	RLS
RF	Right front
RR	Right rear
RR DISP	Right rear LCD
SAS	Steering angle sensor
SCCU	SCCU
SCCP	SCCU panel
SMA	Sunroof motor assembly
SOC	Battery state of charge
SCM	Electric steering column
SKA	Gearshift lever
EPS	Electric power steering
SST	Special maintenance tools
FDM	Full display mirror
T-Box	Vehicle-mounted remote communication terminal
TCM	TCU
TPMS	TPMS
USB	Universal serial bus
VIN	Vehicle identification number
YAW	Yaw angle sensor
YRS	Yaw angle sensor
WCM	Wireless charging module
WMM	Electronic wiper control unit
4WD/TOD	Four-wheel drive control unit
Digital-TV-box	Digital TV Box
FCP	FCP assembly

Abbreviations	Meaning
Fragrance diffuser	Fragrance diffuser control unit
Gear Indicator	Gear indicator lamp
Generator	Generator
BMS	Battery management system
Compressor	Electric compressor
DCT	Dual-clutch transmission
DCDC	DC converter
ETC	ETC OBU
Lamp	Exterior lamp control unit
HUD	HUD
LCDA	LCDA
LLGP	Left lower guard plate switch panel
MCP	MCP assembly
MCU	Motor control unit
PDC	PDC
HCU	VCU

EMS (2.0 T and 1.8 T)

ECM ES-1
Precautions ES-1
Location of parts ES-3
System diagram ES-9
System description ES-13
Symptom chart ES-19
ECU terminal ES-21
DTC chart ES-24
P000A00 ..... ES-41
P003C00 ..... ES-41
P001000 ..... ES-41
P001676 ..... ES-41
P001678 ..... ES-41
P208800 ..... ES-41
P208900 ..... ES-41
P001100 ..... ES-41
P000B00 ..... ES-48
P005A00 ..... ES-48
P001300 ..... ES-48
P001776 ..... ES-48
P001778 ..... ES-48
P209000 ..... ES-48
P209100 ..... ES-48
P001400 ..... ES-48
P003000 ..... ES-55
P003100 ..... ES-55
P003200 ..... ES-55
P003600 ..... ES-60
P003700 ..... ES-60
P003800 ..... ES-60
P003A22 ..... ES-65
P003A21 ..... ES-65
P003A72 ..... ES-65
P003A73 ..... ES-65
P024477 ..... ES-65
P024437 ..... ES-65
P256400 ..... ES-65
P256500 ..... ES-65
P170300 ..... ES-65

P024300 ..... ES-65
P024600 ..... ES-65
P005300 ..... ES-72
P005400 ..... ES-74
P008700 ..... ES-77
P008800 ..... ES-77
P008985 ..... ES-82
P008984 ..... ES-82
P009000 ..... ES-88
P025100 ..... ES-88
P025400 ..... ES-88
P025900 ..... ES-88
P00C600 ..... ES-93
P01062A ES-99
P010622 ..... ES-99
P010621 ..... ES-99
P120000 ..... ES-99
P120100 ..... ES-99
P00C721 ..... ES-99
P00C722 ..... ES-99
P010700 ..... ES-99
P010800 ..... ES-99
P011126 ..... ES-99
P011200 ..... ES-99
P011300 ..... ES-99
P011400 ..... ES-99
P00CE24 ..... ES-99
P00CE23 ..... ES-99
P012300 ..... ES-105
P012200 ..... ES-105
P012100 ..... ES-105
P022300 ..... ES-105
P022200 ..... ES-105
P022100 ..... ES-105
P012800 ..... ES-111
P013300 ..... ES-116
P013A00 ..... ES-116
P219500 ..... ES-116
P219600 ..... ES-116
P209700 ..... ES-116
P209600 ..... ES-116
P013800 ..... ES-119
P013700 ..... ES-119

P013600 ..... ES-119
P017F00 ..... ES-125
P128000 ..... ES-125
P128100 ..... ES-125
P043E00 ..... ES-125
P043F00 ..... ES-125
P24C100 ..... ES-125
P240700 ..... ES-125
P044200 ..... ES-125
P019800 ..... ES-132
P019700 ..... ES-132
P019664 ..... ES-132
P019629 ..... ES-132
P121800 ..... ES-132
P052300 ..... ES-132
P052200 ..... ES-132
P021900 ..... ES-137
P023400 ..... ES-139
P029900 ..... ES-139
P023700 ..... ES-147
P023800 ..... ES-147
P138024 ..... ES-147
P138023 ..... ES-147
P009800 ..... ES-147
P009700 ..... ES-147
P009900 ..... ES-147
P009626 ..... ES-147
P020100 ..... ES-153
P026200 ..... ES-153
P02EE00 ..... ES-153
P02CD00 ..... ES-153
P02CC00 ..... ES-153
P126100 ..... ES-153
P020200 ..... ES-159
P026500 ..... ES-159
P02EF00 ..... ES-159
P02CF00 ..... ES-159
P02CE00 ..... ES-159
P126200 ..... ES-159
P020300 ..... ES-165
P026800 ..... ES-165
P02F000 ..... ES-165
P02D100 ..... ES-165

P02D000 ..... ES-165
P126300 ..... ES-165
P020400 ..... ES-171
P027100 ..... ES-171
P02F100 ..... ES-171
P02D300 ..... ES-171
P02D200 ..... ES-171
P126400 ..... ES-171
P030000 ..... ES-177
P030100 ..... ES-177
P030200 ..... ES-177
P030300 ..... ES-177
P030400 ..... ES-177
P036300 ..... ES-177
P032700 ..... ES-183
P032714 ..... ES-183
P032800 ..... ES-183
P032815 ..... ES-183
P032500 ..... ES-183
P151000 ..... ES-183
P032600 ..... ES-183
P033900 ..... ES-189
P261700 ..... ES-189
P033664 ..... ES-189
P034A00 ..... ES-189
P034B00 ..... ES-189
P034100 ..... ES-195
P034200 ..... ES-195
P034300 ..... ES-195
P035100 ..... ES-200
P230000 ..... ES-200
P230100 ..... ES-200
P035200 ..... ES-205
P230300 ..... ES-205
P230400 ..... ES-205
P035300 ..... ES-210
P230600 ..... ES-210
P230700 ..... ES-210
P035400 ..... ES-215
P230900 ..... ES-215
P231000 ..... ES-215
P036600 ..... ES-220
P036800 ..... ES-220

P036700 ..... ES-220
P042000 ..... ES-225
P044400 ..... ES-227
P045800 ..... ES-227
P045900 ..... ES-227
P049700 ..... ES-227
P046000 ..... ES-232
P25B000 ..... ES-232
P128400 ..... ES-232
P046129 ..... ES-232
P046300 ..... ES-232
P046200 ..... ES-232
U067681 ..... ES-232
P046700 ..... ES-243
P046800 ..... ES-243
P128500 ..... ES-243
P128600 ..... ES-243
P048371 ..... ES-248
P048372 ..... ES-248
P048000 ..... ES-248
P069200 ..... ES-248
P069100 ..... ES-248
P063400 ..... ES-248
P04F000 ..... ES-253
P050B00 ..... ES-255
P050B20 ..... ES-255
P053F22 ..... ES-255
P053F21 ..... ES-255
P050A22 ..... ES-255
P050A21 ..... ES-255
P050D00 ..... ES-255
P05EC00 ..... ES-255
P050700 ..... ES-255
P050600 ..... ES-255
P050500 ..... ES-255
P050C24 ..... ES-261
P050C23 ..... ES-261
P011623 ..... ES-261
P011626 ..... ES-261
P011800 ..... ES-261
P011700 ..... ES-261
P011900 ..... ES-261
P051300 ..... ES-266

P063300 ..... ES-266
P163100 ..... ES-266
P161100 ..... ES-266
P055800 ..... ES-268
P055700 ..... ES-268
P145200 ..... ES-268
P056300 ..... ES-272
P056200 ..... ES-272
P057100 ..... ES-276
P050400 ..... ES-276
P061A00 ..... ES-281
P060D00 ..... ES-281
P152000 ..... ES-281
P152100 ..... ES-281
P152200 ..... ES-281
P153900 ..... ES-281
P153700 ..... ES-281
P153500 ..... ES-281
P153600 ..... ES-281
P062900 ..... ES-283
P062800 ..... ES-283
P062700 ..... ES-283
P062B9A ES-287
P062B64 ..... ES-287
P062B96 ..... ES-287
P063000 ..... ES-289
P064100 ..... ES-290
P065100 ..... ES-290
P069700 ..... ES-290
P064D00 ..... ES-291
P223700 ..... ES-291
P225100 ..... ES-291
P224300 ..... ES-291
P013200 ..... ES-291
P013100 ..... ES-291
P241400 ..... ES-291
P064D13 ..... ES-291
P262600 ..... ES-291
P223713 ..... ES-291
P013000 ..... ES-291
P068500 ..... ES-298
P068700 ..... ES-298
P068600 ..... ES-298

P06869E ES-298
P06B842 ..... ES-303
P06B843 ..... ES-303
P06DC00 ..... ES-304
P06DB00 ..... ES-304
P06DA00 ..... ES-304
P070000 ..... ES-309
P120400 ..... ES-310
P120500 ..... ES-310
P023622 ..... ES-310
P023621 ..... ES-310
P121200 ..... ES-316
P050000 ..... ES-316
P050165 ..... ES-316
P050166 ..... ES-316
P019000 ..... ES-322
P019128 ..... ES-322
P019129 ..... ES-322
P019200 ..... ES-322
P019300 ..... ES-322
P019400 ..... ES-322
P127000 ..... ES-322
P12C200 ..... ES-327
P12C300 ..... ES-327
P139D00 ..... ES-331
P139C00 ..... ES-331
P139B00 ..... ES-331
P139A00 ..... ES-331
P139E00 ..... ES-331
P26CD00 ..... ES-331
P170100 ..... ES-331
P170200 ..... ES-331
P26CA00 ..... ES-331
P138E00 ..... ES-331
P142000 ..... ES-337
P142100 ..... ES-337
P14AE00 ..... ES-338
P14AF00 ..... ES-338
P26F200 ..... ES-338
P26F100 ..... ES-338
P14AC00 ..... ES-338
P14AD00 ..... ES-338
P153800 ..... ES-344

P152700 ..... ES-344
P152800 ..... ES-344
P061C00 ..... ES-344
P152900 ..... ES-344
P153000 ..... ES-344
P153100 ..... ES-344
P157100 ..... ES-344
P157200 ..... ES-344
P157300 ..... ES-344
P157400 ..... ES-344
P261000 ..... ES-344
P157500 ..... ES-344
P155000 ..... ES-346
P155100 ..... ES-346
P155600 ..... ES-346
P155700 ..... ES-346
P155800 ..... ES-346
P155900 ..... ES-346
P155A00 ..... ES-346
P155B00 ..... ES-346
P155400 ..... ES-349
P155500 ..... ES-349
P156100 ..... ES-349
P156000 ..... ES-349
P15A000 ..... ES-355
P15A100 ..... ES-355
P15A200 ..... ES-355
P15A300 ..... ES-355
P15A400 ..... ES-355
P15A500 ..... ES-355
P15A600 ..... ES-355
P15A700 ..... ES-355
P15A800 ..... ES-355
P15A900 ..... ES-355
P15AA00 ..... ES-355
P15AB00 ..... ES-355
P15AC00 ..... ES-355
P15AD00 ..... ES-355
P15AE00 ..... ES-355
P15AF00 ..... ES-355
P15B000 ..... ES-355
P15B100 ..... ES-355
P15B200 ..... ES-355

P15B300 ..... ES-355
P15B400 ..... ES-355
P15B500 ..... ES-355
P15B600 ..... ES-355
P15B700 ..... ES-355
P15B800 ..... ES-355
P15B900 ..... ES-356
P15BA00 ..... ES-356
P15BB00 ..... ES-356
P15BC00 ..... ES-356
P15BD00 ..... ES-356
P15BE00 ..... ES-356
P15BF00 ..... ES-356
P15C000 ..... ES-356
P15C100 ..... ES-356
P15C200 ..... ES-356
P15C300 ..... ES-356
P15C400 ..... ES-356
P15C500 ..... ES-356
P15C600 ..... ES-356
P15C700 ..... ES-356
P15C800 ..... ES-356
P15C900 ..... ES-356
P15CA00 ..... ES-356
P15CB00 ..... ES-356
P15CC00 ..... ES-356
P15CD00 ..... ES-357
P15CE00 ..... ES-357
P15CF00 ..... ES-357
P15D000 ..... ES-357
P15D100 ..... ES-357
P15D200 ..... ES-357
P15D300 ..... ES-357
P15D400 ..... ES-357
P15D500 ..... ES-357
P15D600 ..... ES-357
P15D700 ..... ES-357
P15D800 ..... ES-357
P15D900 ..... ES-357
P15DA00 ..... ES-357
P15DB00 ..... ES-357
P15DC00 ..... ES-357
P15DD00 ..... ES-357

P15DE00 ..... ES-357
P15DF00 ..... ES-357
P15E000 ..... ES-357
P210300 ..... ES-364
P211800 ..... ES-364
P210600 ..... ES-364
P210000 ..... ES-364
P213800 ..... ES-369
P212300 ..... ES-369
P212800 ..... ES-369
P212200 ..... ES-369
P212700 ..... ES-369
P214800 ..... ES-375
P215100 ..... ES-380
P217700 ..... ES-385
P217800 ..... ES-385
P218700 ..... ES-385
P218800 ..... ES-385
P218500 ..... ES-395
P218400 ..... ES-395
P218324 ..... ES-395
P218323 ..... ES-395
P222900 ..... ES-400
P222800 ..... ES-400
P222729 ..... ES-400
P222722 ..... ES-400
P222721 ..... ES-400
P222785 ..... ES-400
P222784 ..... ES-400
P120200 ..... ES-400
P120300 ..... ES-400
P223200 ..... ES-402
P227000 ..... ES-408
P227100 ..... ES-408
P227900 ..... ES-411
P240C00 ..... ES-412
P240B00 ..... ES-412
P240A00 ..... ES-412
P24BF00 ..... ES-412
P24BE00 ..... ES-412
P24BD00 ..... ES-412
P240200 ..... ES-412
P240100 ..... ES-412

P240000 ..... ES-412
P25AB00 ..... ES-418
P25AA00 ..... ES-418
P25A900 ..... ES-418
P26E600 ..... ES-423
P26E500 ..... ES-423
P061500 ..... ES-423
P061700 ..... ES-423
P061600 ..... ES-423
P26E400 ..... ES-423
P063441 ..... ES-423
P063444 ..... ES-423
P150000 ..... ES-428
P150100 ..... ES-428
P150200 ..... ES-428
P150300 ..... ES-428
P138824 ..... ES-431
P138823 ..... ES-431
P007300 ..... ES-431
P007200 ..... ES-431
P007000 ..... ES-431
P003300 ..... ES-434
P003400 ..... ES-434
P003500 ..... ES-434
P226100 ..... ES-434
P12C400 ..... ES-439
P12C500 ..... ES-439
P261D00 ..... ES-443
P261C00 ..... ES-443
P261A00 ..... ES-443
U012100 ..... ES-447
U041500 ..... ES-447
U015100 ..... ES-447
U010F00 ..... ES-447
U007300 ..... ES-447
U025900 ..... ES-447
U01B000 ..... ES-447
U041600 ..... ES-447
U014600 ..... ES-447
U015500 ..... ES-447
U012600 ..... ES-447
U042800 ..... ES-447
U010100 ..... ES-447

U040200 ..... ES-447
ECM assembly ES-449
Parts ES-449
Removal ES-450
Installation ES-450
Camshaft position sensor ES-451
Parts ES-451
Removal ES-453
Installation ES-453
Upstream oxygen sensor assembly ES-454
Parts ES-454
Removal ES-455
Installation ES-455
Downstream oxygen sensor ES-456
Parts ES-456
Removal ES-457
Installation ES-457
Electric accelerator pedal ES-458
Parts ES-458
Removal ES-459
Installation ES-459
Electronic throttle body assembly ES-460
Parts ES-460
Removal ES-462
Installation ES-462
Solenoid valve assembly ES-463
Parts ES-463
Removal ES-464
Installation ES-464
MAP/IAT sensor assembly ES-465
Parts ES-465
Removal ES-466
Installation ES-466
Knock sensor ES-467
Parts ES-467
Removal ES-468
Installation ES-468
Crankshaft position sensor ES-469
Parts ES-469
Removal ES-470
Installation ES-470

ECM

Precautions

1. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

2. General repair instructions

(a) Only the use of digital multimeter to check EFI system is permitted.

(b) Genuine part shall be used during maintenance, otherwise the normal operation of the EFI system cannot be guaranteed.

(c) Only unleaded gasoline can be used during maintenance.

(d) Please follow the standard maintenance and diagnosis process for maintenance work.

(e) It is forbidden to disassemble and remove the parts of EFI system during maintenance.

(f) During maintenance, take and place electronic components (ECU, sensor, etc.) carefully to avoid injuries caused by impact and static electricity.

(g) Establish awareness of environmental protection and effectively dispose of wastes generated during maintenance.

3. Maintenance precautions

(a) Do not remove any part of the EFI system or its connector from its installation position at will, so as to avoid accidental damage or foreign matters such as water and oil entering the connector and affecting the normal operation of the EFI system.

(b) When disconnecting or connecting each part connector, be sure to set the ignition switch in off position. Otherwise the electrical components will be damaged.

(c) Never make the temperature of the ECU exceed 80°C during hot working conditions simulation of faults and other maintenance operations that may increase the temperature.

(d) The oil supply pressure of the EFI system is relatively high, so the fuel pipeline adopts high pressure resistant fuel pipe. High fuel pressure is maintained in the fuel circuit even if the engine is not running. Therefore, be careful not to remove the oil pipe easily during maintenance. If the fuel system needs to be repaired, depressurize the fuel system before removing the fuel pipe.

(e) When removing the electric fuel pump from the fuel tank, do not energize the pump to avoid electric sparks and fire.

(f) Do not run the fuel pump in dry state or in water for test; otherwise its service life will be shortened. In addition, do not reverse the positive and negative poles of the fuel pump.

(g) When checking the ignition system, the spark-over detection can only be carried out when necessary, and the time should be as short as possible. During the spark-over detection, the fuel injector connector should be disconnected to make the fuel injector not work, so as to avoid a large amount of unburned gasoline entering the exhaust manifold and damaging the TWC.

(h) Since the idle speed control is completed by the EFI system, no manual control is required. The corresponding self-learning has been performed by the electronic throttle body when the system is powered on for the first time, so the disassembling and commissioning of the electronic throttle body are not allowed.

(i) Correctly connect the positive and negative poles of the battery to avoid damage to the electronic component. This system adopts negative ground.

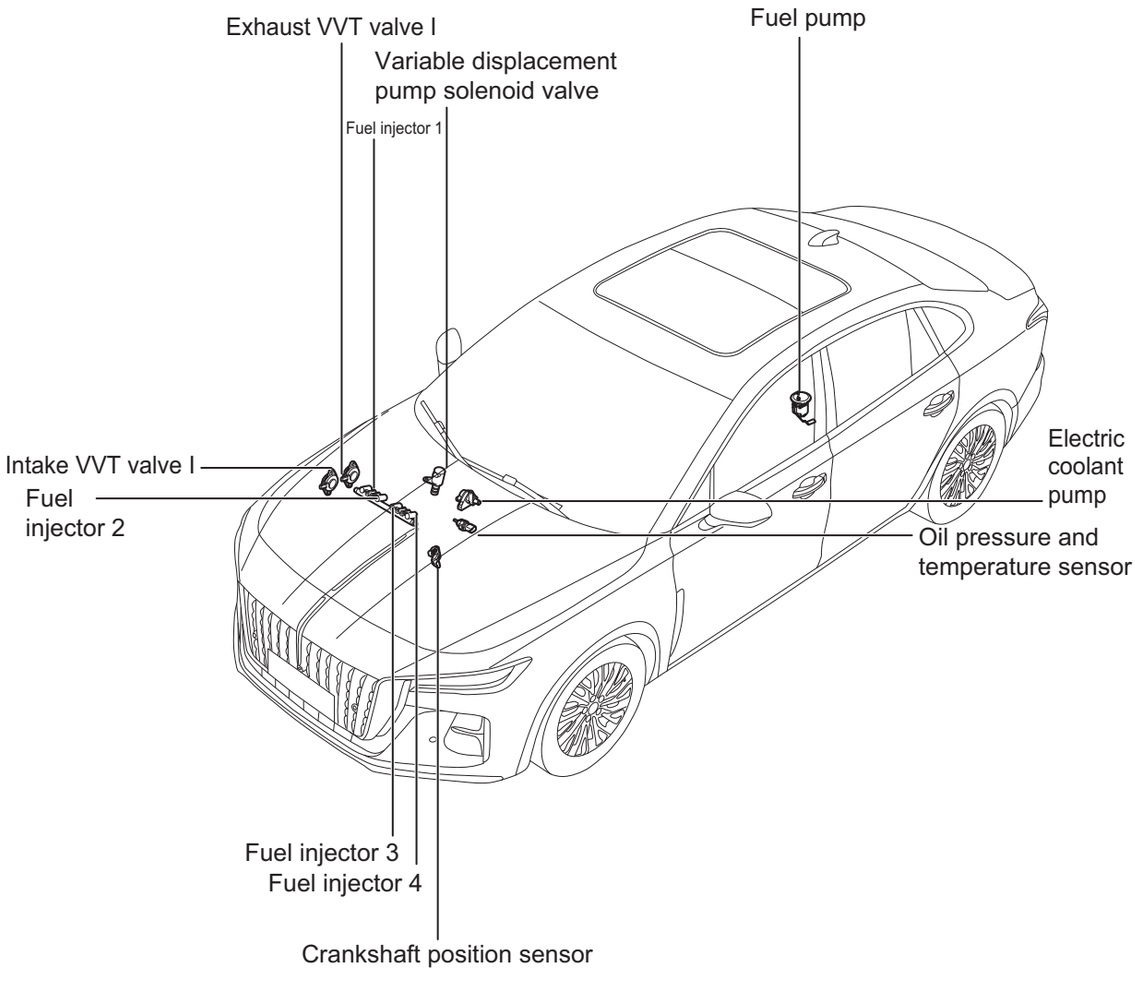
(j) When the engine is running, removal of battery cable is not allowed.

(k) Before carrying out electric welding on the vehicle, in order to protect the safety of EFI system, disconnect the battery positive and negative cables, and remove the ECU at the same time.

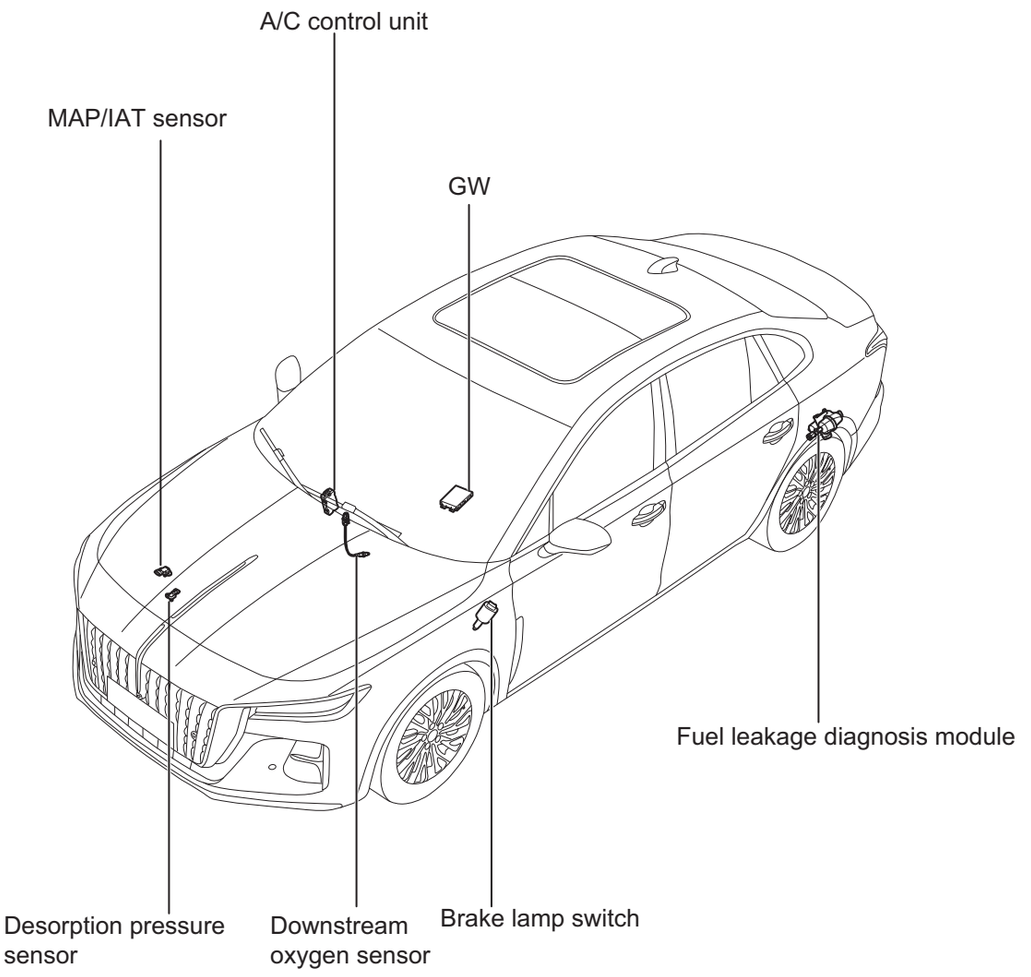
(l) It is not recommended to use the method of piercing the wire skin to detect the electrical signal input and output of the part, so as to avoid harness short circuit.

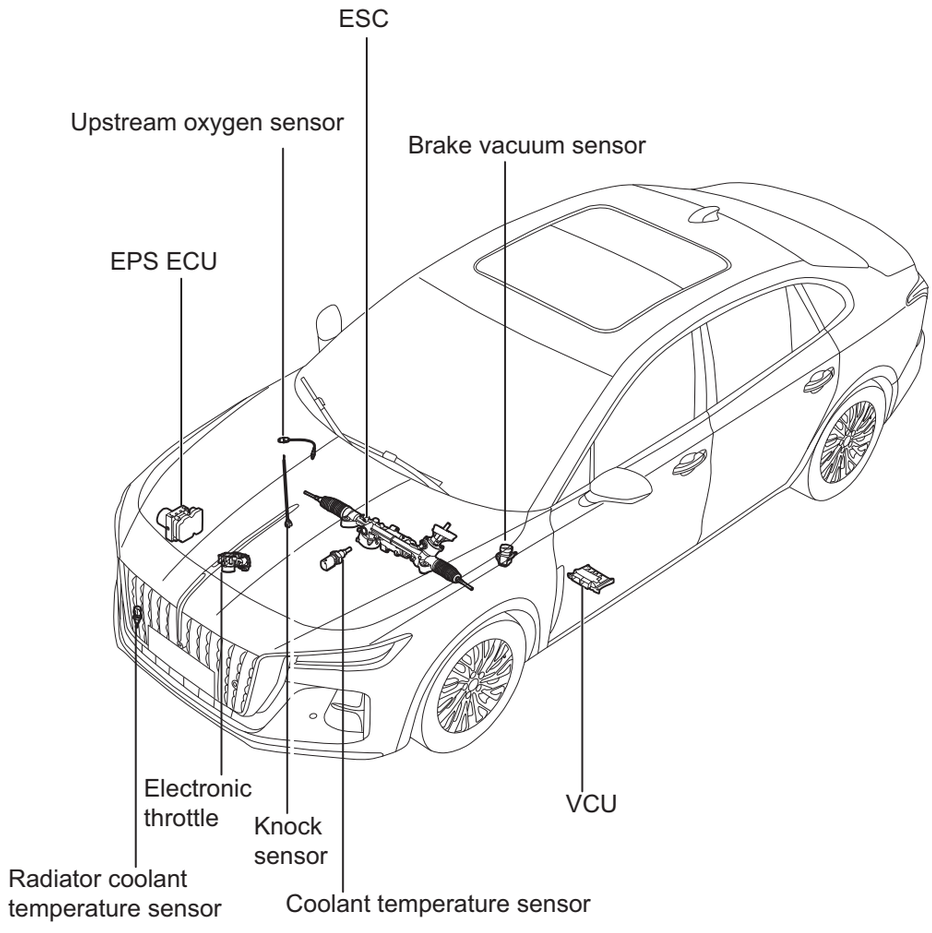
ES

Location of parts



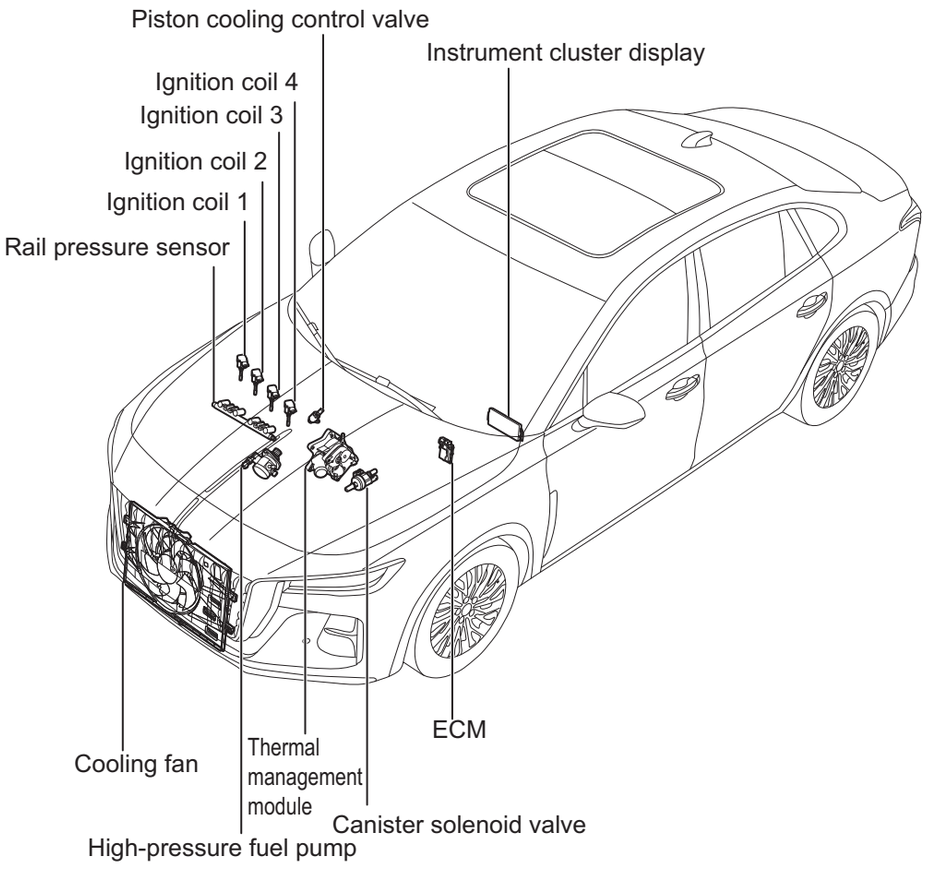
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A/C control unit
MAP/IAT sensor
GW
Fuel leakage diagnosis module
Desorption pressure sensor
Downstream oxygen sensor
Brake lamp switch
ES04710RM

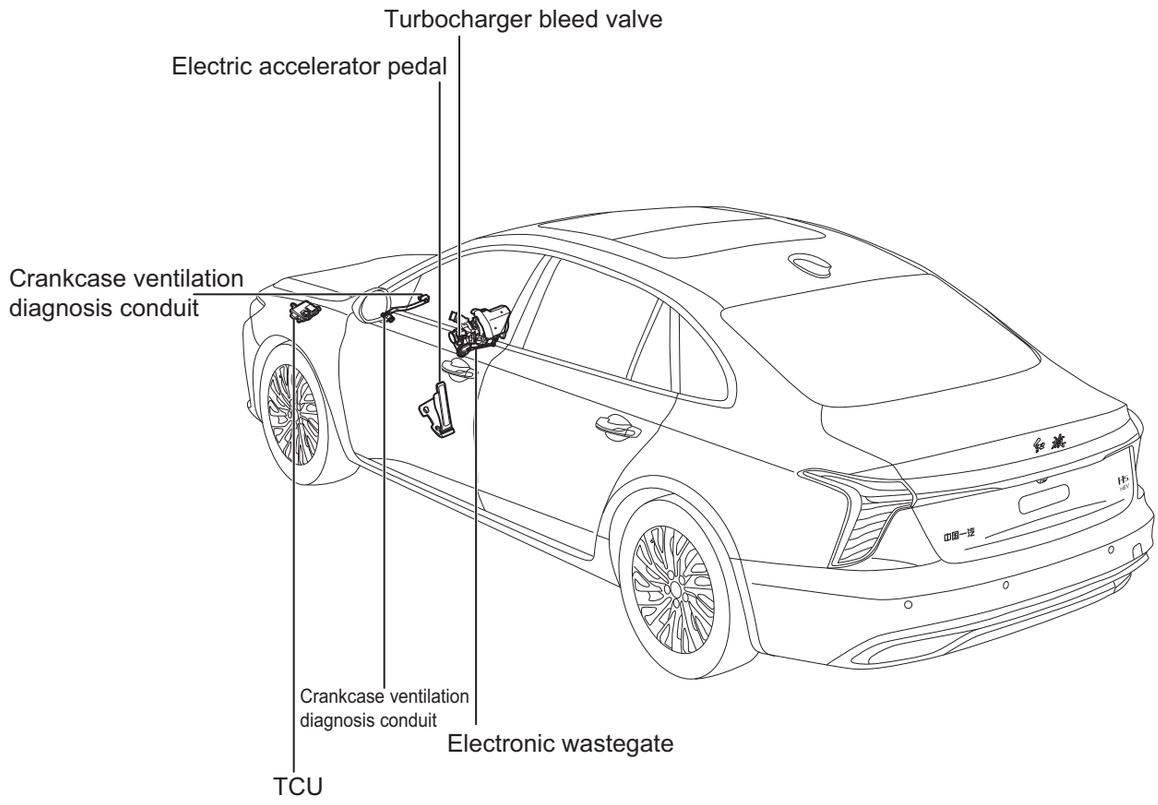

ESC
Upstream oxygen sensor
Brake vacuum sensor
EPS ECU
Electronic throttle
Knock sensor
VCU
Radiator coolant temperature sensor
Coolant temperature sensor

ES04810RM

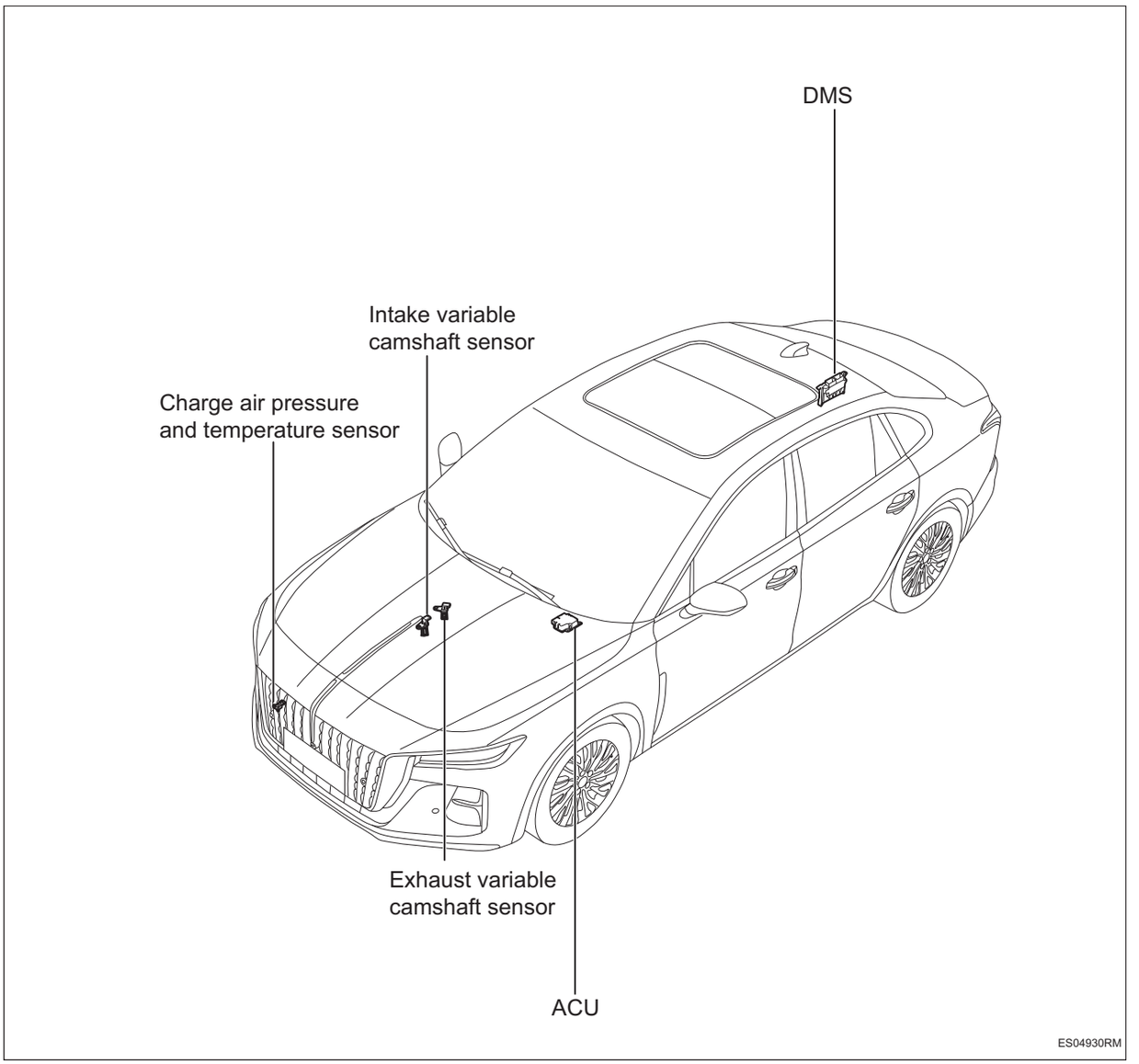
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ES04910RM

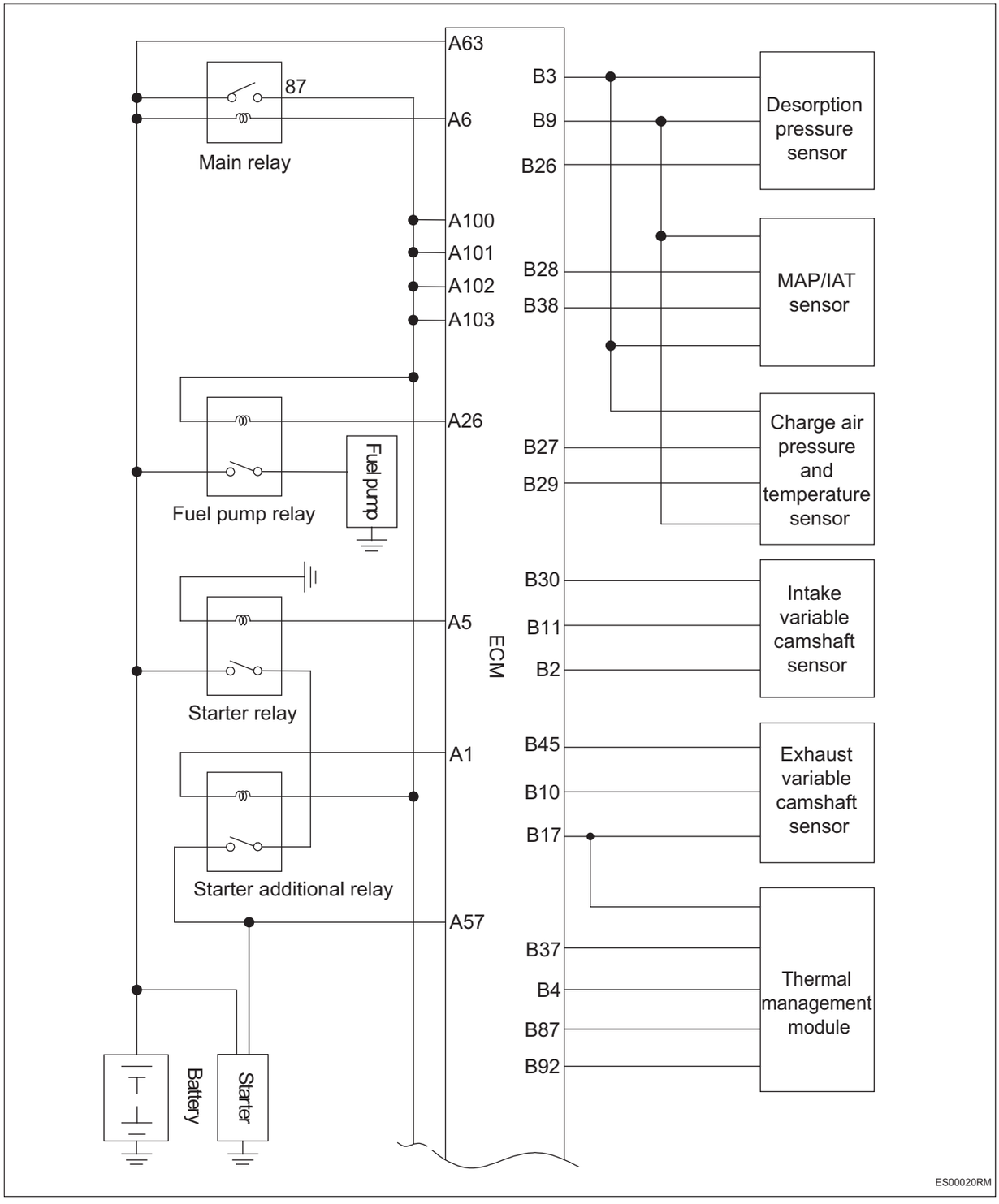

Turbocharger bleed valve
Electric accelerator pedal
Crankcase ventilation diagnosis conduit
Crankcase ventilation diagnosis conduit
Electronic wastegate
TCU

ES04920RM


DMS
Intake variable camshaft sensor
Charge air pressure and temperature sensor
Exhaust variable camshaft sensor
ACU
ES04930RM

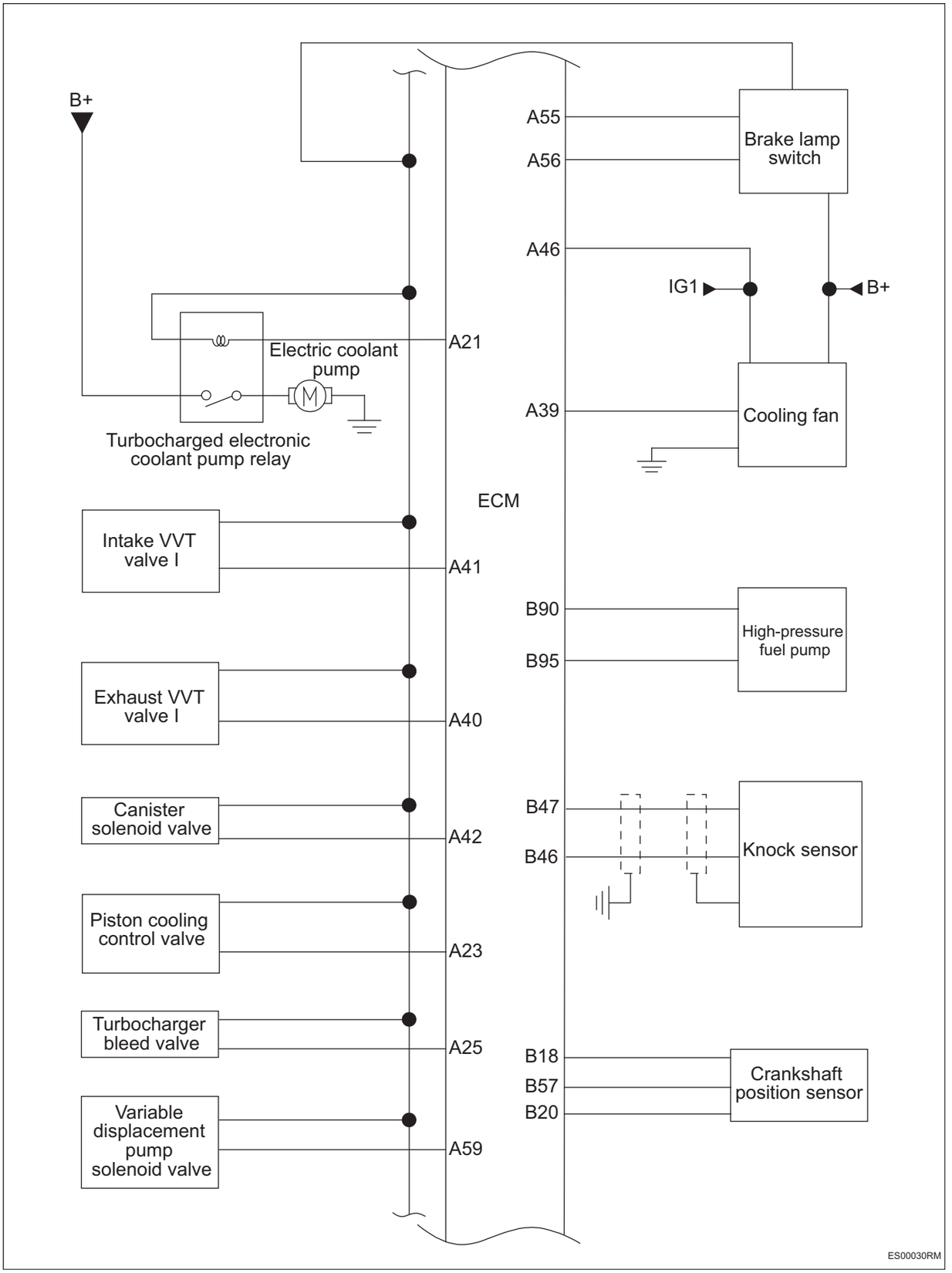
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System diagram

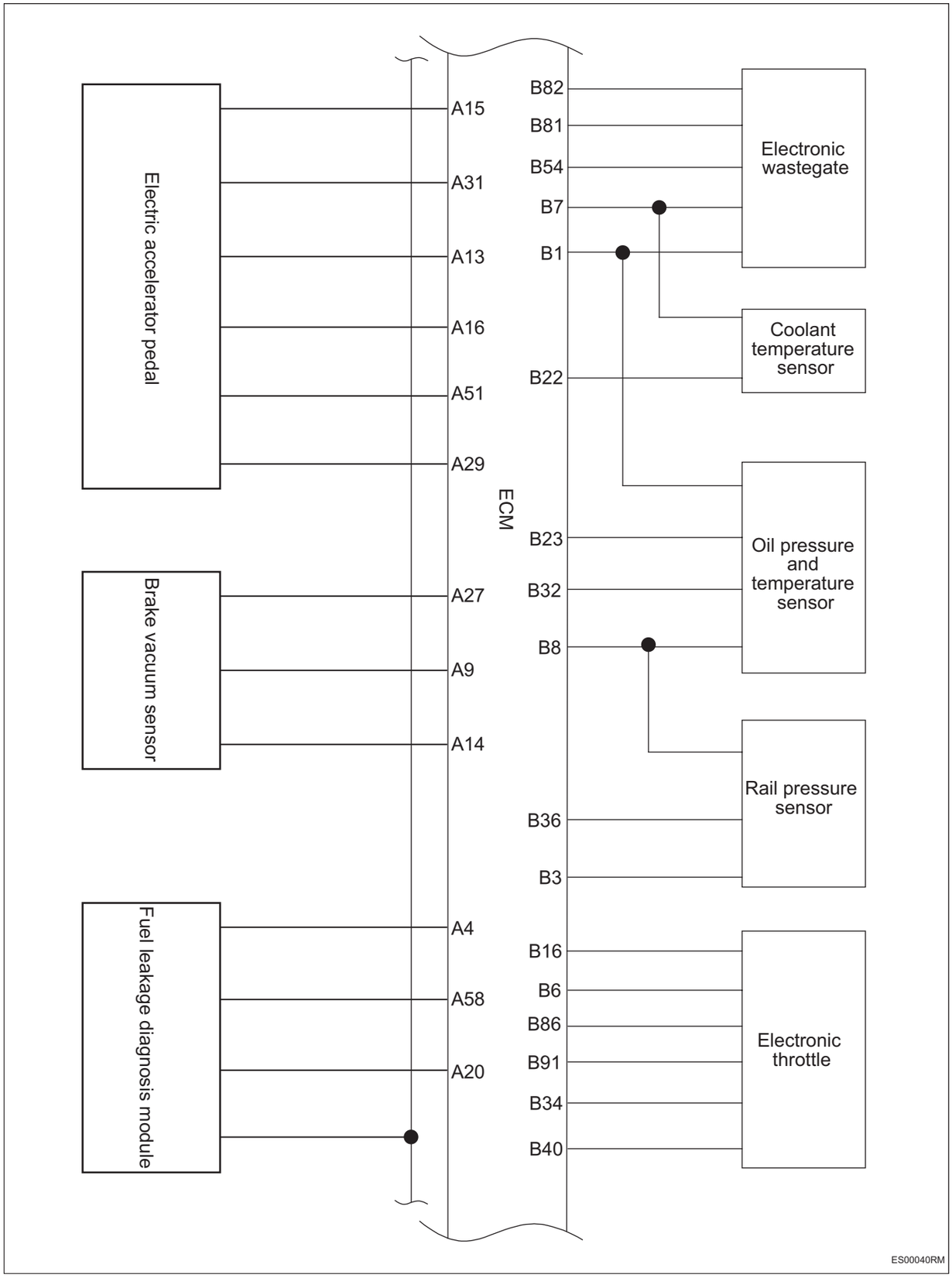


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System diagram

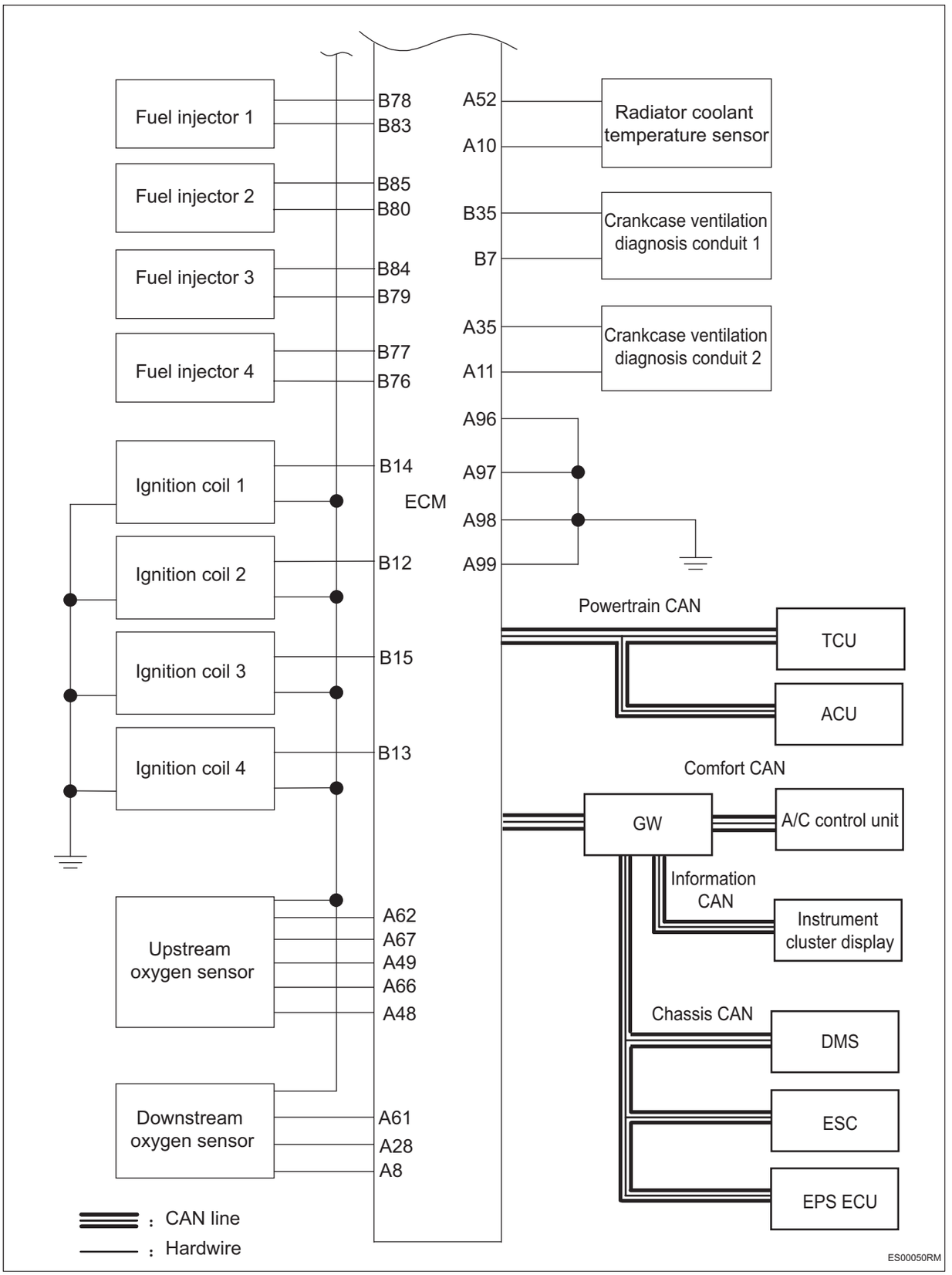


System diagram



ES

System diagram



System description

1. EMS

(a) The EMS is usually composed of sensors, microprocessors (ECUs) and actuators to control the intake air volume, fuel injection volume and ignition advance angle when the engine is working.

(b) The system adopts a combination of open-loop and closed-loop (feedback) control to provide various control signals for the operation of the engine. The basic functions of the system include: start control, heating control of warm-up and TWC, acceleration/deceleration and reverse towing fuel cutoff control, idle speed control, closed-loop control, mixture control, evaporative emission control, knock control and OBD diagnostic control, etc. In addition, additional functions include engine immobilizer, start-stop control, fan control, A/C control, VVT control, turbocharging control, etc.

2. Start control

(a) During the starting process, special calculation methods shall be adopted to control the charge, fuel injection and ignition timing. At the beginning of this process, air in the intake manifold is stationary, and the internal pressure of the intake manifold is indicated as the ambient atmospheric pressure. The electronic throttle is set to a fixed opening parameter based on the starting temperature at that time. The fuel injection mode and injection volume vary according to the temperature of the engine to promote better mixture of the fuel and air in the cylinder. In order to obtain reliable combustible mixture near the spark plug, the mixture should be enriched before the engine reaches a certain speed. Once the engine starts to run, the system starts to gradually reduce the fuel injection amount until the start enrichment is completely canceled at the end of start working condition. Under the starting condition, the ignition angle is also constantly adjusted. It varies with engine temperature, intake air temperature and engine speed. High-voltage start is usually used. In case of failure mode or extremely low temperature, low pressure start is adopted.

3. Heating control of warm up and TWC

(a) The engine still needs additional supply of fuel for a period of time after starting at low temperature. Multiple injections may be carried out according to the working conditions, and the cylinder charge and ignition angle are adjusted to compensate for the higher torque requirements of the engine; This process continues until the appropriate temperature threshold is reached. The most important aspect of this phase is the rapid heating of TWC, because a rapid transition to TWC operation can greatly reduce exhaust emissions. Under this working conditions, the exhaust gas is used for "TWC heating" with appropriate fuel injection mode (multiple injections) and a moderately delayed ignition advance angle.

4. Acceleration / deceleration and reverse towing fuel cutoff control

(a) In fact, a small part of the fuel injected into the cylinder will not participate in the combustion process in time. Instead, it forms an film on the cylinder wall or piston. When the throttle opening increases, a small part of the injected fuel is absorbed by the film. Therefore, the corresponding amount of supplementary fuel must be injected for compensation and prevent the mixture from thinning during acceleration.Once the load factor is reduced, the additional fuel contained in the fuel film will be released again, and the corresponding injection duration must be reduced during deceleration. Reverse towing or traction condition means the case where the power provided by the engine at the flywheel is negative. In this case, the friction and pumping losses of the engine can be used to decelerate the vehicle. When the engine is in reverse towing or traction conditions, the fuel injection is cut off to reduce fuel consumption and exhaust emissions, and more importantly, to protect the TWC. Once the speed drops to the recovery speed set above idle speed, the fuel injection system will supply fuel again. In fact, there is a recovery speed range in the ECU program, which varies

according to the changes of engine temperature, gear position, dynamic change of engine speed and other parameters, and the speed is prevented from falling to the specified minimum threshold through calculation. Once the injection system is re-fueled, the system begins to supply make-up fuel using the initial injection pulse. After fuel injection is resumed, the torque-based control system makes the increase of engine torque slow and smooth (gentle transition).

5. Idle speed control

(a) When idling, the engine does not provide torque to the flywheel. In order to ensure the stable operation of the engine at the lowest idle speed as possible, the closed-loop idle speed control system must maintain the balance between the torque generated and the "power consumption" of the engine. When idling, a certain amount of power needs to be generated to meet various load requirements, They include internal friction from engine crankshaft and valve train as well as auxiliary components such as coolant pump. The system uses the torque as the main control strategy to determine the engine output torque required to maintain the required idle speed under any working conditions based on the closed-loop idle speed control. The output torque increases with the decrease in the engine speed and decreases with the increase in the engine speed. The system responds to new "interference factors" by requiring bigger torque, such as the starting up and turning off of the A/C compressor or the gear shift of the automatic transmission. When the engine temperature is low, the torque also needs to be increased in order to compensate greater internal friction loss and/or maintain higher idle speed. The sum of all these output torque requirements is transmitted to the torque coordinator, which performs processing and calculation and obtains the corresponding charge density, mixture composition and ignition timing.

6. Closed-loop control

(a) TWC exhaust aftertreatment is an effective method to reduce the concentration of harmful substances in exhaust gas. A three-way catalytic converter can reduce hydrocarbons (HC), carbon monoxide (CO) and nitrogen oxides (NOx) by 98% or more, converting them into water (H2O), carbon dioxide (CO2) and nitrogen (N2). However, such a high efficiency can only be achieved within a very narrow range around the engine excess air coefficient λ = 1, and the closed-loop control goal is to ensure that the mixture concentration is within this range. The closed-loop control system can only work when equipped with an oxygen sensor. Oxygen sensor monitors the oxygen content in the exhaust gas at a location on the TWC side, the lean mixture (λ > 1) produces a sensor voltage of about 100 mV and the rich mixture (λ < 1) produces a sensor voltage of about 800 mV. When λ=1, there is a jump in the sensor voltage. The closed-loop control modifies the control variable in response to the input signal (λ > 1 = lean mixture, λ< 1 = rich mixture) to generate a correction factor as a multiplier to correct the injection duration.

7. Evaporative emission control

(a) The fuel in the fuel tank is heated to form fuel vapor due to external radiant heat and return heat transfer. As restricted by evaporative emission regulations, these vapors containing a large amount of HC components are prohibited from direct discharge into the atmosphere. In the system fuel vapors are collected in the activated carbon canister through the guide pipe and enter the engine by purging when appropriate to participate in the combustion process. The flow of purging air is realized by the ECU controlling the canister control valve. This control only works when the closed-loop control system works in a closed loop.

8. Knock control

(a) The system detects the characteristic vibration when the knock is generated through the knock sensor installed at the appropriate position of the engine, and converts it into an electronic signal for transmission to the ECU for processing. ECU uses a special processing algorithm to detect whether knock occurs in each combustion cycle of each cylinder. Once knock is detected, the closed-loop knock control is triggered. When the knock risk is eliminated, the ignition of the affected cylinder is gradually advanced again to the predetermined ignition advance angle.

9. OBD fault diagnosis control

(a) The ECU continuously monitors the sensor, actuator, related circuit, fault indicator lamp and battery voltage, etc., as well as the ECU itself, and conducts rationality tests on sensor output signals, actuator drive signals and internal signals (such as lambda closed-loop control, coolant temperature, knock control, idle speed control and battery voltage control). Once a link is found to be faulty, or a signal value is implausible, the ECU immediately sets a fault information record in the fault memory of RAM. The fault information records are stored in the form of DTC and displayed in the order in which the faults occur.

10. TMM (smart thermal management module)

(a) Smart thermal management module is a new type of engine thermal management system control strategy. Its core component is an electronic ball valve driven by a motor to control the coolant flow of multiple circuits. The main purpose of the smart thermal management module is to speed up the engine heating process by separately controlling the opening time of the cooling water circulation of cylinder head and cylinder block, and to more accurately control the engine temperature of the hot engine state, so as to achieve the goal of reducing vehicle fuel consumption. At the same time, the transmission fluid cooler is also included in the cooling system, which can effectively shorten the transmission fluid temperature rise process. Warm up working conditions: electronic ball valve closes the radiator cycle to speed up the temperature rise of the coolant; As the coolant temperature rises, the oil can be

heated in advance. It can shorten the warm up time, improve combustion, reduce friction, reduce cooling loss and reduce fuel consumption.Hot engine working conditions: electronic ball valve controls the coolant flowing through the radiator as required to achieve different cooling effects, and makes the engine operate in the economic water temperature zone as much as possible to reduce fuel consumption of the vehicle.

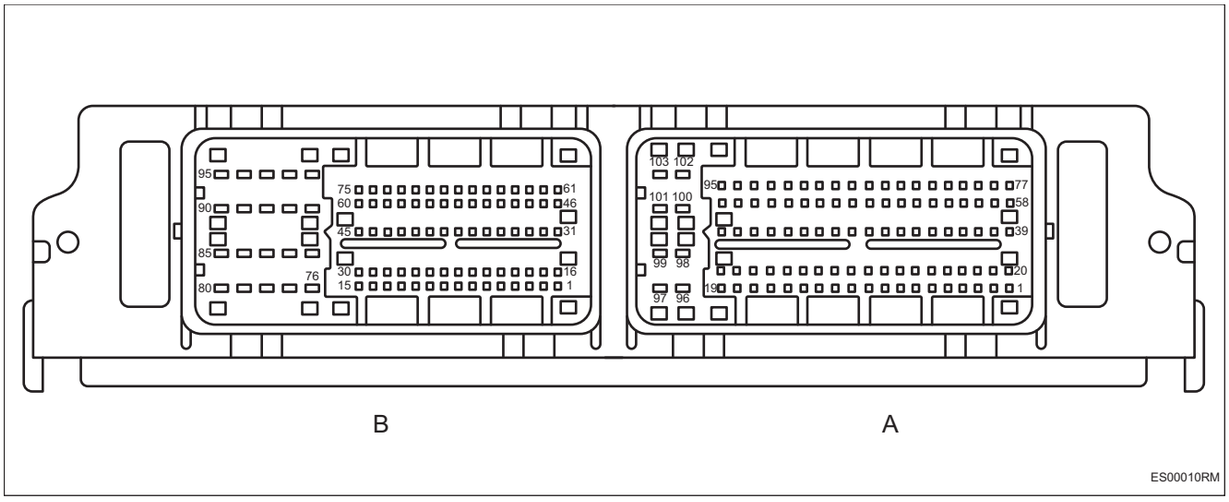
Symptom chart

Fault	Possible location
No or slow engine running during start	• Battery • Starter • Harness or ignition switch • Engine mechanical parts
Engine running but start failure	• Fuel pump • Crankshaft position sensor • Ignition coil • Engine mechanical parts
Difficulty in hot start	• Fuel pump • Coolant temperature sensor • Ignition coil
Difficulty in cold start	• Fuel pump • Coolant temperature sensor • Fuel injector • Ignition coil • Electronic throttle • Engine mechanical parts
Normal speed but difficult start at any time	• Fuel pump • Coolant temperature sensor • Fuel injector • Ignition coil • Electronic throttle • Intake duct • Ignition timing • Spark plug • Engine mechanical parts
Normal start, but unstable idle speed	• Fuel injector • Spark plug • Intake duct • Electronic throttle • Ignition timing • Engine mechanical parts
Unstable idle speed during warm-up	• Coolant temperature sensor • Spark plug • Electronic throttle • Intake duct • Engine mechanical parts
Unstable idle speed after warm-up	• Coolant temperature sensor • Spark plug • Electronic throttle • Intake duct • Engine mechanical parts

Fault	Possible location
Normal start but unstable idling or flameout under partial load	• A/C system • Electronic throttle body • Fuel injector • Exhaust gas recirculation valve
Normal starting idle speed too high	• Electronic throttle • Vacuum pipe • Coolant temperature sensor • Ignition timing
Poor acceleration (engine speed increase failure or flameout)	• Spark plug • Electronic throttle • Intake duct • Fuel injector • Ignition timing • Exhaust manifold
Slow acceleration response	• Spark plug • Electronic throttle body • Intake duct • Fuel injector • Ignition timing • Exhaust manifold • Charge air pressure and temperature sensor • Exhaust gas recirculation valve
Poor acceleration performance	• Spark plug • Ignition coil • Electronic throttle • Intake duct • Fuel injector • Ignition timing • Exhaust manifold • Turbocharger

ES

ECU terminal



ECM A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Starter control LSD	53	—
2	—	54	—
3	—	55	Brake lamp switch
4	Electronic canister pump	56	Brake switch
5	Starter control HSD	57	Starter status feedback signal
6	Main relay coil	58	Electronic canister purge valve heater
7	—	59	Variable displacement oil pump
8	Downstream oxygen sensor	60	—
9	Analog sensor ground	61	Downstream oxygen sensor heating
10	Analog sensor ground 6	62	Upstream oxygen sensor heating
11	Analog sensor ground 7	63	B+
12	—	64	Powertrain CAN_L
13	Accelerator pedal position sensor 1 power supply	65	Powertrain CAN_H
14	Sensor 5V power supply	66	Upstream oxygen sensor
15	Accelerator pedal position sensor 2	67	Upstream oxygen sensor VN
16	Accelerator pedal position sensor 2 power supply	68	—
17	—	69	—
18	—	70	EMS matching CAN_H
19	—	71	EMS matching CAN_L
20	Electronic canister purge valve	72	—
21	Turbocharged electronic coolant pump relay	73	—
22	—	74	—
23	Piston cooling nozzle control valve	75	—

ECM A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
24	—	76	—
25	Relief control valve	77	—
26	Low-pressure fuel pump relay	78	–
27	Brake vacuum sensor	79	—
28	Downstream oxygen sensor ground	80	—
29	Accelerator pedal position sensor 2 ground	81	—
30	—	82	—
31	Accelerator pedal position sensor 1	83	—
32	—	84	—
33	—	85	—
34	—	86	—
35	Crankcase ventilation diagnosis conduit 2	87	—
36	—	88	—
37	—	89	—
38	—	90	—
39	PWM fan	91	—
40	VVT valve (exhaust)	92	—
41	VVT valve (intake)	93	—
42	Canister control valve	94	—
43	—	95	—
44	—	96	ECU ground 4
45	—	97	ECU ground 2
46	IG1	98	ECU ground 3
47	—	99	ECU ground 1
48	Upstream oxygen sensor IP	100	Main relay power supply 1
49	Upstream oxygen sensor VM	101	Main relay power supply 2
50	—	102	Main relay power supply 3
51	Accelerator pedal position sensor 1 ground	103	Main relay power supply 4
52	Radiator coolant temperature sensor	-	-

ECM B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Sensor power supply (5 V)	49	—
2	Sensor power supply (5 V)	50	—
3	Sensor power supply	51	—
4	Digital sensor ground	52	—
5	—	53	—

ECM B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
6	Analog sensor ground	54	Electric actuator position signal
7	Analog sensor ground	55	—
8	Analog sensor ground	56	Airbag hardwire
9	Analog sensor ground	57	Engine speed sensor signal
10	Exhaust CMP sensor ground	58	—
11	Intake CMP sensor ground	59	—
12	2# cylinder ignition	60	—
13	4# cylinder ignition	61	—
14	1# cylinder ignition	62	—
15	3# cylinder ignition	63	—
16	Sensor power supply (5 V)	64	—
17	Sensor power supply (5 V)	65	—
18	Speed sensor power supply	66	—
19	—	67	—
20	Speed sensor ground	68	—
21	—	69	—
22	Engine coolant temperature sensor signal	70	—
23	Oil pressure sensor	71	—
24	—	72	—
25	—	73	—
26	High-load desorption pressure sensor	74	—
27	Charge air pressure sensor signal	75	—
28	MAP sensor signal	76	4# cylinder fuel injector+
29	Charge air temperature sensor signal	77	4# cylinder fuel injector-
30	Intake CMP sensor signal	78	1# cylinder fuel injector-
31	—	79	3# cylinder fuel injector+
32	Oil temperature sensor	80	2# cylinder fuel injector+
33	—	81	Electric actuator control-
34	Electronic throttle feedback signal 2	82	Electric actuator control +
35	Crankcase ventilation diagnosis conduit 1	83	1# cylinder fuel injector+
36	Rail pressure sensor signal	84	3# cylinder fuel injector-
37	EYM position feedback signal	85	2# cylinder fuel injector-
38	IAT sensor signal	86	Electronic throttle control-
39	—	87	EYM actuator +
40	Electronic throttle feedback signal 1	88	—
41	—	89	—
42	—	90	Fuel pressure control valve -

ECM B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
43	—	91	Electronic throttle control +
44	—	92	EYM actuator-
45	Exhaust CMP sensor signal	93	—
46	Knock sensor +	94	—
47	Knock sensor -	95	Fuel pressure control valve +
48	—	-	-

DTC chart

DTC	Description	Reference page
P000A00	Intake VVT operation fault (retarded)	(See page ES-41)
P003C00	Intake VVT operation fault (stuck)	(See page ES-41)
P001000	Intake VVT control circuit open	(See page ES-41)
P001676	Crankshaft-intake camshaft initial installation position implausible (Bank1)	(See page ES-41)
P001678	Excessive relative position deviation between crankshaft and intake camshaft (Bank1)	(See page ES-41)
P208800	Intake VVT control circuit undervoltage	(See page ES-41)
P208900	Intake VVT control circuit overvoltage	(See page ES-41)
P001100	Intake camshaft locking position operation implausible	(See page ES-41)
P000B00	Exhaust VVT operation fault (retarded)	(See page ES-48)
P005A00	Exhaust VVT operation fault (stuck)	(See page ES-48)
P001300	Exhaust VVT control circuit open	(See page ES-48)
P001776	Crankshaft-exhaust camshaft initial installation position implausible (Bank1)	(See page ES-48)
P001778	Excessive relative position deviation between crankshaft and exhaust camshaft (Bank1)	(See page ES-48)
P209000	Exhaust VVT control circuit undervoltage	(See page ES-48)
P209100	Exhaust VVT control circuit overvoltage	(See page ES-48)
P001400	Exhaust camshaft locking position operation implausible	(See page ES-48)
P003000	Upstream oxygen sensor heater control circuit open	(See page ES-55)
P003100	Upstream oxygen sensor heater control circuit undervoltage	(See page ES-55)
P003200	Upstream oxygen sensor heater control circuit overvoltage	(See page ES-55)
P003600	Downstream oxygen sensor heater control circuit open	(See page ES-60)
P003700	Downstream oxygen sensor heater control circuit undervoltage	(See page ES-60)

DTC	Description	Reference page
P003800	Downstream oxygen sensor heater control circuit overvoltage	(See page ES-60)
P003A22	Turbocharger electronic wastegate initial zero self-learning above upper limit	(See page ES-65)
P003A21	Turbocharger electronic wastegate initial zero self-learning below lower limit	(See page ES-65)
P003A72	Turbocharger electronic wastegate zero self-learning above upper limit	(See page ES-65)
P003A73	Turbocharger electronic wastegate zero self-learning below lower limit	(See page ES-65)
P024477	Deviation between turbocharger electronic wastegate target position and actual position out of limit	(See page ES-65)
P024437	Turbocharger electronic wastegate duty cycle out of limit	(See page ES-65)
P256400	Turbocharger electronic wastegate position sensor undervoltage	(See page ES-65)
P256500	Turbocharger electronic wastegate position sensor overvoltage	(See page ES-65)
P170300	Turbocharger wastegate control circuit communication failure	(See page ES-65)
P024300	Turbocharger wastegate control circuit open	(See page ES-65)
P024600	Turbocharger wastegate control circuit overvoltage or undervoltage	(See page ES-65)
P005300	Upstream oxygen sensor heater circuit fault	(See page ES-72)
P005400	Downstream oxygen sensor heater internal resistance implausible	(See page ES-74)
P008700	High-pressure fuel rail pressure low	(See page ES-77)
P008800	High-pressure fuel rail pressure high	(See page ES-77)
P008985	Too large PID control deviation of high-pressure fuel supply pressure	(See page ES-82)
P008984	Too small PID control deviation of high-pressure fuel supply pressure	(See page ES-82)
P009000	Flow control valve high side control circuit high side and low side circuits shorted to each other	(See page ES-88)
P025100	Flow control valve high or low side control circuit open	(See page ES-88)
P025400	Flow control valve high side control circuit overvoltage or undervoltage	(See page ES-88)
P025900	Flow control valve low side control circuit overvoltage or undervoltage	(See page ES-88)
P00C600	High-voltage start failure	(See page ES-93)
P01062A	Abnormal signal value without fluctuation of MAP sensor	(See page ES-99)
P010622	MAP sensor pressure implausibly higher than model pressure	(See page ES-99)
P010621	MAP sensor pressure implausibly lower than model pressure	(See page ES-99)

DTC	Description	Reference page
P120000	MAP sensor pressure above upper limit	(See page ES-99)
P120100	MAP sensor pressure below lower limit	(See page ES-99)
P00C721	MAP sensor signal pressure value too low during start	(See page ES-99)
P00C722	MAP sensor signal pressure value too high during start	(See page ES-99)
P010700	MAP sensor circuit shorted to ground	(See page ES-99)
P010800	MAP sensor circuit shorted to power supply fault	(See page ES-99)
P011126	IAT sensor 1 signal implausible (sticky)	(See page ES-99)
P011200	IAT sensor 1 circuit undervoltage	(See page ES-99)
P011300	IAT sensor 1 circuit overvoltage	(See page ES-99)
P011400	IAT sensor 1 circuit voltage implausible	(See page ES-99)
P00CE24	Air temperature sensor 1 cold start check implausible (positive deviation)	(See page ES-99)
P00CE23	IAT sensor 1 cold start check implausible (negative deviation)	(See page ES-99)
P012300	Electronic throttle position sensor 1 signal circuit overvoltage	(See page ES-105)
P012200	Electronic throttle position sensor 1 signal circuit undervoltage	(See page ES-105)
P012100	Electronic throttle position sensor 1 signal implausible	(See page ES-105)
P022300	Electronic throttle position sensor 2 signal circuit overvoltage	(See page ES-105)
P022200	Electronic throttle position sensor 2 signal circuit undervoltage	(See page ES-105)
P022100	Electronic throttle position sensor 2 signal implausible	(See page ES-105)
P012800	Thermostat performance implausible (water temperature failing to reach nominal opening temperature of thermostat)	(See page ES-111)
P013300	Upstream oxygen sensor aging	(See page ES-116)
P013A00	Downstream oxygen sensor rich-lean response slow	(See page ES-116)
P219500	LSU oxygen sensor characteristic deviation (biased lean)	(See page ES-116)
P219600	LSU oxygen sensor characteristic deviation (biased rich)	(See page ES-116)
P209700	Closed-loop correction value based on downstream oxygen sensor above upper limit - biased rich	(See page ES-116)
P209600	Closed-loop correction value based on downstream oxygen sensor below lower limit -biased lean	(See page ES-116)
P013800	Downstream oxygen sensor signal line shorted to power supply	(See page ES-119)
P013700	Downstream oxygen sensor signal line shorted to ground	(See page ES-119)

DTC	Description	Reference page
P013600	Downstream oxygen sensor signal circuit open	(See page ES-119)
P017F00	DMTL air cleaner flow resistance high	(See page ES-125)
P128000	DMTL pump current frequency high	(See page ES-125)
P128100	DMTL pump current frequency low	(See page ES-125)
P043E00	EVAP system leakage diagnosis DMTL reference pump current high	(See page ES-125)
P043F00	EVAP system leakage diagnosis DMTL reference pump current relatively low	(See page ES-125)
P24C100	DMTL pump idle current high	(See page ES-125)
P240700	DMTL pump current fluctuation out of plausible range (caused by humidity)	(See page ES-125)
P044200	EVAP system 1.0mm leakage	(See page ES-125)
P019800	Oil temperature sensor circuit overvoltage	(See page ES-132)
P019700	Oil temperature sensor circuit undervoltage	(See page ES-132)
P019664	Oil temperature sensor signal implausible (high side)	(See page ES-132)
P019629	Oil temperature sensor signal implausible (low side)	(See page ES-132)
P121800	Oil temperature sensor signal above upper limit	(See page ES-132)
P052300	High oil pressure sensor circuit voltage/duty cycle	(See page ES-132)
P052200	Low oil pressure sensor circuit voltage/duty cycle	(See page ES-132)
P021900	High engine speed	(See page ES-137)
P023400	Turbocharger charge air pressure display high	(See page ES-139)
P029900	Turbocharger charge air pressure display low	(See page ES-139)
P023700	Charge air pressure sensor circuit shorted to ground	(See page ES-147)
P023800	Charge air pressure sensor circuit shorted to power supply	(See page ES-147)
P138024	IAT sensor 2 cold start check implausible (positive deviation)	(See page ES-147)
P138023	IAT sensor 2 cold start check implausible (negative deviation)	(See page ES-147)
P009800	IAT sensor 2 circuit overvoltage	(See page ES-147)
P009700	IAT sensor 2 circuit undervoltage	(See page ES-147)
P009900	IAT sensor 2 circuit voltage implausible	(See page ES-147)
P009626	IAT sensor 2 signal implausible (sticky)	(See page ES-147)
P020100	1# cylinder fuel injector control circuit open	(See page ES-153)
P026200	1# cylinder fuel injector low side control circuit overvoltage or undervoltage	(See page ES-153)
P02EE00	1# cylinder fuel injector high side and low side control circuits shorted to each other	(See page ES-153)

DTC	Description	Reference page
P02CD00	1# cylinder CVO self-learning adjustment up to upper limit	(See page ES-153)
P02CC00	1# cylinder CVO self-learning adjustment up to lower limit	(See page ES-153)
P126100	1# cylinder CVO circuit signal implausible	(See page ES-153)
P020200	2# cylinder fuel injector control circuit open	(See page ES-159)
P026500	2# cylinder fuel injector low side control circuit overvoltage or undervoltage	(See page ES-159)
P02EF00	2# cylinder fuel injector high side and low side control circuits shorted to each other	(See page ES-159)
P02CF00	#2 Cylinder CVO self-learning adjustment at upper limit	(See page ES-159)
P02CE00	2# cylinder CVO self-learning adjustment at lower limit	(See page ES-159)
P126200	2# cylinder CVO circuit signal implausible	(See page ES-159)
P020300	3# cylinder fuel injector control circuit open	(See page ES-165)
P026800	3# cylinder fuel injector low side control circuit overvoltage or undervoltage	(See page ES-165)
P02F000	3# cylinder fuel injector high side and low side control circuits shorted to each other	(See page ES-165)
P02D100	3# cylinder CVO self-learning adjustment at upper limit	(See page ES-165)
P02D000	4# cylinder CVO self-learning adjustment at lower limit	(See page ES-165)
P126300	3# cylinder CVO circuit signal implausible	(See page ES-165)
P020400	4# cylinder fuel injector control circuit open	(See page ES-171)
P027100	4# cylinder fuel injector low side control circuit overvoltage or undervoltage	(See page ES-171)
P02F100	4# cylinder fuel injector high side and low side control circuits shorted to each other	(See page ES-171)
P02D300	4# cylinder CVO self-learning adjustment at upper limit	(See page ES-171)
P02D200	4# cylinder CVO self-learning adjustment at lower limit	(See page ES-171)
P126400	4# cylinder CVO circuit signal implausible	(See page ES-171)
P030000	Engine random or multi-cylinder misfire	(See page ES-177)
P030100	1# Cylinder misfire detected	(See page ES-177)
P030200	2# Cylinder misfire detected	(See page ES-177)
P030300	3# Cylinder misfire detected	(See page ES-177)
P030400	4# cylinder misfire detected	(See page ES-177)
P036300	Engine misfire triggering fuel cutoff	(See page ES-177)
P032700	Knock sensor A end shorted to ground	(See page ES-183)
P032714	Knock sensor B end shorted to ground	(See page ES-183)
P032800	Knock sensor A end shorted to power supply	(See page ES-183)
P032815	Knock sensor B end shorted to power supply	(See page ES-183)

DTC	Description	Reference page
P032500	Knock sensor signal circuit undervoltage	(See page ES-183)
P151000	Knock sensor signal evaluation and diagnosis	(See page ES-183)
P032600	Knock sensor signal circuit overvoltage	(See page ES-183)
P033900	Speed sensor signal Implausible	(See page ES-189)
P261700	Speed sensor signal lost	(See page ES-189)
P033664	Crankshaft sensor pulse width signal implausible	(See page ES-189)
P034A00	Crankshaft position sensor –crankshaft starting position incorrect (stop position implausible)	(See page ES-189)
P034B00	Crankshaft position sensor -crankshaft rotation direction incorrect (reverse signal implausible)	(See page ES-189)
P034100	Intake camshaft sensor signal Implausible (Bank1)	(See page ES-195)
P034200	Intake camshaft sensor signal circuit shorted to ground (Bank1)	(See page ES-195)
P034300	Intake camshaft sensor signal circuit shorted to power supply (Bank1)	(See page ES-195)
P035100	1# cylinder ignition coil control circuit open	(See page ES-200)
P230000	1# cylinder ignition coil control circuit undervoltage	(See page ES-200)
P230100	1# cylinder ignition coil control circuit overvoltage	(See page ES-200)
P035200	2# cylinder ignition coil control circuit open	(See page ES-205)
P230300	2# cylinder ignition coil control circuit undervoltage	(See page ES-205)
P230400	2# cylinder ignition coil control circuit overvoltage	(See page ES-205)
P035300	3# cylinder ignition coil control circuit open	(See page ES-210)
P230600	3# cylinder ignition coil control circuit undervoltage	(See page ES-210)
P230700	3# cylinder ignition coil control circuit overvoltage	(See page ES-210)
P035400	4# cylinder ignition coil control circuit open	(See page ES-215)
P230900	4# cylinder ignition coil control circuit undervoltage	(See page ES-215)
P231000	4# cylinder ignition coil control circuit overvoltage	(See page ES-215)
P036600	Exhaust camshaft sensor signal implausible (Bank1)	(See page ES-220)
P036800	Exhaust camshaft sensor signal circuit shorted to power supply (Bank1)	(See page ES-220)
P036700	Exhaust camshaft sensor signal circuit shorted to ground (Bank1)	(See page ES-220)
P042000	TWC OSC aging	(See page ES-225)
P044400	Canister control valve control circuit open	(See page ES-227)

DTC	Description	Reference page
P045800	Canister control valve circuit undervoltage	(See page ES-227)
P045900	Canister control valve circuit overvoltage	(See page ES-227)
P049700	Canister solenoid valve stuck closed	(See page ES-227)
P046000	Fuel level sensor original signal out of range	(See page ES-232)
P25B000	Fuel level sensor signal stuck	(See page ES-232)
P128400	Fuel level signal out of range	(See page ES-232)
P046129	Fuel level signal implausible	(See page ES-232)
P046300	Fuel level sensor circuit overvoltage	(See page ES-232)
P046200	Fuel level sensor circuit undervoltage	(See page ES-232)
U067681	Fuel level sensor signal loss/failure/check error	(See page ES-232)
P046700	High-load desorption pipeline pressure sensor circuit undervoltage	(See page ES-243)
P046800	High-load desorption pipeline pressure sensor circuit overvoltage	(See page ES-243)
P128500	High-load desorption pipeline pressure sensor signal above upper threshold	(See page ES-243)
P128600	High-load desorption pipeline pressure sensor signal below lower threshold	(See page ES-243)
P048371	Cooling fan plausibility fault type 1	(See page ES-248)
P048372	Cooling fan plausibility fault type 2	(See page ES-248)
P048000	Cooling fan 1 control circuit open	(See page ES-248)
P069200	Cooling fan 1 control circuit overvoltage	(See page ES-248)
P069100	Cooling fan 1 control circuit undervoltage	(See page ES-248)
P063400	Cooling fan 1 driver chip overheating	(See page ES-248)
P04F000	High-load desorption pipeline fault - canister valve fault	(See page ES-253)
P050B00	Ignition angle efficiency monitoring during catalytic converter heating (idle speed)	(See page ES-256)
P050B20	Ignition angle efficiency monitoring during catalytic converter heating (partial load)	(See page ES-256)
P053F22	High-pressure fuel passage pressure high during catalytic converter heating	(See page ES-256)
P053F21	High-pressure fuel passage pressure low during catalytic converter heating	(See page ES-256)
P050A22	High engine idle speed during catalytic converter heating	(See page ES-256)
P050A21	Low engine idle speed during catalytic converter heating	(See page ES-256)
P050D00	Parking idle speed fluctuation out of range during catalytic converter heating and without fuel cutoff	(See page ES-256)
P05EC00	Multiple injection monitoring faults during catalytic converter heating	(See page ES-256)
P050700	Engine idle speed high	(See page ES-256)
P050600	Engine idle speed low	(See page ES-256)

DTC	Description	Reference page
P050500	Engine idle speed fluctuation out of range	(See page ES-256)
P050C24	Coolant temperature sensor 1 cold start check implausible (positive deviation)	(See page ES-262)
P050C23	Coolant temperature sensor 1 cold start check implausible (negative deviation)	(See page ES-262)
P011623	Coolant temperature sensor 1 signal implausible (low side)	(See page ES-262)
P011626	Coolant temperature sensor 1 signal implausible (stuck)	(See page ES-262)
P011800	Coolant temperature sensor 1 circuit overvoltage	(See page ES-262)
P011700	Coolant temperature sensor 1 circuit undervoltage	(See page ES-262)
P011900	Coolant temperature sensor 1 circuit voltage implausible	(See page ES-262)
P051300	Incorrect immobilizer authentication response and immobilizer authentication failure	(See page ES-267)
P063300	ECM no IMMO matching	(See page ES-267)
P163100	Immobilizer authentication communication error or no response from immobilizer	(See page ES-267)
P161100	PIN input error	(See page ES-267)
P055800	Brake chamber vacuum pressure sensor overvoltage	(See page ES-269)
P055700	Brake chamber vacuum pressure sensor undervoltage	(See page ES-269)
P145200	Unreasonable brake chamber pressure	(See page ES-269)
P056300	Battery overvoltage	(See page ES-273)
P056200	Battery undervoltage	(See page ES-273)
P057100	Asynchronous brake signal	(See page ES-277)
P050400	Brake signal correlation failure	(See page ES-277)
P061A00	Second layer torque monitoring fault (torque comparison fault)	(See page ES-282)
P060D00	Second accelerator pedal signal implausible	(See page ES-282)
P152000	Load forecast monitoring fault	(See page ES-282)
P152100	Pipe monitoring fault in fuel cutoff mode	(See page ES-282)
P152200	Pipe monitoring fault in fuel supply mode	(See page ES-282)
P153900	Synchronization process plausibility check (based on speed and sync count)	(See page ES-282)
P153700	Load comparison monitoring fault	(See page ES-282)
P153500	Mixture monitoring fault	(See page ES-282)
P153600	Operating mode monitoring fault	(See page ES-282)
P062900	Fuel pump relay control circuit overvoltage	(See page ES-284)
P062800	Fuel pump relay control circuit undervoltage	(See page ES-284)
P062700	Fuel pump relay control circuit open	(See page ES-284)

DTC	Description	Reference page
P062B9A	Similar working condition path of self-learning adjustment out of limit	(See page ES-288)
P062B64	Similar working condition path of circuit signal implausible	(See page ES-288)
P062B96	ECU fault (CVO failure in all cylinders)	(See page ES-288)
P063000	VIN not written or incompatible	(See page ES-290)
P064100	5V power supply module 1 faulty	(See page ES-291)
P065100	Chip 5 V power supply voltage 2 fault	(See page ES-291)
P069700	5V power supply module 3 faulty	(See page ES-291)
P064D00	LSU integrated chip register writing failure	(See page ES-292)
P223700	LSU type oxygen sensor APE circuit open (near ECU end)	(See page ES-292)
P225100	Upstream oxygen sensor IPE circuit open	(See page ES-292)
P224300	Upstream oxygen sensor RE circuit open	(See page ES-292)
P013200	Upstream oxygen sensor signal circuit overvoltage (APE / IPE / RE circuit shorted to power supply)	(See page ES-292)
P013100	Upstream oxygen sensor signal circuit undervoltage (APE / IPE / RE circuit shorted to ground)	(See page ES-292)
P241400	Upstream oxygen sensor output voltage implausible	(See page ES-292)
P064D13	LSU integrated chip SPI communication failure	(See page ES-292)
P262600	Upstream oxygen sensor MES circuit open	(See page ES-292)
P223713	LSU type oxygen sensor APE circuit open	(See page ES-292)
P013000	Upstream oxygen sensor compensation resistor circuit open	(See page ES-292)
P068500	Main relay open circuit	(See page ES-299)
P068700	Main relay circuit shorted to power supply	(See page ES-299)
P068600	Main relay circuit shorted to ground	(See page ES-299)
P06869E	ECM/PCM main relay stuck or circuit shorted to ground	(See page ES-299)
P06B842	Error in reading NVM Block	(See page ES-304)
P06B843	Error in writing NVM Block	(See page ES-304)
P06DC00	Two-stage oil pump control circuit overvoltage	(See page ES-305)
P06DB00	Two-stage oil pump control circuit undervoltage	(See page ES-305)
P06DA00	Two-stage oil pump control circuit open	(See page ES-305)
P070000	Transmission control fault request to illuminate MIL	(See page ES-310)
P120400	Charge air pressure above upper limit	(See page ES-311)
P120500	Charge air pressure below lower limit	(See page ES-311)
P023622	Charge air pressure implausibly high	(See page ES-311)

DTC	Description	Reference page
P023621	Charge air pressure implausible, low	(See page ES-311)
P121200	Vehicle speed sensor performance failure (vehicle speed above upper limit)	(See page ES-317)
P050000	Vehicle speed sensor input signal failure	(See page ES-317)
P050165	Vehicle speed sensor performance failure (vehicle speed low during coasting with fuel off)	(See page ES-317)
P050166	Vehicle speed implausible - Low vehicle speed during high engine load	(See page ES-317)
P019000	High-pressure fuel rail pressure sensor voltage signal implausible	(See page ES-323)
P019128	Negative deviation of characteristic curve of high-pressure fuel rail pressure sensor	(See page ES-323)
P019129	Positive deviation of characteristic curve of high-pressure fuel rail pressure sensor	(See page ES-323)
P019200	High-pressure fuel rail pressure sensor circuit undervoltage	(See page ES-323)
P019300	High-pressure fuel rail pressure sensor circuit overvoltage	(See page ES-323)
P019400	High-pressure fuel rail pressure sensor signal stuck	(See page ES-323)
P127000	Rail pressure signal of high-pressure fuel rail pressure sensor above upper limit	(See page ES-323)
P139D00	TMM position sensor signal value out of range (SENT input)	(See page ES-332)
P139C00	TMM position sensor signal fault (SENT signal wire shorted to power supply)	(See page ES-332)
P139B00	TMM position sensor signal fault (SENT signal line shorted to ground)	(See page ES-332)
P139A00	TMM position sensor signal fault (communication protocol not satisfied)	(See page ES-332)
P139E00	TMM position sensor closed position self-learning out of limit	(See page ES-332)
P26CD00	TMM control circuit overvoltage or undervoltage	(See page ES-332)
P170100	TMM control circuit overcurrent	(See page ES-332)
P170200	TMM control circuit communication failure	(See page ES-332)
P26CA00	TMM control circuit open	(See page ES-332)
P138E00	TMM valve body stuck	(See page ES-332)
P142000	CAN hardware register response timeout	(See page ES-338)
P142100	LIN hardware register response timeout	(See page ES-338)
P14AE00	Starter feedback voltage signal line (KL50r) circuit shorted to power supply or R1 relay stuck	(See page ES-339)
P14AF00	Starter feedback voltage signal line (KL50r) circuit shorted to ground	(See page ES-339)
P26F200	Drive chain status relay R2 (PT State Relay) stuck closed	(See page ES-339)

DTC	Description	Reference page
P26F100	Crank relay R1 or PT state relay R2 stuck open	(See page ES-339)
P14AC00	Starter damage or starter power supply circuit interrupted	(See page ES-339)
P14AD00	Engine stalling or starter failure to mesh with flywheel	(See page ES-339)
P153800	Ignition angle signal, harness or ECU fault	(See page ES-345)
P152700	First layer safety fuel cutoff monitoring fault	(See page ES-345)
P152800	Second layer safety fuel cutoff monitoring fault	(See page ES-345)
P061C00	Second layer engine speed monitoring fault	(See page ES-345)
P152900	Starter control monitoring fault	(See page ES-345)
P153000	AD converter zero test monitoring fault	(See page ES-345)
P153100	AD converter set voltage test monitoring fault	(See page ES-345)
P157100	Drive stage check fault or communication failure in the shutdown path check	(See page ES-345)
P157200	ABE activated at normal voltage	(See page ES-345)
P157300	Monitoring error response fault	(See page ES-345)
P157400	Errorpin activated with normal monitoring communication	(See page ES-345)
P261000	Engine off timer implausible	(See page ES-345)
P157500	DVE drive cutoff due to overvoltage	(See page ES-345)
P155000	Electronic throttle self-learning condition not met	(See page ES-347)
P155100	Electronic throttle lower limit position initialization self-learning fault	(See page ES-347)
P155600	Throttle mechanical BDC re-self-learning maximum error	(See page ES-347)
P155700	Throttle mechanical BDC re-self-learning ninimum value error	(See page ES-347)
P155800	Deviation of throttle limp home position from initial self-learning value out of limit	(See page ES-347)
P155900	Throttle limp position above upper limit	(See page ES-347)
P155A00	Deviation of throttle limp home position from last self-learning value out of limit	(See page ES-347)
P155B00	Throttle limp position below lower limit	(See page ES-347)
P155400	Return spring stuck in maximum position	(See page ES-350)
P155500	Return spring stuck in minimum position	(See page ES-350)
P156100	DVE position control deviation	(See page ES-350)
P156000	Throttle body PID adjustment out of limit	(See page ES-350)
P15A000	CPU0: MPU fault (register, DSPR, PSPR)	(See page ES-358)
P15A100	CPU0: DCACHE/DSPRECC uncorrectable	(See page ES-358)
P15A200	CPU0: DCACHE/DSPR address failure	(See page ES-358)

DTC	Description	Reference page
P15A300	CPU0: DCACHE TAG SRAM ECC uncorrectable	(See page ES-358)
P15A400	CPU0: DCACHE TAG SRAM address failure	(See page ES-358)
P15A500	CPU0: PCACHE TAGRAM ECC uncorrectable	(See page ES-358)
P15A600	CPU0: PCACHE TAGRAM address failure	(See page ES-358)
P15A700	CPU0: PCACHE/PSPR ECC uncorrectable	(See page ES-358)
P15A800	CPU0: PCACHE/PSPR address failure	(See page ES-358)
P15A900	CPU1: Lockstep comparator fault	(See page ES-358)
P15AA00	CPU1: MPU fault (register, DSPR, PSPR)	(See page ES-358)
P15AB00	CPU1: DCACHE/DSPR ECC uncorrectable	(See page ES-358)
P15AC00	CPU1: DCACHE/DSPR address failure	(See page ES-358)
P15AD00	CPU1: DCACHE TAGRAM ECC uncorrectable	(See page ES-358)
P15AE00	CPU1: DCACHE TAGRAM address failure	(See page ES-358)
P15AF00	CPU1: PCACHE TAGRAM ECC uncorrectable	(See page ES-358)
P15B000	CPU1: PCACHE TAGRAM address failure	(See page ES-358)
P15B100	CPU1: PCACHE/PSPR ECC uncorrectable	(See page ES-358)
P15B200	CPU1:PCACHE/PSPR address failure	(See page ES-358)
P15B300	LMU: SRAM ECC monitoring fault	(See page ES-358)
P15B400	LMU: SRAM ECC uncorrectable	(See page ES-358)
P15B500	LMU: SRAM address failure	(See page ES-358)
P15B600	SMU: Timer0 recovery timeout	(See page ES-358)
P15B700	SMU: Timer1 recovery timeout	(See page ES-358)
P15B800	PMU: PFLASH ECC uncorrectable multiple bit faults	(See page ES-358)
P15B900	PMU: PFLASH address failure	(See page ES-358)
P15BA00	PMU: PFLASH ECC monitoring fault (covering all ECC modules)	(See page ES-358)
P15BB00	PMU: PFLASH EDC comparator failure (covering all PFLASH instances)	(See page ES-358)
P15BC00	SCU/CGU: system PLL OSC_WDT: input clock out of limit	(See page ES-358)
P15BD00	SCU/CGU: system PLL VCO clock event loss	(See page ES-358)
P15BE00	SCU/EVR: EVR 1.3 V digital undervoltage	(See page ES-358)
P15BF00	SCU/EVR: EVR 3.3 V overvoltage	(See page ES-358)
P15C000	SCU/EVR: external power supply overvoltage	(See page ES-358)
P15C100	SCU/WDTS: safety watchdog timeout	(See page ES-358)
P15C200	SCU/WDTCPU0: watchdog CPU0 timeout	(See page ES-358)
P15C300	SCU/WDTCPU1: watchdog CPU1 timeout	(See page ES-358)

DTC	Description	Reference page
P15C400	SCU/CGU: PLL_ERAY VCO clock event loss	(See page ES-358)
P15C500	SCU/WDTCPU2: watchdog CPU2 timeout	(See page ES-358)
P15C600	SCU/ DTS: temperature sensor overflow	(See page ES-358)
P15C700	Registers: fault detected by register monitoring	(See page ES-358)
P15C800	SCU/LSCU: SCU configuration failure: monitoring dual-rail property (reversesignal) from lockstep comparator (LSCU) alarm	(See page ES-358)
P15C900	SCU/CGU: clock monitoring: STM out of frequency range	(See page ES-358)
P15CA00	SCU/CGU: clock monitoring: PLL_ERAY out of frequency range	(See page ES-358)
P15CB00	SCU/CGU: clock monitoring: PLL out of frequency range	(See page ES-358)
P15CC00	SCU/CGU: clock monitoring: SRI out of frequency range	(See page ES-358)
P15CD00	SCU/CGU: clock monitoring: SPB out of frequency range	(See page ES-358)
P15CE00	SCU/CGU: clock monitoring: GTM out of frequency range	(See page ES-358)
P15CF00	SCU/CGU: clock monitoring: ADC out of frequency range	(See page ES-358)
P15D000	GTM: SRAMs uncorrectable	(See page ES-358)
P15D100	FLEXRAY: SRAM address failure	(See page ES-358)
P15D200	Misc SRAMs: SRAM ECC uncorrectable	(See page ES-358)
P15D300	Misc SRAMs: SRAM address failure	(See page ES-358)
P15D400	GTM: SRAMs address failure	(See page ES-358)
P15D500	CAN: SRAM uncorrectable	(See page ES-358)
P15D600	CAN: SRAM address failure	(See page ES-358)
P15D700	FLEXRAY: SRAM ECC uncorrectable	(See page ES-358)
P15D800	CPU2: MPU fault (register, DSPR, PSPR)	(See page ES-358)
P15D900	CPU2: DCACHE/DSPR ECC uncorrectable	(See page ES-358)
P15DA00	CPU2: DCACHE/DSPR address failure	(See page ES-358)
P15DB00	CPU2: DCACHE TAG SRAM ECC uncorrectable	(See page ES-358)
P15DC00	CPU2:DCACHE TAG SRAM address failure	(See page ES-358)
P15DD00	CPU2: 121 PCACHE TAGRAM ECC uncorrectable	(See page ES-358)
P15DE00	CPU2: PCACHE TAGRAM address failure	(See page ES-358)
P15DF00	CPU2: PCACHE/PSPR ECC uncorrectable	(See page ES-358)
P15E000	CPU2 PCACHE/PSPR address failure	(See page ES-358)
P210300	Electronic throttle drive stage fault (short circuit)	(See page ES-365)
P211800	Electronic throttle drive stage fault (overheat or overcurrent)	(See page ES-365)

DTC	Description	Reference page
P210600	Electronic throttle drive stage fault (implausible)	(See page ES-365)
P210000	Electronic throttle drive stage fault (open circuit)	(See page ES-365)
P213800	Electronic accelerator pedal position sensor signal implausible	(See page ES-370)
P212300	Electronic accelerator pedal position sensor 1 signal overvoltage	(See page ES-370)
P212800	Electronic accelerator pedal position sensor 2 signal overvoltage	(See page ES-370)
P212200	Electronic accelerator pedal position sensor 1 signal undervoltage	(See page ES-370)
P212700	Electronic accelerator pedal position sensor 2 signal undervoltage	(See page ES-370)
P214800	1# and 4# cylinder fuel injector high side control circuit overvoltage/undervoltage or 4# cylinder fuel injector low side control circuit overvoltage/undervoltage	(See page ES-376)
P215100	2# and 3# cylinder fuel injector high side control circuit overvoltage/undervoltage or #2 cylinder fuel injector low side control circuit overvoltage/undervoltage	(See page ES-381)
P217700	Air-fuel ratio closed-loop control self-learning value above upper limit (medium load zone)	(See page ES-386)
P217800	Air-fuel ratio closed-loop control self-learning value below lower limit (medium load zone)	(See page ES-386)
P218700	Air-fuel ratio closed-loop control self-learning value above upper limit (idle speed)	(See page ES-386)
P218800	Air-fuel ratio closed-loop control self-learning value below lower limit (idle speed)	(See page ES-386)
P218500	Coolant temperature sensor 2 circuit overvoltage	(See page ES-396)
P218400	Coolant temperature sensor 2 circuit undervoltage	(See page ES-396)
P218324	Coolant temperature sensor 2 cold start check implausible (positive deviation)	(See page ES-396)
P218323	Coolant temperature sensor 2 cold start check implausible (negative deviation)	(See page ES-396)
P222900	Ambient pressure sensor circuit shorted to power supply	(See page ES-401)
P222800	Ambient pressure sensor circuit shorted to ground	(See page ES-401)
P222729	Ambient pressure sensor signal fault	(See page ES-401)
P222722	Ambient pressure sensor pressure implausibly high	(See page ES-401)
P222721	Ambient pressure sensor pressure implausibly low	(See page ES-401)
P222785	Ambient pressure sensor signal pressure value high during starting	(See page ES-401)
P222784	Ambient pressure sensor signal pressure value low during starting	(See page ES-401)

DTC	Description	Reference page
P120200	Ambient pressure sensor pressure above upper limit	(See page ES-401)
P120300	Ambient pressure sensor pressure below lower limit	(See page ES-401)
P223200	Coupling of downstream oxygen sensor signal line to heater wire	(See page ES-403)
P227000	Downstream oxygen sensor aging - signal biased lean continuously	(See page ES-409)
P227100	Downstream oxygen sensor aging - signal biased rick continuously	(See page ES-409)
P227900	Excessive inflation model deviation	(See page ES-412)
P240C00	EVAP system leakage diagnosis DMTL heating unit circuit overvoltage	(See page ES-413)
P240B00	EVAP system leakage diagnosis DMTL heating unit circuit undervoltage	(See page ES-413)
P240A00	EVAP system leakage diagnosis DMTL heating unit circuit open	(See page ES-413)
P24BF00	EVAP system DMTL solenoid valve control circuit overvoltage	(See page ES-413)
P24BE00	EVAP system DMTL solenoid valve control circuit undervoltage	(See page ES-413)
P24BD00	EVAP system DMTL solenoid valve control circuit open	(See page ES-413)
P240200	EVAP system DMTL pump control circuit overvoltage	(See page ES-413)
P240100	EVAP system DMTL pump control circuit undervoltage	(See page ES-413)
P240000	EVAP system DMTL pump control circuit open	(See page ES-413)
P25AB00	Piston cooling nozzle control valve control circuit overvoltage	(See page ES-419)
P25AA00	Piston cooling nozzle control valve control circuit undervoltage	(See page ES-419)
P25A900	Piston cooling nozzle control valve control circuit open	(See page ES-419)
P26E600	Starter relay control circuit overvoltage	(See page ES-424)
P26E500	Starter relay control circuit undervoltage	(See page ES-424)
P061500	Starter relay control circuit fault-control terminal A	(See page ES-424)
P061700	Starter relay control circuit overvoltage	(See page ES-424)
P061600	Starter relay control circuit undervoltage	(See page ES-424)
P26E400	Starter relay control circuit fault-control terminal B	(See page ES-424)
P063441	Starter drive chip 1 overheating	(See page ES-424)
P063444	Starter drive chip 2 overheating	(See page ES-424)
P150000	Collision and fuel cutoff signal received by vehicle	(See page ES-429)

DTC	Description	Reference page
P150100	Airbag communication information implausible	(See page ES-429)
P150200	Collision and fuel cutoff signal received by vehicle	(See page ES-429)
P150300	Airbag signal implausible	(See page ES-429)
P138824	Ambient temperature sensor cold start check implausible (positive deviation)	(See page ES-432)
P138823	Ambient temperature sensor cold start check implausible (negative deviation)	(See page ES-432)
P007300	Ambient temperature sensor circuit overvoltage	(See page ES-432)
P007200	Ambient temperature sensor circuit undervoltage	(See page ES-432)
P007000	Lost communication with ambient temperature sensor CAN	(See page ES-432)
P003300	Turbocharger relief valve control circuit open	(See page ES-435)
P003400	Turbocharger relief valve control circuit undervoltage	(See page ES-435)
P003500	Turbocharger relief valve control circuit overvoltage	(See page ES-435)
P226100	Turbocharger relief valve mechanical fault	(See page ES-435)
P12C400	Crankcase ventilation pipe 2 diagnostic circuit voltage high	(See page ES-440)
P12C500	Crankcase ventilation pipe 2 diagnostic circuit voltage low	(See page ES-440)
P261D00	Turbocharger electronic coolant pump control circuit overvoltage	(See page ES-444)
P261C00	Turbocharger electronic coolant pump control circuit undervoltage/implausibility	(See page ES-444)
P261A00	Turbocharger electronic coolant pump control circuit open	(See page ES-444)
U012100	Lost communication with ABS module	(See page ES-448)
U041500	ABS module communication Check Sum/ Rolling Counter fault	(See page ES-448)
U015100	Lost communication with ACU module	(See page ES-448)
U010F00	Lost communication with A/C module	(See page ES-448)
U007300	CAN bus 1 OFF	(See page ES-448)
U025900	Lost communication with multiple DMS	(See page ES-448)
U01B000	Lost communication with EBS module	(See page ES-448)
U041600	ESP module communication Check Sum/ Rolling Counter fault	(See page ES-448)
U014600	Lost communication with GW module	(See page ES-448)
U015500	Lost communication with ICM or abnormal signal	(See page ES-448)
U012600	Lost communication with SAS module	(See page ES-448)
U042800	SAS module communication Check Sum/ Rolling Counter fault	(See page ES-448)

DTC	Description	Reference page
U010100	Lost communication with TCM module	(See page ES-448)
U040200	TCM communication Check Sum/Rolling Counter fault	(See page ES-448)

DTC	P000A00	Intake VVT operation fault (retarded)
DTC	P003C00	Intake VVT operation fault (stuck)
DTC	P001000	Intake VVT control circuit open
DTC	P001676	Crankshaft-Intake camshaft initial installation position implausible (Bank1)
DTC	P001678	Excessive relative position deviation between crankshaft and intake camshaft (Bank1)
DTC	P208800	Intake VVT control circuit undervoltage
DTC	P208900	Intake VVT control circuit overvoltage
DTC	P001100	Intake camshaft locking position operation implausible

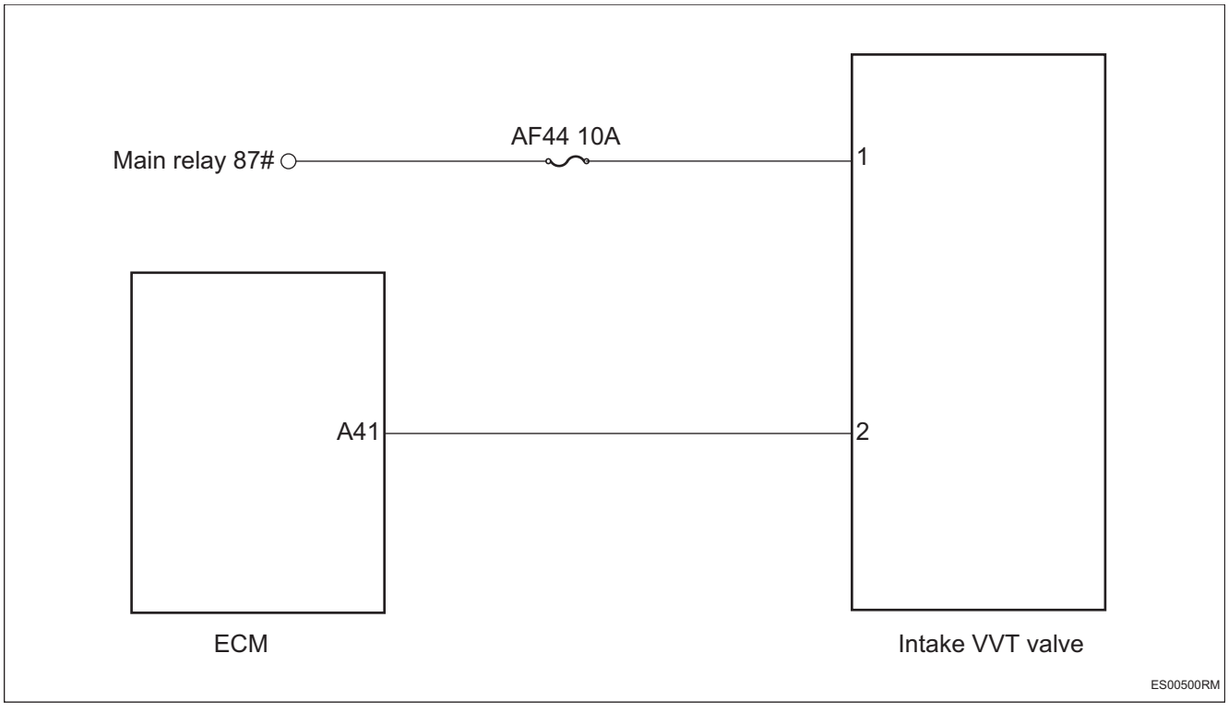
Description

The VVT system adjusts the intake and exhaust valve timing to improve handling performance. ECM changes the oil passage through the solenoid valve, and use the oil pressure to turn the camshaft regulator to adjust the valve timing. When ECM applies 12 V voltage to the solenoid valve, the valve moves. ECM changes the excitation time (duty ratio) of the solenoid valve according to the camshaft position, crankshaft position, throttle position, etc.

DTC	DTC detection conditions	Faulty location
P000A00	(a) The VVT actual position has poor consistency with the target position.	• OCV • Intake camshaft regulator with sprocket assembly • Intake VVT valve • Insufficient oil pressure
P003C00	(a) VVT actual position failure to move near the target position.	• OCV • Intake camshaft regulator with sprocket assembly • Intake VVT valve • Insufficient oil pressure
P001000	(a) Drive channel self-diagnosing fault.	• ECM • Harness and connector • Intake VVT valve
P001676	(a) The absolute value of the self-learning deviation of the relative position between the intake camshaft and the crankshaft is greater than 20 degrees of crank angle.	• Valve timing
P001678	(a) The absolute value of offset deviation between the intake camshaft and the crankshaft is greater than 15 degrees of crank angle.	• Valve timing

DTC	DTC detection conditions	Faulty location
P208800	(a) Drive channel self-diagnosing fault.	• ECM • Harness and connector • Intake VVT valve
P208900	(a) Drive channel self-diagnosing fault.	• ECM • Harness and connector • Intake VVT valve
P001100	(a) When starting, the deviation between intake camshaft and locking position exceeds the threshold value.	• Valve timing • OCV • Harness and connector • Intake camshaft regulator with sprocket assembly • Intake VVT valve

Circuit diagram



Inspection procedure

Hint:

The system will also produce DTC when the spool valve is not working well due to the quality of engine oil and the adhesion of foreign body such as sludge.

1	Check intake VVT valve fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the intake VVT valve fuse.

(d) Measure the resistance according to the values in the table below.

Standard value

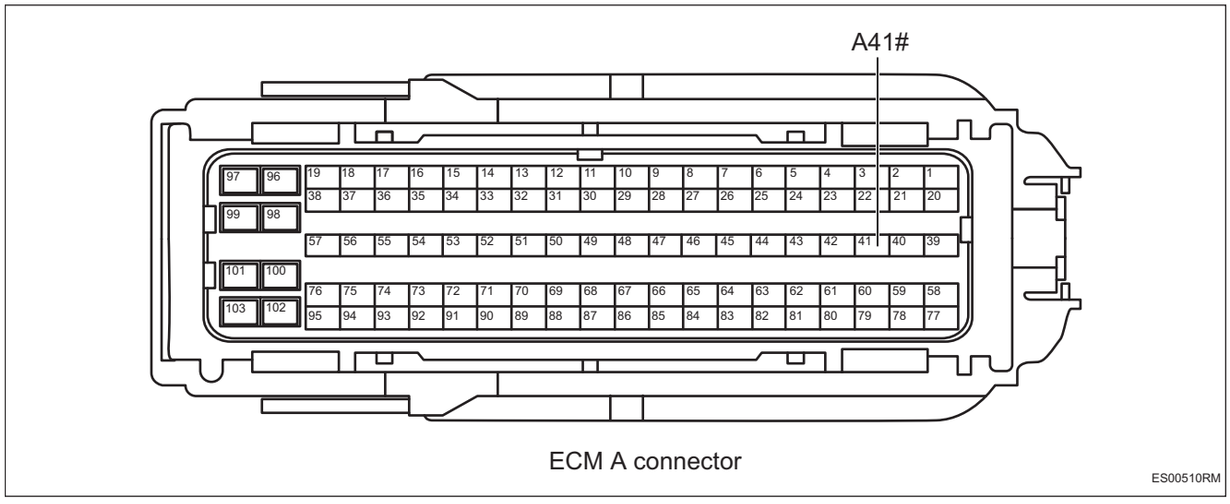
Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

ES

NG → **Replace fuse**

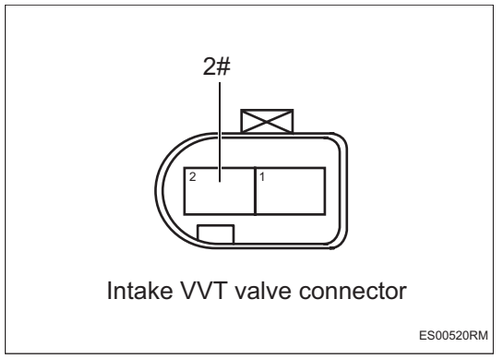
OK

2	Check intake VVT valve harness and connector for open circuit



ECM A connector

ES00510RM



Intake VVT valve connector

ES00520RM

(a) Disconnect the ECM connector.

(b) Disconnect the intake VVT valve connector.

(c) Measure the resistance according to the values in the table below.

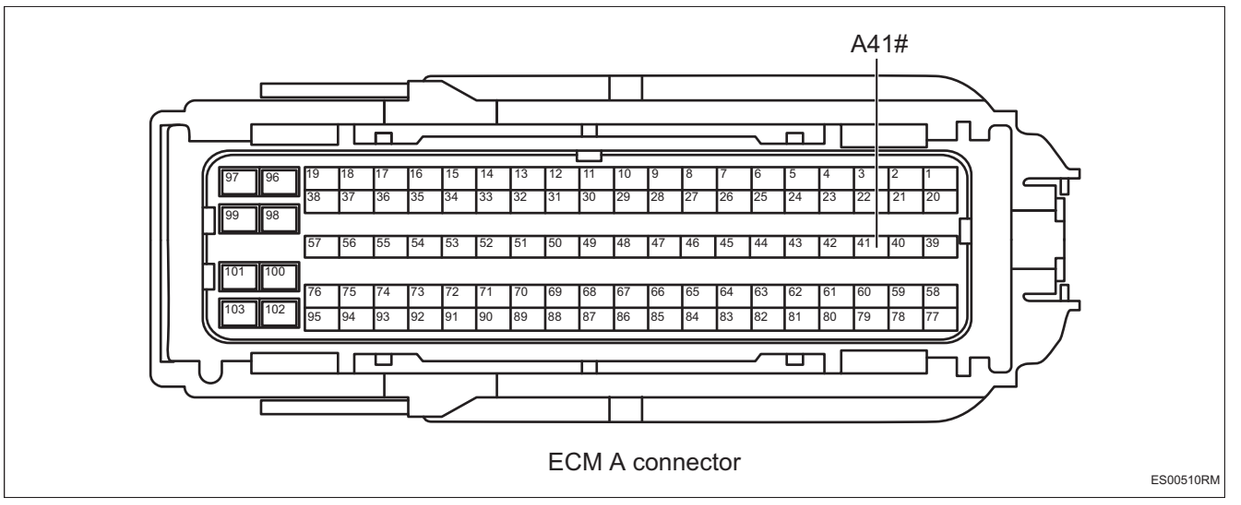
Standard value

Detector connection	Detection conditions	Specified state
ECM connection A41# -intake VVT valve connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check intake VVT valve harness and connector for circuit shorted to ground



ECM A connector

ES00510RM

(a) Measure the resistance according to the values in the table below.

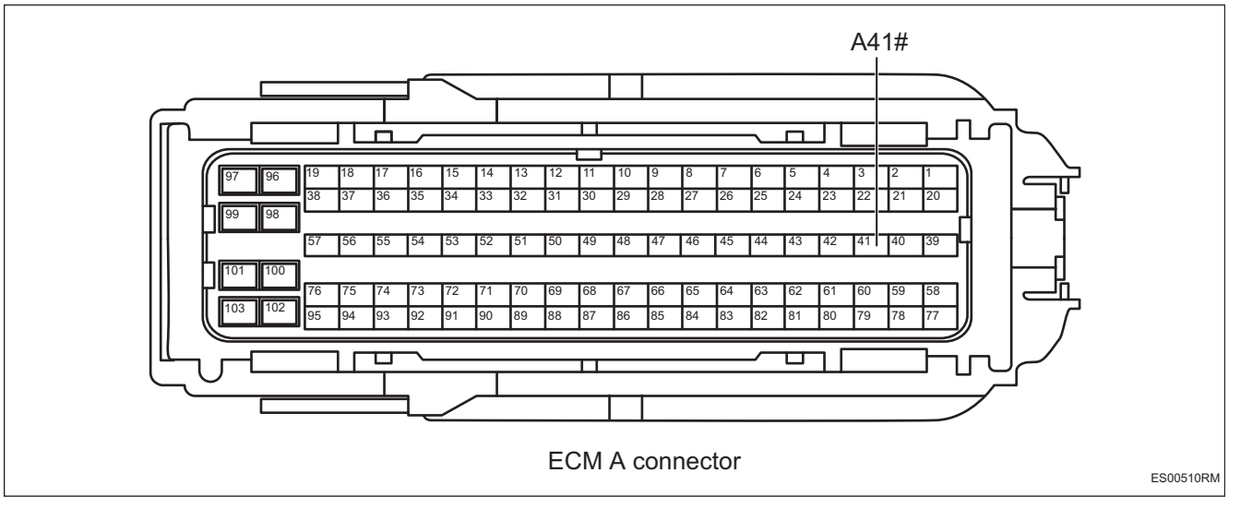
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A41# - body GND	Always connected	10KΩ or greater

NG **Repair or replace the harness and connector**

OK

4	Check intake VVT valve harness and connector for circuit shorted to power supply



ECM A connector

ES00510RM

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

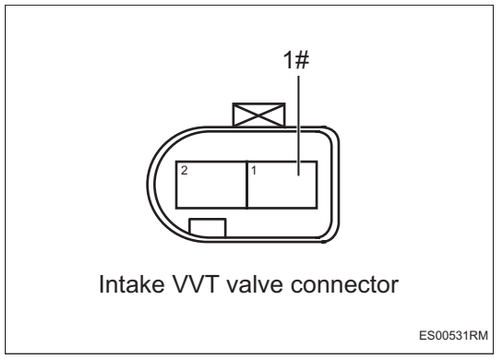
Detector connection	Detection conditions	Specified state
ECM connector A41# - body GND	Set the ignition switch to "ON"	Less than 1 V

ES

NG → **Repair or replace the harness and connector**

OK

5	Check intake VVT valve power supply



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Connect ECM connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the voltage according to the values in the table below.

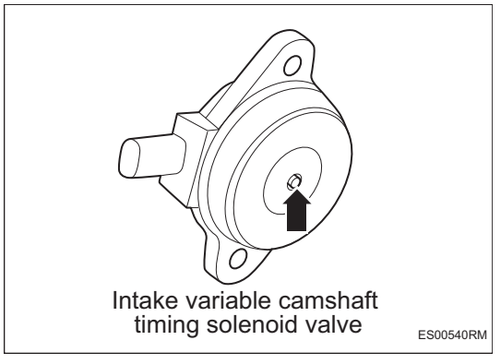
Standard value

Detector connection	Detection conditions	Specified state
Intake VVT valve connector 1# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector and relay**

OK

6	Check intake VVT valve



(a) Measure the intake VVT valve resistance.

Standard value:

5.5~7.1 Ω (20 ℃).

(b) Remove the intake VVT valve.

(c) Apply battery positive voltage to terminal 1 and negative voltage to terminal 2 to check spool valve movement.

Criteria:

Power supply: extend; Power supply stop: retract. (Place the solenoid valve upwards)

NG → **Repair or replace the intake VVT valve (See page ES-464)**

OK

7	Check lubrication system pressure

(a) Check whether the lubrication system is blocked or leaking.

(b) Measure the oil pressure according to the values in the table below.

Standard value

Description	Detection conditions (oil temperature 85 ℃)	Specified state
Oil pressure	Idle working conditions	⩾ 100kPa
	2000r/min	⩾ 150kPa
	4000r/min	⩾ 350kPa

NG → **Repair or replace. Repair according to the fault**

OK

8	Check OCV control valve

(a) Check the OCV control valve for stuck or damage.

NG → **Repair or replace the OCV control valve (See page EM-12)**

OK

9	**Check intake camshaft regulator with sprocket assembly**

(a) Check whether the intake camshaft regulator with sprocket assembly is damaged.

NG → **Replace the intake camshaft regulator & sprocket assembly (See page EM-12)**

OK

10	**Check valve timing**

(a) Check whether the timing chain is loose and slipping.

(b) Check whether the camshaft and crankshaft are installed correctly.

(c) Turn the crankshaft to check whether the valve timing is correct.

NG → **Repair or adjust valve timing**

OK

11	**Replace the ECM (See page ES-450)**

DTC	P000B00	Exhaust VVT operation fault (retarded)
DTC	P005A00	Exhaust VVT operation fault (stuck)
DTC	P001300	Exhaust VVT control circuit open
DTC	P001776	Crankshaft-exhaust camshaft initial installation position implausible (Bank1)
DTC	P001778	Excessive relative position deviation between crankshaft and exhaust camshaft (Bank1)
DTC	P209000	Exhaust VVT control circuit undervoltage
DTC	P209100	Exhaust VVT control circuit overvoltage
DTC	P001400	Exhaust camshaft locking position operation implausible

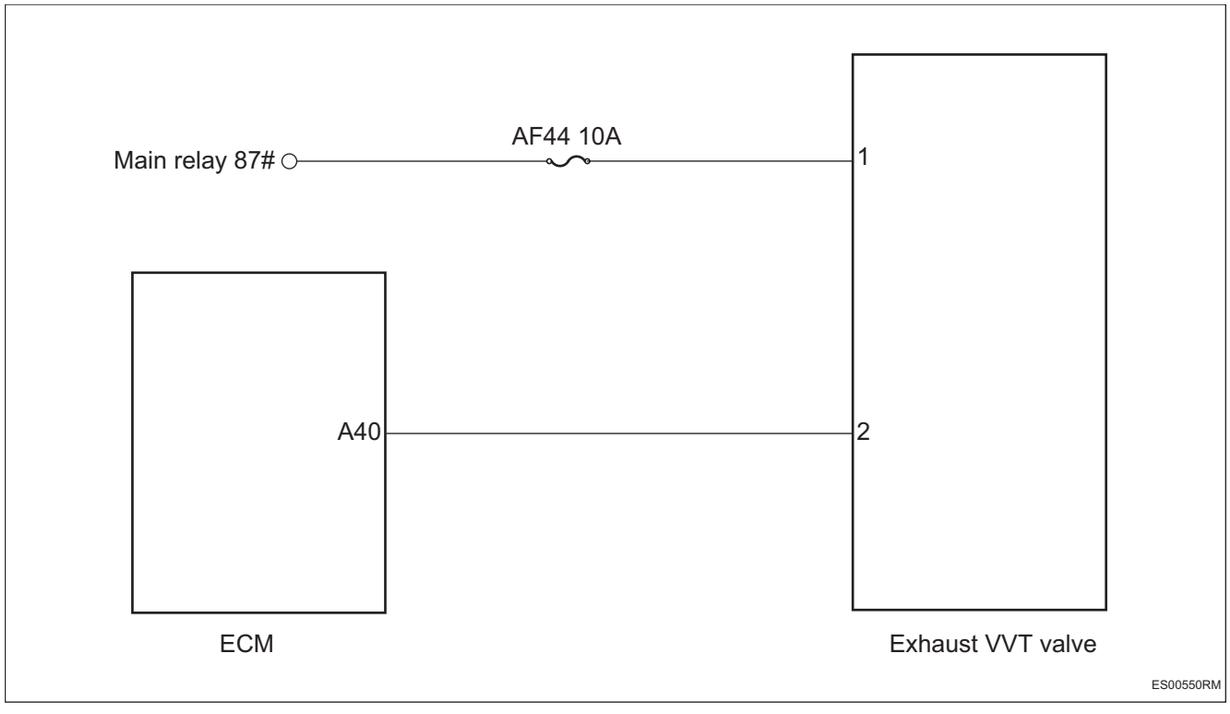
Description

The VVT system adjusts the intake and exhaust valve timing to improve handling performance. ECM changes the oil passage through the solenoid valve, and use the oil pressure to turn the camshaft regulator to adjust the valve timing. When ECM applies 12 V voltage to the solenoid valve, the valve moves. ECM changes the excitation time (duty ratio) of the solenoid valve according to the camshaft position, crankshaft position, throttle position, etc.

DTC	DTC detection conditions	Faulty location
P000B00	(a) The VVT actual position has poor consistency with the target position.	• OCV • Exhaust camshaft regulator with sprocket assembly • Exhaust VVT valve • Insufficient oil pressure
P005A00	(a) VVT actual position failure to move near the target position.	• OCV • Exhaust camshaft regulator with sprocket assembly • Exhaust VVT valve • Insufficient oil pressure
P001300	(a) Drive channel self-diagnosing fault.	• ECM • Harness and connector • Exhaust VVT valve
P001776	(a) The absolute value of the self-learning deviation of the relative position between the exhaust camshaft and the crankshaft is greater than 20 degrees of crank angle.	• Valve timing
P001778	(a) The absolute value of the offset deviation between the exhaust camshaft and the crankshaft is greater than 15 degrees of crank angle.	• Valve timing

DTC	DTC detection conditions	Faulty location
P209000	(a) Drive channel self-diagnosing fault.	• ECM • Harness and connector • Exhaust VVT valve
P209100	(a) Drive channel self-diagnosing fault.	• ECM • Harness and connector • Exhaust VVT valve
P001400	(a) When starting, the deviation between exhaust camshaft and locking position exceeds the threshold value.	• Valve timing • OCV • Harness and connector • Exhaust camshaft regulator with sprocket assembly • Exhaust VVT valve

Circuit diagram



Inspection procedure

Hint:

The system will also produce DTC when the spool valve is not working well due to the quality of engine oil and the adhesion of foreign body such as sludge.

1	Check exhaust VVT valve fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the exhaust VVT valve fuse.

(d) Measure the resistance according to the values in the table below.

ES

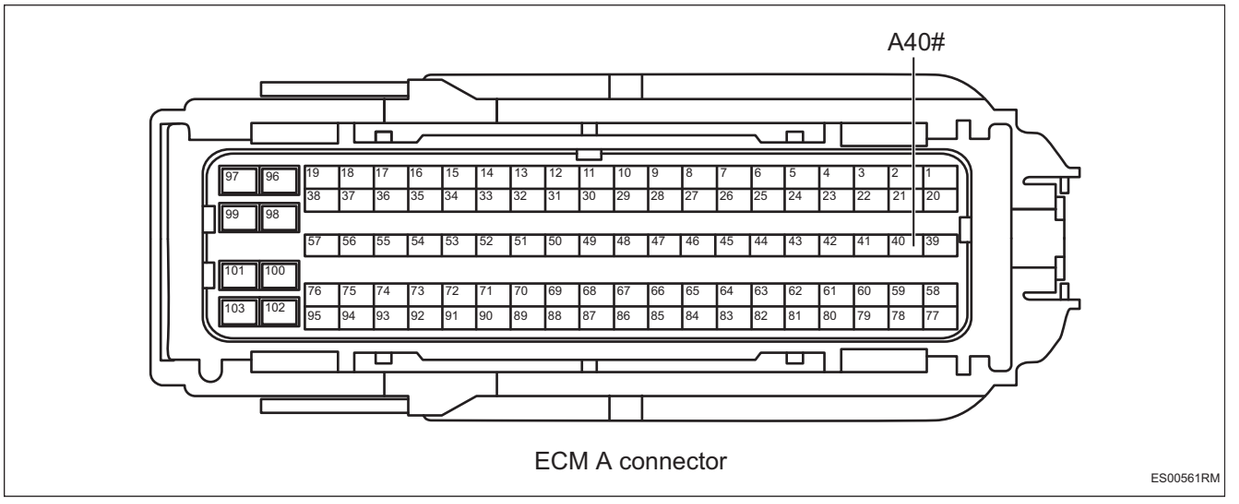
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

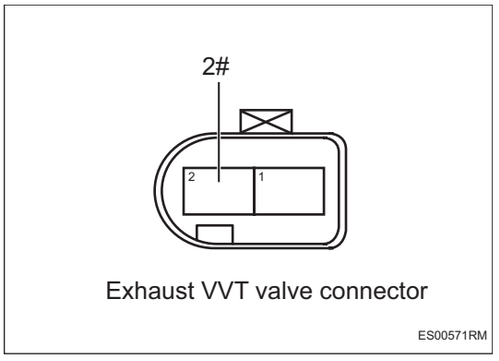
OK

2	Check exhaust VVT valve harness and connector for open circuit



ECM A connector

ES00561RM



Exhaust VVT valve connector

ES00571RM

(a) Disconnect the ECM connector.

(b) Disconnect the exhaust VVT valve connector.

(c) Measure the resistance according to the values in the table below.

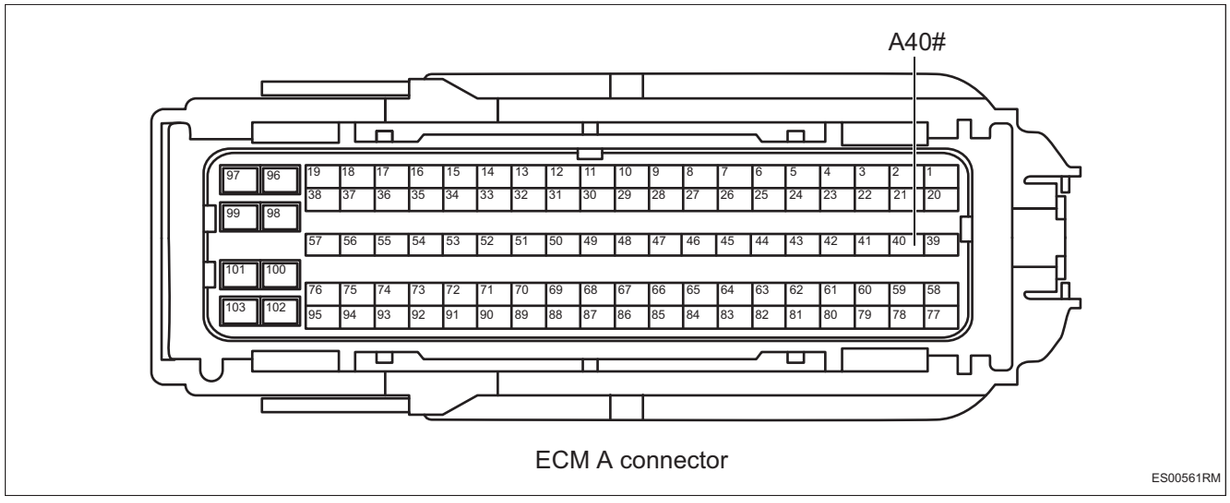
Standard value

Detector connection	Detection conditions	Specified state
ECM connection A40# -exhaust VVT valve connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check exhaust VVT valve harness and connector for circuit shorted to ground



ECM A connector

ES00561RM

(a) Measure the resistance according to the values in the table below.

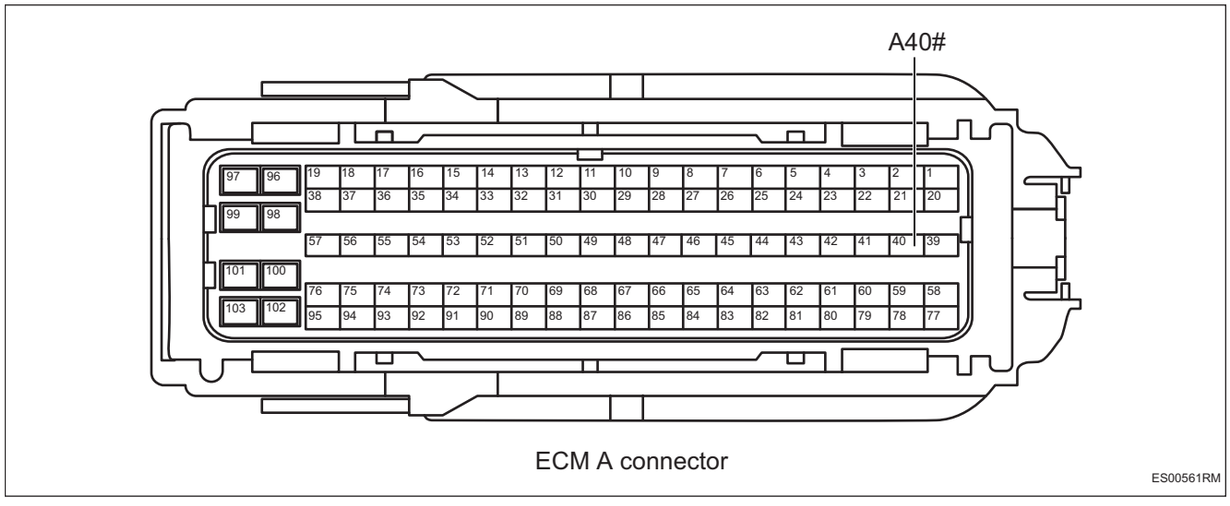
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A40# - body GND	Always connected	10KΩ or greater

NG **Repair or replace the harness and connector**

OK

4	Check exhaust VVT valve harness and connector for circuit shorted to power supply



ECM A connector

ES00561RM

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

ES

(d) Measure the voltage according to the values in the table below.

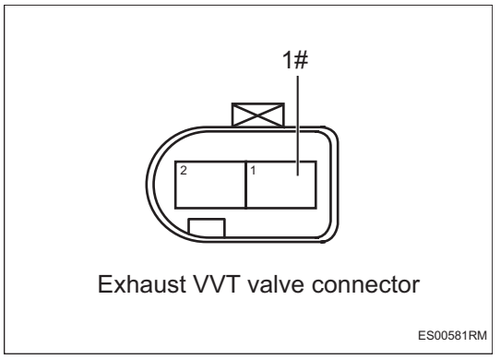
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A40# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Check exhaust VVT valve power supply



Exhaust VVT valve connector

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Connect ECM connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the voltage according to the values in the table below.

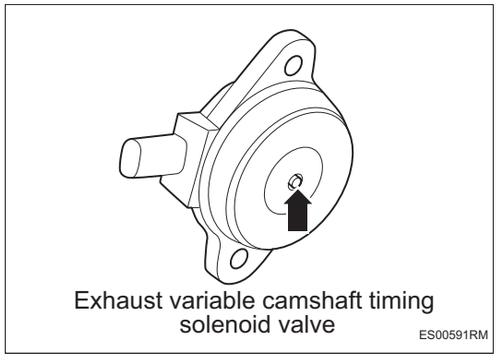
Standard value

Detector connection	Detection conditions	Specified state
Exhaust VVT valve connector 1# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector and relay**

OK

6	Check exhaust VVT valve


Exhaust variable camshaft timing solenoid valve
ES00591RM

(a) Measure the exhaust VVT valve resistance.

Standard value:

5.5~7.1 Ω (20 ℃).

(b) Remove the exhaust VVT valve.

(c) Apply battery positive voltage to terminal 1 and negative voltage to terminal 2 to check spool valve movement.

Criteria:

Power supply: extend; Power supply stop: retract. (Place the solenoid valve upwards)

NG → **Repair or replace the exhaust VVT valve (See page ES-464)**

OK

7	Check lubrication system pressure

(a) Check whether the lubrication system is blocked or leaking.

(b) Measure the oil pressure according to the values in the table below.

Standard value

Description	Detection conditions (oil temperature 85 ℃)	Specified state
Oil pressure	Idle working conditions	⩾ 100kPa
	2000r/min	⩾ 150kPa
	4000r/min	⩾ 350kPa

NG → **Repair or replace. Repair according to the fault**

OK

8	Check OCV control valve

(a) Check the OCV control valve for stuck or damage.

NG → **Repair or replace the OCV control valve (See page EM-12)**

OK

9	**Check exhaust camshaft regulator with sprocket assembly**

ES

(a) Check whether the exhaust camshaft regulator with sprocket assembly is damaged.

NG → **Replace the exhaust camshaft regulator & sprocket assembly (See page EM-12)**

OK

10	**Check valve timing**

(a) Check whether the timing chain is loose and slipping.

(b) Check whether the camshaft and crankshaft are installed correctly.

(c) Turn the crankshaft to check whether the valve timing is correct.

NG → **Repair or adjust valve timing**

OK

11	**Replace the ECM (See page ES-450)**

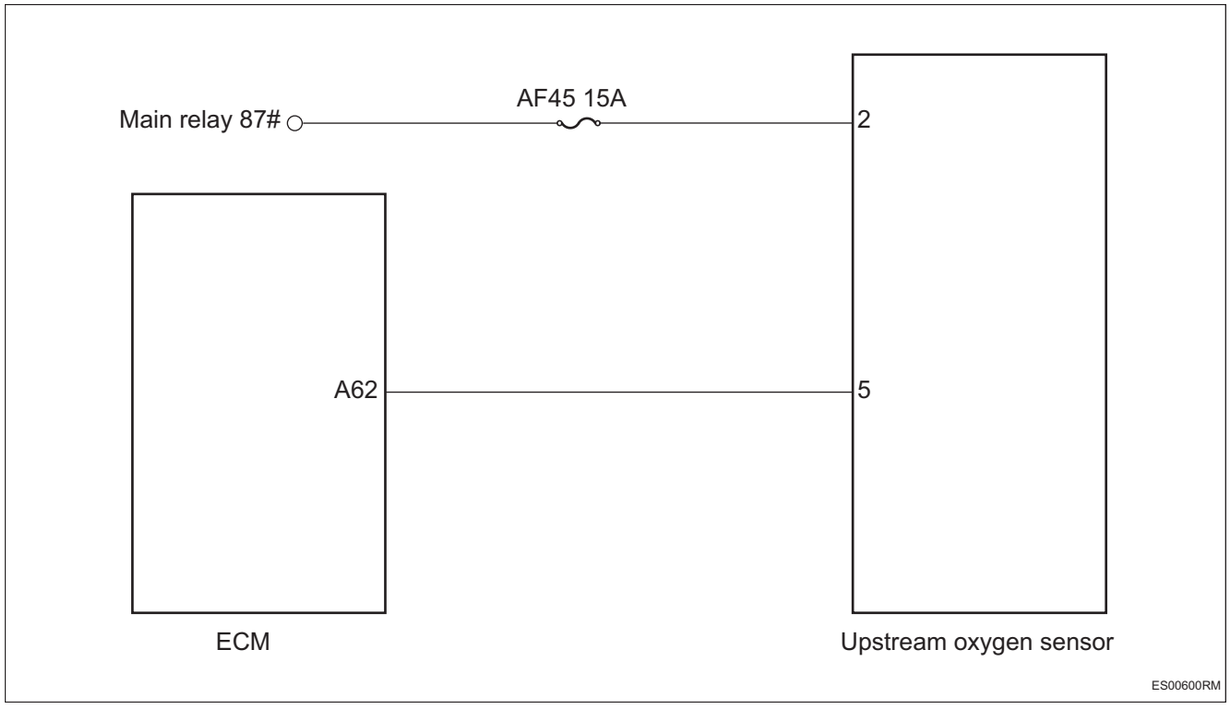
DTC	P003000	Upstream oxygen sensor heater control circuit open
DTC	P003100	Upstream oxygen sensor heater control circuit undervoltage
DTC	P003200	Upstream oxygen sensor heater control circuit overvoltage

Description

When the heating circuit of the upstream oxygen sensor is shorted or open, the ECM will record the DTC.

DTC	DTC detection conditions	Faulty location
P003000	(a) Drive channel self-diagnosing fault.	• ECM • Harness and connector • Upstream oxygen sensor
P003100	(a) Drive channel self-diagnosing fault.	• ECM • Harness and connector • Upstream oxygen sensor
P003200	(a) Drive channel self-diagnosing fault.	• ECM • Harness and connector • Upstream oxygen sensor

Circuit diagram



Inspection procedure

1	Check the upstream oxygen sensor fuse

ES

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the upstream oxygen sensor fuse.

(d) Measure the resistance according to the values in the table below.

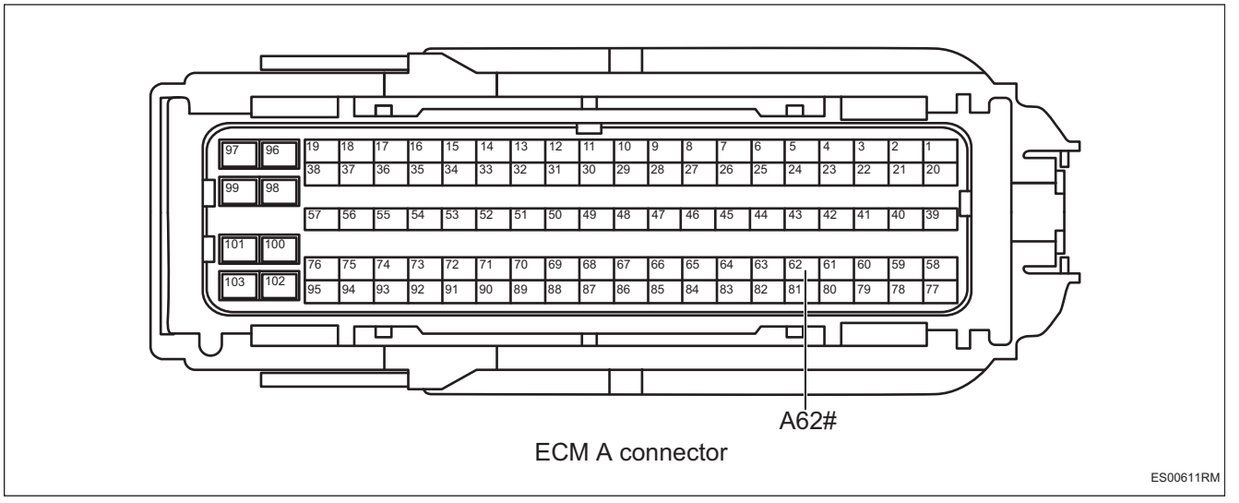
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Repair or adjust and replace the fuse**

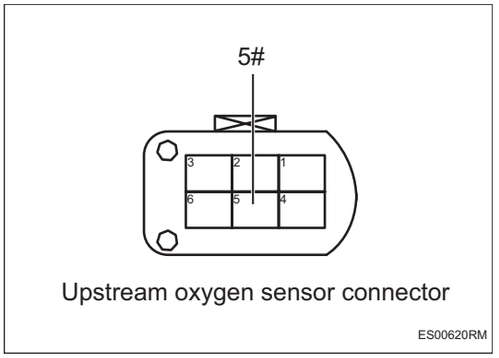
OK

2	Check upstream oxygen sensor harness and connector for open circuit



ECM A connector

ES00611RM



Upstream oxygen sensor connector

ES00620RM

(a) Disconnect the ECM connector.

(b) Disconnect the upstream oxygen sensor connector.

(c) Measure the resistance according to the values in the table below.

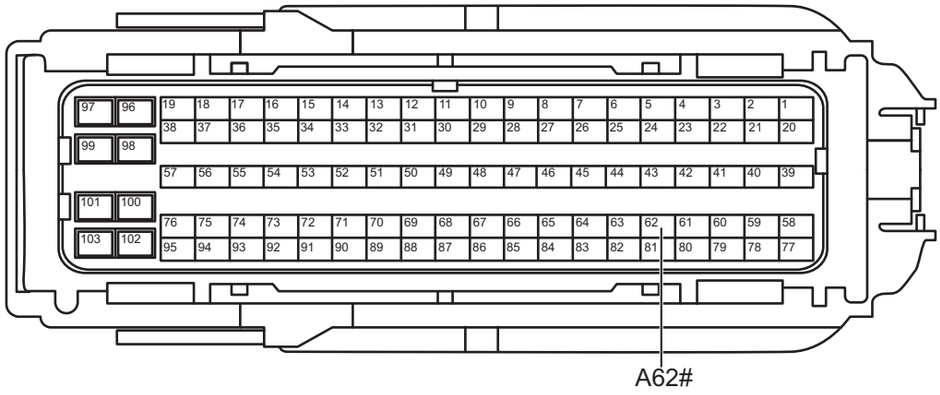
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A62# - upstream oxygen sensor connector 5#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check upstream oxygen sensor harness and connector for circuit shorted to ground



ECM A connector

ES00611RM

(a) Measure the resistance according to the values in the table below.

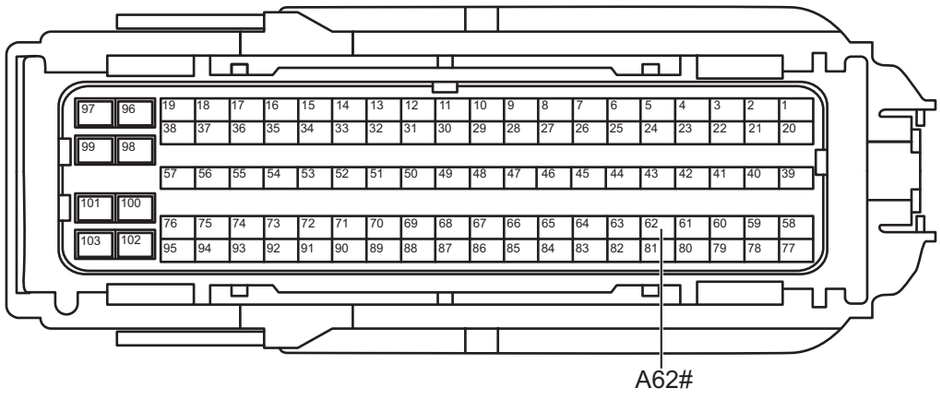
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A62# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

4	Check upstream oxygen sensor harness and connector for circuit shorted to power supply



ECM A connector

ES00611RM

ES

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

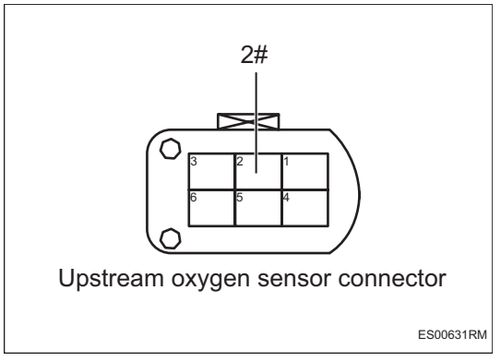
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A62# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Check the upstream oxygen sensor power supply



Upstream oxygen sensor connector

ES00631RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Connect ECM connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Upstream oxygen sensor connector 2# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector and relay**

OK

6	Replace the upstream oxygen sensor (See page ES-455)

(a) Replace the upstream oxygen sensor.

(b) Connect the HQ-VDS .

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG	**Repair or replace the ECM (See page ES-450)**

ES

OK

7	**End**

ES

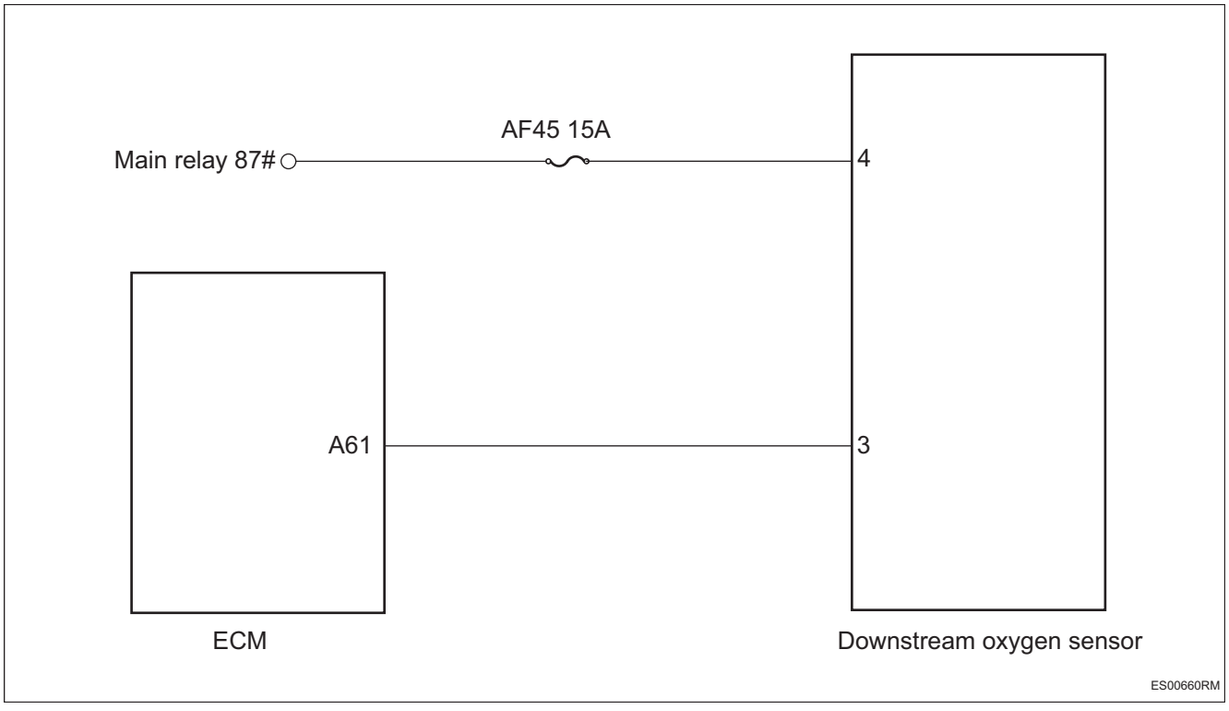
DTC	P003600	Downstream oxygen sensor heater control circuit open
DTC	P003700	Downstream oxygen sensor heater control circuit undervoltage
DTC	P003800	Downstream oxygen sensor heater control circuit overvoltage

Description

When the heating circuit of the downstream oxygen sensor is shorted or open, the ECM will record the DTC.

DTC	DTC detection conditions	Faulty location
P003600	(a) Drive channel self-diagnosing fault.	• ECM • Harness and connector • Downstream oxygen sensor
P003700	(a) Drive channel self-diagnosing fault.	• ECM • Harness and connector • Downstream oxygen sensor
P003800	(a) Drive channel self-diagnosing fault.	• ECM • Harness and connector • Downstream oxygen sensor

Circuit diagram



Inspection procedure

1	Check the downstream oxygen sensor fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the downstream oxygen sensor fuse.

(d) Measure the resistance according to the values in the table below.

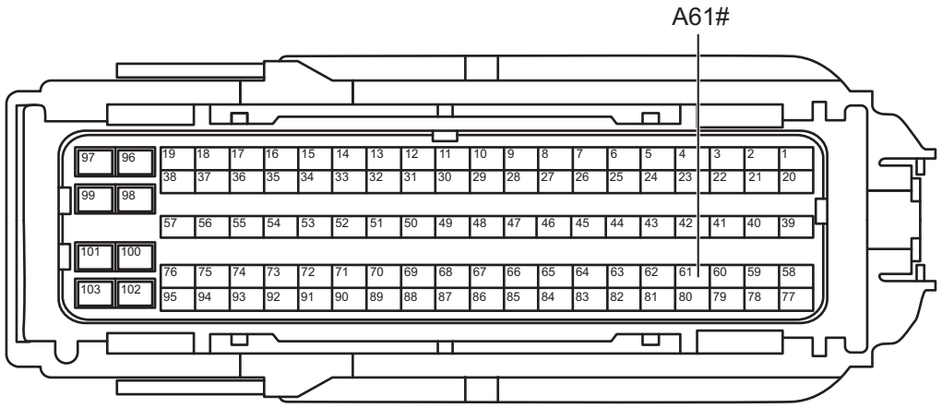
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

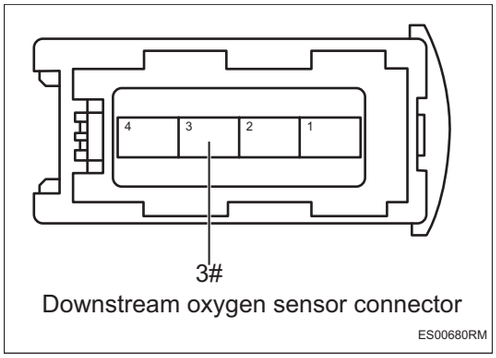
OK

2 Check downstream oxygen sensor harness and connector for open circuit



ECM A connector

ES00671RM



Downstream oxygen sensor connector

ES00680RM

(a) Disconnect the ECM connector.

(b) Disconnect the downstream oxygen sensor connector.

(c) Measure the resistance according to the values in the table below.

Standard value

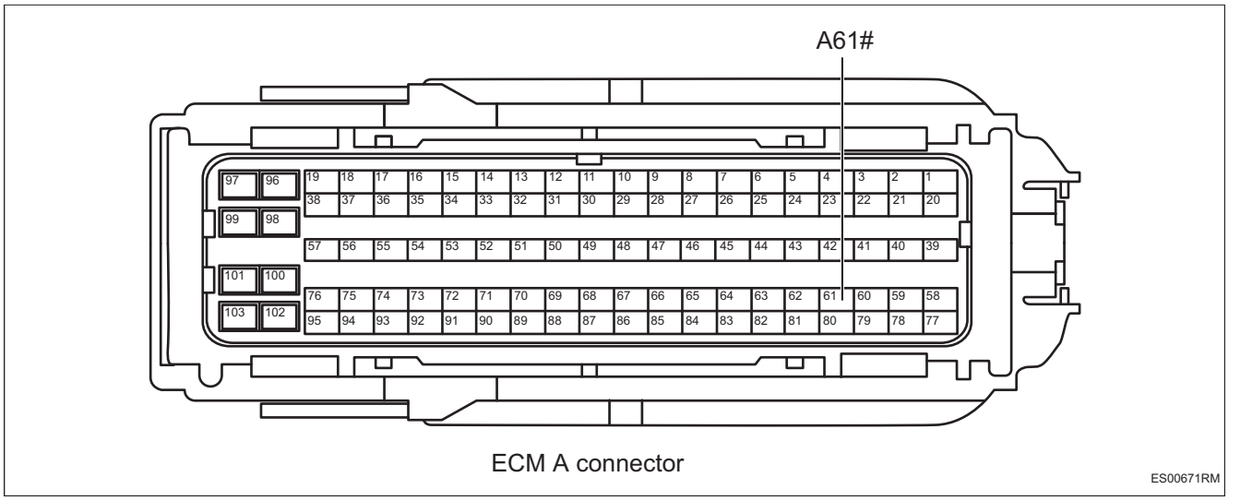
Detector connection	Detection conditions	Specified state
ECM connector A61# - downstream oxygen sensor connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check downstream oxygen sensor harness and connector for circuit shorted to ground**

ES



ECM A connector

ES00671RM

(a) Measure the resistance according to the values in the table below.

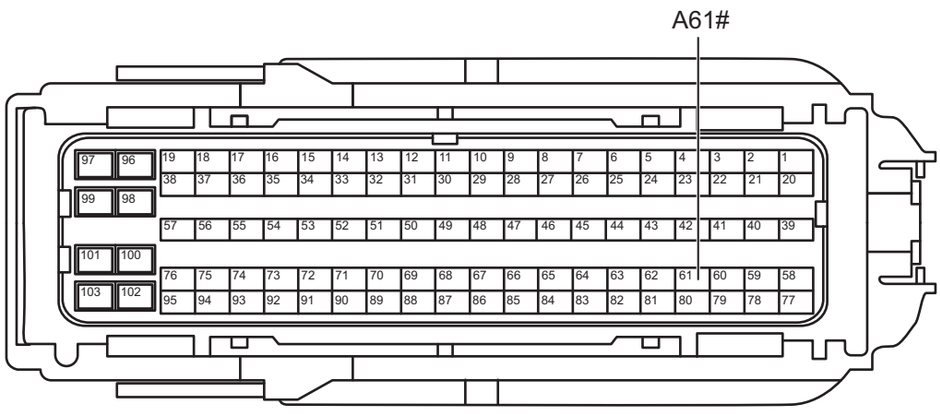
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A61# - body GND	Always connected	10KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check downstream oxygen sensor harness and connector for circuit shorted to power supply**



ECM A connector

ES00671RM

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

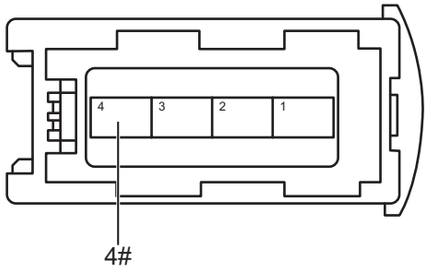
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A61# - body GND	Set the ignition switch to "ON"	Less than 1V

NG **Repair or replace the harness and connector**

OK

5	Check the downstream oxygen sensor power supply



Downstream oxygen sensor connector

ES00691RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Connect ECM connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Downstream oxygen sensor connector 4# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector and relay**

OK

6	**Replace the downstream oxygen sensor (See page ES-457)**

(a) Replace the downstream oxygen sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

7	**End**

DTC	P003A22	Turbocharger electronic wastegate initial zero self-learning above upper limit
DTC	P003A21	Turbocharger electronic wastegate initial zero self-learning below lower limit
DTC	P003A72	Turbocharger electronic wastegate zero self-learning above upper limit
DTC	P003A73	Turbocharger electronic wastegate zero self-learning below lower limit
DTC	P024477	Deviation between turbocharger electronic wastegate target position and actual position out of limit
DTC	P024437	Turbocharger electronic wastegate duty cycle out of limit
DTC	P256400	Turbocharger electronic wastegate position sensor undervoltage
DTC	P256500	Turbocharger electronic wastegate position sensor overvoltage
DTC	P170300	Turbocharger wastegate control circuit communication failure
DTC	P024300	Turbocharger wastegate control circuit open
DTC	P024600	Turbocharger wastegate control circuit overvoltage or undervoltage

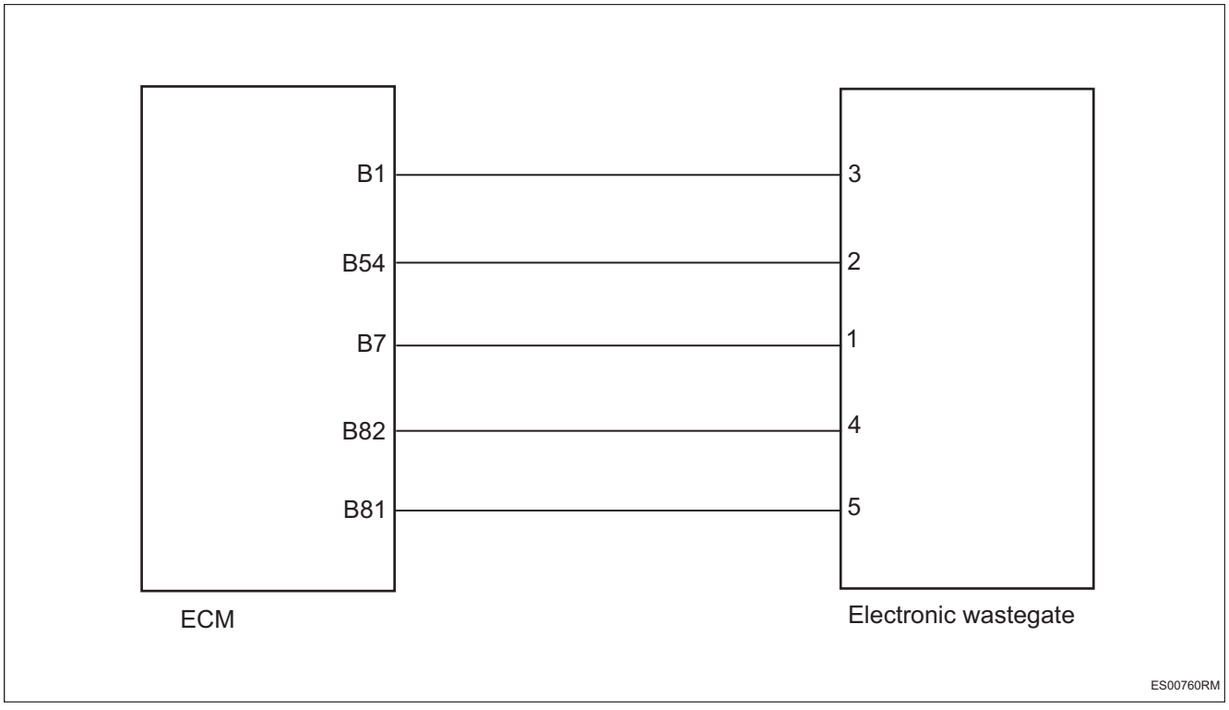
Description

When the electronic wastegate working signal is abnormal and the circuit fails, the ECM records DTC.

DTC	DTC detection conditions	Faulty location
P003A22	(a) The first learned zero voltage above upper limit.	• Electronic wastegate • Turbocharger
P003A21	(a) The first learned zero voltage below lower limit.	• Electronic wastegate • Turbocharger
P003A72	(a) Learned zero voltage above upper limit.	• Electronic wastegate • Turbocharger
P003A73	(a) Learned zero voltage below lower limit.	• Electronic wastegate • Turbocharger
P024477	(a) Deviation of turbocharger electronic wastegate target position from actual position above threshold.	• ECM • Harness and connector • Electronic wastegate

DTC	DTC detection conditions	Faulty location
P024437	(a) Turbocharger electronic wastegate control duty cycle out of limit value.	• ECM • Harness and connector • Electronic wastegate
P256400	(a) Turbocharger electronic wastegate position sensor voltage below limit.	• ECM • Harness and connector • Electronic wastegate
P256500	(a) Turbocharger electronic wastegate position sensor voltage above limit.	• ECM • Harness and connector • Electronic wastegate
P170300	(a) Turbocharger wastegate control circuit SPI communication failure.	• ECM • Harness and connector • Electronic wastegate
P024300	(a) Drive channel self-diagnosing fault.	• ECM • Harness and connector • Electronic wastegate
P024600	(a) Drive channel self-diagnosing fault.	• ECM • Harness and connector • Electronic wastegate

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Read and save the DTC freeze frame information.

(d) Record and clear the DTC.

(e) Check whether the DTC appears again.

Results

ES

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

2	Check the electronic wastegate

(a) Check whether the electronic wastegate is stuck.

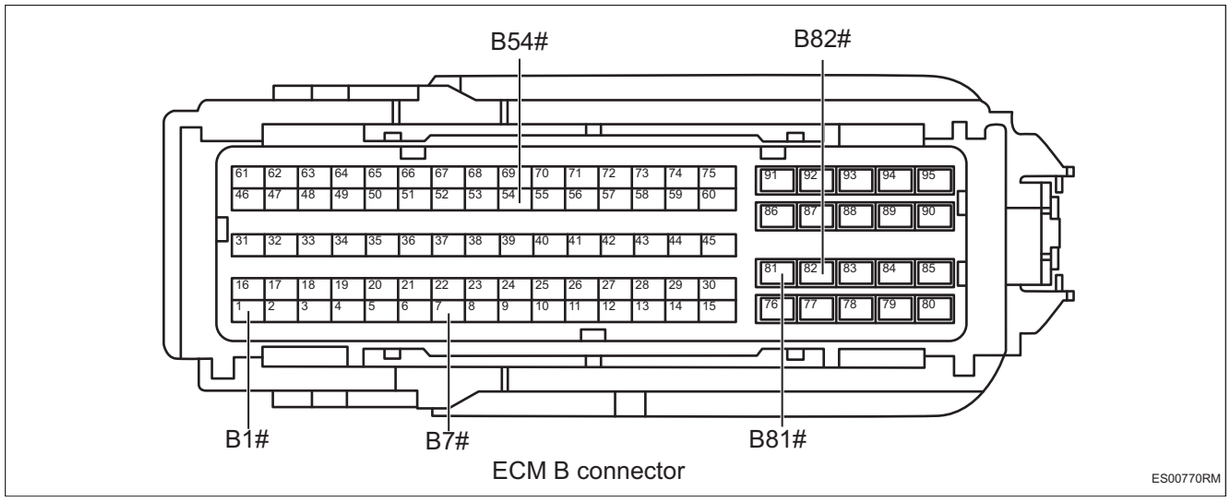
(b) Check whether the electronic wastegate link is loose and falls off.

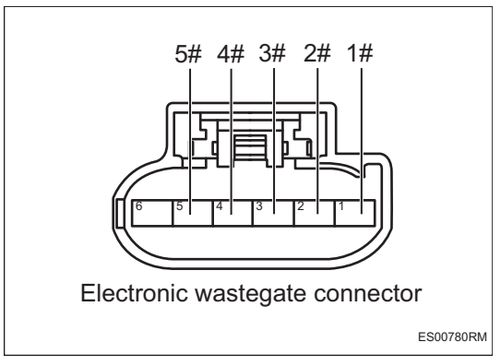
(c) Manually push the turbocharger to the closed position, read whether the position voltage is within the normal range, and confirm whether it is random failure.

NG → **Repair according to the fault**

OK

3	Check the electronic wastegate harness and the connector for open circuit





Electronic wastegate connector

ES00780RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the electronic wastegate connector.

(e) Measure the resistance according to the values in the table below.

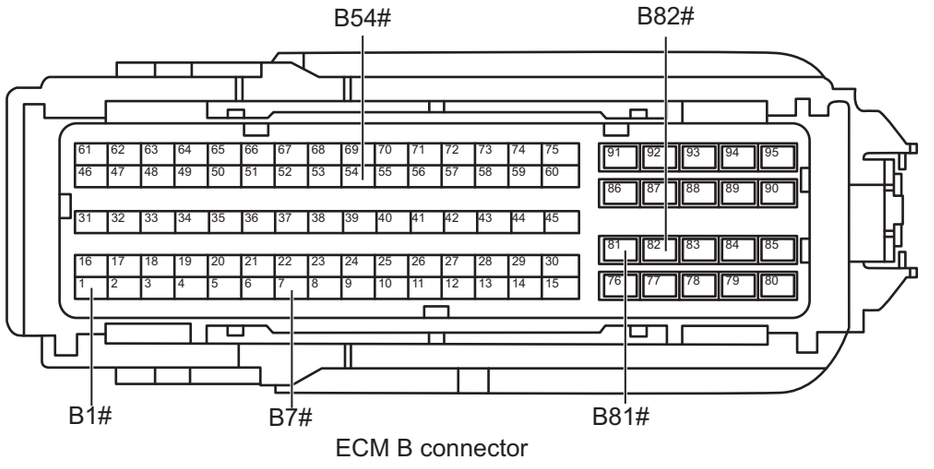
Standard value

Detector connection	Detection conditions	Specified state
Electronic wastegate connector 1# - ECM connector B7#	Always connected	Less than 1Ω
Electronic wastegate connector 2# - ECM connector B54#	Always connected	Less than 1Ω
Electronic wastegate connector 3# - ECM connector B1#	Always connected	Less than 1Ω
Electronic wastegate connector 4# - ECM connector B82#	Always connected	Less than 1Ω
Electronic wastegate connector 5# - ECM connector B81#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	Check electronic wastegate harness and connector for circuit shorted to ground



ECM B connector

ES00770RM

(a) Measure the resistance according to the values in the table below.

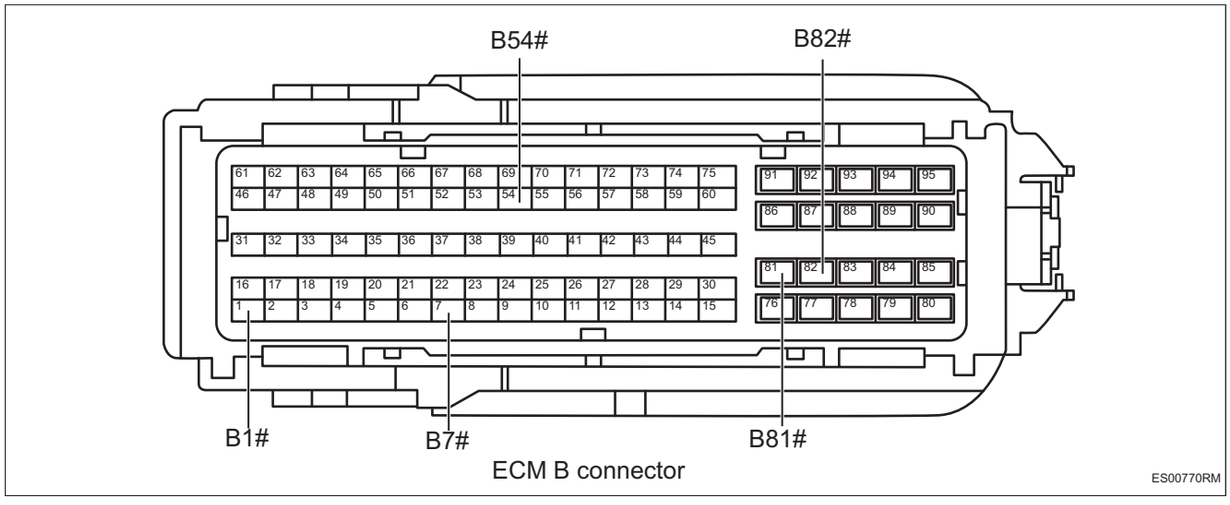
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B1# - body GND	Always connected	10 KΩ or greater
ECM connector B5 #-Body GND	Always connected	10 KΩ or greater
ECM connector B7# - body GND	Always connected	10 KΩ or greater
ECM connector B82# - body GND	Always connected	10 KΩ or greater
ECM connector B81# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	**Check electronic wastegate harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B1# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B54# - body GND	Set the ignition switch to "ON"	Less than 1 V

ES

Detector connection	Detection conditions	Specified state
ECM connector B7# - body ground	Set the ignition switch to "ON"	Less than 1 V
ECM connector B82# - body GND	Set the ignition switch to "ON"	Less than 1 V
Engine control unit connector B81# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Replace the electronic wastegate (See page IT-16)**

(a) Replace the electronic wastegate.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC not repeated	Normal

OK → **End**

NG

7	**Replace the turbocharger (See page IT-16)**

(a) Replace the turbocharger.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

8	End

DTC	P005300	Upstream oxygen sensor heater circuit fault

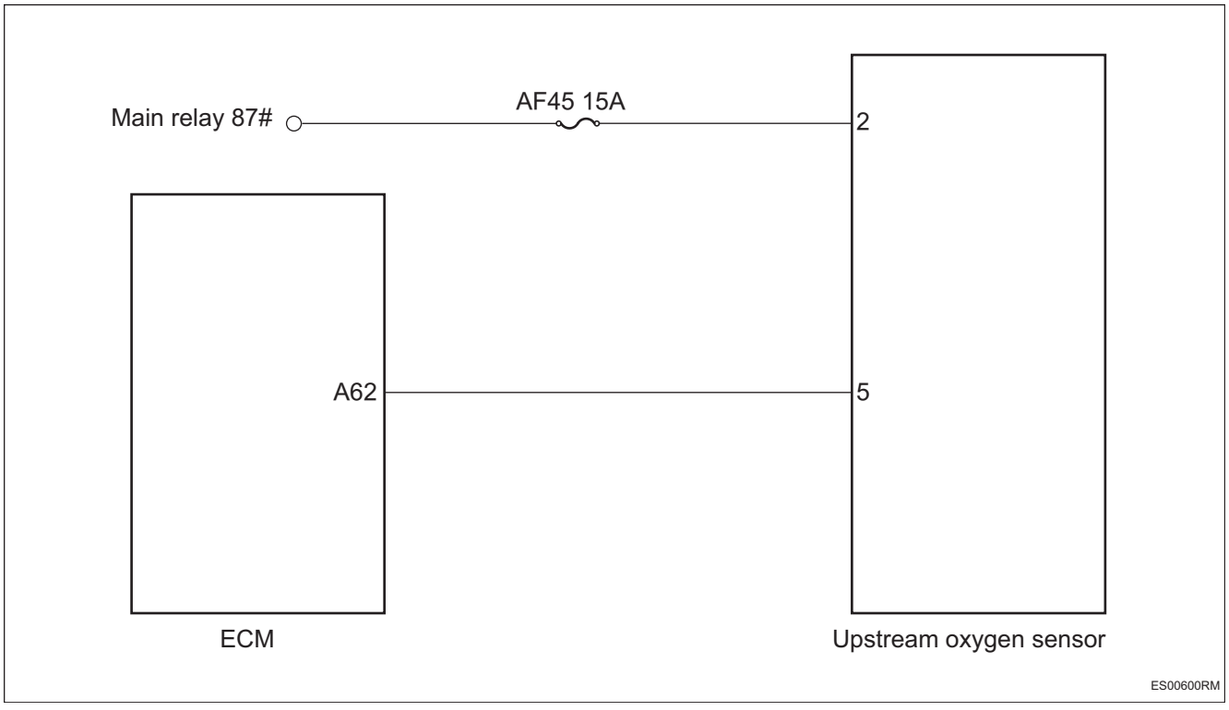
Description

ES

The ECM records a DTC when there is a failure in the upstream oxygen sensor heater circuit.

DTC	DTC detection conditions	Faulty location
P005300	(a) Current internal resistance above threshold of the corresponding working condition.	• ECM • Harness and connector • Upstream oxygen sensor

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Read and save the DTC freeze frame information.

(d) Record and clear the DTC.

(e) Check whether the DTC appears again.

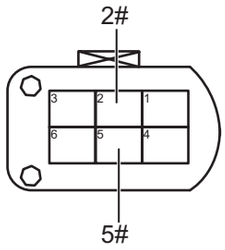
Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

2 Check the upstream oxygen sensor harness voltage



Upstream oxygen sensor connector

ES00641RM

(a) Do not disconnect the upstream oxygen sensor connector.

(b) Measure the voltage according to the values in the table below.

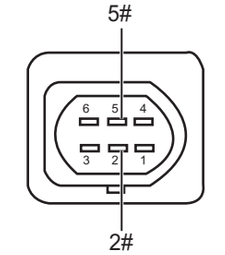
Standard value

Detector connection	Detection conditions	Specified state
Upstream oxygen sensor connector 2# - body GND	Set the ignition switch to "ON"	12V
Upstream oxygen sensor connector 5# - body GND	Set the ignition switch to "ON"	12V

NG → **Repair or replace the harness and connector**

OK

3 Check the upstream oxygen sensor heating resistance



Upstream oxygen sensor

ES00650RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the upstream oxygen sensor connector.

(c) Cool the upstream oxygen sensor to room temperature.

(d) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Upstream oxygen sensor 2# -upstream oxygen sensor 5#	Always connected	⩽ 15Ω

NG → **Replace the upstream oxygen sensor (See page ES-455)**

OK

4 Replace the ECM (See page ES-450)

DTC	P005400	Downstream oxygen sensor heater internal resistance implausible

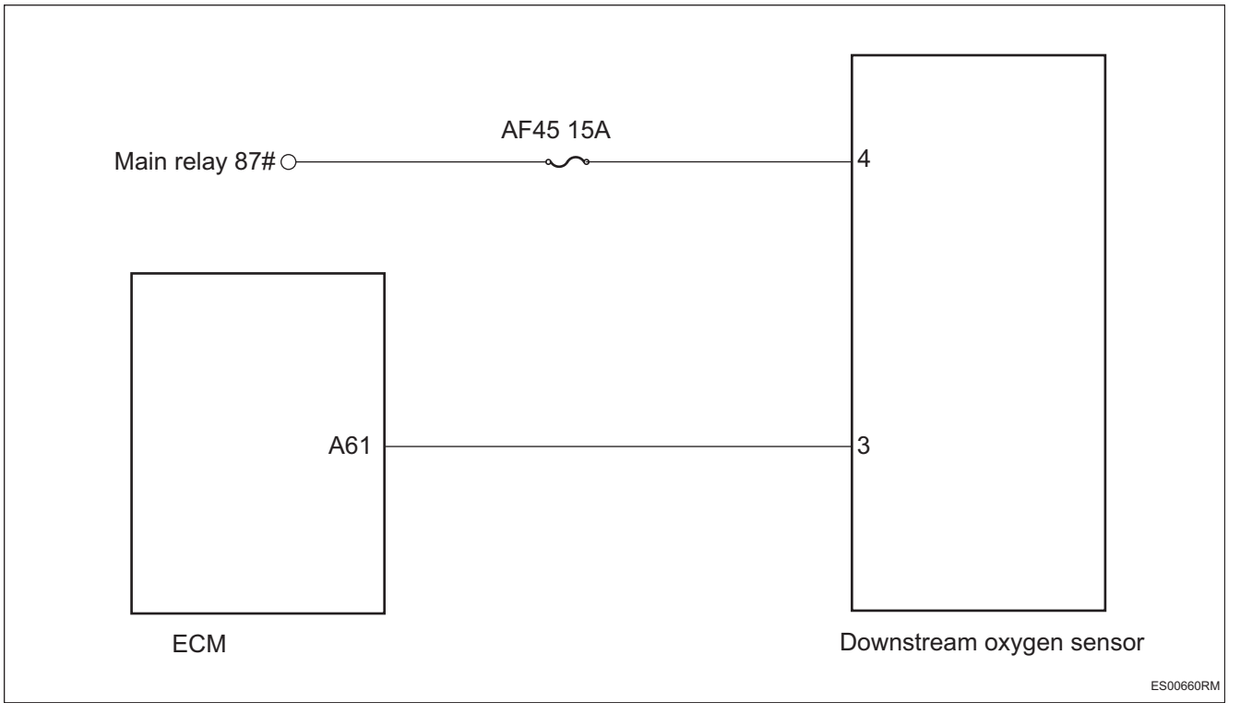
ES

Description

The ECM records a DTC when there is a failure in the downstream oxygen sensor heater circuit.

DTC	DTC detection conditions	Faulty location
P005400	(a) Current internal resistance above threshold of the corresponding working condition.	• ECM • Harness and connector • Downstream oxygen sensor

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Read and save the DTC freeze frame information.

(d) Record and clear the DTC.

(e) Check whether the DTC appears again.

Results

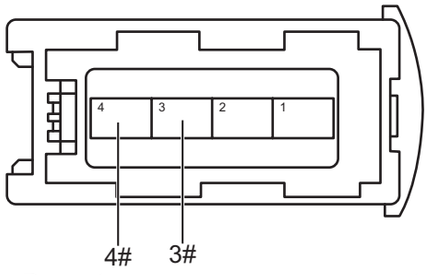
Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

ES

2 Check the downstream oxygen sensor harness voltage



Downstream oxygen sensor connector

ES00701RM

(a) Do not disconnect the downstream oxygen sensor connector.

(b) Measure the voltage according to the values in the table below.

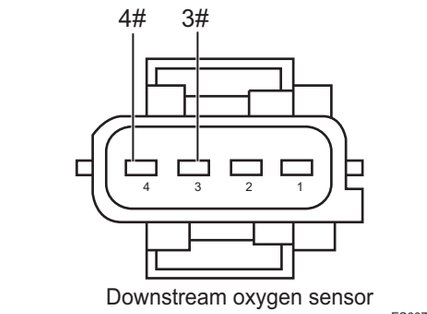
Standard value

Detector connection	Detection conditions	Specified state
Downstream oxygen sensor connector 3# - body GND	Set the ignition switch to "ON"	12V
Downstream oxygen sensor connector 4# - body GND	Set the ignition switch to "ON"	12V

NG → **Repair or replace the harness and connector**

OK

3 Check the downstream oxygen sensor heating resistance



Downstream oxygen sensor

ES00710RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the downstream oxygen sensor connector.

(c) Cool the downstream oxygen sensor to room temperature.

(d) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Downstream oxygen sensor 3# -downstream oxygen sensor 4#	Always connected	⩽ 15Ω

NG → **Replace the downstream oxygen sensor (See page ES-457)**

OK

4	Replace the ECM (See page ES-450)

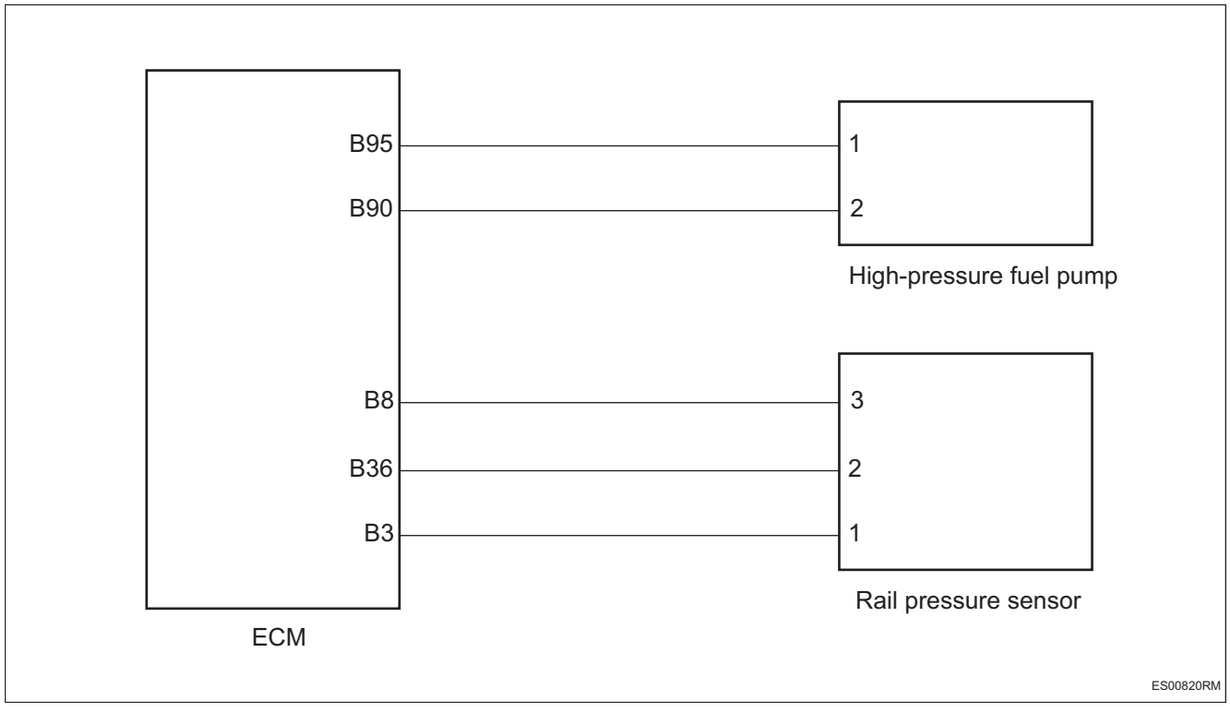
DTC	P008700	High-pressure fuel rail pressure low
DTC	P008800	High-pressure fuel rail pressure high

Description

When the fuel system high-pressure fuel rail pressure is too high or too low, the ECM records DTC.

DTC	DTC detection conditions	Faulty location
P008700	(a) High-pressure fuel rail pressure control deviation below -3 MPa.	• ECM • Harness and connector • High-pressure fuel pump • Rail pressure sensor • High-pressure fuel rail • Fuel system pipeline • Fuel filter • Fuel pump with fuel level sensor • High-pressure fuel pump tappet • Camshaft
P008800	(a) High-pressure fuel rail pressure control deviation above 3 MPa.	• ECM • Harness and connector • High-pressure fuel pump • Rail pressure sensor • High-pressure fuel rail

Circuit diagram



Inspection procedure

1	Check fuel system pipeline

(a) Check if there is insufficient fuel.

(b) Check whether the fuel system pipeline is properly connected.

(c) Check whether the fuel system pipeline is leaking or blocked.

NG → **Repair according to the fault**

OK

2	Check the fuel filter

(a) Check whether the fuel filter is installed correctly.

(b) Check whether the fuel filter model is correct.

(c) Check whether the fuel filter is leaking or blocked.

NG → **Repair according to the fault**

OK

3	Check low-pressure fuel system pressure

(a) Measure the low-pressure fuel system pressure according to the values in the table below.

Standard value

Working conditions	Specified state
idle speed	4.5~5.5 bar
Pressure maintaining (after 20 minutes shutdown)	Greater than 2.5 bar

NG → **Replacement of fuel pump with fuel level sensor**

OK

4	Check the low-pressure fuel pump

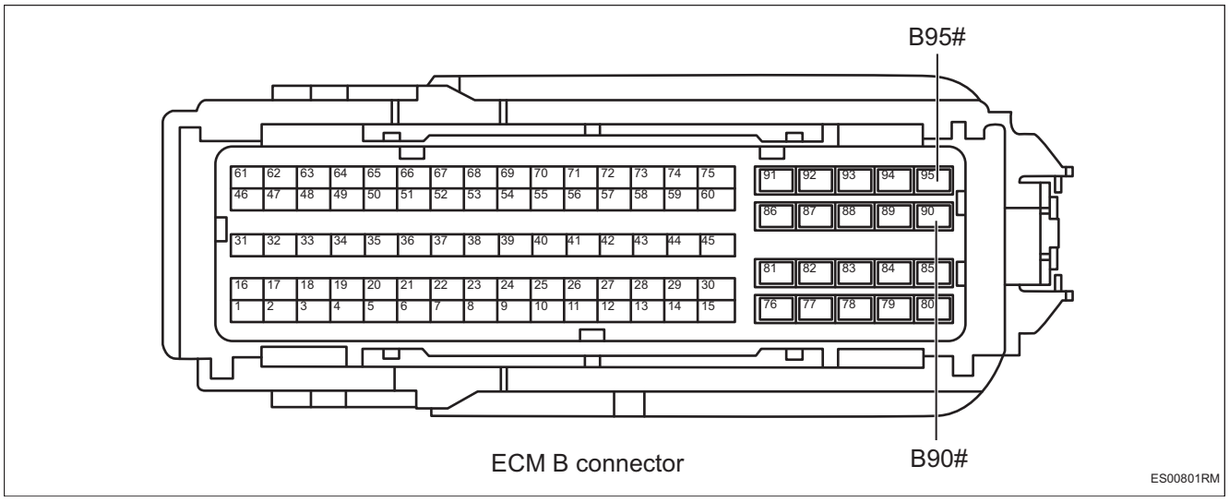
(a) Measure the low-pressure fuel pump resistance according to the values in the table below.

Standard value: 0.4 ~ 1.2 Ω

NG → **Replacement of fuel pump with fuel level sensor**

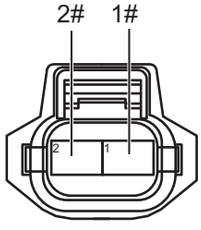
OK

5	Check high-pressure fuel pump harness and connector



ECM B connector

ES00801RM



High-pressure fuel pump connector

ES00810RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the high-pressure fuel pump connector.

(e) Measure the resistance according to the values in the table below.

Standard value

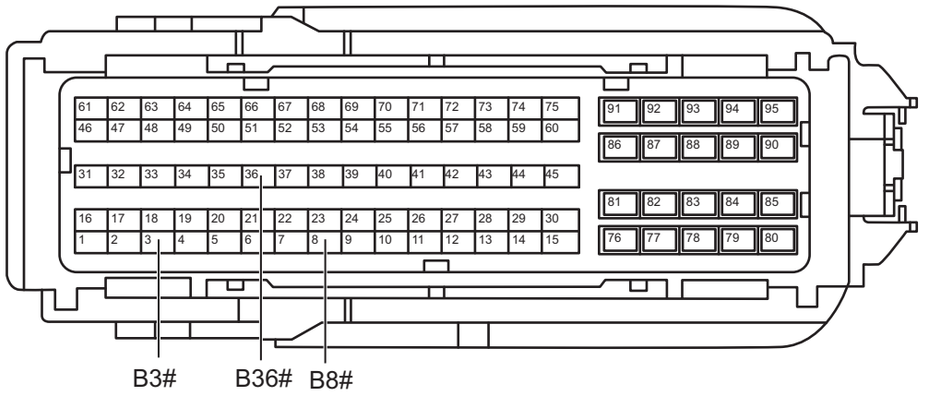
Detector connection	Detection conditions	Specified state
High-pressure fuel pump connector 1# - ECM connector B95#	Always connected	Less than 1Ω
High-pressure fuel pump connector 2# - ECM connector B90#	Always connected	Less than 1Ω
High-pressure fuel pump connector 2# -body GND	Always connected	10 KΩ or greater
High-pressure fuel pump connector 1# -body GND	Always connected	10 KΩ or greater
High-pressure fuel pump connector 2# - B +	Always connected	10 KΩ or greater
High-pressure fuel pump connector 1# - B +	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

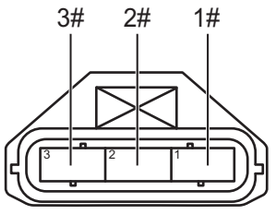
6	Check rail pressure sensor harness and connector

ES



ECM B connector

ES00831RM



Rail pressure sensor connector

ES00840RM

(a) Disconnect the rail pressure sensor connector.

(b) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Rail Sensor connector 1# - ECM connector B3#	Always connected	Less than 1Ω
Rail pressure sensor connector 2# - ECM connector B36#	Always connected	Less than 1Ω
Rail pressure sensor connector 3# - ECM connector B8#	Always connected	Less than 1Ω
Rail pressure sensor connector 1# -body GND	Always connected	10 KΩ or greater
Rail pressure sensor connector 2# -body GND	Always connected	10 KΩ or greater
Rail pressure sensor connector 3# -body GND	Always connected	10 KΩ or greater
Rail pressure sensor connector 1# — B+	Always connected	10 KΩ or greater
Rail pressure sensor connector 2# — B+	Always connected	10 KΩ or greater
Rail pressure sensor connector 3# — B+	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

7	**Check the rail pressure sensor**

(a) Check whether the rail pressure sensor is installed correctly.

(b) Check whether the rail pressure sensor is damaged.

NG → **Repair according to the fault**

ES

OK

8	Check the high-pressure fuel pump and tappet

(a) Check whether the high-pressure fuel pump is installed correctly.

(b) Check whether the high-pressure fuel pump is leaking or damaged.

(c) Check the high-pressure fuel pump and tappet for abnormal wear.

NG → **Repair according to the fault**

OK

9	Check camshaft

(a) Check whether the camshaft is worn abnormally (drive high-pressure fuel pump).

NG → **Replace the camshaft (See page EM-12)**

OK

10	Replace the high-pressure fuel rail (See page FU-4)

(a) Replace the high-pressure fuel rail.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

11	End

ES

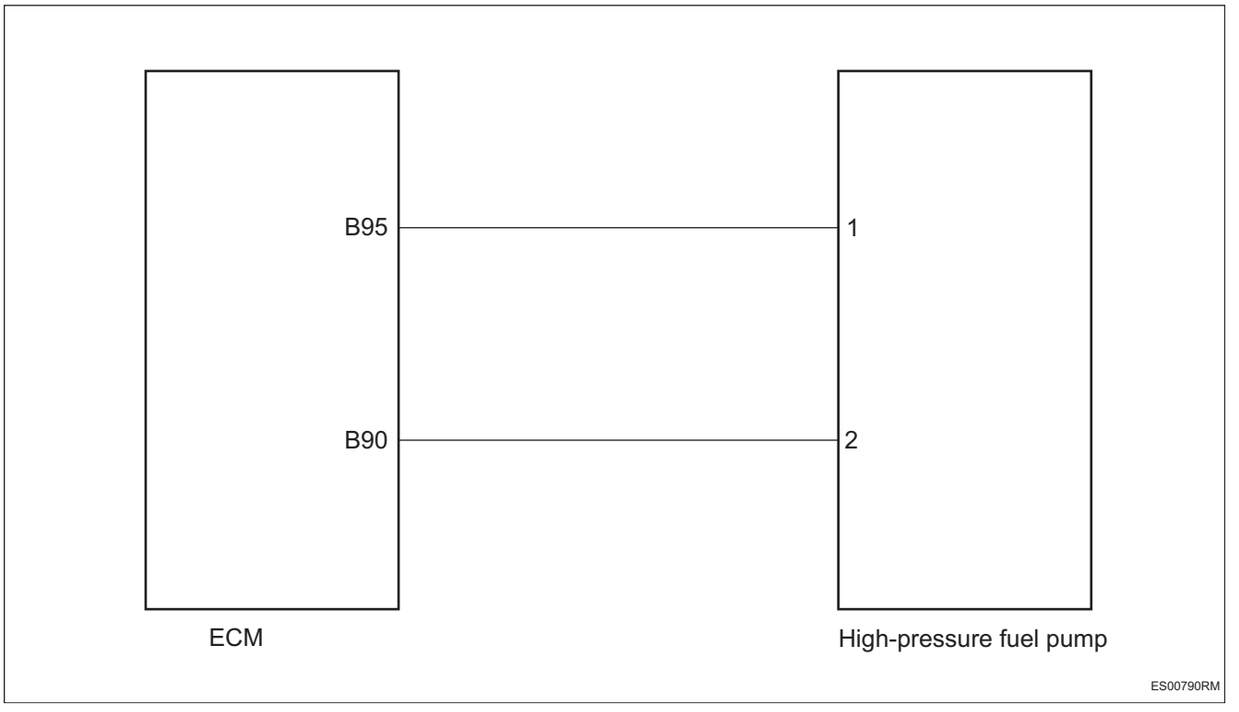
DTC	P008985	Too large PID control deviation of high-pressure fuel supply pressure
DTC	P008984	Too small PID control deviation of high-pressure fuel supply pressure

Description

When the adjustment deviation of high-pressure fuel pressure is out of the normal range, the ECM records the DTC.

DTC	DTC detection conditions	Faulty location
P008985	(a) High-pressure fuel supply PID control deviation above 5 MPa.	• ECM • Harness and connector • Fuel pump with fuel level sensor • Fuel pipeline • High-pressure fuel pump
P008984	(a) High-pressure fuel supply PID control deviation below -5 MPa.	• ECM • Harness and connector • High-pressure fuel pump

Circuit diagram



Inspection procedure

1	Check fuel system pipeline

(a) Check if there is insufficient fuel.

(b) Check whether the fuel system pipeline is properly connected.

(c) Check whether the fuel system pipeline is leaking or blocked.

NG → **Repair according to the fault**

OK

2	Check low-pressure fuel system pressure

(a) Measure the low-pressure fuel system pressure according to the values in the table below.

Standard value

Working conditions	Specified state
idle speed	4.5~5.5 bar
Pressure maintaining (after 20 minutes shutdown)	Greater than 2.5 bar

NG → **Replacement of fuel pump with fuel level sensor**

OK

3	Check the low-pressure fuel pump

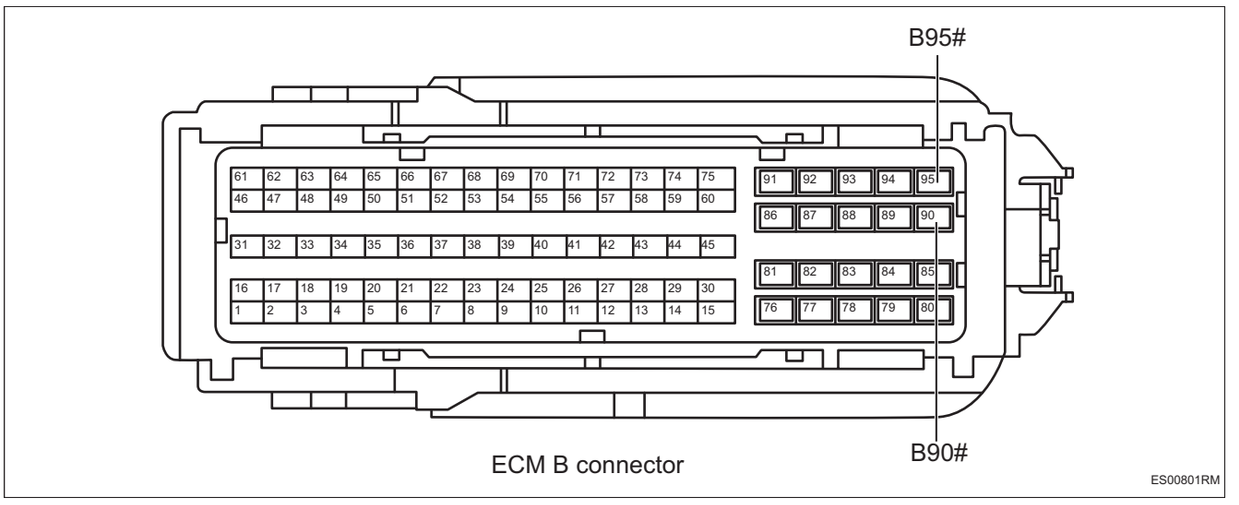
(a) Measure the low-pressure fuel pump resistance according to the values in the table below.

Standard value: 0.4 ~ 1.2Ω

NG → **Replacement of fuel pump with fuel level sensor**

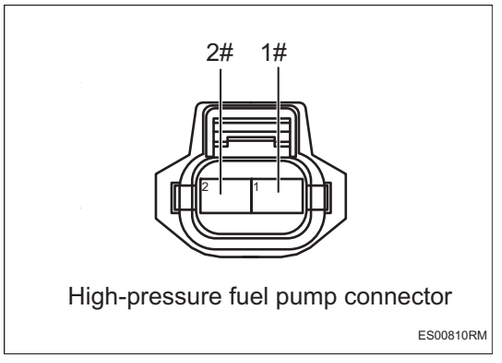
OK

4	Check high-pressure fuel pump harness and connector for open circuit



ECM B connector

ES00801RM



High-pressure fuel pump connector

ES00810RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the high-pressure fuel pump connector.

(e) Measure the resistance according to the values in the table below.

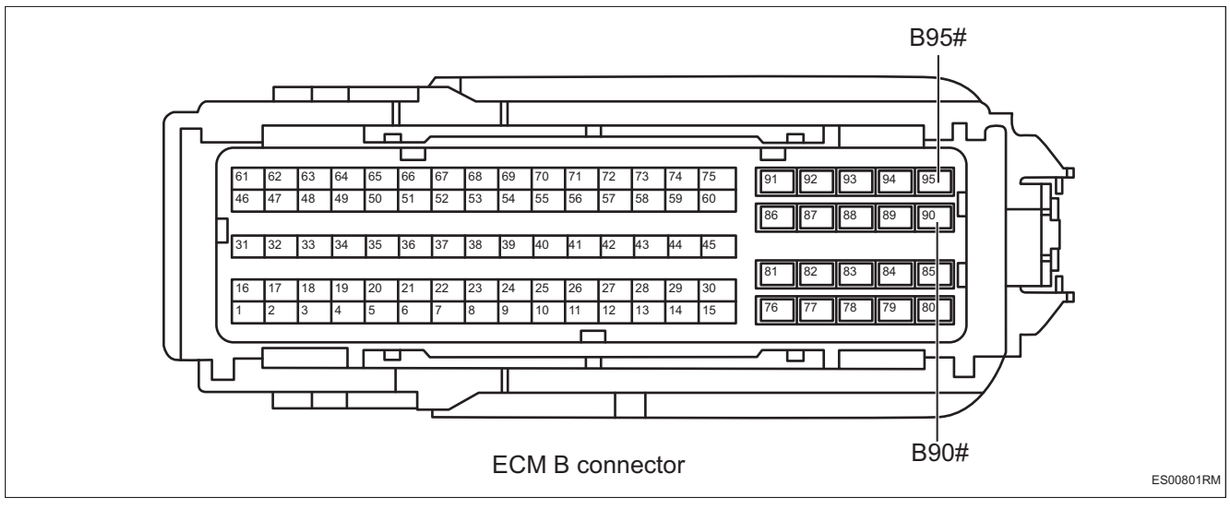
Standard value

Detector connection	Detection conditions	Specified state
High-pressure fuel pump connector 1# - ECM connector B95#	Always connected	Less than 1Ω
High-pressure fuel pump connector 2# - ECM connector B90#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

5	**Check high-pressure fuel pump harness and connector for circuit shorted to each other**



(a) Measure the resistance according to the values in the table below.

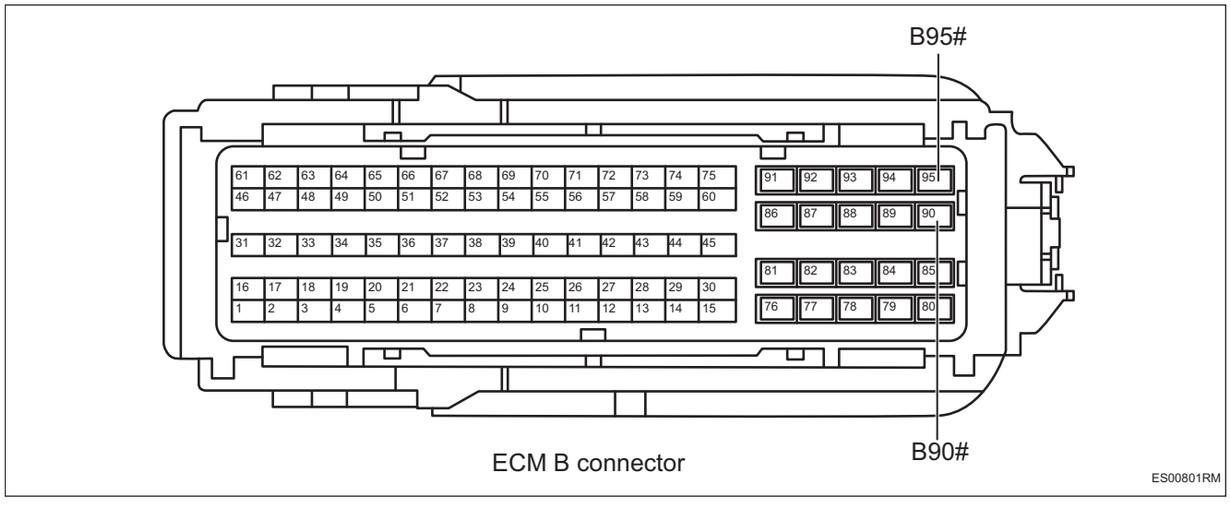
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B95# - ECM connector B90#	Always connected	10KΩ or greater

NG → **Repair or replace the harness and connector**

OK

6	Check high-pressure fuel pump harness and connector for circuit shorted to ground



(a) Measure the resistance according to the values in the table below.

Standard value

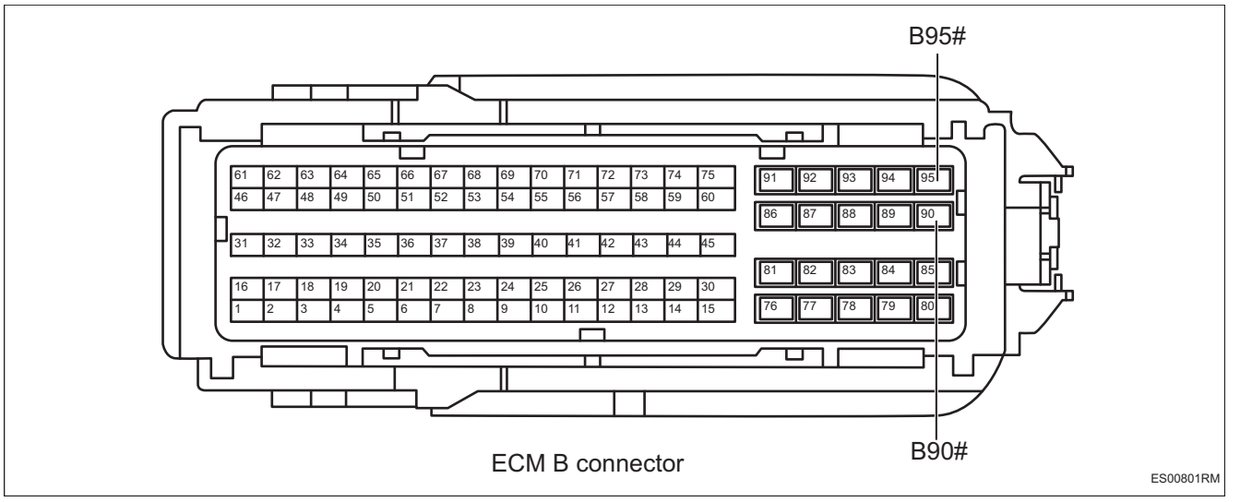
ES

Detector connection	Detection conditions	Specified state
ECM connector B95# - body GND	Always connected	10KΩ or greater
ECM connector B90# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

7	**Check high-pressure fuel pump harness and connector for circuit shorted to power supply**



ECM B connector

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B95# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B90# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

8	**Replace the high-pressure fuel pump (See page FU-1)**

(a) Replace the high-pressure fuel pump.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace the ECM (See page ES-450)**

OK

9	**End**

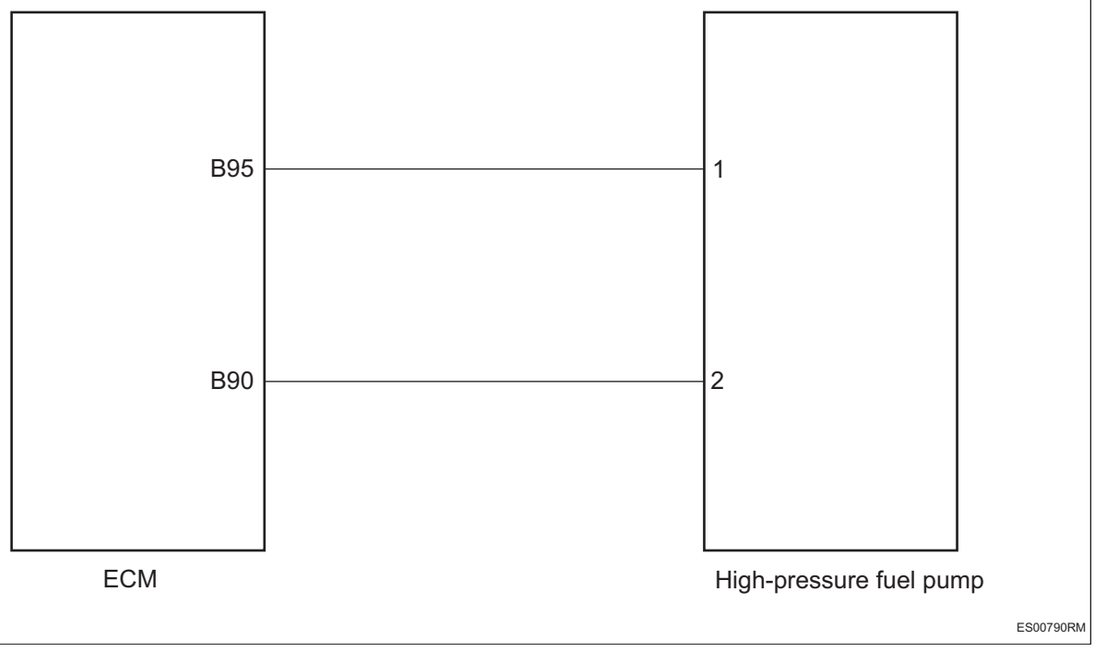
DTC	P009000	Flow control valve high side control circuit high side and low side circuits shorted to each other
DTC	P025100	Flow control valve high or low side control circuit open
DTC	P025400	Flow control valve high side control circuit overvoltage or undervoltage
DTC	P025900	Flow control valve low side control circuit overvoltage or undervoltage

Description

When high-pressure fuel pump control circuit is shorted or open, ECM will record DTC.

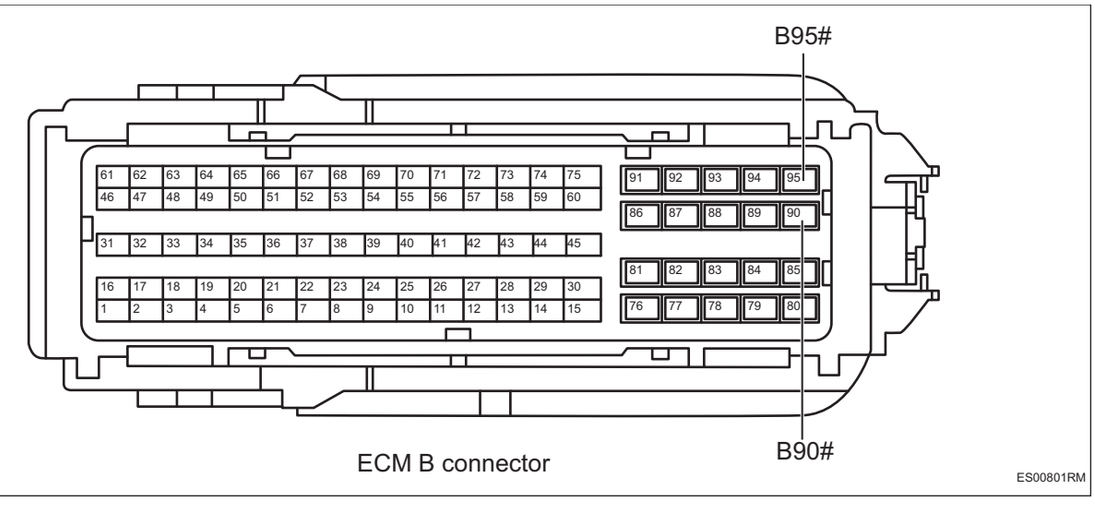
DTC	DTC detection conditions	Faulty location
P009000	(a) Drive channel self-diagnosing fault.	• ECM • Harness and connector • High-pressure fuel pump
P025100	(a) Hardware circuit self-diagnosis.	• ECM • Harness and connector • High-pressure fuel pump
P025400	(a) Hardware circuit self-diagnosis.	• ECM • Harness and connector • High-pressure fuel pump
P025900	(a) Hardware circuit self-diagnosis.	• ECM • Harness and connector • High-pressure fuel pump

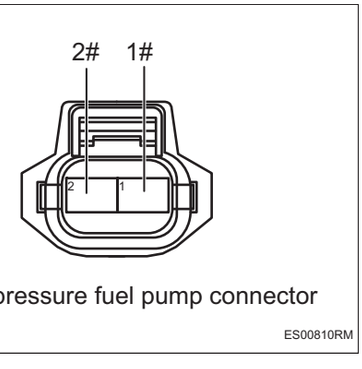
Circuit diagram



Inspection procedure

1	Check high-pressure fuel pump harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the high-pressure fuel pump connector.

(e) Measure the resistance according to the values in the table below.

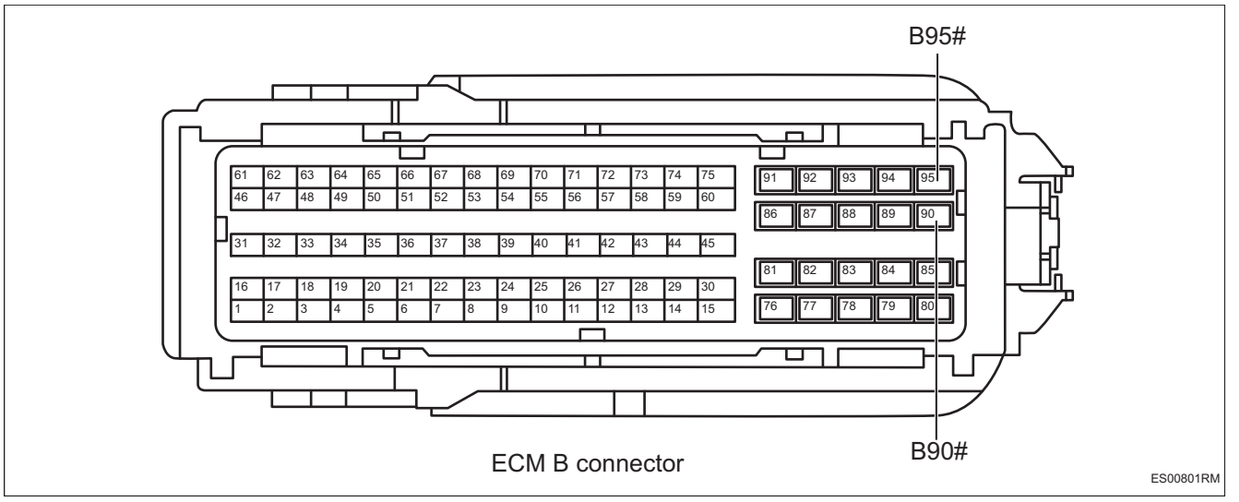
Standard value

Detector connection	Detection conditions	Specified state
High-pressure fuel pump connector 1# - ECM connector B95#	Always connected	Less than 1Ω
High-pressure fuel pump connector 2# -ECM connector B90#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check high-pressure fuel pump harness and connector for circuit shorted to each other**



ECM B connector

(a) Measure the resistance according to the values in the table below.

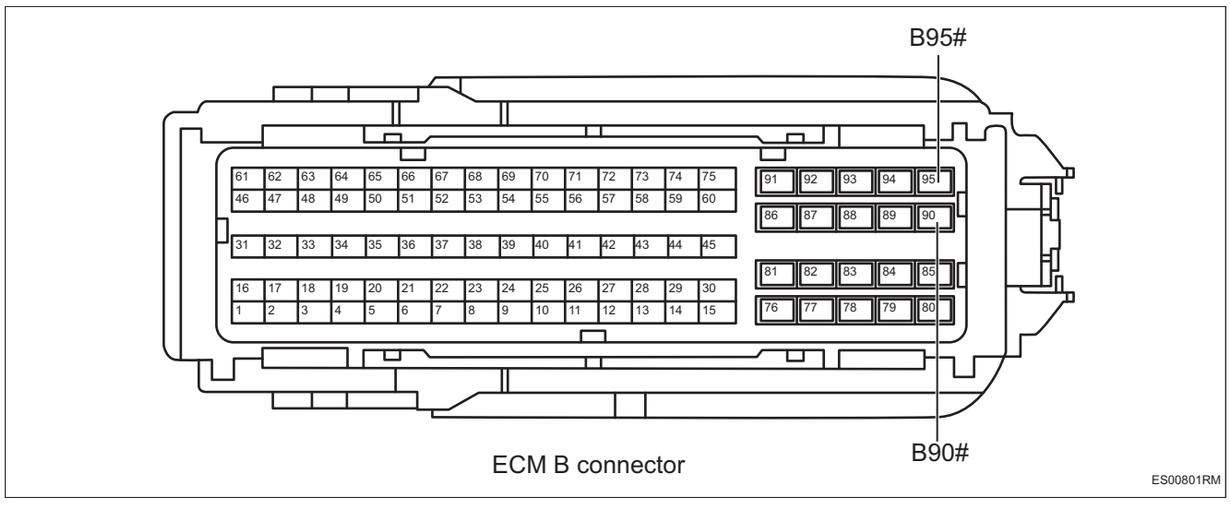
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B95# - ECM connector B90#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check high-pressure fuel pump harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

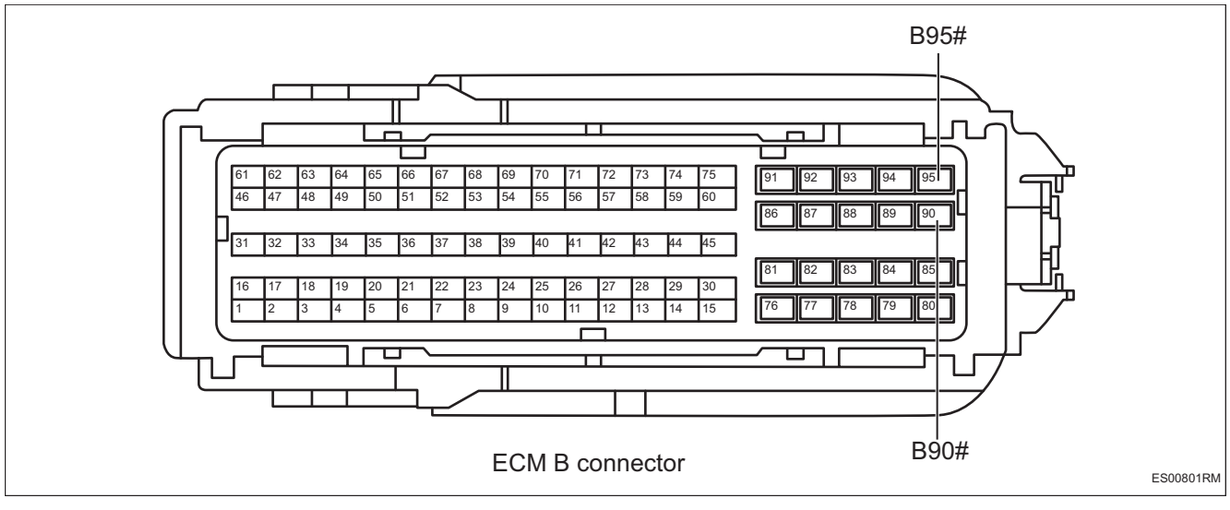
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B95# - body GND	Always connected	10 KΩ or greater
ECM connector B90# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check high-pressure fuel pump harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

ES

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B95# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B90# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the high-pressure fuel pump (See page FU-1)**

(a) Replace the high-pressure fuel pump.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace the ECM (See page ES-450)**

OK

6	**End**

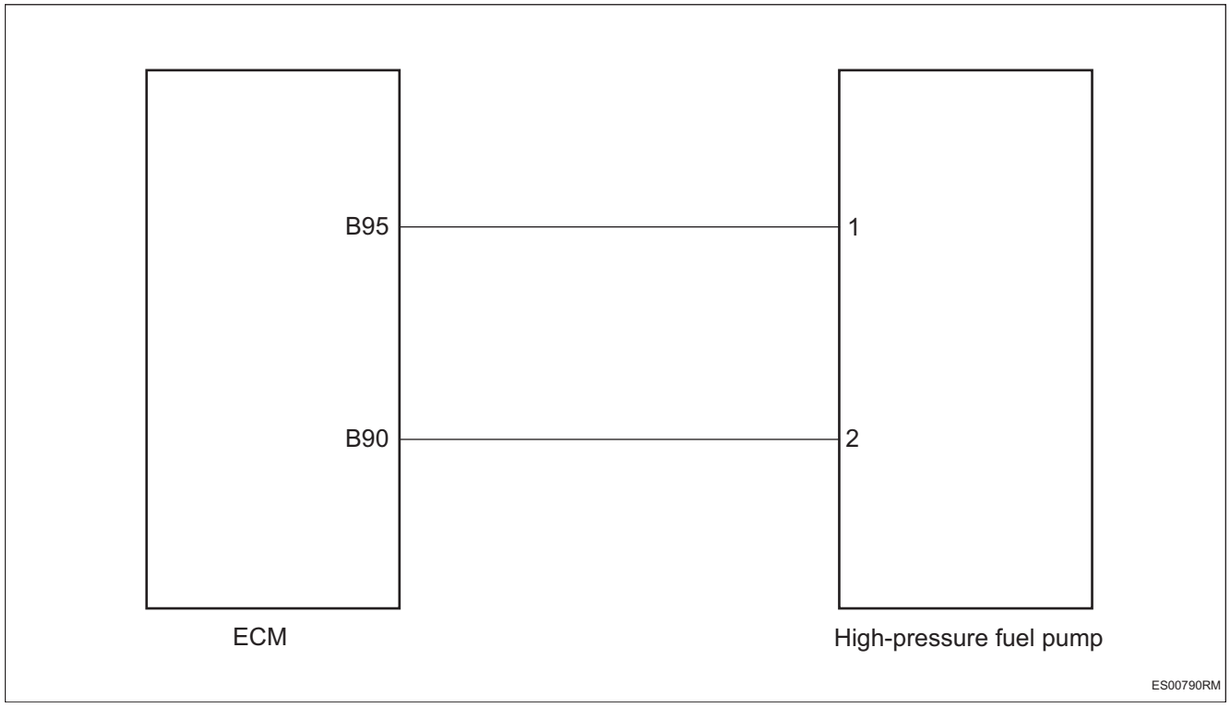
DTC	P00C600	High-voltage start failure

Description

When the high voltage system pressure is abnormal at start-up, the ECM records DTC.

DTC	DTC detection conditions	Faulty location
P00C600	(a) Low fuel rail pressure during start and high-voltage start failure.	• ECM • Harness and connector • Fuel pump with fuel level sensor • Fuel pipeline • High-pressure fuel pump • Fuel injector

Circuit diagram



Inspection procedure

Note: If new fuel pipe is replaced, eliminate the fault, start the vehicle and drive it for 10 min to allow the oil pressure to be fully established, then shut down the engine and check whether the fault recurs.

1	Check fuel system pipeline

(a) Check if there is insufficient fuel.

(b) Check whether the fuel system pipeline is properly connected.

(c) Check whether the fuel system pipeline is leaking or blocked.

NG	Repair according to the fault

OK

2	Check fuel injector

ES

(a) Check whether the fuel injector is blocked or leaking.

NG → **Repair according to the fault**

OK

3	Check low-pressure fuel system pressure

(a) Measure the low-pressure fuel system pressure according to the values in the table below.

Standard value

Working conditions	Specified state
idle speed	4.5 ~ 5.5bar
Pressure maintaining (after 20 minutes shutdown)	Greater than 2.5 bar

NG → **Replacement of fuel pump with fuel level sensor**

OK

4	Check the low-pressure fuel pump

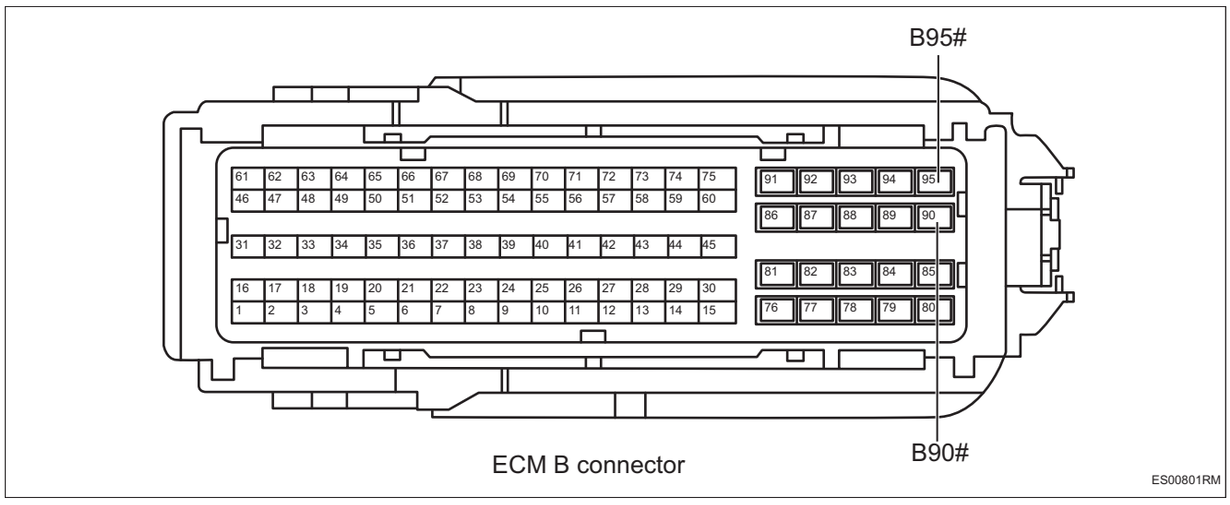
(a) Measure the low-pressure fuel pump resistance according to the values in the table below.

Standard value: 0.4 ~ 1.2Ω

NG → **Replacement of fuel pump with fuel level sensor**

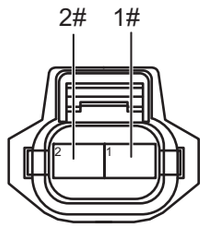
OK

5	Check high-pressure fuel pump harness and connector for open circuit



ECM B connector

ES00801RM



High-pressure fuel pump connector

ES00810RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the high-pressure fuel pump connector.

(e) Measure the resistance according to the values in the table below.

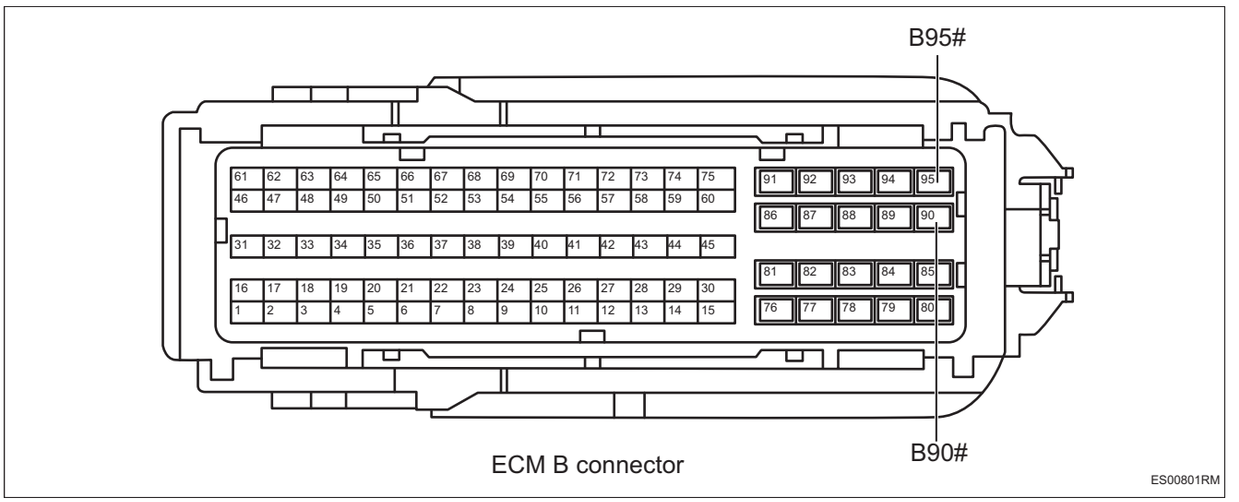
Standard value

Detector connection	Detection conditions	Specified state
High-pressure fuel pump connector 1# ECM connector B95#	Always connected	Less than 1Ω
High-pressure fuel pump connector 2# - ECM connector B90#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

6	**Check high-pressure fuel pump harness and connector for circuit shorted to each other**



(a) Measure the resistance according to the values in the table below.

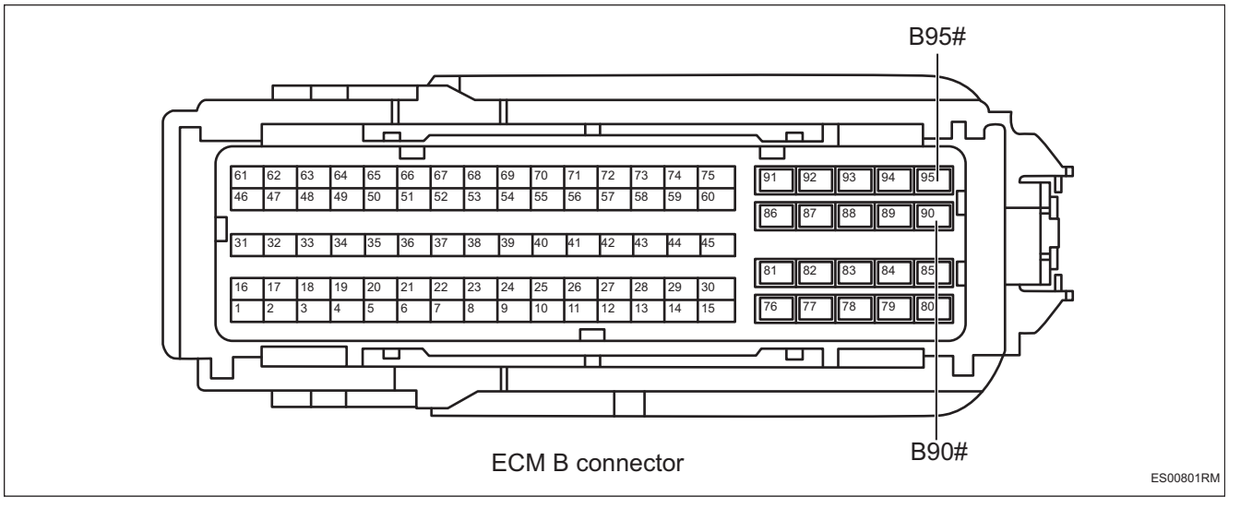
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B95# - ECM connector B90#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

7	Check high-pressure fuel pump harness and connector for circuit shorted to ground



(a) Measure the resistance according to the values in the table below.

Standard value

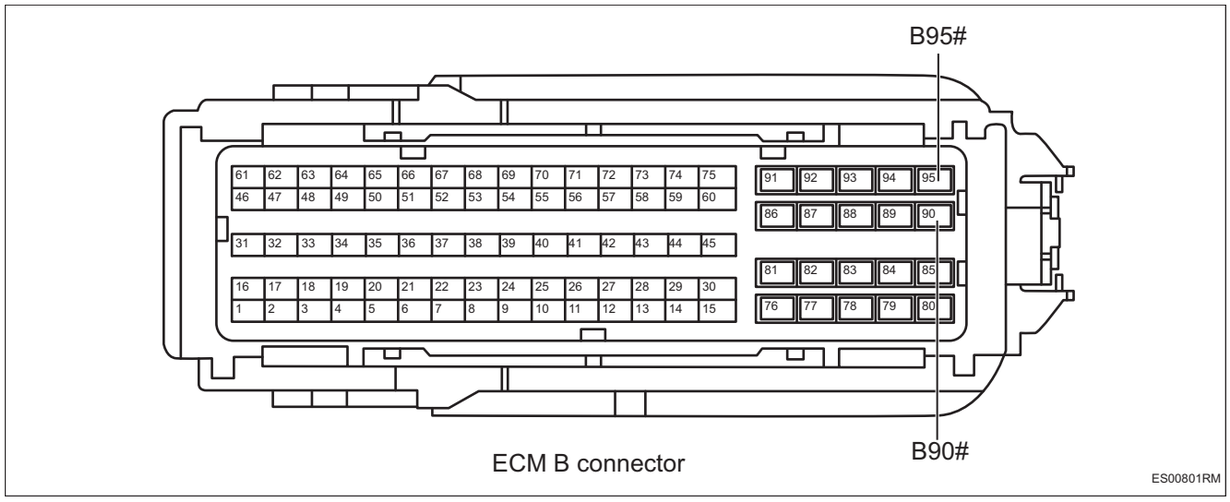
Detector connection	Detection conditions	Specified state
ECM connector B95# - body GND	Always connected	10 KΩ or greater
ECM connector B90# - body GND	Always connected	10 KΩ or greater

ES

NG → **Repair or replace the harness and connector**

OK

8	**Check high-pressure fuel pump harness and connector for circuit shorted to power supply**



ECM B connector

ES00801RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B95# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector 90# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

9	**Replace the high-pressure fuel pump (See page FU-1)**

ES

(a) Replace the high-pressure fuel pump.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace the ECM (See page ES-450)**

OK

10	**End**

DTC	P01062A	Abnormal signal value without fluctuation of MAP sensor
DTC	P010622	MAP sensor pressure implausibly higher than model pressure
DTC	P010621	MAP sensor pressure implausibly lower than model pressure
DTC	P120000	MAP sensor pressure above upper limit
DTC	P120100	MAP sensor pressure below lower limit
DTC	P00C721	MAP sensor signal pressure value too low during start
DTC	P00C722	MAP sensor signal pressure value too high during start
DTC	P010700	MAP sensor circuit shorted to ground
DTC	P010800	MAP sensor circuit shorted to power supply fault
DTC	P011126	IAT sensor 1 signal implausible (sticky)
DTC	P011200	IAT sensor 1 circuit undervoltage
DTC	P011300	IAT sensor 1 circuit overvoltage
DTC	P011400	IAT sensor 1 circuit voltage implausible
DTC	P00CE24	Air temperature sensor 1 cold start check implausible (positive deviation)
DTC	P00CE23	IAT sensor 1 cold start check implausible (negative deviation)

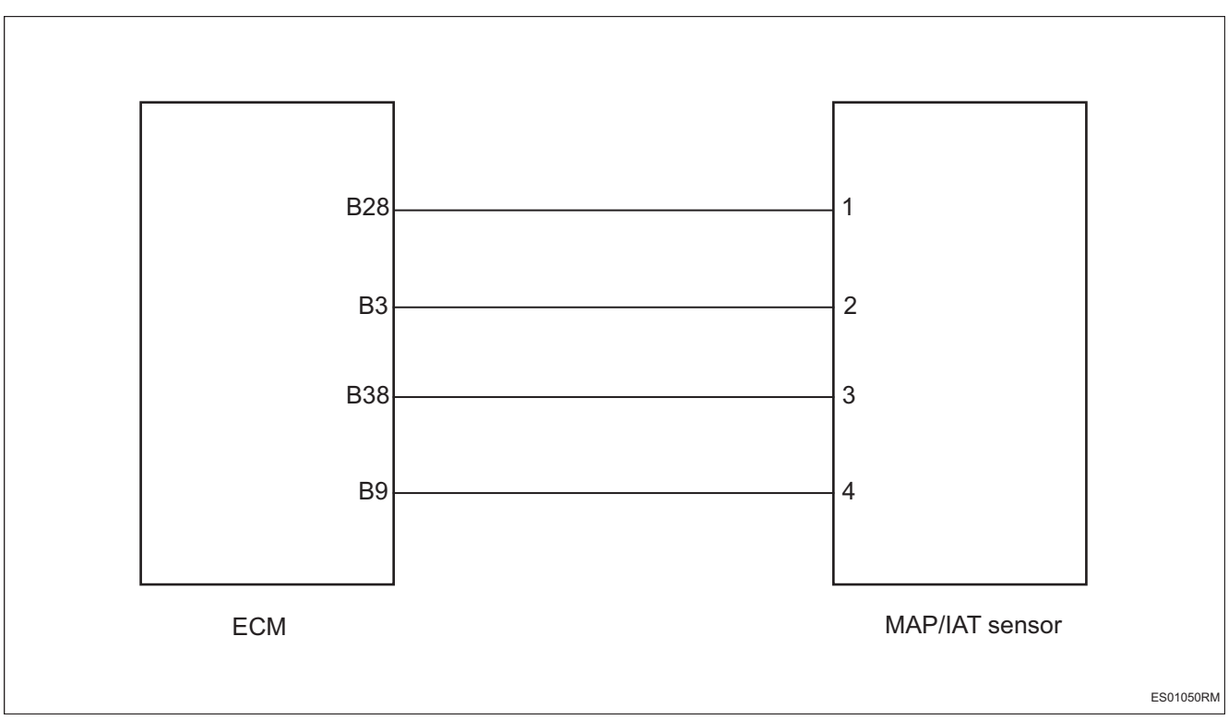
Description

When the MAP/IAT sensor circuit is shorted or open, or failure occurs inside the sensor, ECM will record DTC.

ES

DTC	DTC detection conditions	Faulty location
P01062A	(a) Difference between intake pressure value and start initialization pressure value below 20 hPa.	• ECM • Harness and connector • MAP/IAT sensor • Intake system pipeline
P010622	(a) The MAP sensor pressure is much higher than the model pressure.	
P010621	(a) The MAP sensor pressure is much lower than the model pressure.	
P120000	(a) MAP sensor pressure out of normal range, high.	
P120100	(a) MAP sensor pressure out of normal range, low.	
P00C721	(a) MAP sensor signal pressure value low during starting.	
P00C722	(a) MAP sensor signal pressure value high during starting.	
P010700	(a) Sensor voltage below threshold.	
P010800	(a) Sensor voltage above threshold.	
P011126	(a) There is no fluctuation in the measured value of IAT sensor.	
P011200	(a) Temperature sensor voltage below 0.1 V.	
P011300	(a) Temperature sensor voltage above 4.9 V.	
P011400	(a) Temperature sensor voltage intermittently above 4.9 V.	
P00CE24	(a) The IAT sensor cold start check is unreasonable.	
P00CE23	(a) The IAT sensor cold start check is unreasonable.	

Circuit diagram



Inspection procedure

1	Read data flow

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Read the "intake pressure" item in the data flow to see whether it deviates seriously from the ambient pressure of about 101 kpa (the specific value is related to the current air pressure).

NG → **Repair according to the fault**

OK

2	Check the MAP/IAT sensor

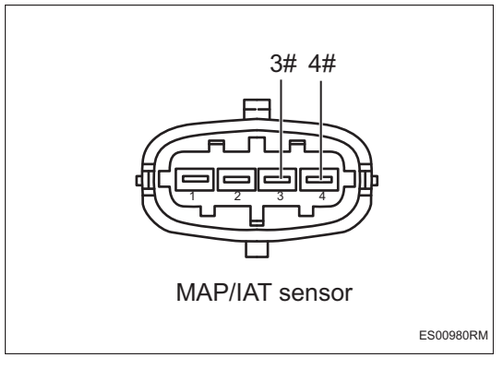
(a) Check whether the MAP/IAT sensor is installed correctly.

(b) Check whether the MAP/IAT sensor is dirty.

NG → **Repair according to the fault**

OK

3	Check the MAP/IAT sensor



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the MAP/IAT sensor connector.

(d) Measure the resistance according to the values in the table below.

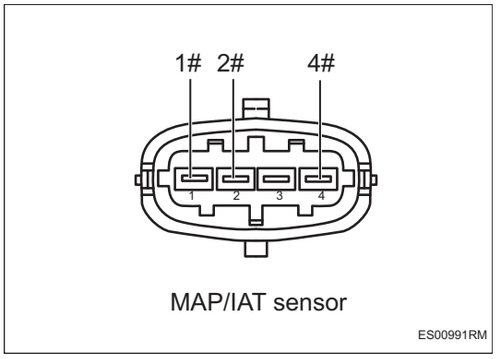
Standard value

Detector connection	Detection conditions	Specified state
MAP/IAT sensor 3# -MAP/IAT sensor 4#	20 ℃	About 2.5 KΩ ± 5%

NG → **Replace the MAP/IAT sensor**

OK

4	Check the MAP/IAT sensor



MAP/IAT sensor
ES00991RM

(a) Connect the MAP/IAT sensor connector.

(b) Connection the battery negative terminal.

(c) Start engine.

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
MAP/IAT sensor 2# -MAP/IAT sensor 4#	idle speed	About 5 V
MAP/IAT sensor 1# -MAP/IAT sensor 4#	Throttle is opened quickly	Instantly reach about 4 V, then drop to about 1.5 V

NG → **Replace the MAP/IAT sensor**

OK

5	Check intake system

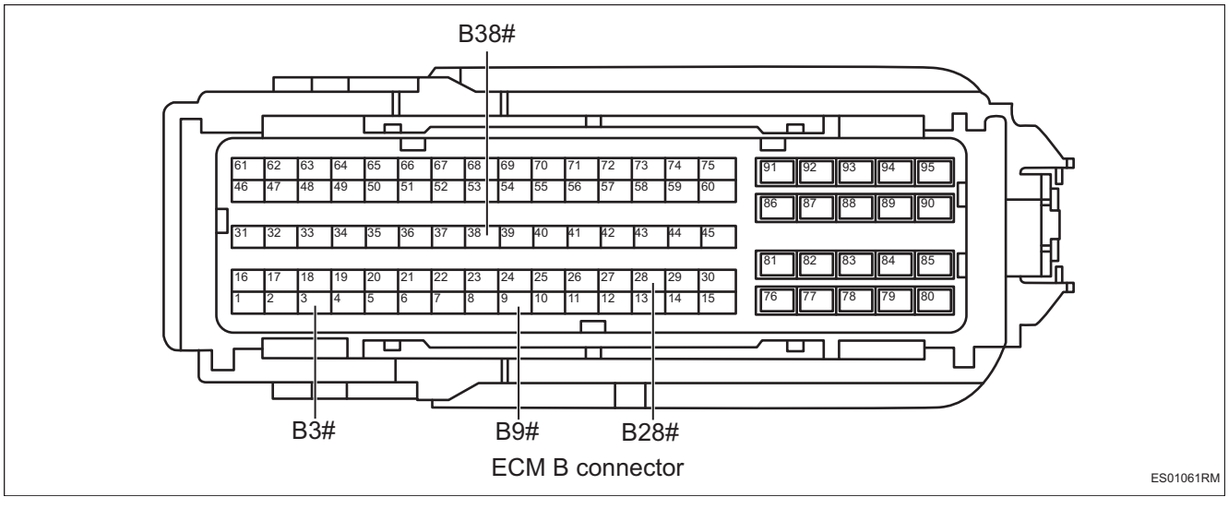
(a) Check whether the intake system pipeline is installed correctly.

(b) Check whether the intake system pipeline is leaking and blocked.

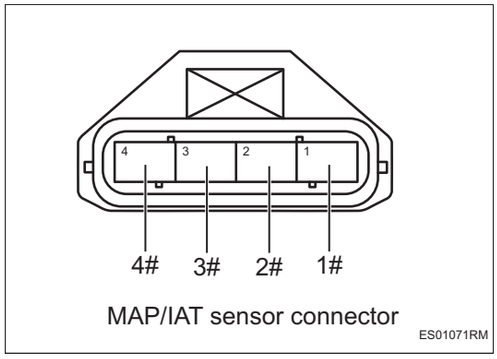
NG → **Repair according to the fault**

OK

6	Check MAP/IAT sensor harness and connector for open circuit



ECM B connector
ES01061RM



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the MAP/IAT sensor connector.

(e) Measure the resistance according to the values in the table below.

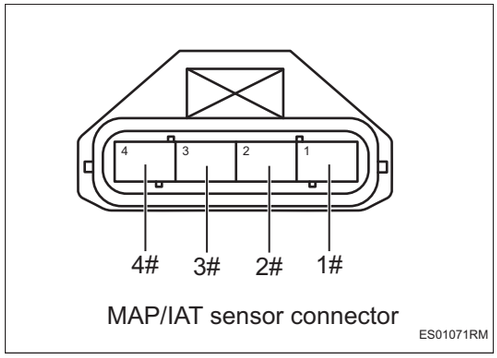
Standard value

Detector connection	Detection conditions	Specified state
MAP/IAT Sensor connector 1# - ECM connector B28#	Always connected	Less than 1Ω
MAP/IAT sensor connector 2# - engine control connector B3#	Always connected	Less than 1Ω
MAP/IAT sensor connector 3# - ECM connector B38#	Always connected	Less than 1Ω
MAP/IAT sensor connector 4# - ECM connector B9#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

7	Check MAP/IAT sensor harness and connector for circuit shorted to ground



(a) Measure the resistance according to the values in the table below.

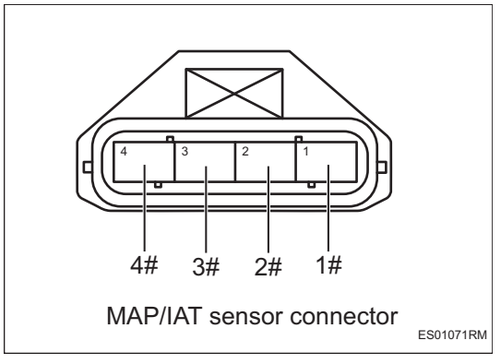
Standard value

Detector connection	Detection conditions	Specified state
MAP/IAT sensor connector 1# -body GND	Always connected	10 KΩ or greater
MAP/IAT sensor connector 2# -body GND	Always connected	10 KΩ or greater
MAP/IAT sensor connector 3# -body GND	Always connected	10 KΩ or greater
MAP/IAT sensor connector 4# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

8	Check MAP/IAT sensor harness and connector for circuit shorted to power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
MAP/IAT sensor connector 1# -body GND	Set the ignition switch to "ON"	Less than 1 V
MAP/IAT sensor connector 2# -body GND	Set the ignition switch to "ON"	Less than 1 V
MAP/IAT sensor connector 3# -body GND	Set the ignition switch to "ON"	Less than 1 V
MAP/IAT sensor connector 4# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

9	**Replace the MAP/IAT sensor (See page ES-466)**

(a) Replace the MAP/IAT sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

10	**End**

DTC	P012300	Electronic throttle position sensor 1 signal circuit overvoltage
DTC	P012200	Electronic throttle position sensor 1 signal circuit undervoltage
DTC	P012100	Electronic throttle position sensor 1 signal implausible
DTC	P022300	Electronic throttle position sensor 2 signal circuit overvoltage
DTC	P022200	Electronic throttle position sensor 2 signal circuit undervoltage
DTC	P022100	Electronic throttle position sensor 2 signal implausible

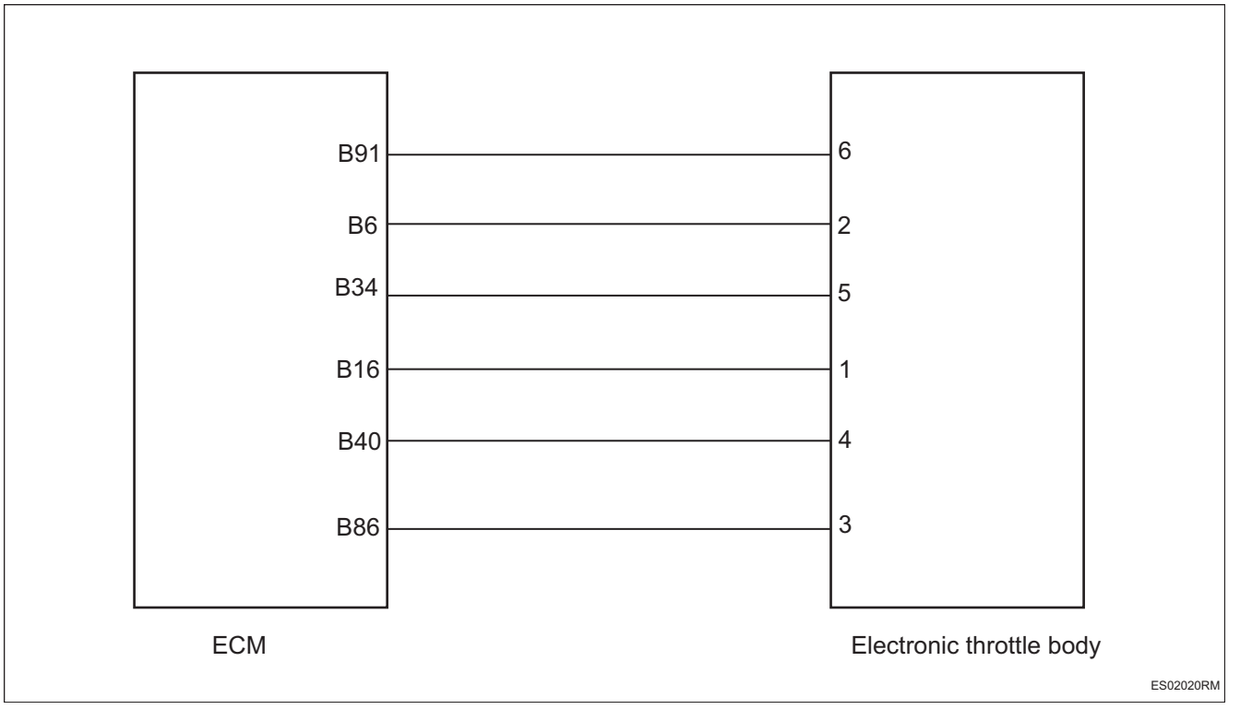
Description

When the electronic throttle position sensor signal circuit voltage is abnormal or the signal is implausible, the ECM records DTC.

DTC	DTC detection conditions	Faulty location
P012300	(a) Electronic throttle position sensor 1 signal circuit overvoltage.	• ECM • Harness and connector • Electronic throttle body
P012200	(a) Electronic throttle position sensor 1 signal circuit undervoltage.	• ECM • Harness and connector • Electronic throttle body
P012100	(a) Electronic throttle position sensor 1 signal implausible.	• ECM • Harness and connector • Electronic throttle body
P022300	(a) Electronic throttle position sensor 2 signal circuit overvoltage.	• ECM • Harness and connector • Electronic throttle body
P022200	(a) Electronic throttle position sensor 2 signal circuit undervoltage.	• ECM • Harness and connector • Electronic throttle body
P022100	(a) Electronic throttle position sensor 2 signal implausible.	• ECM • Harness and connector • Electronic throttle body

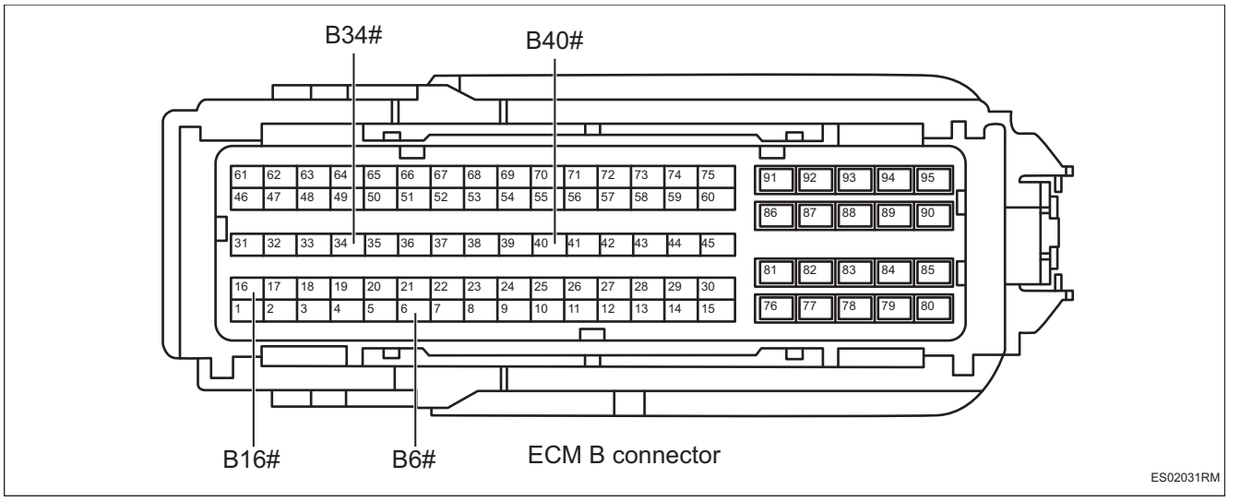
ES

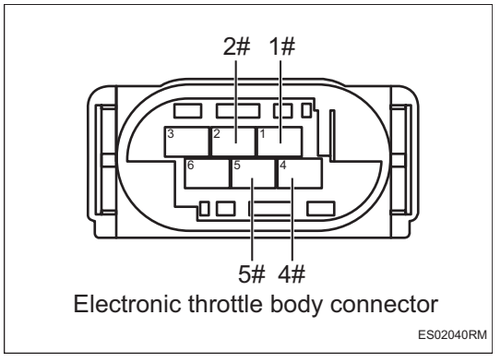
Circuit diagram



Inspection procedure

1	Check electronic throttle body harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the electronic throttle body connector.

(e) Measure the resistance according to the values in the table below.

Standard value

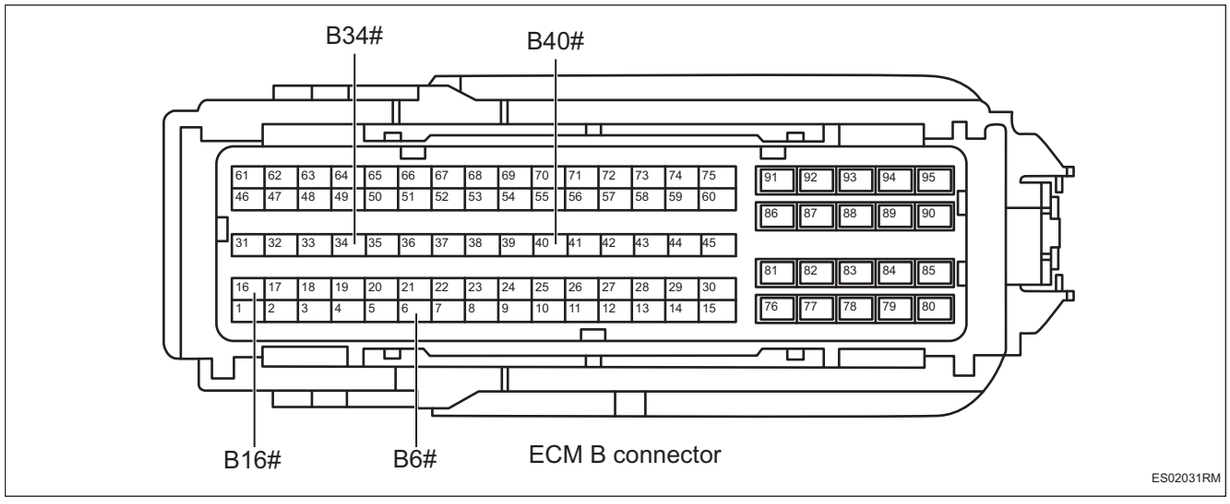
Detector connection	Detection conditions	Specified state
Electronic throttle body connector 2# - ECM connector B6#	Always connected	Less than 1Ω
Electronic throttle body connector 4# - ECM connector B40#	Always connected	Less than 1Ω
Electronic throttle body connector 1# - ECM connector B16#	Always connected	Less than 1Ω
Electronic throttle body connector 5# - engine control connector B34#	Always connected	Less than 1Ω

ES

NG → **Repair or replace the harness and connector**

OK

2 Check electronic throttle body harness and connector for circuit shorted to ground



(a) Measure the resistance according to the values in the table below.

Standard value

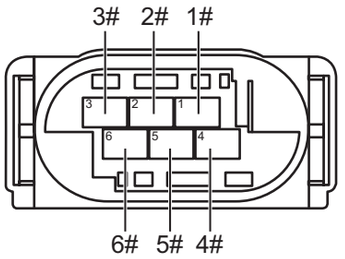
Detector connection	Detection conditions	Specified state
ECM connector B6# - body GND	Always connected	10 KΩ or greater
ECM connector B16# - body GND	Always connected	10 KΩ or greater
ECM connector B34# - body GND	Always connected	10 KΩ or greater
ECM connector B40# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	Check electronic throttle body harness and connector for circuit shorted to each other

ES



Electronic throttle body connector

ES02051RM

(a) Measure the resistance according to the values in the table below.

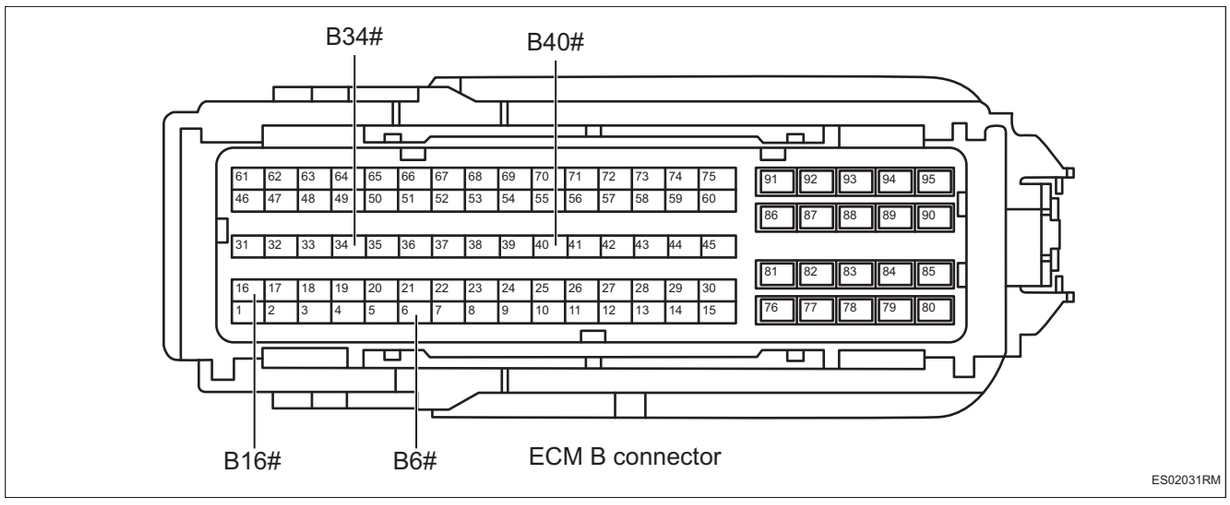
Standard value

Detector connection	Detection conditions	Specified state
Electronic throttle body connector 1# -electronic throttle body connector 2#	Always connected	10 KΩ or greater
Electronic throttle body connector 1# -electronic throttle body connector 3#	Always connected	10 KΩ or greater
Electronic throttle body connector 1# -electronic throttle body connector 4#	Always connected	10 KΩ or greater
Electronic throttle body connector 1# -electronic throttle body connector 5#	Always connected	10 KΩ or greater
Electronic throttle body connector 1# -electronic throttle body connector 6#	Always connected	10 KΩ or greater
Electronic throttle body connector 2# -electronic throttle body connector 3#	Always connected	10 KΩ or greater
Electronic throttle body connector 2# -electronic throttle body connector 4#	Always connected	10 KΩ or greater
Electronic throttle body connector 2# -electronic throttle body connector 5#	Always connected	10 KΩ or greater
Electronic throttle body connector 2# -electronic throttle body connector 6#	Always connected	10 KΩ or greater
Electronic throttle body connector 3# -electronic throttle body connector 4#	Always connected	10 KΩ or greater
Electronic throttle body connector 3# -electronic throttle body connector 5#	Always connected	10 KΩ or greater
Electronic throttle body connector 3# -electronic throttle body connector 6#	Always connected	10 KΩ or greater
Electronic throttle body connector 4# -electronic throttle body connector 5#	Always connected	10 KΩ or greater
Electronic throttle body connector 4# -electronic throttle body connector 6#	Always connected	10 KΩ or greater
Electronic throttle body connector #5 - electronic throttle body connection #	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check electronic throttle body harness and connector for circuit shorted to power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connection B6# -body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B16# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B34# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B40# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the electronic throttle body (See page ES-461)**

(a) Replace the electronic throttle body.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG	Replace the ECM (See page ES-450)

OK

6	End

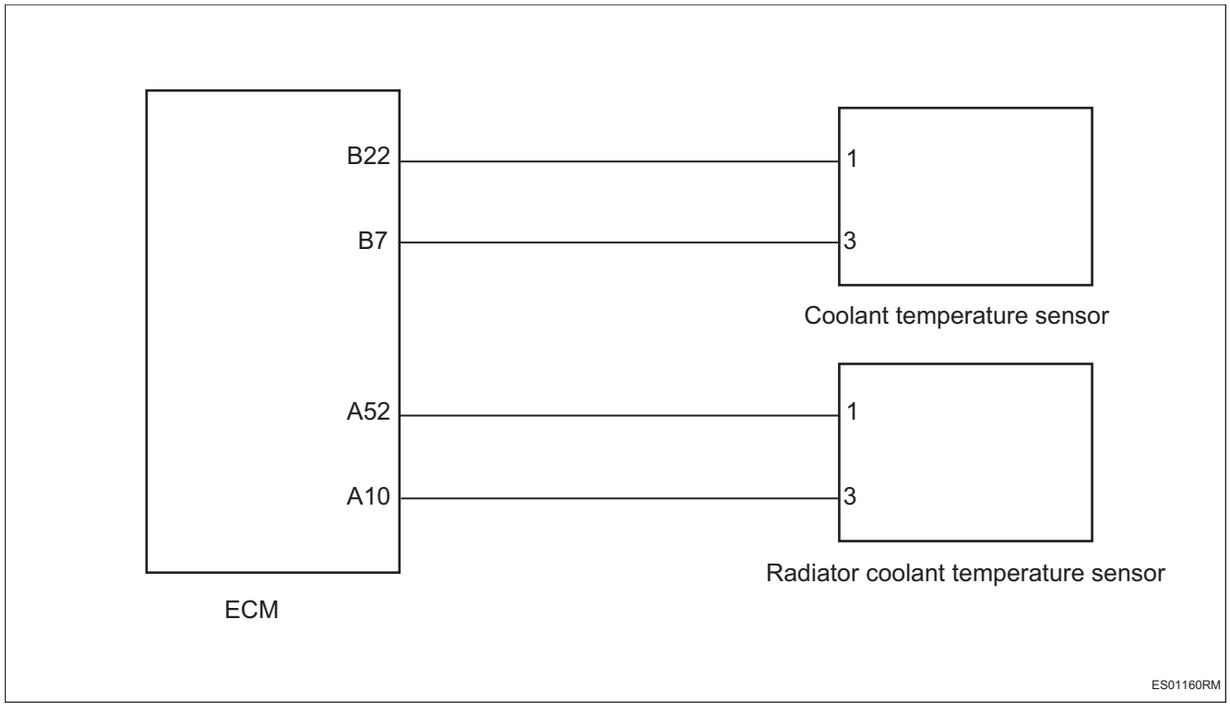
DTC	P012800	Thermostat performance implausible (water temperature failing to reach nominal opening temperature of thermostat)

Description

When the thermostat cannot be turned on according to the normal operating temperature, the ECM records DTC.

DTC	DTC detection conditions	Faulty location
P012800	(a) The thermostat performance is unreasonable.	• ECM • Harness and connector • Coolant temperature sensor • Radiator coolant temperature sensor • Engine cooling system • Thermal management module • Coolant pump

Circuit diagram



Inspection procedure

1	Check engine cooling system

(a) Check whether the coolant level is normal.

(b) Check whether the cooling system is blocked or leaking.

(c) Check whether the coolant has deteriorated.

(d) Check whether the cooling fan is working properly.

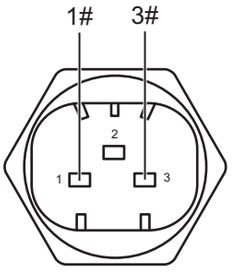
(e) Check whether the coolant pump works properly.

NG → **Repair according to the fault**

ES

OK

2	Check coolant temperature/radiator coolant temperature sensor



Radiator coolant temperature sensor/coolant temperature sensor ES01171RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the coolant temperature sensor connector.

(d) Disconnect the radiator coolant temperature sensor connector.

(e) Remove the coolant temperature sensor.

(f) Remove the radiator coolant temperature sensor.

(g) Measure the resistance according to the values in the table below.

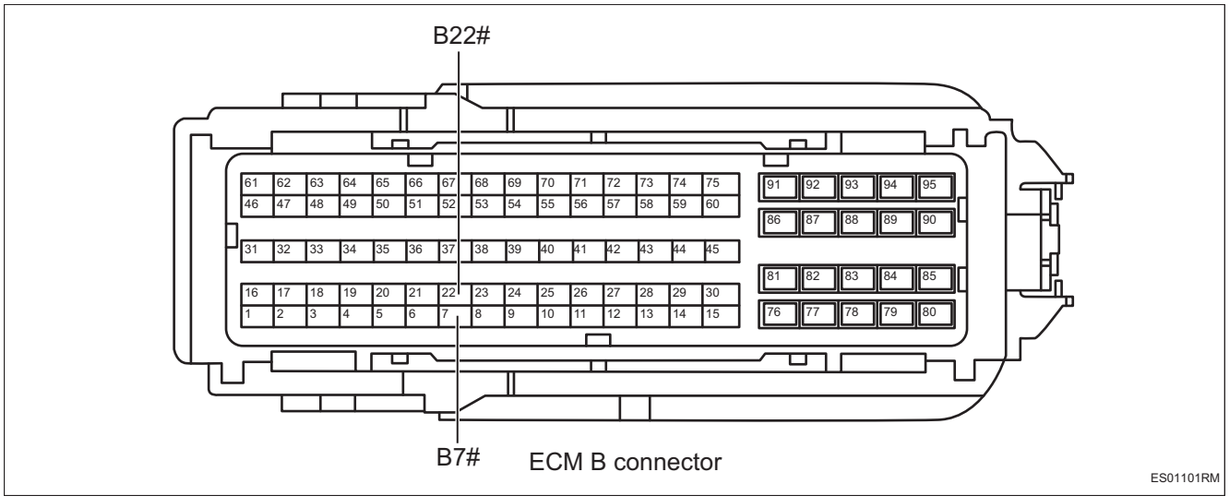
Standard value

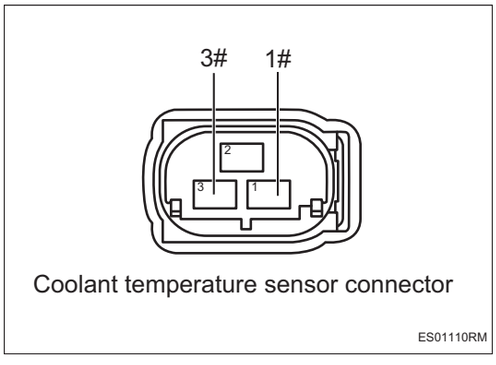
Detector connection	Detection conditions	Specified state
Coolant temperature sensor 1#-coolant temperature sensor 3#	20 ℃	2.2128 KΩ ~ 2.63 1KΩ
Coolant temperature sensor 1#-coolant temperature sensor 3#	80 ℃	0.3030 KΩ ~ 0.3260 KΩ
Radiator coolant temperature sensor #1 -radiator coolant temperature sensor #3	20 ℃	2.2128 KΩ ~ 2.6391 KΩ
Radiator coolant temperature sensor #1 -radiator coolant temperature sensor #3	80 ℃	0.3030 KΩ ~ 0.3260 KΩ

NG → **Replace coolant temperature/radiator coolant temperature sensor**

OK

3	Check coolant temperature sensor harness and connector





(a) Disconnect the ECM connector.

(b) Measure the resistance according to the values in the table below.

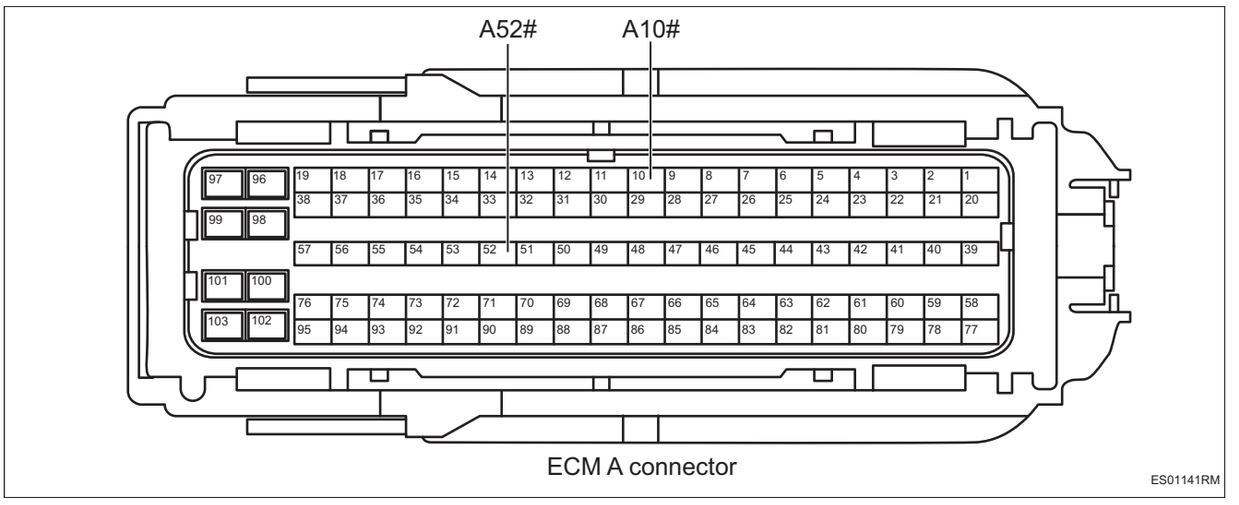
Standard value

Detector connection	Detection conditions	Specified state
Coolant temperature sensor connector 1# - ECM connector B22#	Always connected	Less than 1Ω
Coolant temperature sensor connector 3# - ECM connector B7#	Always connected	Less than 1Ω
Coolant temperature sensor connector 1# - body GND	Always connected	10 KΩ or greater
Coolant temperature sensor connector 3# - body GND	Always connected	10 KΩ or greater
Coolant temperature sensor connector 1# - B+	Always connected	10 KΩ or greater
Coolant temperature sensor connector 3# - B+	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

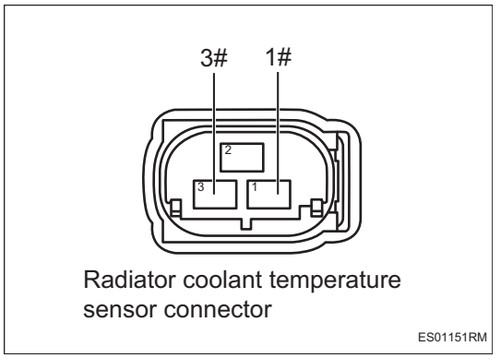
OK

4	**Check radiator coolant temperature sensor harness and connector**



ECM A connector

ES01141RM



Radiator coolant temperature sensor connector

ES01151RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Radiator coolant temperature sensor connector 1# - ECM connector A52#	Always connected	Less than 1Ω
Radiator coolant temperature sensor connector 3# - ECM connection A 0#	Always connected	Less than 1Ω
Radiator coolant temperature sensor connector 1# -body GND	Always connected	10 KΩ or greater
Radiator coolant temperature sensor connector 3# -body GND	Always connected	10 KΩ or greater
Radiator coolant temperature sensor connector 1# - B +	Always connected	10 KΩ or greater
Radiator coolant temperature sensor connector 3# - B +	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	**Replace the thermal management module (See page CO-25)**

(a) Replace the thermal management module.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG	Replace the ECM (See page ES-450)

OK

6	End

DTC	P013300	Upstream oxygen sensor aging
DTC	P013A00	Downstream oxygen sensor rich-lean response slow
DTC	P219500	LSU oxygen sensor characteristic deviation (biased lean)
DTC	P219600	LSU oxygen sensor characteristic deviation (biased rich)
DTC	P209700	Closed-loop correction value based on downstream oxygen sensor above upper limit - biased rich
DTC	P209600	Closed-loop correction value based on downstream oxygen sensor below lower limit -biased lean

Description

In case of oxygen sensor aging or continuous rich or lean signal, the ECM records DTC.

DTC	DTC detection conditions	Faulty location
P013300	(a) The upstream oxygen sensor dynamic factor is less than threshold.	• Oxygen sensor • intake system • Exhaust system
P013A00	(a) The transition time of the downstream oxygen sensor voltage signal from rich to lean exceeds the threshold.	• Oxygen sensor
P219500	(a) LSU oxygen sensor characteristic offset fault.	• Oxygen sensor • intake system • Exhaust system
P219600	(a) LSU oxygen sensor characteristic offset.	• Oxygen sensor • intake system • Exhaust system
P209700	(a) Closed-loop correction value based on the downstream oxygen sensor above the upper limit -biased rich.	• Oxygen sensor • intake system • Exhaust system • Catalytic converter
P209600	(a) Closed-loop correction value based on downstream oxygen sensor below the lower limit - biased lean.	• Oxygen sensor • intake system • Exhaust system • Catalytic converter

Inspection procedure

1	**Check whether there is other DTC output**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Read the DTC.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

ES

NG → **Repair according to the DTC**

OK

2	Check intake system

(a) Check whether the intake system pipeline is properly connected.

(b) Check the intake system for leakage damage.

NG → **Repair or replace the intake system components**

OK

3	Check the exhaust system

(a) Check whether the exhaust system pipeline is properly connected.

(b) Check the exhaust system for leakage damage.

NG → **Repair or replace the exhaust system components**

OK

4	Replace the oxygen sensor (See page ES-455)

(a) Replace the oxygen sensor.

(b) Release the the throttle to coast at the vehicle speed of about 70 km/h several times.

(c) Connect the HQ-VDS.

(d) Clear the DTC.

(e) Re-read the DTC.

Criteria:

No DTC is output.

NG	Replace the catalytic converter (See page EX-2)

ES

OK

5	End

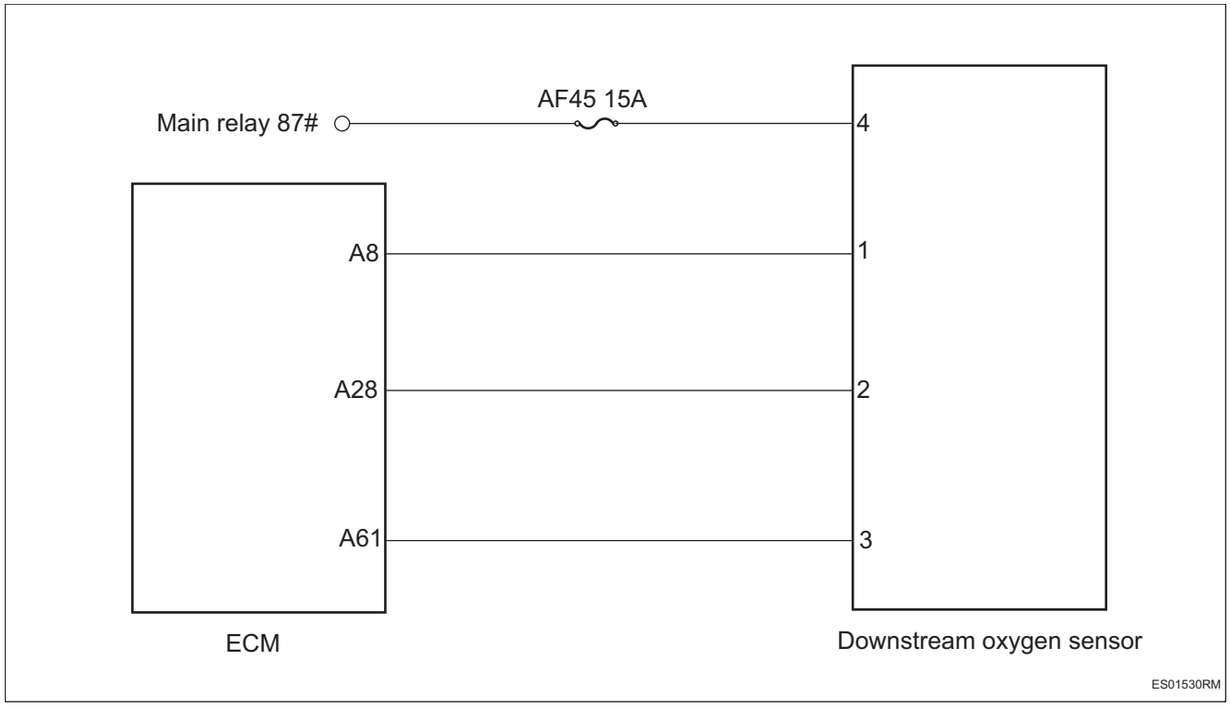
DTC	P013800	Downstream oxygen sensor signal line shorted to power supply
DTC	P013700	Downstream oxygen sensor signal line shorted to ground
DTC	P013600	Downstream oxygen sensor signal circuit open

Description

When the downstream oxygen sensor signal circuit is shorted or open, ECM will record DTC.

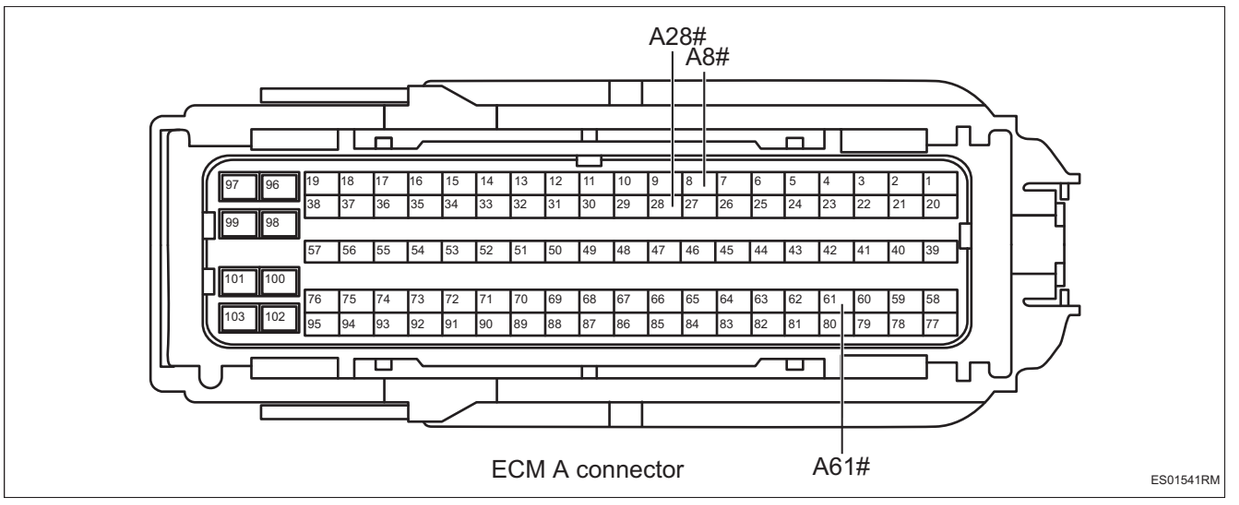
DTC	DTC detection conditions	Faulty location
P013800	(a) Downstream oxygen sensor signal line shorted to power supply.	• ECM • Harness and connector • Downstream oxygen sensor
P013700	(a) Downstream oxygen sensor signal line shorted to ground.	• ECM • Harness and connector • Downstream oxygen sensor
P013600	(a) Downstream oxygen sensor signal circuit open.	• ECM • Harness and connector • Downstream oxygen sensor

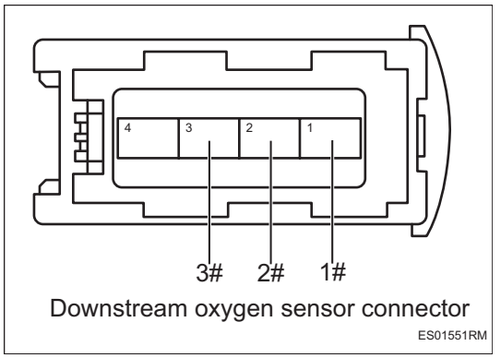
Circuit diagram



Inspection procedure

1	Check downstream oxygen sensor harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the downstream oxygen sensor connector.

(e) Measure the resistance according to the values in the table below.

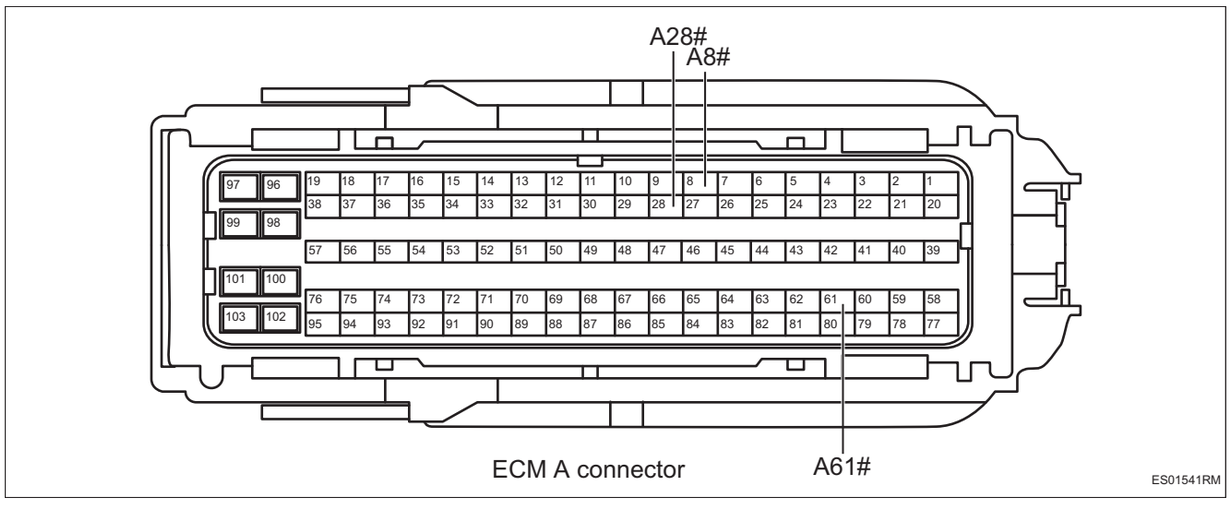
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A8# - downstream oxygen sensor connector 1#	Always connected	Less than 1Ω
ECM connector A28# - downstream oxygen sensor connector 2#	Always connected	Less than 1Ω
ECM connector A61# - downstream oxygen sensor connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check downstream oxygen sensor harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

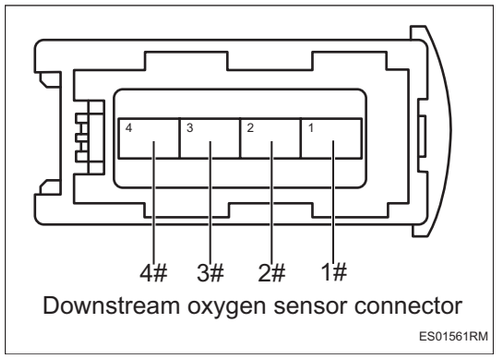
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A8# - body GND	Always connected	10 KΩ or greater
ECM connector A28# - body GND	Always connected	10 KΩ or greater
ECM connector A61# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	Check downstream oxygen sensor harness and connector for circuit shorted to each other



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Downstream oxygen sensor connector 1# - downstream oxygen sensor connector 2#	Always connected	10 KΩ or greater
Downstream oxygen sensor connector 1# - downstream oxygen sensor connector 3#	Always connected	10 KΩ or greater
Downstream oxygen sensor connector 1# - downstream oxygen sensor connector 4#	Always connected	10 KΩ or greater
Downstream oxygen sensor connector 2# - downstream oxygen sensor connector 3#	Always connected	10 KΩ or greater

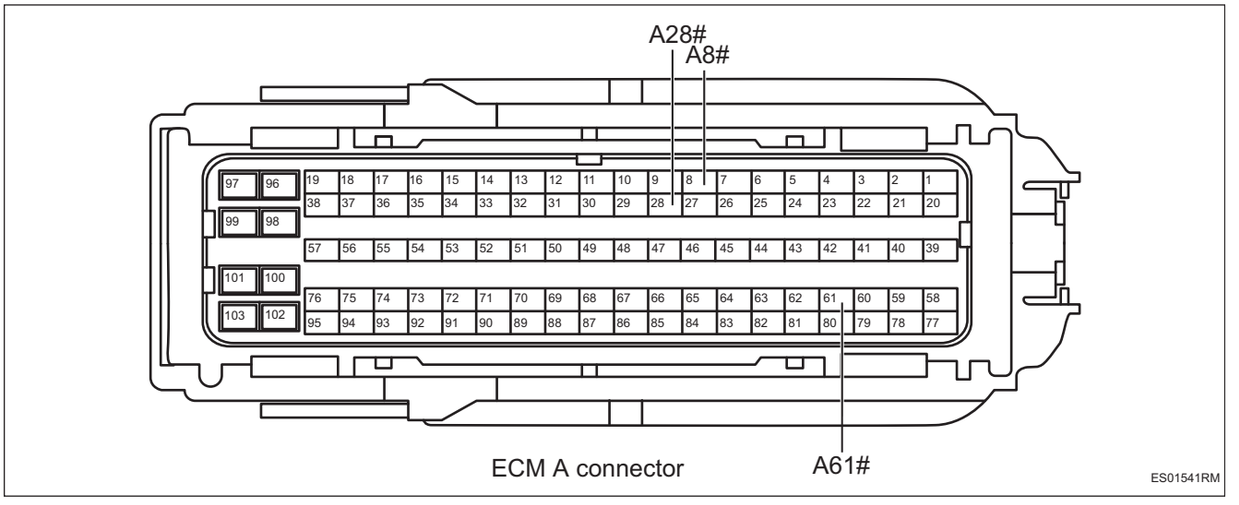
ES

Detector connection	Detection conditions	Specified state
Downstream oxygen sensor connector 2# - downstream oxygen sensor connector 4#	Always connected	10 KΩ or greater
Downstream oxygen sensor connector 3# - downstream oxygen sensor connector 4#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check downstream oxygen sensor harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

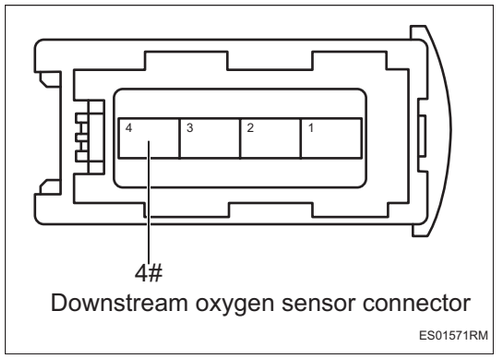
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A8# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A28# - body GND	Ignition switch in "ON"	Less than 1 V
ECM connector A61# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Check the downstream oxygen sensor power supply



Downstream oxygen sensor connector
ES01571RM

(a) Set the ignition switch to "OFF".
(b) Disconnect the battery negative terminal.
(c) Connect ECM connector.
(d) Connect the battery negative terminal.
(e) Set the ignition switch to "ON".
(f) Measure the voltage according to the values in the table below.

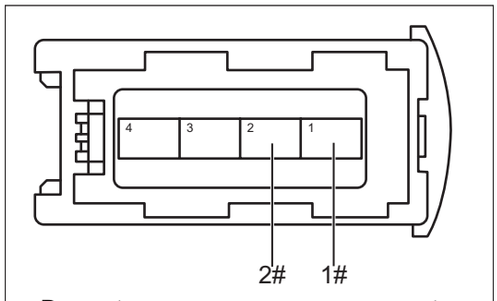
Standard value

Detector connection	Detection conditions	Specified state
Downstream oxygen sensor connector 4# — body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector, fuse and relay**

OK

6	Check the downstream oxygen sensor



Downstream oxygen sensor connector
ES01581RM

(a) Set the ignition switch to "OFF".
(b) Connect downstream oxygen sensor connector.
(c) Set the ignition switch to "ON".
(d) Measure the voltage according to the values in the table below.

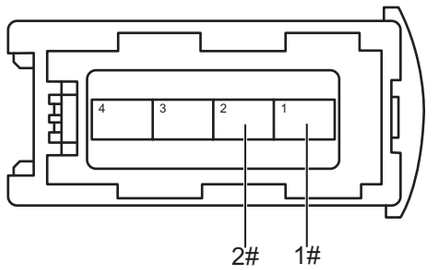
Standard value

Detector connection	Detection conditions	Specified state
Downstream oxygen sensor connector 1# - downstream oxygen sensor connector 2#	Always connected	About 0.45 V

NG → **Replace the downstream oxygen sensor (See page ES-457)**

OK

7	Check the downstream oxygen sensor



Downstream oxygen sensor connector

ES01581RM

(a) Start the vehicle (idle).

(b) Run the vehicle until the coolant temperature is normal.

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Downstream oxygen sensor connector 1# - downstream oxygen sensor connector 2#	Always connected	Jump between 0~1 V

NG → **Replace the downstream oxygen sensor (See page ES-457)**

OK

8	**Replace the ECM (See page ES-450)**

DTC	P017F00	DMTL air cleaner flow resistance high
DTC	P128000	DMTL pump current frequency high
DTC	P128100	DMTL pump current frequency low
DTC	P043E00	EVAP system leakage diagnosis DMTL reference pump current high
DTC	P043F00	EVAP system leakage diagnosis DMTL reference pump current relatively low
DTC	P24C100	DMTL pump idle current high
DTC	P240700	DMTL pump current fluctuation out of plausible range (caused by humidity)
DTC	P044200	EVAP system 1.0mm leakage

Description

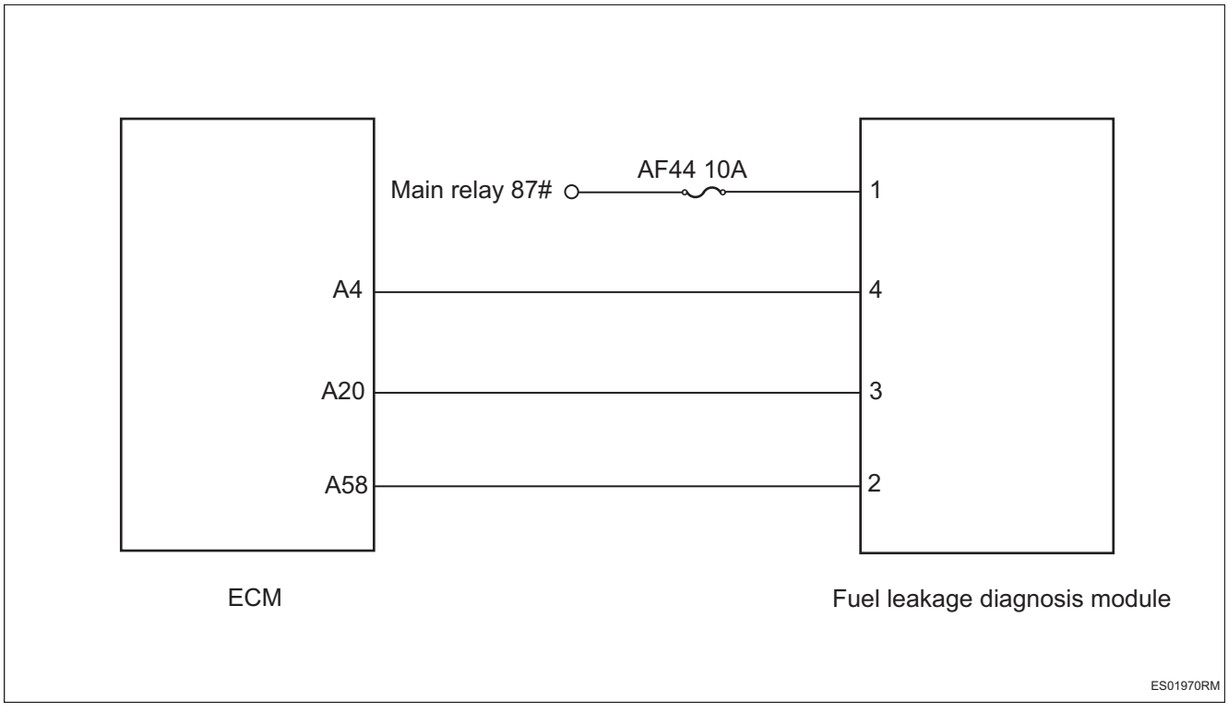
When it is detected that the fuel leakage diagnosis module works abnormally or the EVAP system leaks, the EMC records the DTC.

DTC	DTC detection conditions	Faulty location
P017F00	(a) DMTL air cleaner flow resistance high.	• EVAP system pipeline • ECM • Fuel leakage diagnosis module
P128000	(a) DMTL pump current overfrequency.	• ECM • Harness and connector • Fuel leakage diagnosis module • Charging system • EVAP system pipeline
P128100	(a) DMTL pump current underfrequency.	• ECM • Harness and connector • Fuel leakage diagnosis module • Charging system • EVAP system pipeline
P043E00	(a) DMTL reference pump current high.	• ECM • Harness and connector • Fuel leakage diagnosis module • Charging system • EVAP system pipeline
P043F00	(a) DMTL reference pump current low.	• ECM • Harness and connector • Fuel leakage diagnosis module • Charging system • EVAP system pipeline

ES

DTC	DTC detection conditions	Faulty location
P24C100	(a) DMTL pump idle current high.	• ECM • Harness and connector • Fuel leakage diagnosis module • Charging system
P240700	(a) DMTL pump current fluctuation out of plausible range.	• ECM • Harness and connector • Fuel leakage diagnosis module • Charging system
P044200	(a) EVAP system leakage.	• ECM • Harness and connector • Fuel leakage diagnosis module • EVAP system pipeline

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2	Check the fuel leakage diagnosis system

(a) Check if the engine intake system is normal.

(b) Check whether the tightness of the fuel tank is normal and whether the fuel tank cover is properly installed.

(c) Check whether the canister solenoid valve is damaged.

(d) Check whether the EVAP system pipeline is properly connected.

(e) Check whether the EVAP system pipeline leaks or is blocked.

(f) Check whether the fuel leakage diagnosis system air filter is blocked.

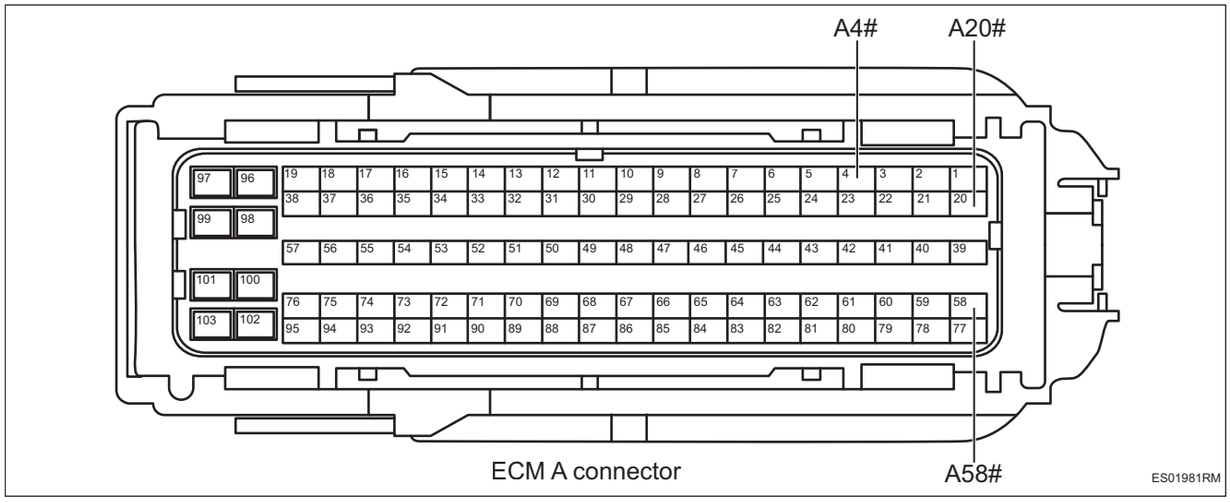
(g) Check whether the fuel leakage diagnosis module installation position is correct.

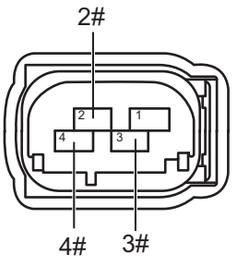
(h) Check whether the fuel leakage diagnosis module exterior is intact.

NG → **Repair according to the fault**

OK

3	Check fuel leakage diagnosis module harness and connector for open circuit





Fuel leakage diagnosis module connector
ES01990RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the fuel leakage diagnosis module connector.

(e) Measure the resistance according to the values in the table below.

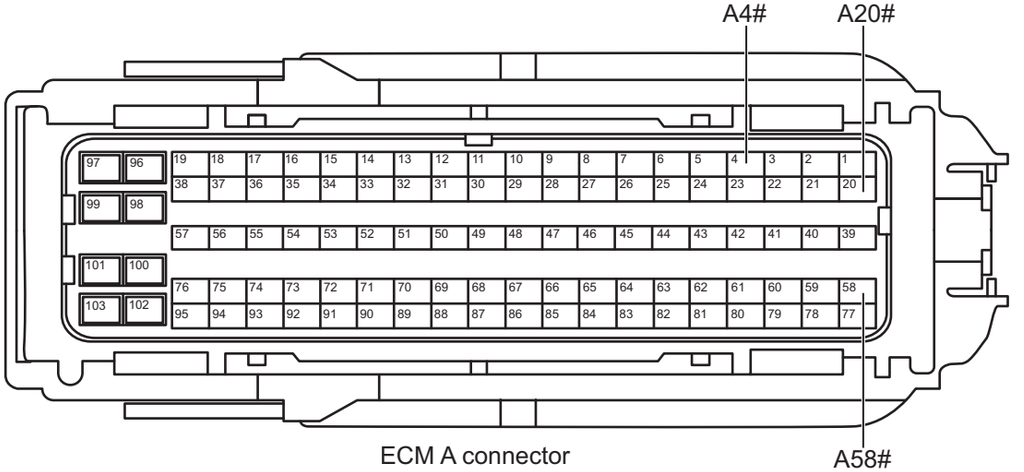
Standard value

Detector connection	Detection conditions	Specified state
Fuel leakage diagnosis module connector 2# - ECM connector A58#	Always connected	Less than 1Ω
Fuel leakage diagnosis module connector 3# - ECM connector A20#	Always connected	Less than 1Ω
Fuel leakage diagnosis module connector 4# - ECM connector A4#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check fuel leakage diagnosis module harness and connector for circuit shorted to ground**



ECM A connector
ES01981RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector A4# - body GND	Always connected	10 KΩ or greater

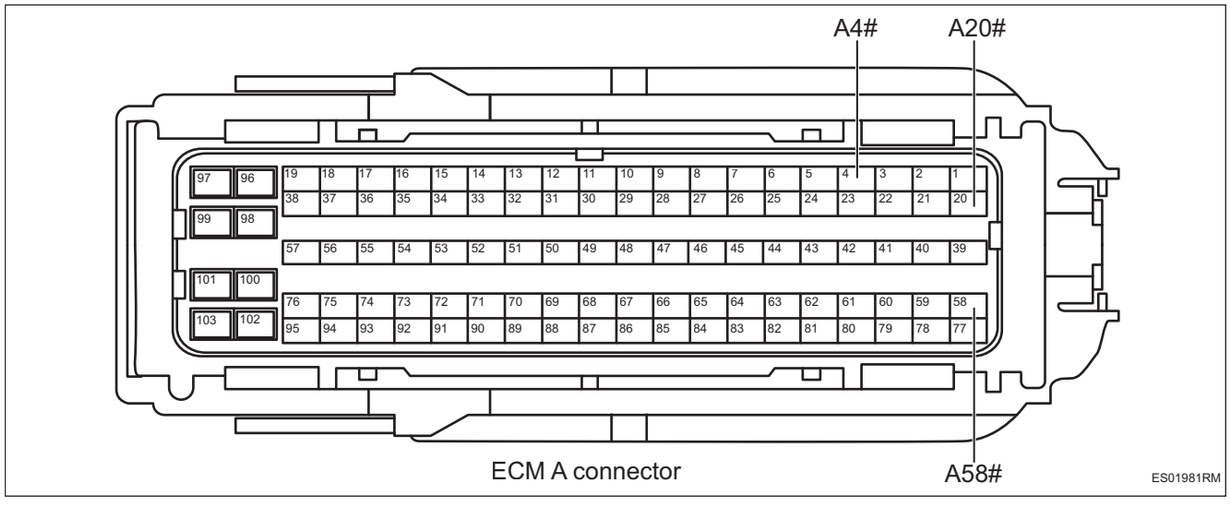
Detector connection	Detection conditions	Specified state
ECM connector A58# - body GND	Always connected	10 KΩ or greater
ECM connector A20# - body GND	Always connected	10 KΩ or greater

ES

NG → **Repair or replace the harness and connector**

OK

5	**Check fuel leakage diagnosis module harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

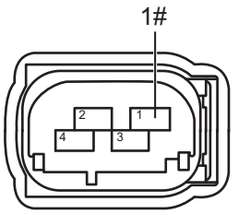
Detector connection	Detection conditions	Specified state
ECM connector A4# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A58# - body GND	Set the ignition switch to "ON"	Less than 1 V
Engine control unit connector A20# -body GND	Set the ignition switch to "ON"	Less than 1V

NG → **Repair or replace the harness and connector**

OK

6	Check the fuel leakage diagnosis module power supply

ES



Fuel leakage diagnosis module connector

ES02001RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Connect ECM connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the voltage according to the values in the table below.

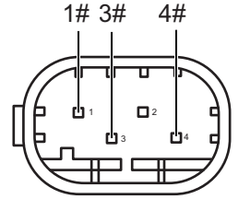
Standard value

Detector connection	Detection conditions	Specified state
Fuel leakage diagnosis module connector 1# -body GND	Set the ignition switch to "ON"	Battery Voltage

NG → **Repair or replace the harness and connector, fuse and relay**

OK

7	Check the fuel leakage diagnosis module



Fuel leakage diagnosis module

ES02010RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the fuel leakage diagnosis module connector.

(d) Remove the fuel leakage diagnosis module.

(e) Apply battery positive voltage to terminal 1 and negative voltage to terminal 3 to check solenoid valve opening and closing.

(f) Apply battery positive voltage to terminal 1 and negative voltage to terminal 4 to check air pump operation.

Criteria:

Solenoid valve: open after power-on; close after power-off.

Air pump: running without stuck after power-on.

NG → **Replace the fuel leakage diagnosis module (See page EC-9)**

OK

8	**Replace the ECM (after cold start, drive for at least 10 min, shut down the engine and park for 5 min, and then power on to check whether the fault recurs) (See page ES-450)**

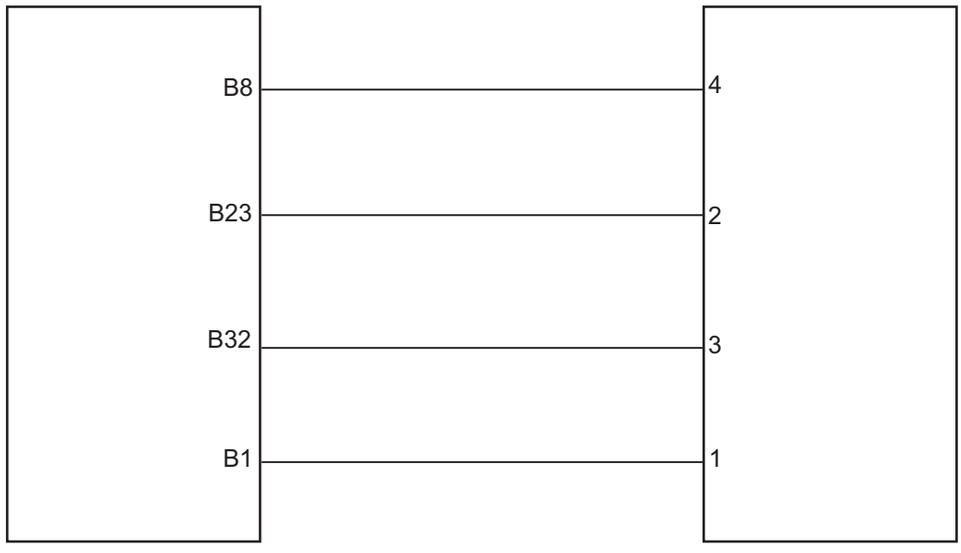
DTC	P019800	Oil temperature sensor circuit overvoltage
DTC	P019700	Oil temperature sensor circuit undervoltage
DTC	P019664	Oil temperature sensor signal implausible (high side)
DTC	P019629	Oil temperature sensor signal implausible (low side)
DTC	P121800	Oil temperature sensor signal above upper limit
DTC	P052300	High oil pressure sensor circuit voltage/duty cycle
DTC	P052200	Low oil pressure sensor circuit voltage/duty cycle

Description

When the oil pressure and temperature sensor circuit voltage is abnormal or the signal is implausible, the ECM records DTC.

DTC	DTC detection conditions	Faulty location
P019800	(a) Oil temperature sensor circuit overvoltage.	• ECM • Harness and connector • Oil pressure and temperature sensor
P019700	(a) Oil temperature sensor circuit undervoltage.	• ECM • Harness and connector • Oil pressure and temperature sensor
P019664	(a) Oil temperature sensor signal implausible.	• ECM • Harness and connector • Oil pressure and temperature sensor
P019629	(a) Oil temperature sensor signal implausible.	• ECM • Harness and connector • Oil pressure and temperature sensor
P121800	(a) Oil temperature sensor signal above upper limit.	• ECM • Harness and connector • Oil pressure and temperature sensor
P052300	(a) High oil pressure sensor circuit voltage/duty cycle.	• ECM • Harness and connector • Oil pressure and temperature sensor
P052200	(a) Low oil pressure sensor circuit voltage/duty cycle.	• ECM • Harness and connector • Oil pressure and temperature sensor

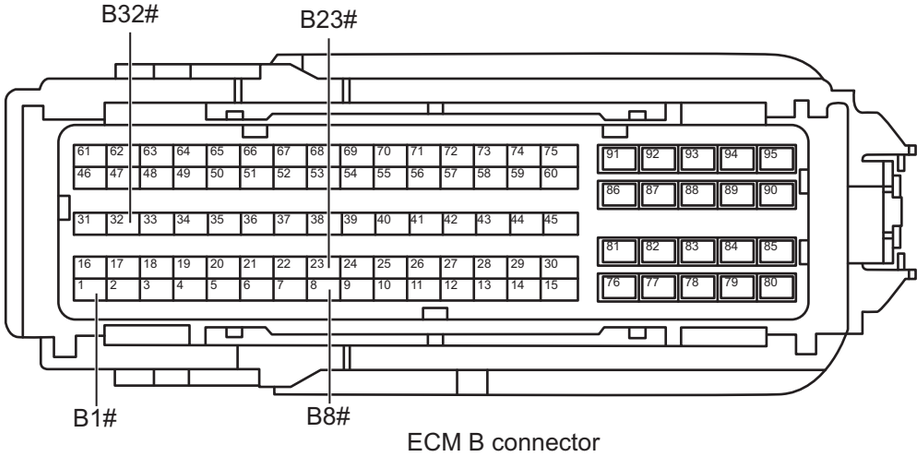
Circuit diagram



ES02550RM

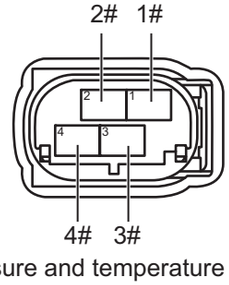
Inspection procedure

1	Check oil pressure and temperature sensor harness and connector for open circuit



ECM B connector

ES02561RM



Oil pressure and temperature sensor connector

ES02570RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the oil pressure and temperature sensor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

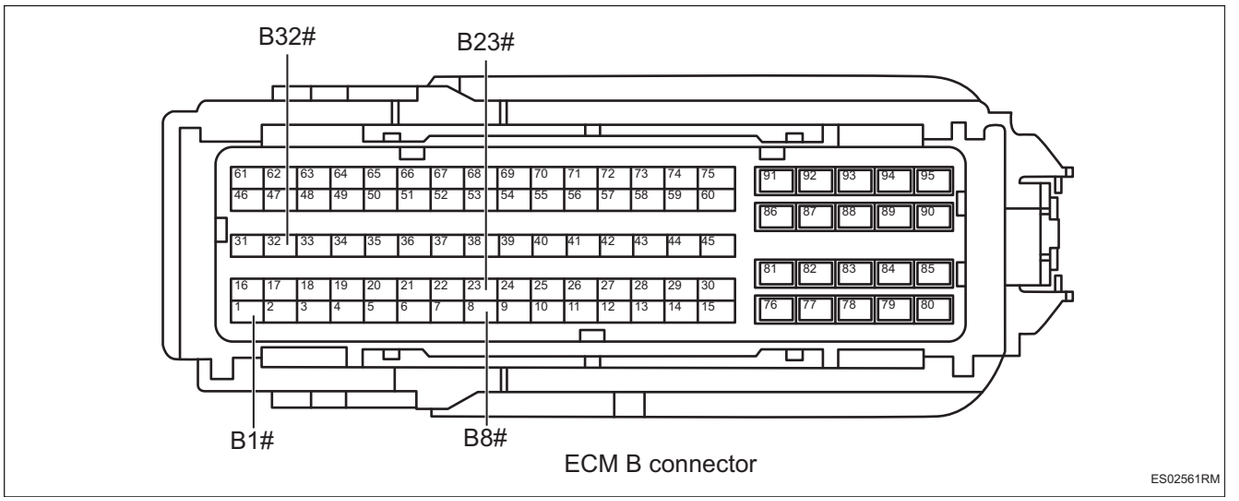
ES

Detector connection	Detection conditions	Specified state
Oil pressure and temperature sensor connector# -ECM connector B8#	Always connected	Less than Ω
Oil pressure and temperature sensor connector 2# -ECM connector B23#	Always connected	Less than 1Ω
Oil pressure and temperature sensor connector 3# -ECM connector B32#	Always connected	Less than 1Ω
Oil pressure and temperature sensor connector 1# -ECM connector B1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check oil pressure and temperature sensor harness and connector for circuit shorted to ground**



ECM B connector

ES02561RM

(a) Measure the resistance according to the values in the table below.

Standard value

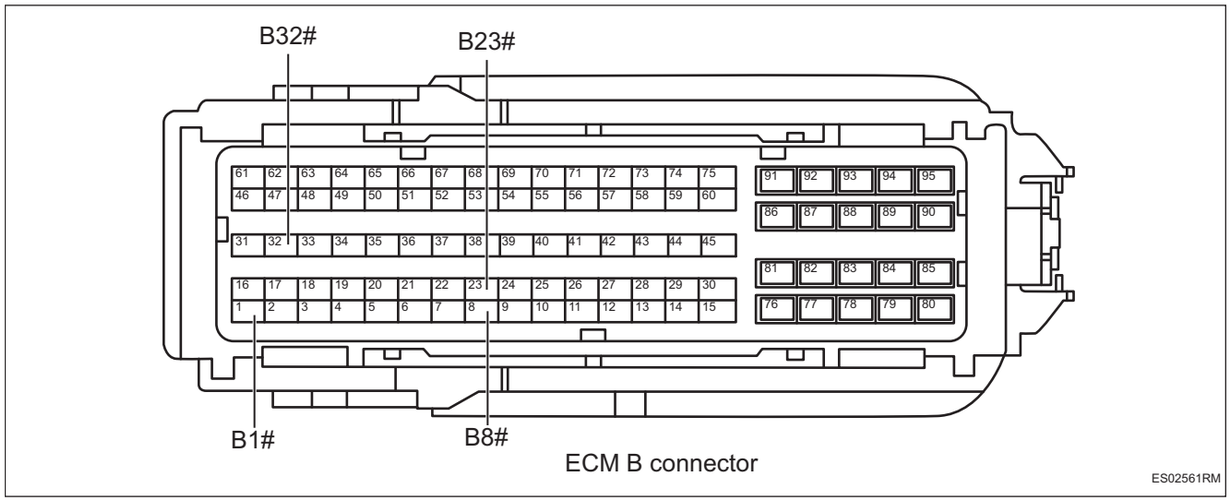
Detector connection	Detection conditions	Specified state
ECM connector B1# - body GND	Always connected	10KΩ or greater
ECM connector B23# - body GND	Always connected	10KΩ or greater
ECM connector B32# - body GND	Always connected	10 KΩ or greater
ECM connector B8# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

ES

3	**Check oil pressure and temperature sensor harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B1# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B23# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B32# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B8# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the oil pressure and temperature sensor (See page LU-6)**

(a) Replace the oil pressure and temperature sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

5	**End**

DTC	P021900	High engine speed

Description

When the engine speed measured by the crankshaft position sensor is abnormal, the ECM records DTC.

DTC	DTC detection conditions	Faulty location
P021900	(a) Engine speed high.	• ECM • Harness and connector • Crankshaft position sensor • Electronic accelerator pedal • Intake system • Electronic throttle body

Inspection procedure

1	Check whether there is artificial improvement of the engine speed

(a) Check whether there has ever been a manual increase in engine speed beyond the maximum safe speed.

Results

Results	Go to
Yes	Abnormal
NO	Normal

NG → **Clear DTC**

OK

2	Check engine intake system

(a) Check whether the intake system pipeline is properly connected.

(b) Check the intake system pipeline for leaks.

NG → **Repair according to the fault**

OK

3	Check electronic throttle body

(a) Check whether the electronic throttle body connector is connected tightly.

(b) Check the electronic throttle body harness and connector for short circuit or open circuit.

(c) Check the electronic throttle body for stuck for damage.

NG → Repair according to the fault

ES

OK

4	Check electronic accelerator pedal

(a) Check whether the electronic accelerator pedal connector is connected tightly.

(b) Check the electronic accelerator pedal harness and connector for short circuit or open circuit.

(c) Check the electronic accelerator pedal for seizure.

NG → Repair according to the fault

OK

5	Check crankshaft position sensor

(a) Check whether the crankshaft position sensor connector is connected tightly.

(b) Check the crankshaft position sensor harness and connector for short circuit or open circuit.

(c) Check whether the crankshaft position sensor is damaged.

NG → Repair according to the fault

OK

6	Replace the ECM (See page ES-450)

DTC	**P023400**	**Turbocharger charge air pressure display high**
DTC	**P029900**	**Turbocharger charge air pressure display low**

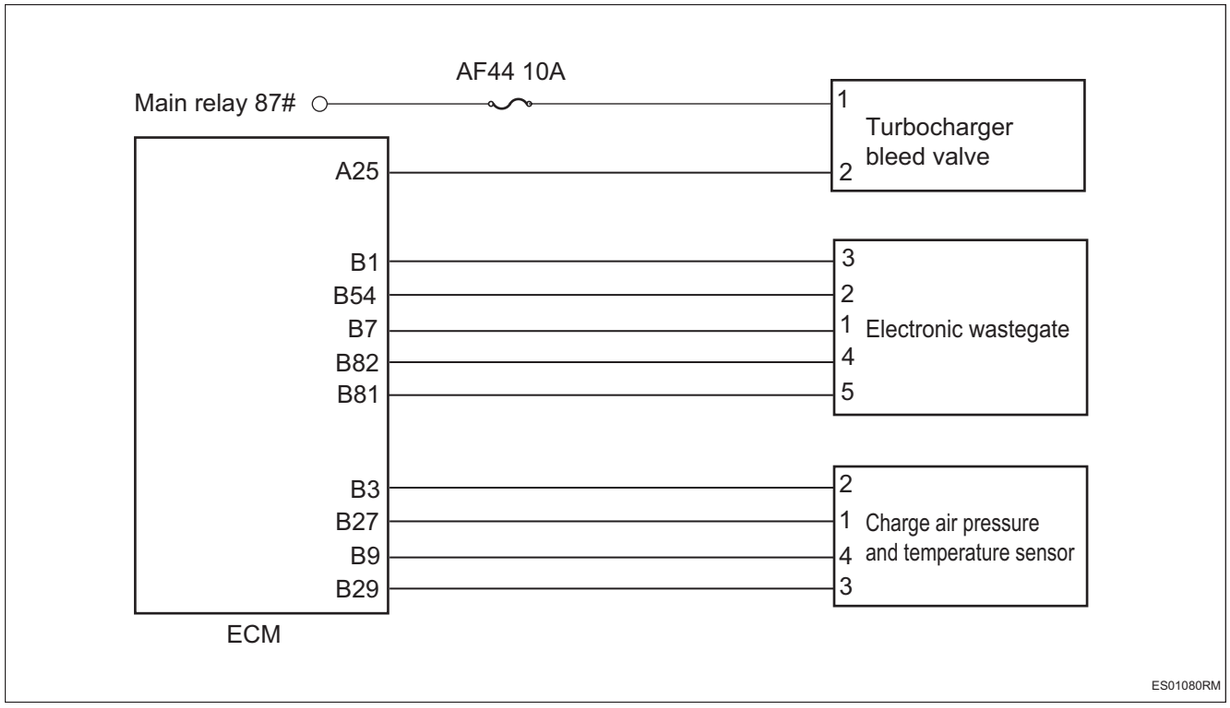
ES

Description

When the turbocharger charge air pressure is abnormal, the ECM records DTC.

DTC	DTC detection conditions	Faulty location
P023400	(a) Charge air pressure above target pressure plus an offset.	• ECM • Harness and connector • bleed valve • Electronic wastegate
P029900	(a) Actual charge air pressure below target charge air pressure minus an offset.	• ECM • Harness and connector • bleed valve • Electronic wastegate • Turbocharger system pipeline • Intake system pipeline • Exhaust system pipeline • Turbocharger

Circuit diagram



Inspection procedure

1	**Check turbocharger system pipeline**

ES

(a) Check whether the turbocharger system pipeline is properly connected.

(b) Check whether the turbocharger system pipeline is blocked or leaky.

NG → **Repair according to the fault**

OK

2	Check intake system pipeline

(a) Check whether the air cleaner is dirty.

(b) Check whether the intake system pipeline is properly connected.

(c) Check whether the intake system pipeline is leaking and blocked.

NG → **Repair according to the fault**

OK

3	Check exhaust system pipeline

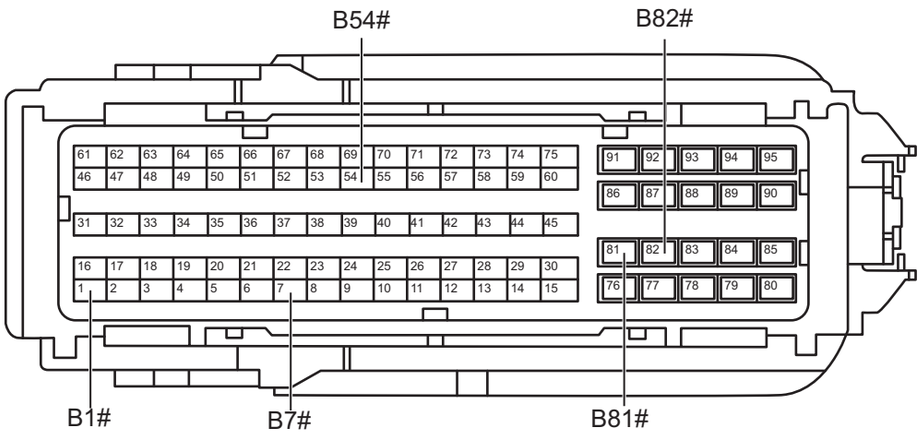
(a) Check whether the exhaust system pipeline is properly connected.

(b) Check whether the exhaust system pipeline leaks or is blocked.

NG → **Repair according to the fault**

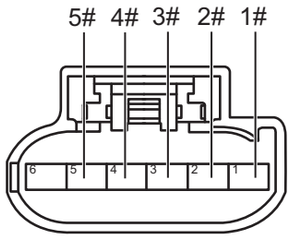
OK

4	Check electronic wastegate harness and connector



ECM B connector

ES00770RM



Electronic wastegate connector

ES00780RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the electronic wastegate connector.

(e) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B1# - electronic wastegate connector 3#	Always connected	Less than 1Ω
ECM connector B54# — Electronic wastegate connector 2#	Always connected	Less than 1Ω
ECM connector B7# - electronic wastegate connector 1#	Always connected	Less than 1Ω
ECM connector B82# - electronic wastegate connector 4#	Always connected	Less than 1Ω
ECM connector B81# — Electronic wastegate connector 5#	Always connected	Less than 1Ω
Electronic wastegate connector 1# — Body GND	Always connected	10 KΩ or greater
Electronic wastegate connector 2# - body GND	Always connected	10 KΩ or greater
Electronic wastegate connector 3# - body GND	Always connected	10 KΩ or greater
Electronic wastegate connector 4# - body GND	Always connected	10 KΩ or greater
Electronic wastegate connector 5# - body GND	Always connected	10 KΩ or greater
Electronic wastegate connector 1# - B +	Always connected	10 KΩ or greater
Electronic wastegate connector 2# B +	Always connected	10 KΩ or greater

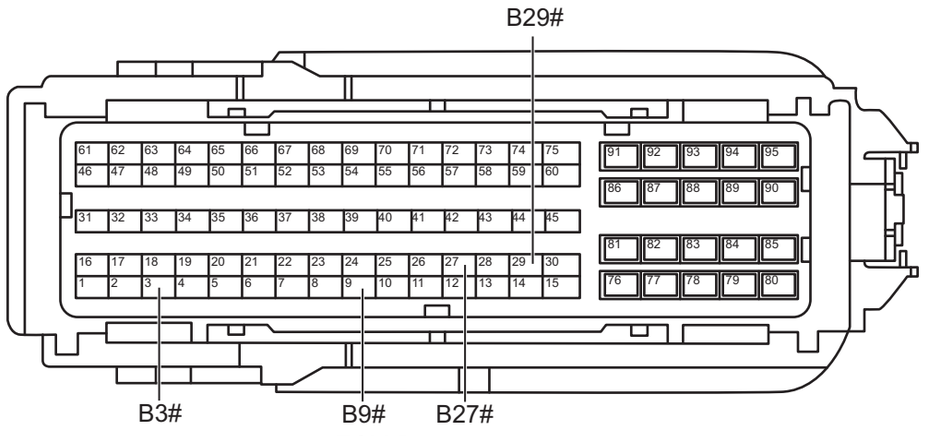
ES

Detector connection	Detection conditions	Specified state
Electronic wastegate connector 3# - B +	Always connected	10 KΩ or greater
Electronic wastegate connector 4# - B +	Always connected	10 KΩ or greater
Electronic wastegate connector 5# - B +	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

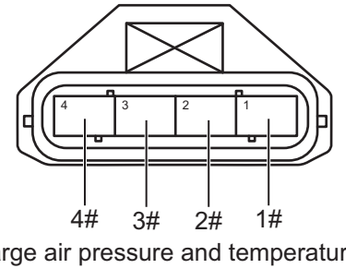
OK

5 Check charge air pressure and temperature sensor harness and connector



ECM B connector

ES01011RM



Charge air pressure and temperature sensor connector

ES01020RM

(a) Disconnect the charge air pressure sensor connector.

(b) Measure the resistance according to the values in the table below.

Standard value

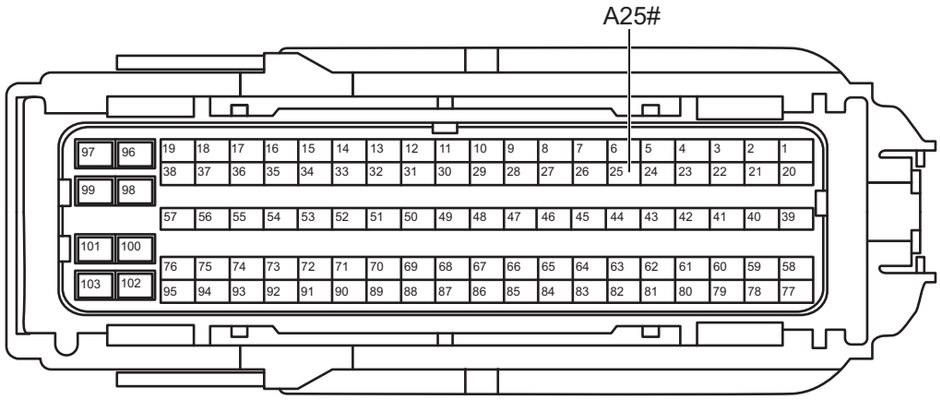
Detector connection	Detection conditions	Specified state
Charge air pressure sensor connector 1# - ECM connector B27#	Always connected	Less than 1Ω
Charge air pressure sensor connector 2# - ECM connector B3#	Always connected	Less than 1Ω
Charge air pressure sensor connector 3# - ECM connector B29#	Always connected	Less than 1Ω
Charge air pressure sensor connector 4# - ECM connector B9#	Always connected	Less than 1Ω
Charge air pressure and temperature sensor connector 1# - body GND	Always connected	10 KΩ or greater
Charge air pressure and temperature sensor connector 2# - body GND	Always connected	10KΩ or greater

Detector connection	Detection conditions	Specified state
Charge air pressure and temperature sensor connector 3# - body GND	Always connected	10 KΩ or greater
Charge air pressure and temperature sensor connector 4# - body GND	Always connected	10 KΩ or greater
Charge air pressure and temperature sensor connector 1# - B +	Always connected	10 KΩ or greater
Increase Pressure and temperature sensor connector 2# — B+	Always connected	10 KΩ or greater
Charge air pressure and temperature sensor connector 3# - B +	Always connected	10 KΩ or greater
Charge air pressure and temperature sensor connector 4# - B +	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

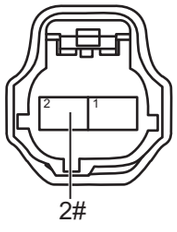
OK

6 Check turbocharger bleed valve harness and connector



ECM A connector

ES00731RM



Turbocharger bleed valve connector

ES00740RM

(a) Disconnect the turbocharger bleed valve connector.

(b) Measure the resistance according to the values in the table below.

Standard value

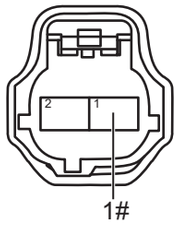
Detector connection	Detection conditions	Specified state
Turbocharger bleed valve connector 2# - ECM connector A25#	Always connected	Less than 1Ω
Turbocharger bleed valve connector 2# - body GND	Always connected	10 KΩ or greater
Turbocharger bleed valve connector 2# - B +	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

ES

OK

7	Check turbocharger bleed valve power supply



Turbocharger bleed valve connector

ES00751RM

(a) Connect ECM connector.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Turbocharger bleed valve connector 1# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector, fuse and relay**

OK

8	Check turbocharger bleed valve

(a) Remove the turbocharger bleed valve.

(b) Apply battery positive voltage to terminal 1 and negative voltage to terminal 2 to check turbocharger bleed valve operation.

Criteria:

Turbocharger bleed valve works normally.

NG → **Replace turbocharger bleed valve**

OK

9	Check charge air pressure and temperature sensor

(a) Check whether the charge air pressure and temperature sensor is installed correctly.

(b) Check whether the charge air pressure and temperature sensor is soiled.

(c) Check whether the charge air pressure and temperature sensor is damaged.

NG → **Replace charge air pressure and temperature sensor**

OK

ES

10	Replace turbocharger bleed valve (See page IT-16)

(a) Replace the turbocharger bleed valve.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **End**

NG

11	Replace the electronic wastegate (See page IT-16)

(a) Replace the electronic wastegate.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **End**

NG

12	Replace the turbocharger (See page IT-16)

(a) Replace the turbocharger.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **ECM (See page ES-450)**

OK

13	**End**

DTC	P023700	Charge air pressure sensor circuit shorted to ground
DTC	P023800	Charge air pressure sensor circuit shorted to power supply
DTC	P138024	IAT sensor 2 cold start check implausible (positive deviation)
DTC	P138023	IAT sensor 2 cold start check implausible (negative deviation)
DTC	P009800	IAT sensor 2 circuit overvoltage
DTC	P009700	IAT sensor 2 circuit undervoltage
DTC	P009900	IAT sensor 2 circuit voltage implausible
DTC	P009626	IAT sensor 2 signal implausible (sticky)

Description

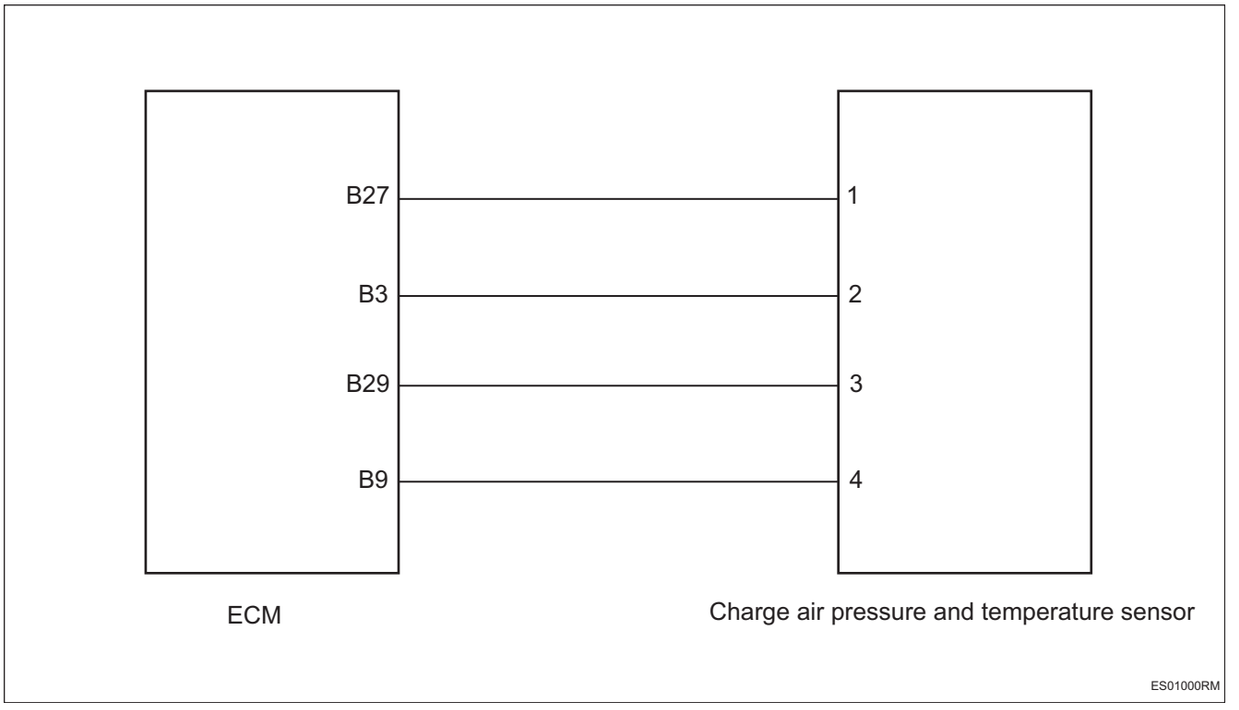
When the charge air pressure and temperature sensor circuit is shorted or open, or the signal is abnormal, ECM will record DTC.

DTC	DTC detection conditions	Faulty location
P023700	(a) Charge air pressure sensor voltage below 0.15 V.	• ECM • Harness and connector • Charge air pressure and temperature sensor
P023800	(a) Charge air pressure sensor voltage above 4.85 V.	• ECM • Harness and connector • Charge air pressure and temperature sensor
P138024	(a) Charge air temperature sensor cold start check implausible.	• ECM • Harness and connector • Charge air pressure and temperature sensor
P138023	(a) Charge air temperature sensor cold start check implausible.	• ECM • Harness and connector • Charge air pressure and temperature sensor
P009800	(a) Temperature sensor voltage above 4.9 V.	• ECM • Harness and connector • Charge air pressure and temperature sensor
P009700	(a) Temperature sensor voltage below 0.1 V.	• ECM • Harness and connector • Charge air pressure and temperature sensor

ES

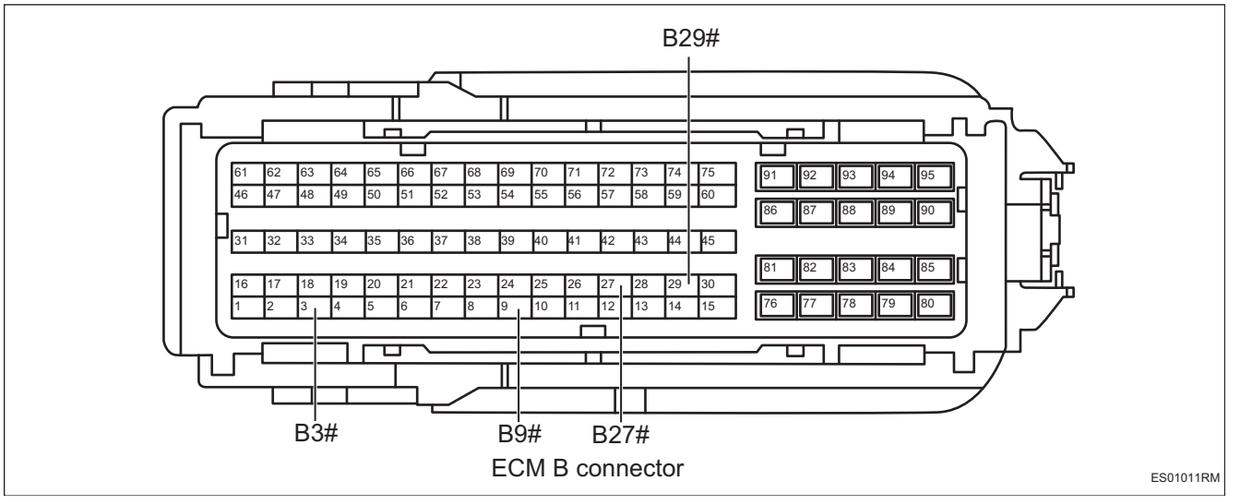
DTC	DTC detection conditions	Faulty location
P009900	(a) Charge air temperature sensor voltage intermittently above 4.9 V.	• ECM • Harness and connector • Charge air pressure and temperature sensor
P009626	(a) The charge air temperature sensor measurements remain unchanged.	• ECM • Harness and connector • Charge air pressure and temperature sensor

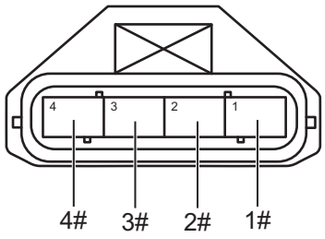
Circuit diagram



Inspection procedure

1	**Check charge air pressure and temperature sensor harness and connector for open circuit**





Charge air pressure and temperature sensor connector

ES01020RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the charge air pressure and temperature sensor connector.

(e) Measure the resistance according to the values in the table below.

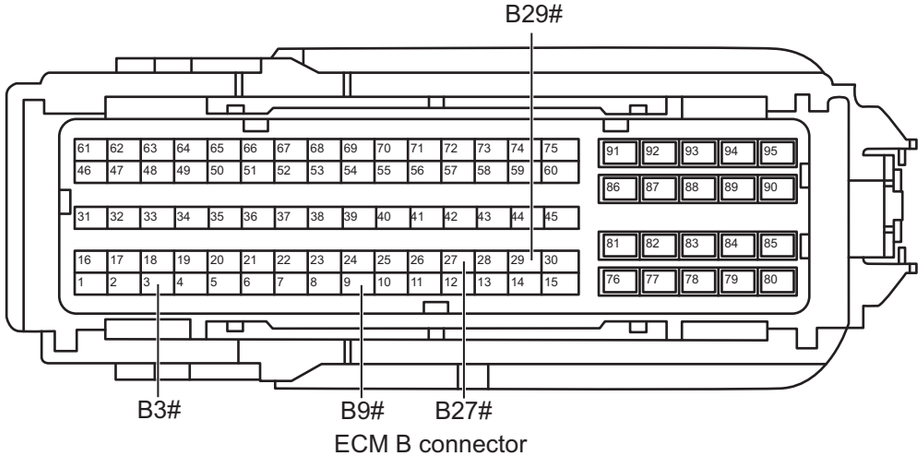
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B27# - charge air pressure and temperature sensor connector 1#	Always connected	Less than 1Ω
ECM connector B3# - charge air pressure and temperature sensor connector 2#	Always connected	Less than 1Ω
ECM connector B29# - charge air pressure and temperature sensor connector 3#	Always connected	Less than 1Ω
ECM connector B9# - charge air pressure and temperature sensor connector 4#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check charge air pressure and temperature sensor harness and connector for circuit shorted to ground**



ECM B connector

ES01011RM

(a) Measure the resistance according to the values in the table below.

Standard value

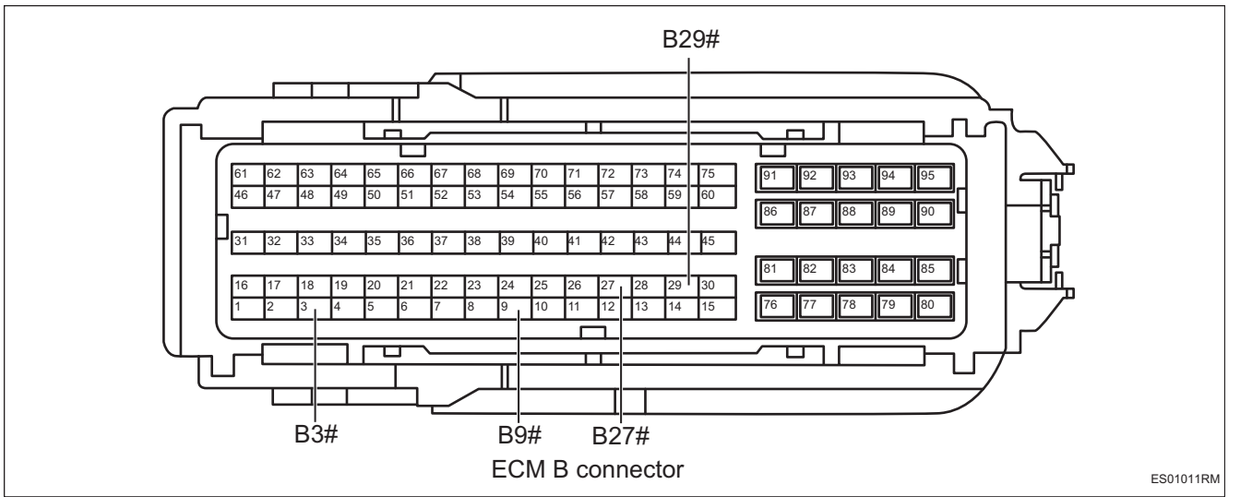
ES

Detector connection	Detection conditions	Specified state
ECM connector B27# - body GND	Always connected	10 KΩ or greater
ECM connector B3# -body GND	Always connected	10 KΩ or greater
ECM B29# -body GND	Always connected	10 KΩ or greater
ECM connector B9# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check charge air pressure and temperature sensor harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B27# - body GND	The ignition switch is set to "ON"	Less than 1 V
ECM connector B3# -body GND	The ignition switch is set to "ON"	Less than 1 V
ECM connector B29# -body GND	The ignition switch is set to "ON"	Less than 1 V

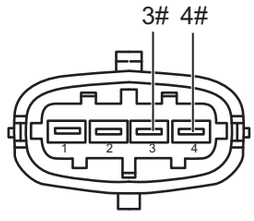
Detector connection	Detection conditions	Specified state
ECM connector B9# -body GND	The ignition switch is set to "ON"	Less than 1 V

ES

NG → **Repair or replace the harness and connector**

OK

4 Check charge air pressure and temperature sensor



Charge air pressure and temperature sensor

ES01031RM

(a) Measure the resistance according to the values in the table below.

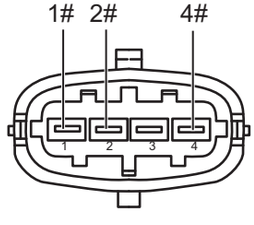
Standard value

Detector connection	Detection conditions	Specified state
Charge air pressure and temperature sensor #3 -charge air pressure and temperature sensor #4	20 ℃	About 2.5 KΩ ± 5%

NG → **Replace charge air pressure and temperature sensor**

OK

5 Check charge air pressure and temperature sensor



Charge air pressure and temperature sensor

ES01041RM

(a) Set the ignition switch to "OFF".

(b) Connect charge air pressure and temperature sensor connector.

(c) Connect ECM connector.

(d) Connect the battery negative terminal.

(e) Start engine.

(f) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Charge air pressure and temperature sensor #2 -charge air pressure and temperature sensor #4	Idle	About 5 V

Detector connection	Detection conditions	Specified state
Charge air pressure and temperature sensor #1 -charge air pressure and temperature sensor #4	Throttle is opened quickly	Instantly reach about 4 V, then drop to about 1.5 V

NG → **Replace charge air pressure and temperature sensor (See page IT-10)**

OK

6	**Replace the ECM (See page ES-450)**

DTC	P020100	1# cylinder fuel injector control circuit open
DTC	P026200	1# cylinder fuel injector low side control circuit overvoltage or undervoltage
DTC	P02EE00	1# cylinder fuel injector high side and low side control circuits shorted to each other
DTC	P02CD00	1# cylinder CVO self-learning adjustment up to upper limit
DTC	P02CC00	1# cylinder CVO self-learning adjustment up to lower limit
DTC	P126100	1# cylinder CVO circuit signal implausible

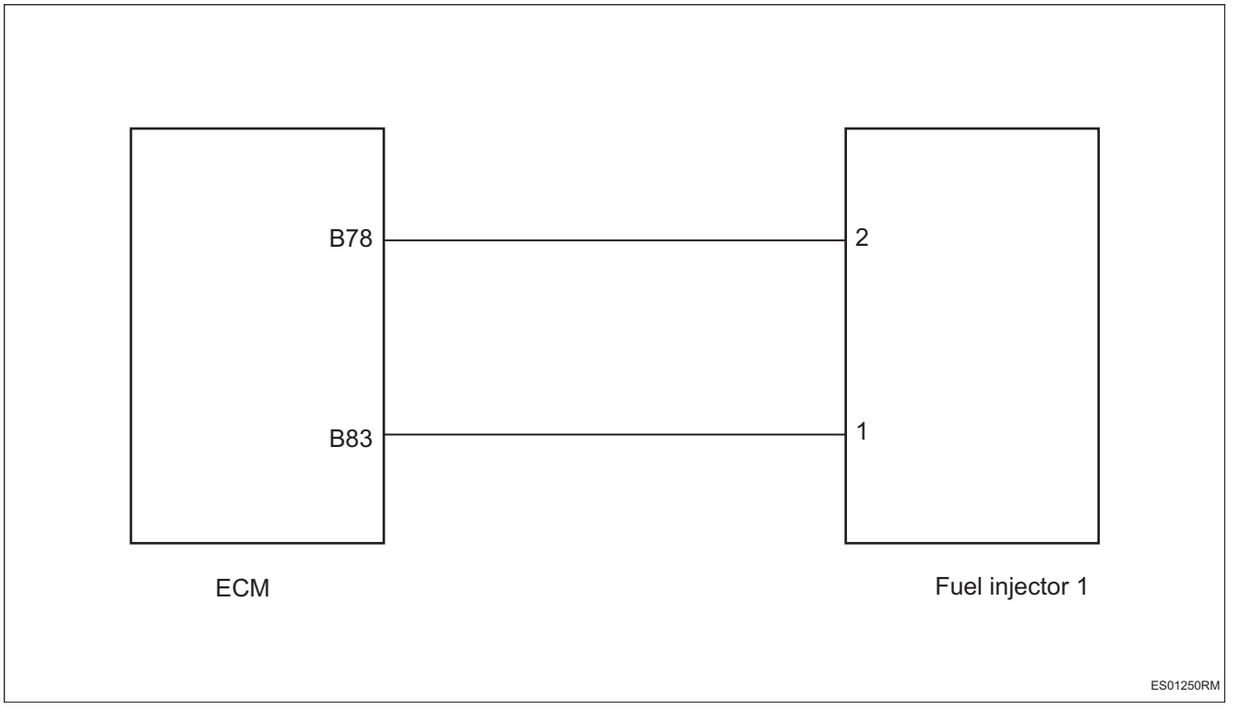
Description

When 1# cylinder fuel injector control circuit is shorted or open, ECM will record DTC.

DTC	DTC detection conditions	Faulty location
P020100	(a) Fuel injector control circuit open.	• ECM • Harness and connector • Fuel injector 1
P026200	(a) Fuel injector low side control circuit overvoltage or undervoltage.	• ECM • Harness and connector • Fuel injector 1
P02EE00	(a) Fuel injector high side and low side control circuits shorted to each other.	• ECM • Harness and connector • Fuel injector 1
P02CD00	(a) 1# cylinder CVO self-learning adjustment up to upper limit.	• ECM • Harness and connector • Fuel injector 1
P02CC00	(a) 1# cylinder CVO self-learning adjustment up to lower limit.	• ECM • Harness and connector • Fuel injector 1
P126100	(a) 1# cylinder CVO circuit signal implausible.	• ECM • Harness and connector • Fuel injector 1

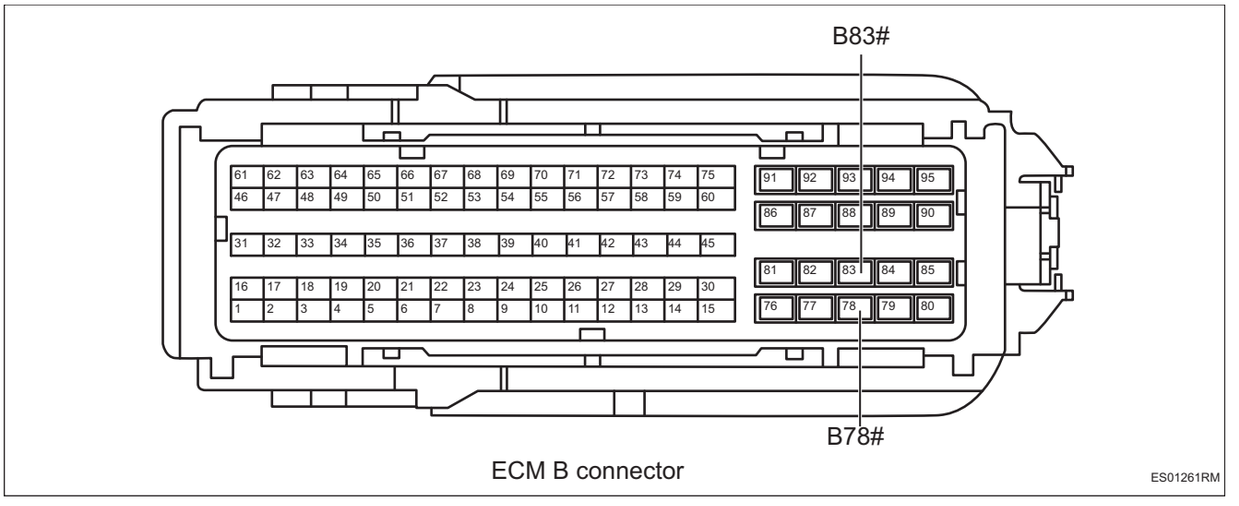
ES

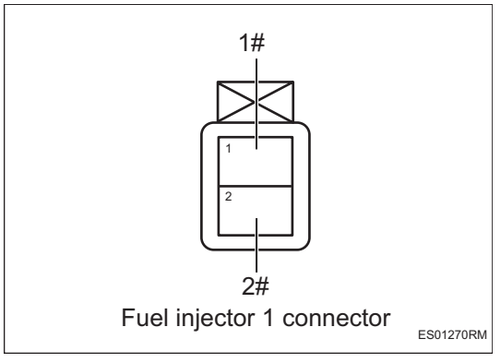
Circuit diagram



Inspection procedure

1	Check fuel injector 1 harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect fuel injector 1 connector.

(e) Measure the resistance according to the values in the table below.

Standard value

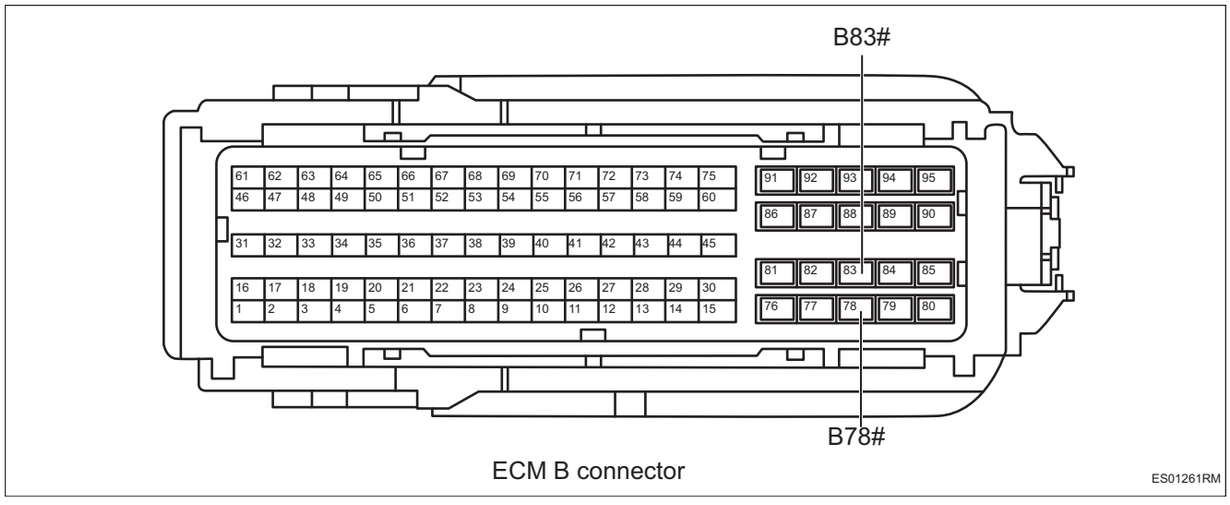
Detector connection	Detection conditions	Specified state
Injector 1 connector 2# -ECM connector B78#	Always connected	Less than 1Ω
Fuel injector 1 connector 1# -ECM connector B83#	Always connected	Less than 1Ω

ES

NG → **Repair or replace the harness and connector**

OK

2	Check fuel injector 1 harness and connector for circuit shorted to ground



ECM B connector

ES01261RM

(a) Measure the resistance according to the values in the table below.

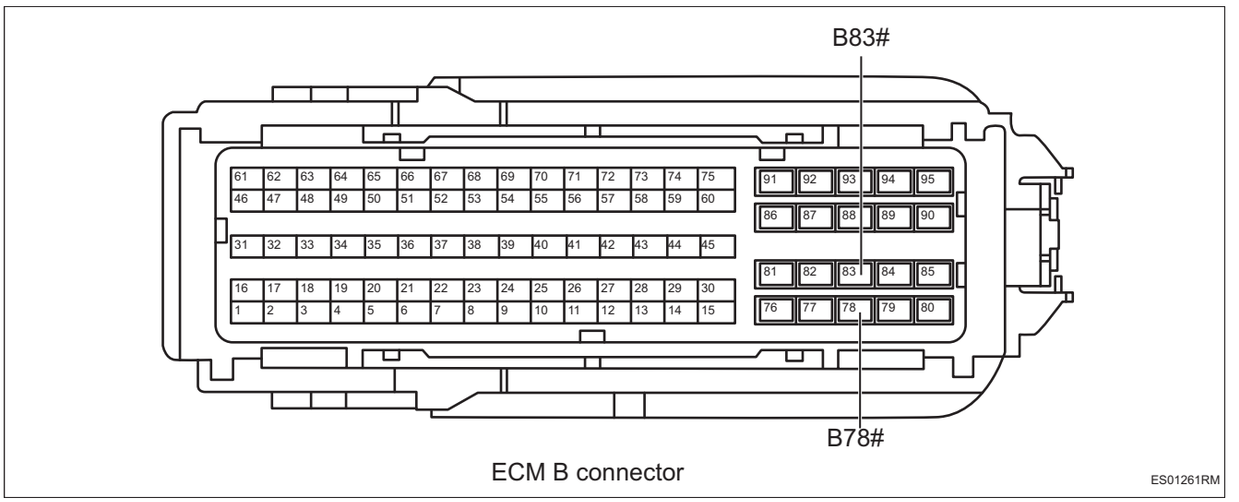
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B78# -body GND	Always connected	10 KΩ or greater
ECM connector B83# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	Check fuel injector 1 harness and connector for circuit shorted to each other



ECM B connector

ES01261RM

(a) Measure the resistance according to the values in the table below.

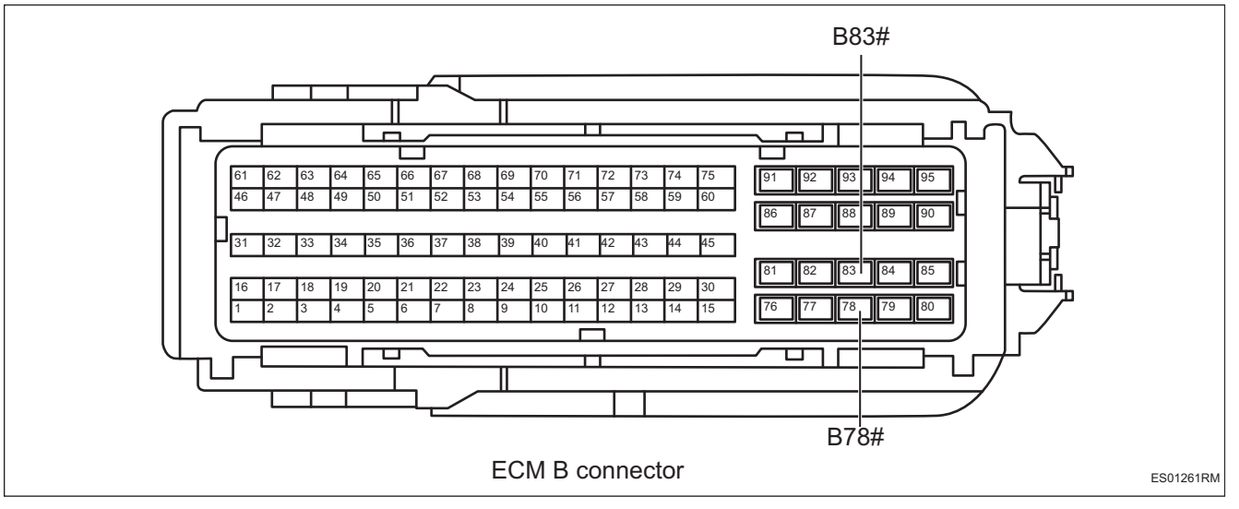
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B78# - ECM connector B83#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check fuel injector 1 harness and connector for circuit shorted to power supply



ECM B connector

ES01261RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

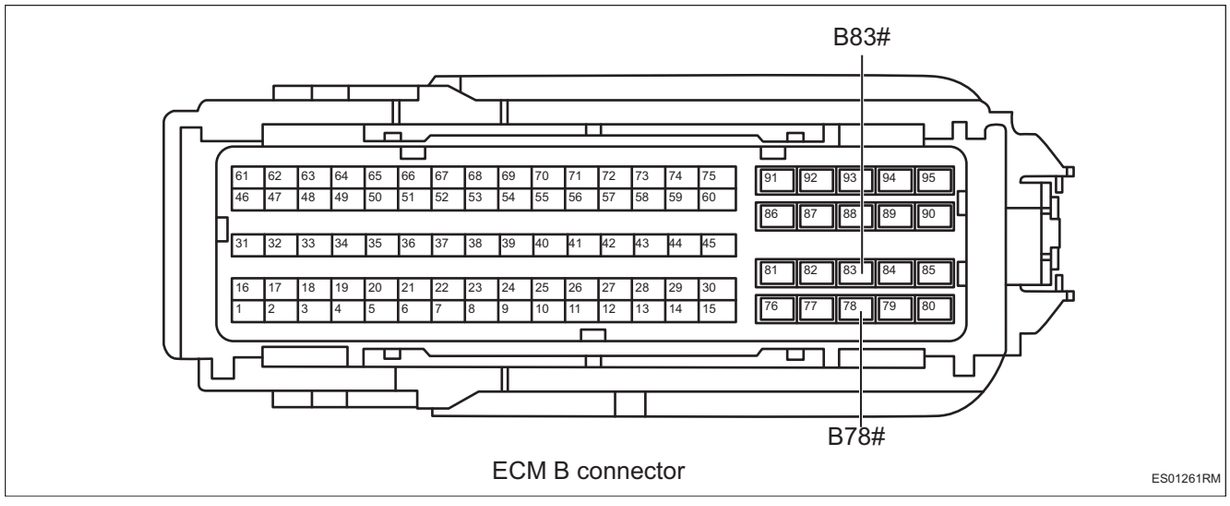
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B78# -body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connection B83# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Check fuel injector 1



ECM B connector

ES01261RM

(a) Check whether the fuel injector is blocked or leaking.

(b) Check whether the fuel injector is damaged.

(c) Connect fuel injector 1 connector.

(d) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B78# - ECM connector B83#	Always connected	1.83±5%Ω

NG → **Replace the fuel injector 1 (See page FU-4)**

OK

6	Replace the ECM (See page ES-450)

DTC	P020200	2# cylinder fuel injector control circuit open
DTC	P026500	2# cylinder fuel injector low side control circuit overvoltage or undervoltage
DTC	P02EF00	2# cylinder fuel injector high side and low side control circuits shorted to each other
DTC	P02CF00	#2 Cylinder CVO self-learning adjustment at upper limit
DTC	P02CE00	2# cylinder CVO self-learning adjustment at lower limit
DTC	P126200	2# cylinder CVO circuit signal implausible

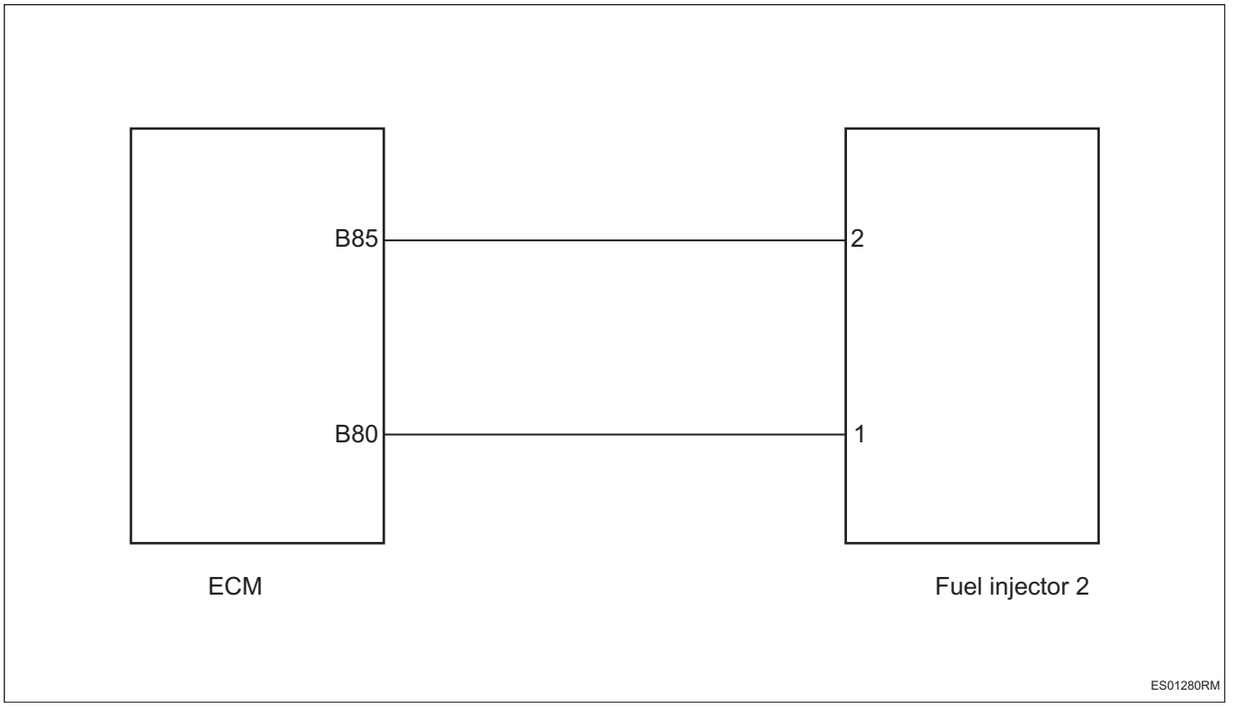
Description

When 2# cylinder fuel injector control circuit is shorted or open, ECM will record DTC.

DTC	DTC detection conditions	Faulty location
P020200	(a) Fuel injector control circuit open.	• ECM • Harness and connector • Fuel injector 2
P026500	(a) Fuel injector low side control circuit overvoltage or undervoltage.	• ECM • Harness and connector • Fuel injector 2
P02EF00	(a) Fuel injector high side and low side control circuits shorted to each other.	• ECM • Harness and connector • Fuel injector 2
P02CF00	(a) 2# cylinder CVO self-learning adjustment up to upper limit.	• ECM • Harness and connector • Fuel injector 2
P02CE00	(a) 2# cylinder CVO self-learning adjustment up to lower limit.	• ECM • Harness and connector • Fuel injector 2
P126200	(a) 2# cylinder CVO circuit signal implausible.	• ECM • Harness and connector • Fuel injector 2

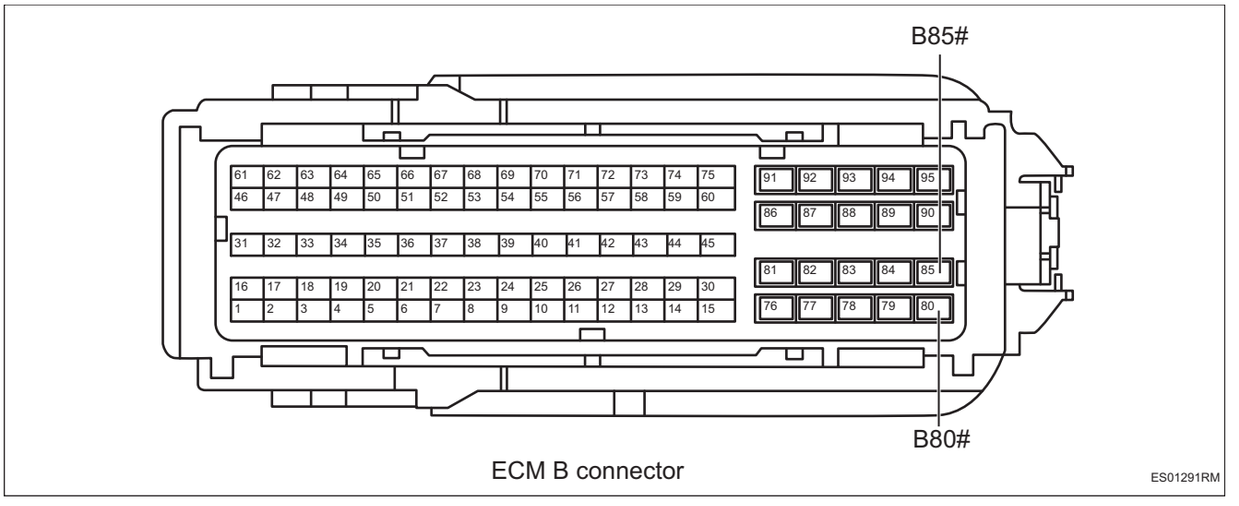
ES

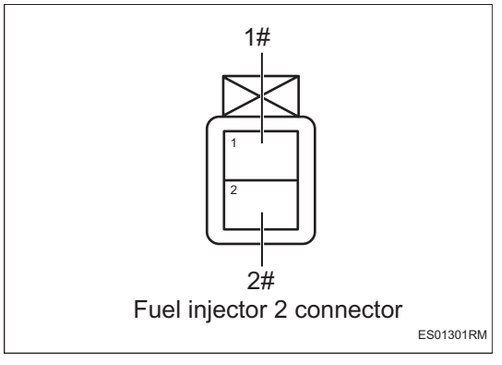
Circuit diagram



Inspection procedure

1	Check fuel injector 2 harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect fuel injector 2 connector.

(e) Measure the resistance according to the values in the table below.

Standard value

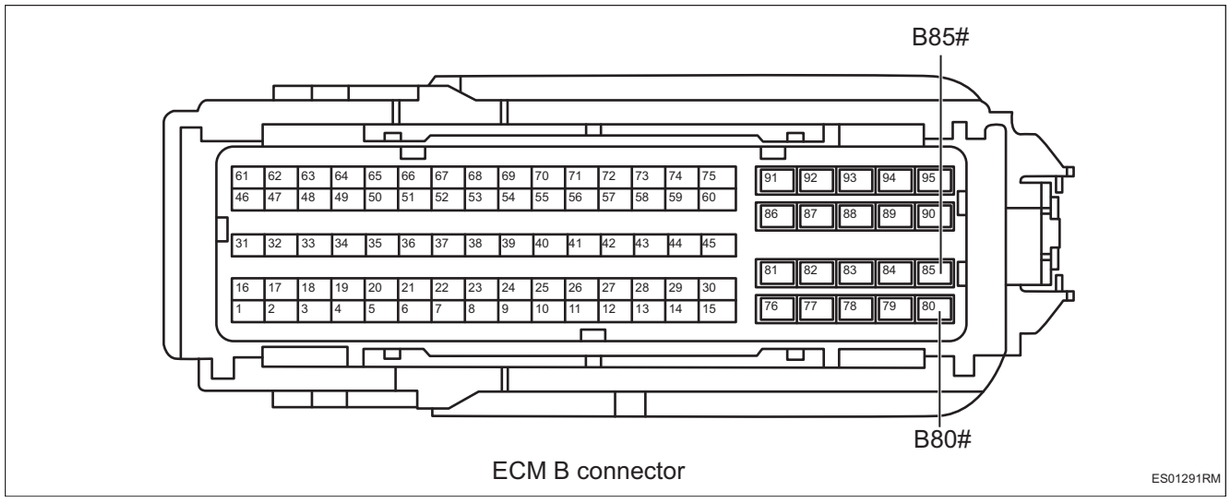
Detector connection	Detection conditions	Specified state
Fuel injector 2 connector 2# - ECM connector B85#	Always connected	Less than 1Ω
Fuel injector 2 connector 1# - ECM connector B80#	Always connected	Less than 1Ω

ES

NG → **Repair or replace the harness and connector**

OK

2 **Check fuel injector 2 harness and connector for circuit shorted to ground**



ECM B connector

ES01291RM

(a) Measure the resistance according to the values in the table below.

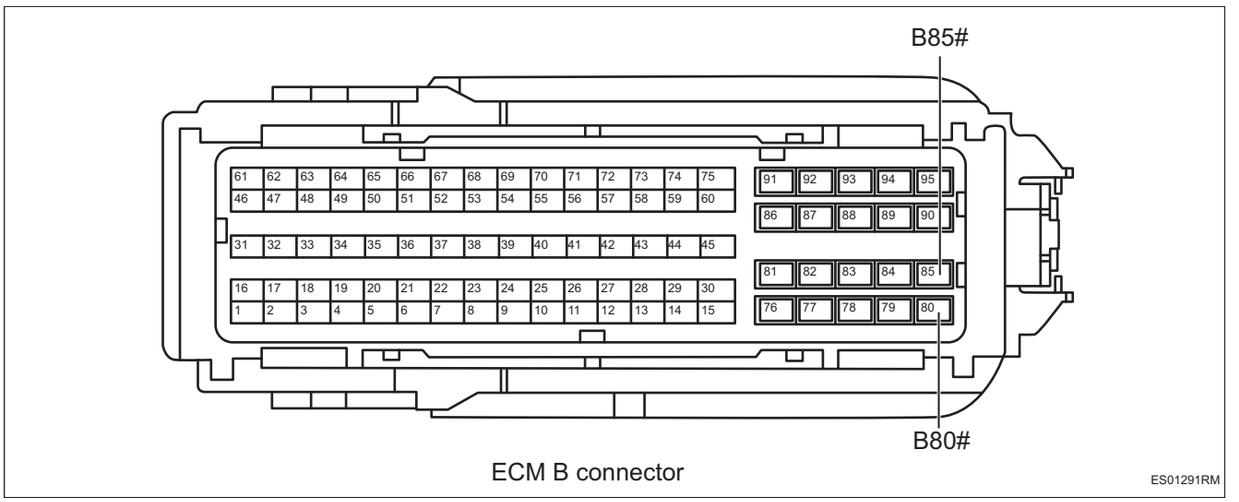
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B85# -body GND	Always connected	10 KΩ or greater
ECM B80# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3 **Check fuel injector 2 harness and connector for circuit shorted to each other**



ECM B connector

(a) Measure the resistance according to the values in the table below.

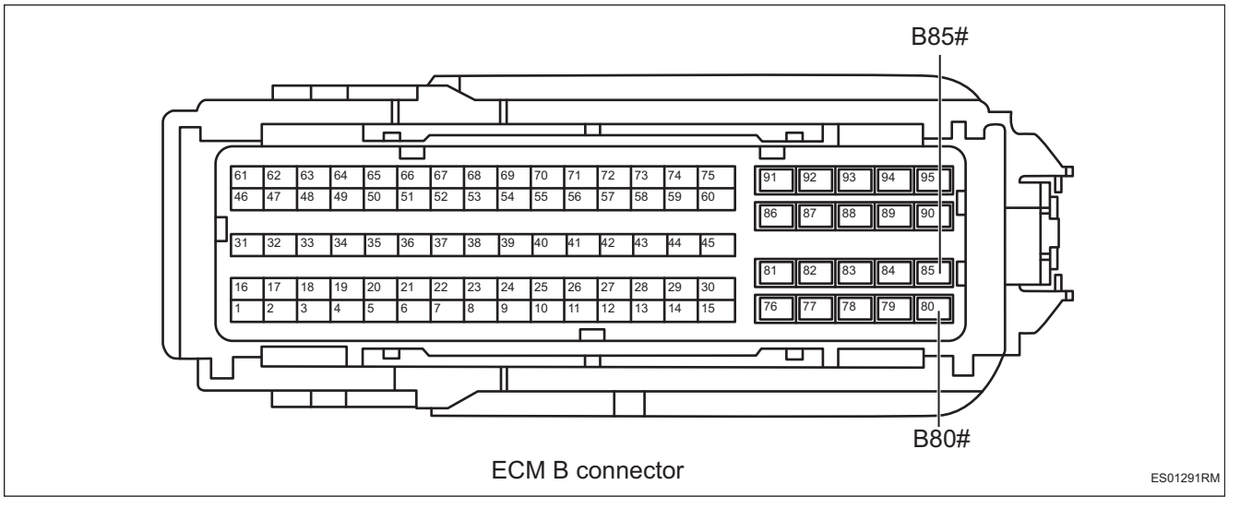
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B85# - ECM connector B80#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check fuel injector 2 harness and connector for circuit shorted to power supply



ECM B connector

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

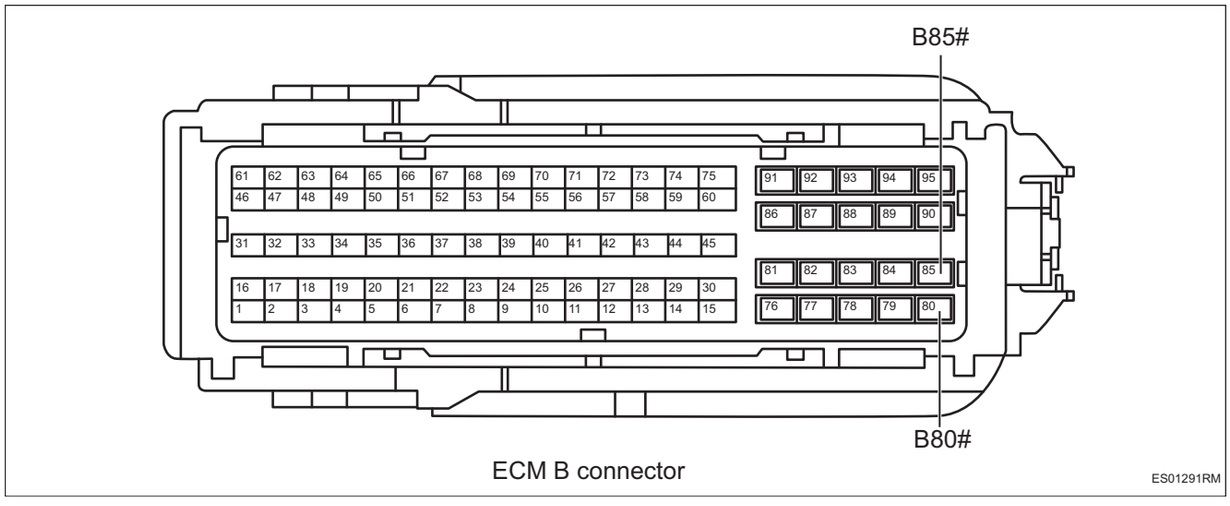
Detector connection	Detection conditions	Specified state
ECM connector B85# -body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B80# -body GND	The ignition switch is set to "O"	Less than 1 V

ES

NG → **Repair or replace the harness and connector**

OK

5	Check fuel injector 2



ECM B connector

ES01291RM

(a) Check whether the fuel injector is blocked or leaking.

(b) Check whether the fuel injector is damaged.

(c) Connect fuel injector 2 connector.

(d) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Always connected
ECM connector B85# - ECM connector B80#	Always connected	1.83±5% Ω

NG → **Replace the fuel injector 2 (See page FU-4)**

OK

6	Replace the ECM (See page ES-450)

DTC	P020300	3# cylinder fuel injector control circuit open
DTC	P026800	3# cylinder fuel injector low side control circuit overvoltage or undervoltage
DTC	P02F000	3# cylinder fuel injector high side and low side control circuits shorted to each other
DTC	P02D100	3# cylinder CVO self-learning adjustment at upper limit
DTC	P02D000	4# cylinder CVO self-learning adjustment at lower limit
DTC	P126300	3# cylinder CVO circuit signal implausible

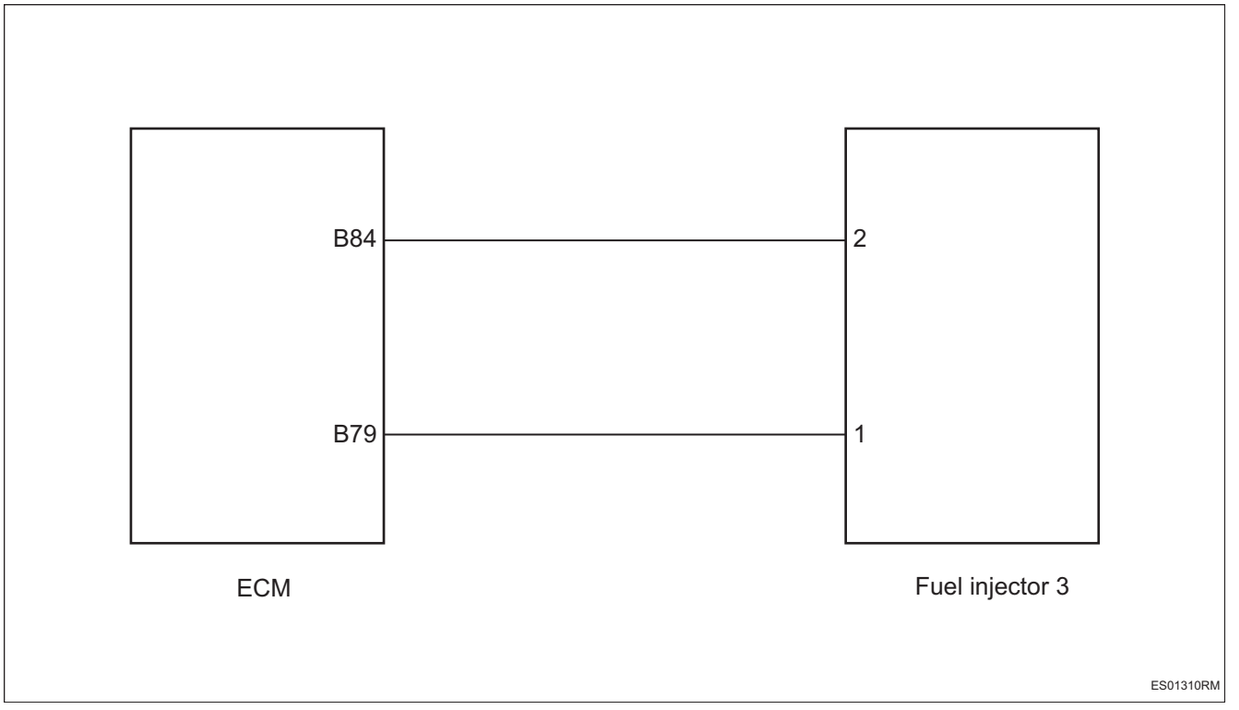
Description

When 3# cylinder fuel injector control circuit is shorted or open, ECM will record DTC.

DTC	DTC detection conditions	Faulty location
P020300	(a) Fuel injector control circuit open.	• ECM • Harness and connector • Fuel injector 3
P026800	(a) Fuel injector low side control circuit overvoltage or undervoltage.	• ECM • Harness and connector • Fuel injector 3
P02F000	(a) Fuel injector high side and low side control circuits shorted to each other.	• ECM • Harness and connector • Fuel injector 3
P02D100	(a) 3# cylinder CVO self-learning adjustment up to upper limit.	• ECM • Harness and connector • Fuel injector 3
P02D000	(a) 3# cylinder CVO self-learning adjustment up to lower limit.	• ECM • Harness and connector • Fuel injector 3
P126300	(a) 3# cylinder CVO circuit signal implausible.	• ECM • Harness and connector • Fuel injector 3

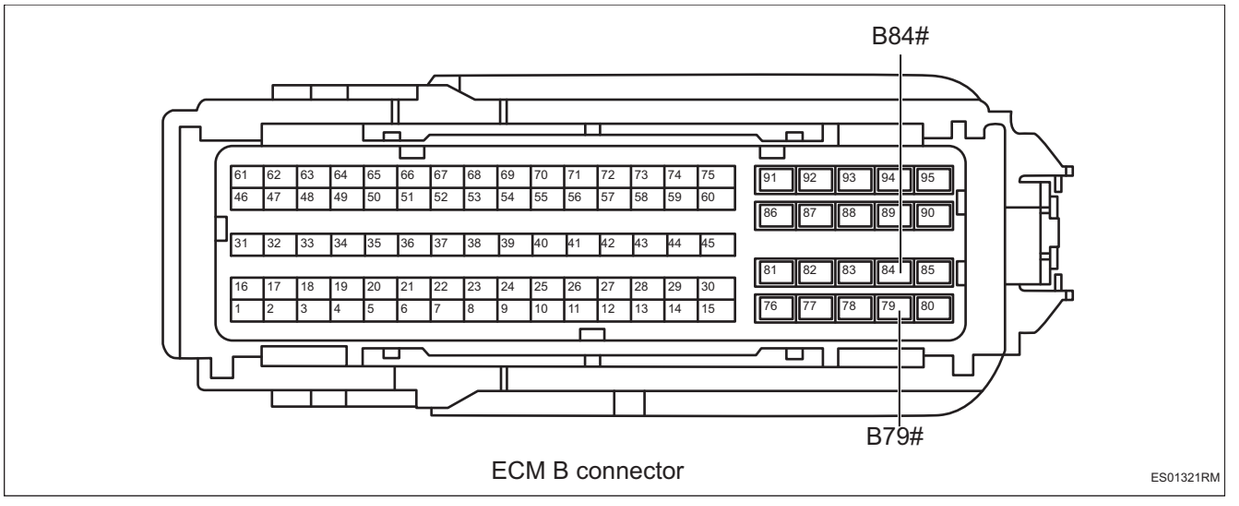
ES

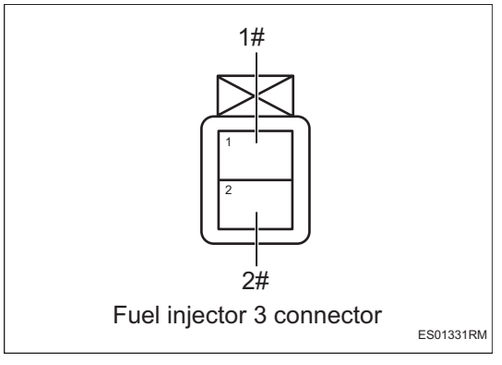
Circuit diagram



Inspection procedure

1	Check fuel injector 3 harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect fuel injector 3 connector.

(e) Measure the resistance according to the values in the table below.

Standard value

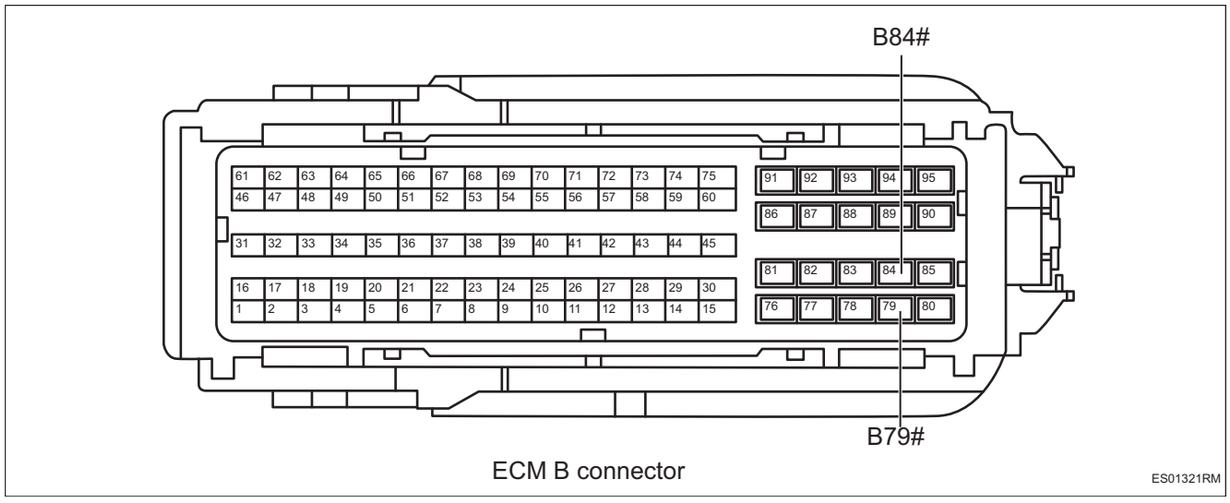
Detector connection	Detection conditions	Specified state
Fuel injector 3 connector 2# -ECM connector B84#	Always connected	Less than 1Ω
Fuel injector 3 connector 1# -ECM connector B79#	Always connected	Less than 1Ω

ES

NG → **Repair or replace the harness and connector**

OK

2	Check whether fuel injector 3 harness and connector circuit is shorted to ground



ECM B connector

ES01321RM

(a) Measure the resistance according to the values in the table below.

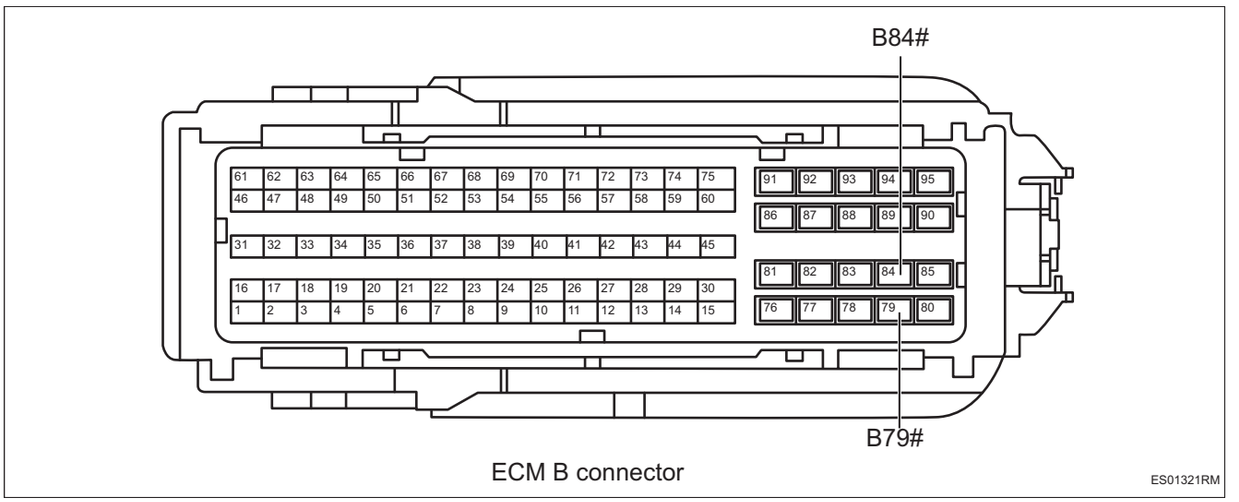
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B8 #-Body GND	Always connected	10 KΩ or greater
ECM connector B79# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	Check whether fuel injector 3 harness and connector are shorted to each other



ECM B connector

ES01321RM

(a) Measure the resistance according to the values in the table below.

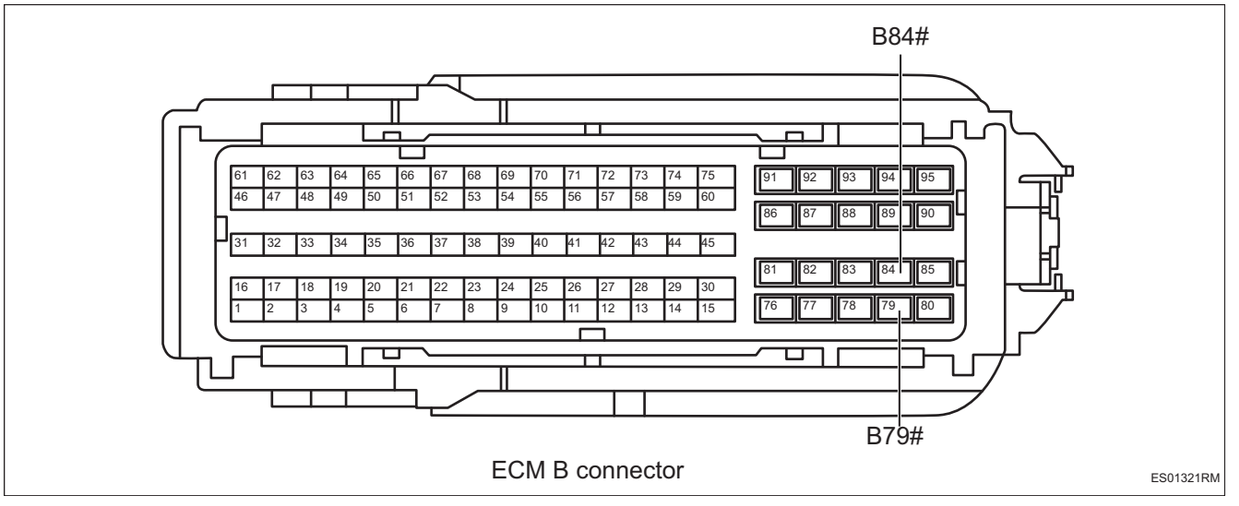
Standard value

Detector connection	Detection conditions	Specified state
Engine ECM connector B84# -ECM connector B79	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check whether fuel injector 3 harness and connector circuit is shorted to power supply**



ECM B connector

ES01321RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

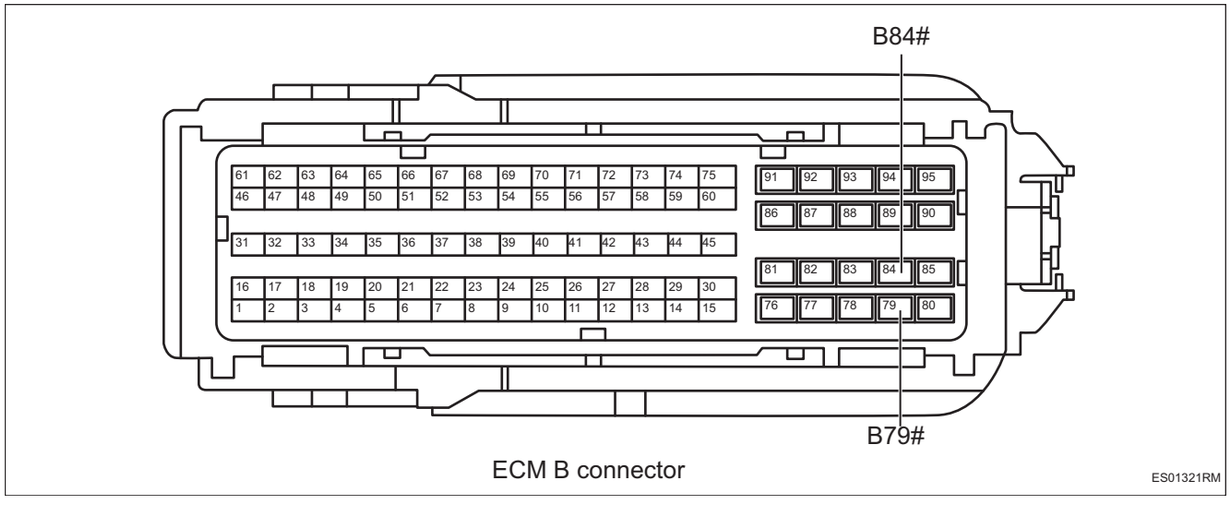
Detector connection	Detection conditions	Specified state
ECM connector B84# -body GND	Set the ignition switch to "ON"	Less than V
ECM connector B79# -body GND	Set the ignition switch to "ON"	Less than 1 V

ES

NG → **Repair or replace the harness and connector**

OK

5	Check fuel injector 3



ECM B connector

ES01321RM

(a) Check whether the fuel injector is blocked or leaking.

(b) Check whether the fuel injector is damaged.

(c) Connect fuel injector 3 connector.

(d) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B84# - ECM connector B79#	Always connected	1.83±5%Ω

NG → **Replace the fuel injector 3 (See page FU-4)**

OK

6	Replace the ECM (See page ES-450)

DTC	P020400	4# cylinder fuel injector control circuit open
DTC	P027100	4# cylinder fuel injector low side control circuit overvoltage or undervoltage
DTC	P02F100	4# cylinder fuel injector high side and low side control circuits shorted to each other
DTC	P02D300	4# cylinder CVO self-learning adjustment at upper limit
DTC	P02D200	4# cylinder CVO self-learning adjustment at lower limit
DTC	P126400	4# cylinder CVO circuit signal implausible

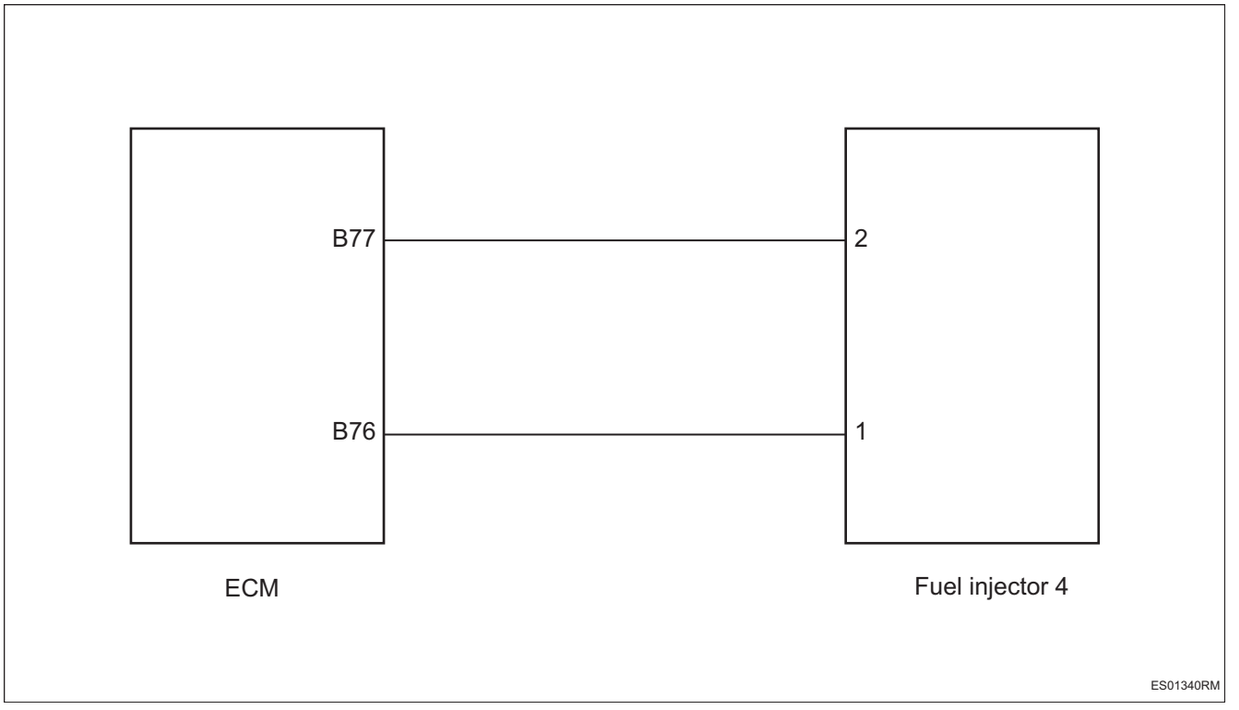
Description

When 4# cylinder fuel injector control circuit is shorted or open, ECM will record DTC.

DTC	DTC detection conditions	Faulty location
P020400	(a) Fuel injector control circuit open.	• ECM • Harness and connector • Injector 4
P027100	(a) Fuel injector low side control circuit overvoltage or undervoltage.	• ECM • Harness and connector • Injector 4
P02F100	(a) Fuel injector high side and low side control circuits shorted to each other.	• ECM • Harness and connector • Injector 4
P02D300	(a) 4# cylinder CVO self-learning adjustment up to upper limit.	• ECM • Harness and connector • Injector 4
P02D200	(a) 4# cylinder CVO self-learning adjustment up to lower limit.	• ECM • Harness and connector • Injector 4
P126400	(a) 4# cylinder CVO circuit signal implausible.	• ECM • Harness and connector • Injector 4

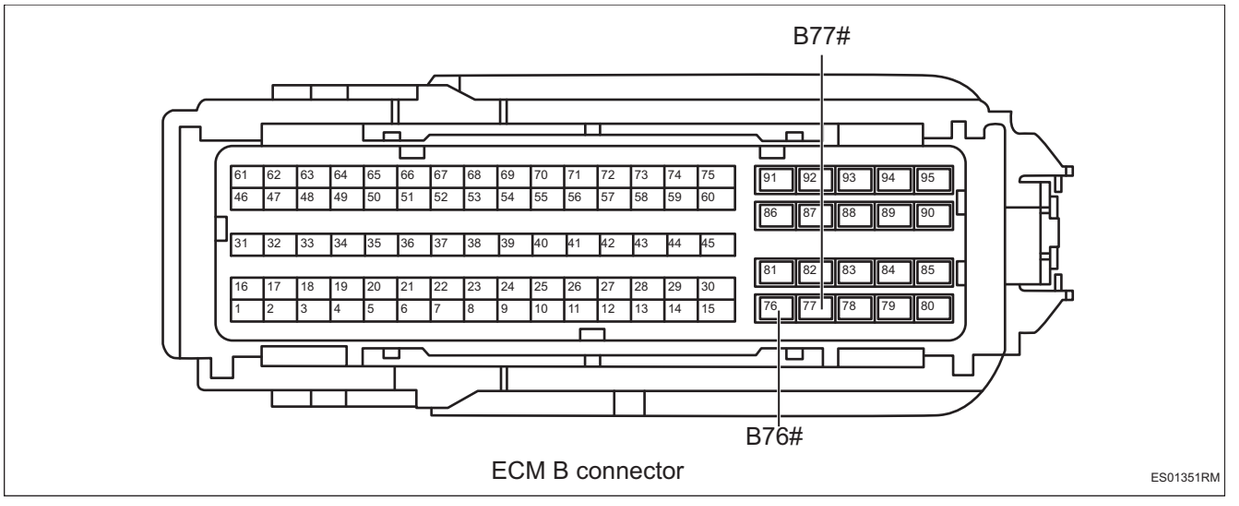
ES

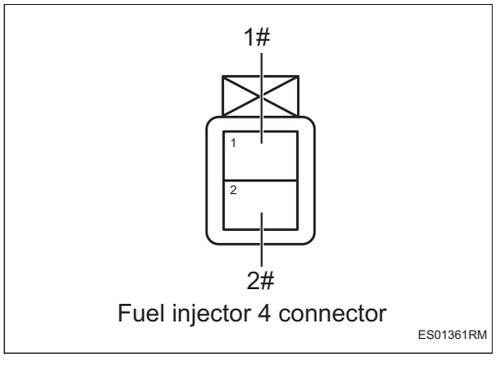
Circuit diagram



Inspection procedure

1	Check fuel injector 4 harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect fuel injector 4 connector.

(e) Measure the resistance according to the values in the table below.

Standard value

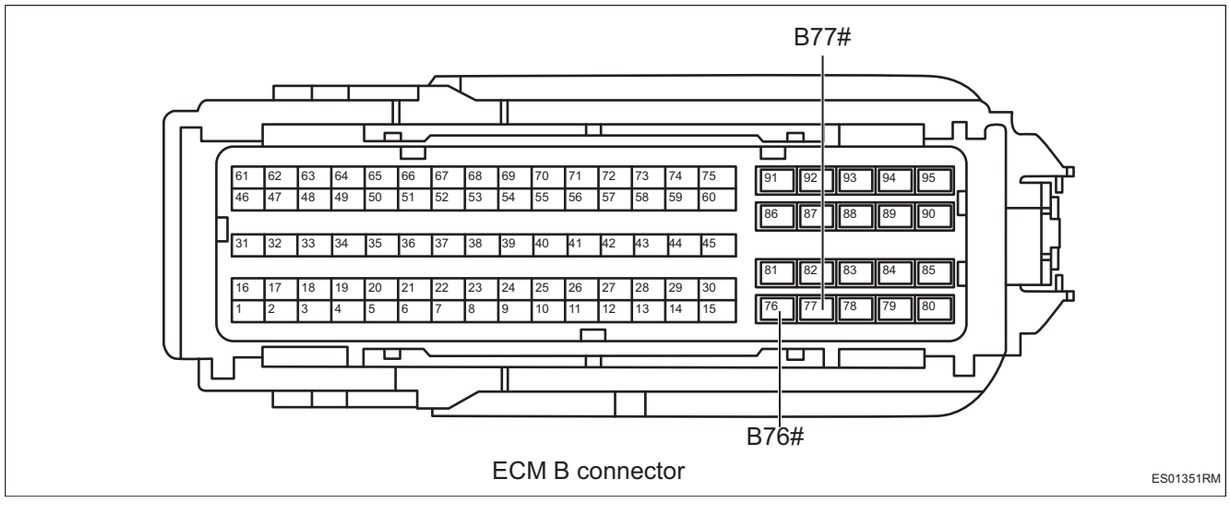
Detector connection	Detection conditions	Specified state
Fuel injector 4 connector 2# -ECM connector B77#	Always connected	Less than 1Ω
Fuel injector 4 connector 1# -ECM connector B76#	Always connected	Less than 1Ω

ES

NG → **Repair or replace the harness and connector**

OK

2	Check whether fuel injector 4 harness and connector circuit is shorted to ground



ECM B connector

ES01351RM

(a) Measure the resistance according to the values in the table below.

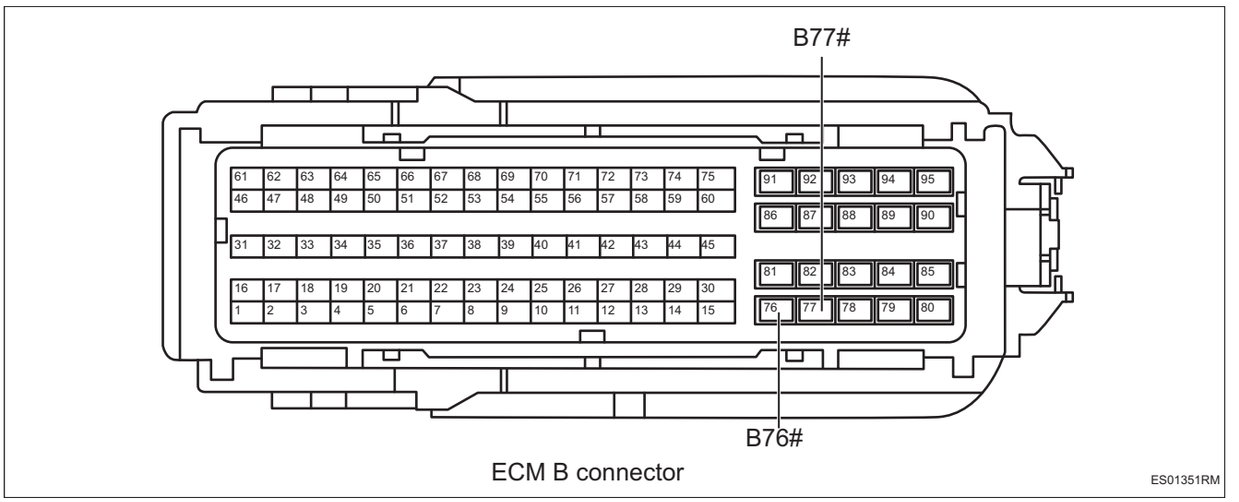
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B77# -body GND	Always connected	10 KΩ or greater
ECM connector B76# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	Check whether fuel injector 4 harness and connector are shorted to each other



ECM B connector

(a) Measure the resistance according to the values in the table below.

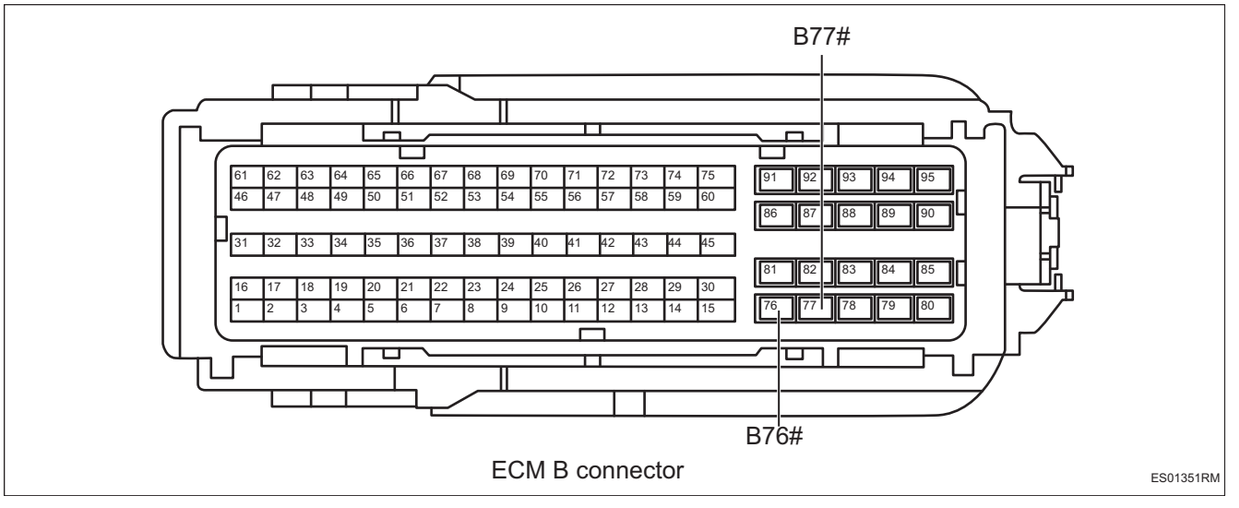
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B77# - ECM connector B76#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check whether fuel injector 4 harness and connector circuit is shorted to power supply**



ECM B connector

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

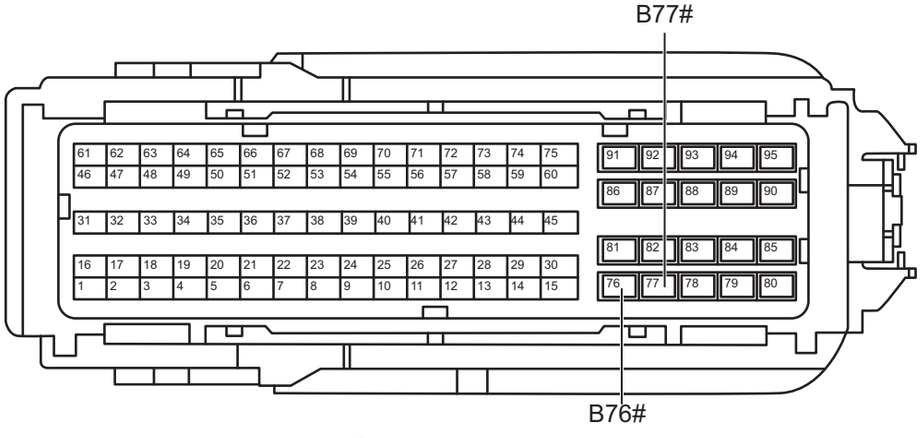
Detector connection	Detection conditions	Specified state
Engine control unit connector B77# -body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connection B76# -body GND	Set the ignition switch to "ON"	Less than 1 V

ES

NG → **Repair or replace the harness and connector**

OK

5 Check fuel injector 4



ECM B connector

ES01351RM

(a) Check whether the fuel injector is blocked or leaking.

(b) Check whether the fuel injector is damaged.

(c) Connect fuel injector 4 connector.

(d) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B77# - ECM connector B76#	Always connected	1.83±5%Ω

NG → **Replace the fuel injector 4 (See page FU-4)**

OK

6	Replace the ECM (See page ES-450)

DTC	P030000	Engine random or multi-cylinder misfire
DTC	P030100	1# Cylinder misfire detected
DTC	P030200	2# Cylinder misfire detected
DTC	P030300	3# Cylinder misfire detected
DTC	P030400	4# cylinder misfire detected
DTC	P036300	Engine misfire triggering fuel cutoff

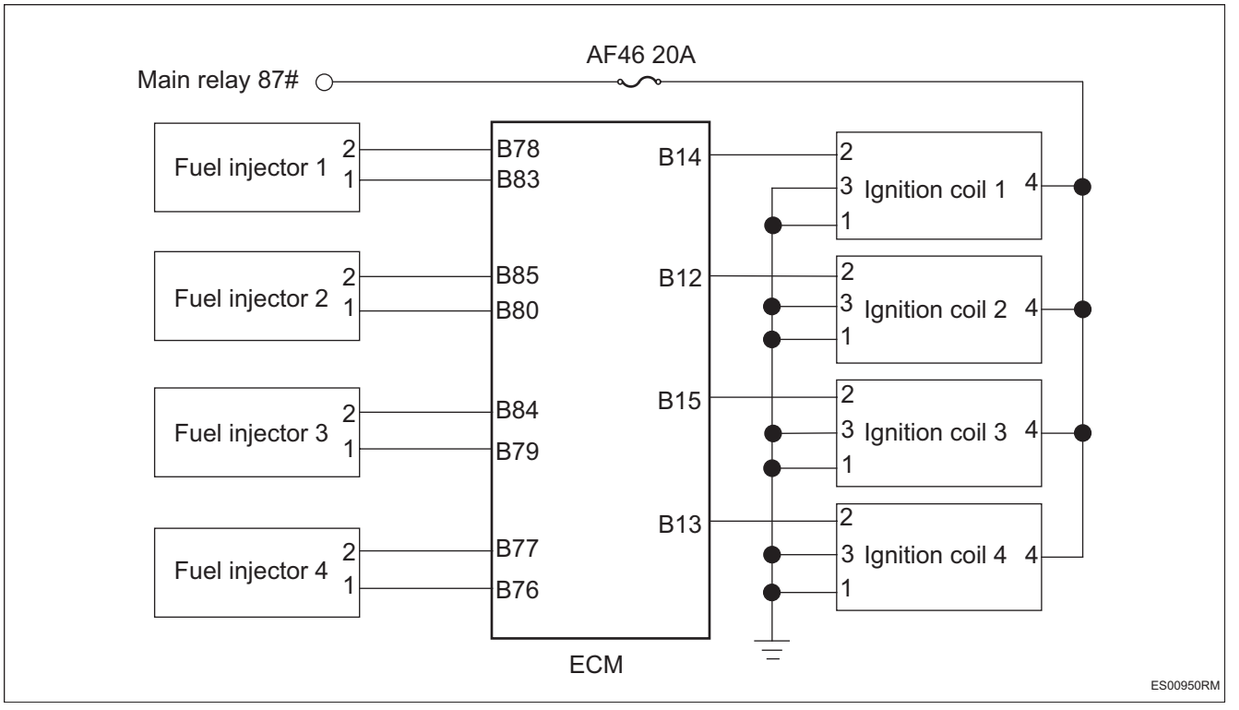
Description

When the engine misfire occurs, unburned hydrocarbons enter the exhaust gas, which cause an increase in exhaust gas emissions and may also raise the temperature of the TWC, leading to the damage to the TWC. To avoid increased emissions and damage from high temperatures, the ECM will monitor the number of engine misfires. The ECM uses the camshaft position sensor and crankshaft position sensor to monitor the misfire situation. The camshaft position sensor is used to identify the cylinder that misfired, while the crankshaft position sensor position sensor is used to measure the change in crankshaft speed. When the change in crankshaft speed exceeds a predetermined threshold, the number of misfires will be counted. If the number of misfires exceeds the threshold and may cause deterioration of emission control system performance, ECM records DTC.

DTC	DTC detection conditions	Faulty location
P030000	(a) Random or multi-cylinder misfires.	• Engine harness circuit open or shorted • Relevant harness • Ignition system • Fuel injector assembly • Fuel system • MAP/IAT sensor • Coolant temperature sensor • Compression pressure • Valve timing • Crankcase ventilation system • intake system • ECM
P030100	(a) 1# cylinder misfire.	
P030200	(a) 2# cylinder misfire.	
P030300	(a) 3# cylinder misfire.	
P030400	(a) 4# cylinder misfire.	
P036300	(a) Engine misfire trigger fuel cutoff.	

ES

Circuit diagram



Inspection procedure

1	Check whether there is other DTC output (except misfire DTC)

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Read the DTC.

Results	Go to
Other faults exist	Abnormal
No other faults	Normal

NG → **Repair according to the DTC**

OK

2	Check crankcase ventilation system pipeline

(a) Check crankcase ventilation system pipeline connections.

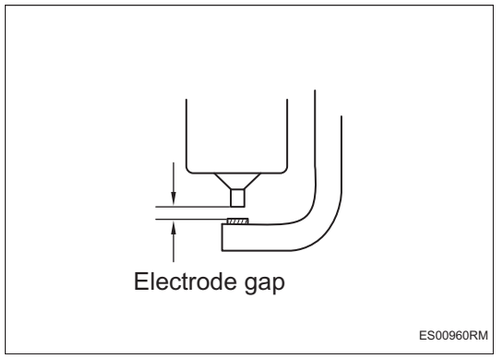
Criteria:

The pipeline is connected correctly without damage.

NG → **Repair or replace the crankcase ventilation system pipeline**

OK

3	Check the spark plug



(a) Check whether the ceramic body of the spark plug is cracked or damaged.

(b) Check the carbon deposition condition and color of the spark plug.

(c) Check the spark plug ignition gap according to the values in the table below.

Standard value

Engine model	Spark plug model	Specified state
CA4GC20TD-33	3707010-27L-A	0.6 ~ 0.7mm
CA4GB15TD-30	3707010A27L	0.6 ~ 0.7mm
CA4GB15TD-34(HEV)	3707010A27L	0.6 ~ 0.7mm

NG → **Replace the spark plug**

OK

4	Check the compression pressure of cylinder

(a) Measure the compression pressure in cylinders.

Standard value

Engine model	Specified state
CA4GC20TD-33	15 ~ 18bar
CA4GB15TD-30	14 ~ 19bar
CA4GB15TD-34(HEV)	14 ~ 19bar

NG → **Check engine mechanical system**

OK

5	Check ignition coil harness and connector

(a) Check the ignition coil harness and connector for short circuit or open circuit

NG → **Repair or replace the harness and connector**

OK

6	Check fuel injector harness and connector

ES

(a) Check the fuel injector harness and connector for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

7	Check fuel injector

(a) Check whether the fuel injector is leaking or blocked.

(b) Measure the resistance of the fuel injector.

Standard value:

1.83±5%Ω

NG → **Replace fuel injector**

OK

8	Check intake system

(a) Check whether the intake system is leaking or blocked.

NG → **Repair or replace the intake system**

OK

9	Check fuel system pressure

(a) Check whether the fuel system is leaking or blocked.

(b) Measure the fuel system pressure according to the values in the table below.

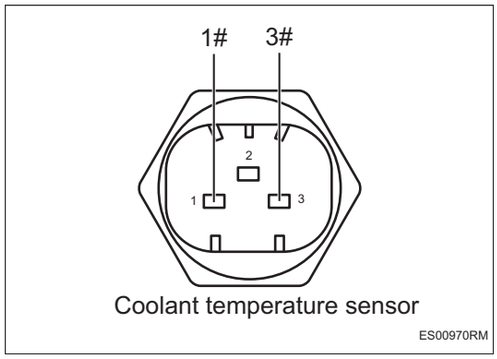
Standard value

Working conditions	Specified state
idle speed	4.5 ~ 5.5bar
Pressure maintaining (after 20 minutes shutdown)	Greater than 2.5bar

NG → **Repair or replace fuel pipeline and fuel pump**

OK

10	Check coolant temperature sensor/radiator coolant temperature sensor



(a) Remove the coolant temperature sensor.

(b) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Coolant temperature sensor 2#-coolant temperature sensor 3#	20 ℃	2.2128KΩ ~ 2.6391KΩ
Coolant temperature sensor 2#-coolant temperature sensor 3#	80 ℃	0.3030KΩ ~ 0.3260KΩ
Radiator coolant temperature sensor #2 -radiator coolant temperature sensor #3	20 ℃	2.2128KΩ ~ 2.6391KΩ
Radiator coolant temperature sensor #2 -radiator coolant temperature sensor #3	80 ℃	0.3030KΩ ~ 0.3260KΩ

NG → **Replace coolant temperature sensor/radiator coolant temperature sensor**

OK

11	Check spark

(a) Remove the ignition coil and spark plug.

(b) Install the spark plug to the ignition coil and connect the ignition coil connector.

(c) Disconnect the fuel injector connector.

(d) Ground the spark plug.

(e) Do visual inspection and confirm the occurrence of sparks while engine start.

Hint:

When checking, be sure to ground the hexagon or thread parts of the spark plug. Do not start the engine for more than 2 seconds.

NG → **Repair or replace the ignition system**

OK

12	Check valve timing

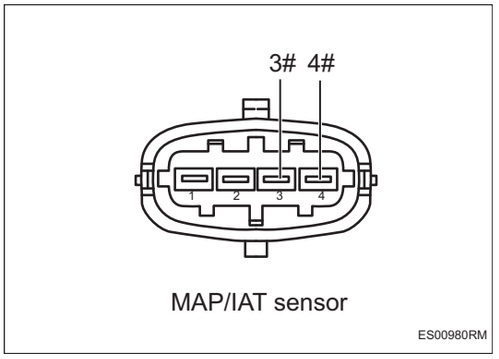
(a) Check whether the valve timing is correct.

NG → **Adjust valve timing**

OK

ES

13	Check the MAP/IAT sensor



(a) Remove the MAP/IAT sensor.

(b) Measure the resistance according to the values in the table below.

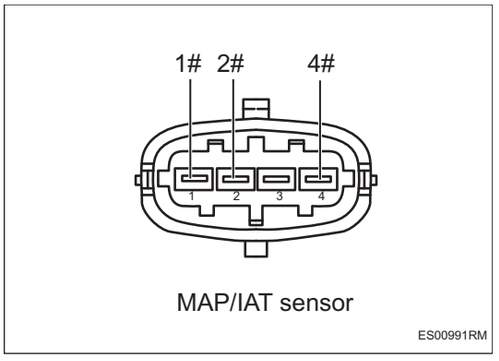
Standard value

Detector connection	Detection conditions	Specified state
MAP/IAT sensor 3# -MAP/IAT sensor 4#	20 ℃	About 2.5 KΩ ± 5%

NG → **Replace the MAP/IAT sensor**

OK

14	Check the MAP/IAT sensor



(a) Install the MAP/IAT sensor.

(b) Start the engine.

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
MAP/IAT sensor 2# -MAP/IAT sensor 4#	idle speed	About 5 V
MAP/IAT sensor 1# -MAP/IAT sensor 4#	Throttle is opened quickly	Instantly reach about 4 V, then drop to about 1.5 V

NG → **Replace the MAP/IAT sensor (See page ES-466)**

OK

15	Replace the ECM (See page ES-450)

DTC	P032700	Knock sensor A end shorted to ground
DTC	P032714	Knock sensor B end shorted to ground
DTC	P032800	Diagnosis of short circuit to power supply of knock sensor end A
DTC	P032815	Diagnosis of short circuit to power supply of knock sensor end B
DTC	P032500	Knock sensor signal circuit undervoltage
DTC	P151000	Knock sensor signal evaluation and diagnosis
DTC	P032600	Knock sensor signal circuit overvoltage

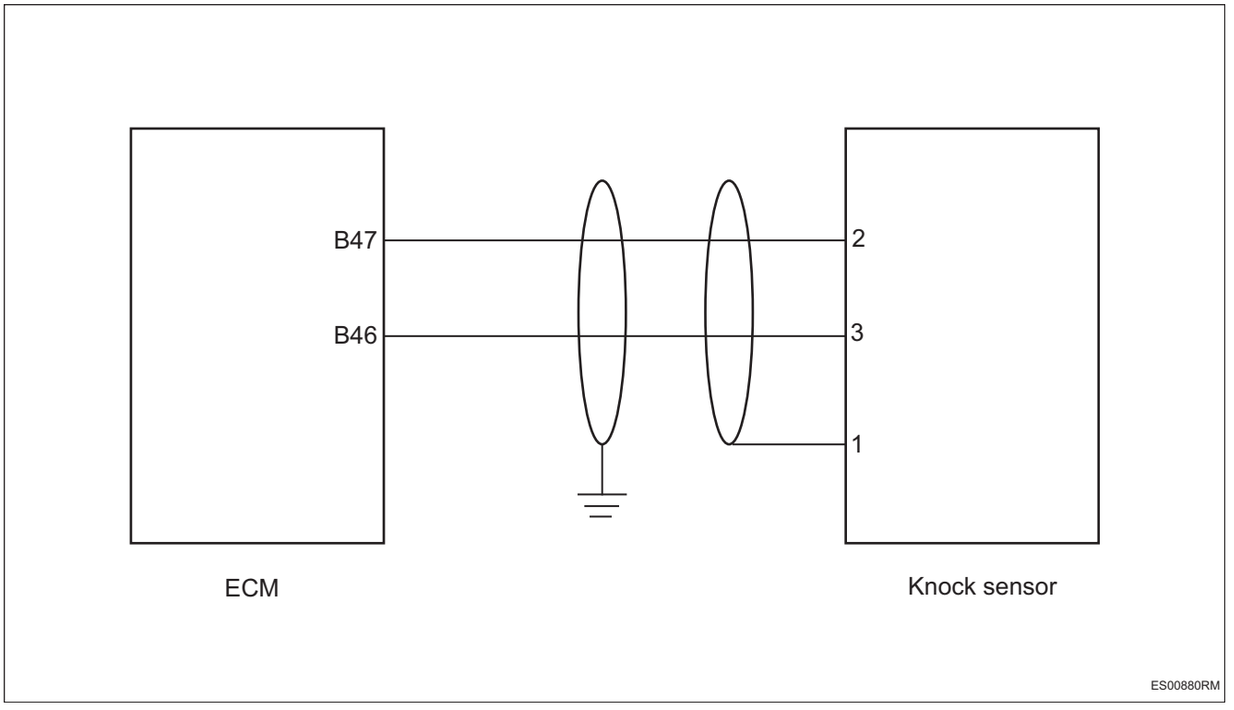
Description

When the knock sensor circuit is shorted or open, or the signal is abnormal, ECM will record DTC.

DTC	DTC detection conditions	Faulty location
P032700	(a) Knock sensor A end circuit shorted to ground.	• ECM • Harness and connector • Knock sensor
P032714	(a) Knock sensor B end circuit shorted to ground.	• ECM • Harness and connector • Knock sensor
P032800	(a) Knock sensor A end circuit shorted to power supply.	• ECM • Harness and connector • Knock sensor
P032815	(a) Knock sensor B end circuit shorted to power supply.	• ECM • Harness and connector • Knock sensor
P032500	(a) Average knock sensor port voltage below 0.7 V.	• ECM • Harness and connector • Shielded wire (electromagnetic interference) • Knock sensor
P151000	(a) The window length error occurs more than 4 times, and the output without measurement window occurs more than 28 times.	• ECM • Knock sensor
P032600	(a) The knock background noise is greater than the noise maximum signal threshold.	• ECM • Engine • Knock sensor

ES

Circuit diagram



Inspection procedure

1	**Check the knock sensor**

(a) Check whether the mounting torque of the knock sensor is correct.

(b) Check whether the knock sensor is installed correctly.

(c) Check whether the knock sensor is damaged.

(d) Check whether the knock sensor shielding harness is normal and whether there is electromagnetic interference.

NG → **Repair or replace the knock sensor**

OK

2	**Check the engine**

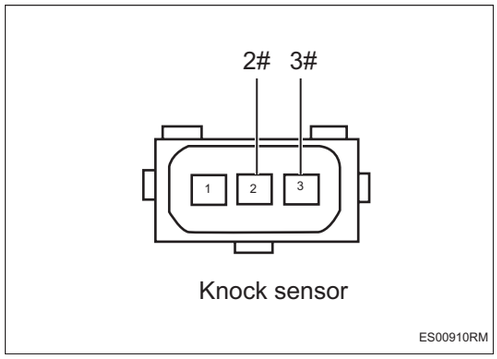
(a) Check whether the engine works properly.

(b) check if the engine is jittering abnormally and making noise.

NG → **Check and repair engine**

OK

3	Check the knock sensor



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the knock sensor connector.

(d) Remove the knock sensor.

(e) Measure the resistance according to the values in the table below.

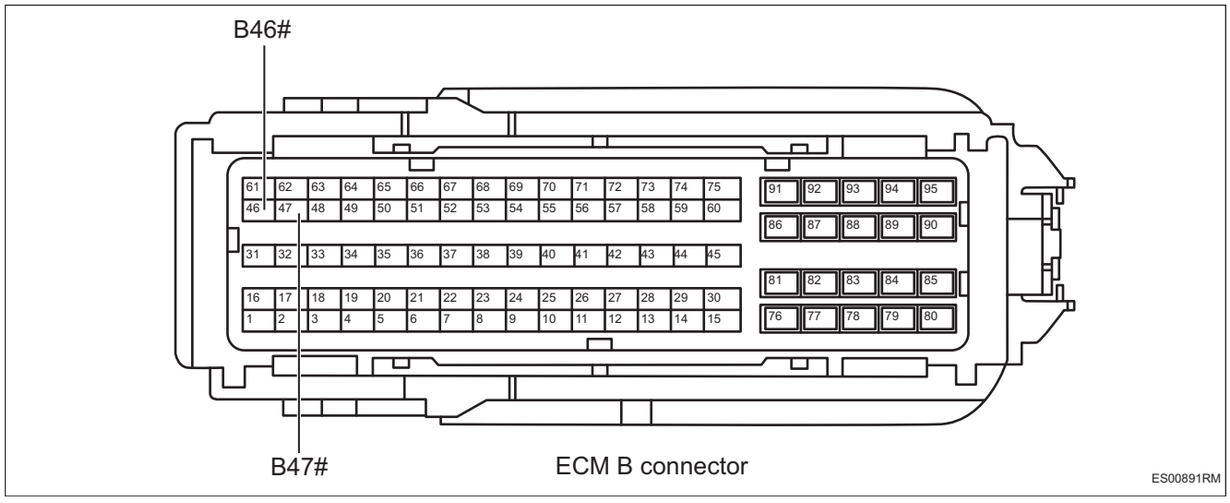
Standard value

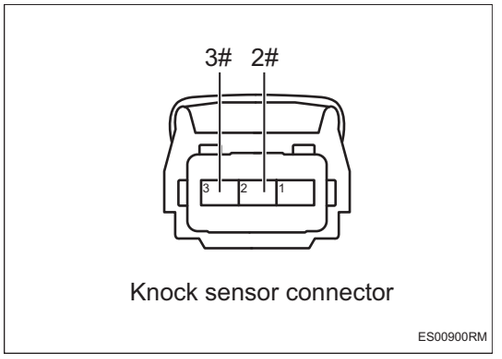
Detector connection	Detection conditions	Specified state
Knock sensor 2# -knock sensor 3#	Room temperature	4.9±20%MΩ

NG **Replace the knock sensor (See page ES-469)**

OK

4	Check knock sensor harness and connector for open circuit





Knock sensor connector

(a) Disconnect the ECM connector.

(b) Measure the resistance according to the values in the table below.

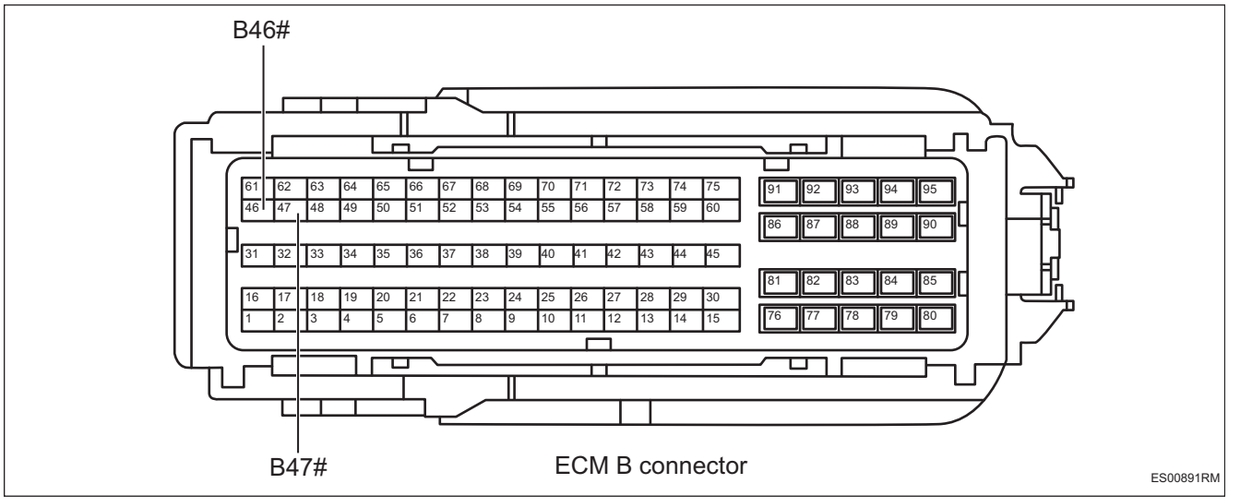
Standard value

Detector connection	Detection conditions	Specified state
Knock sensor connector 2# -ECM connector 47#	Always connected	Less than 1Ω
Knock sensor connector 3# -ECM connector B46#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

5	Check whether knock sensor harness and connector circuit is shorted to ground



ECM B connector

(a) Measure the resistance according to the values in the table below.

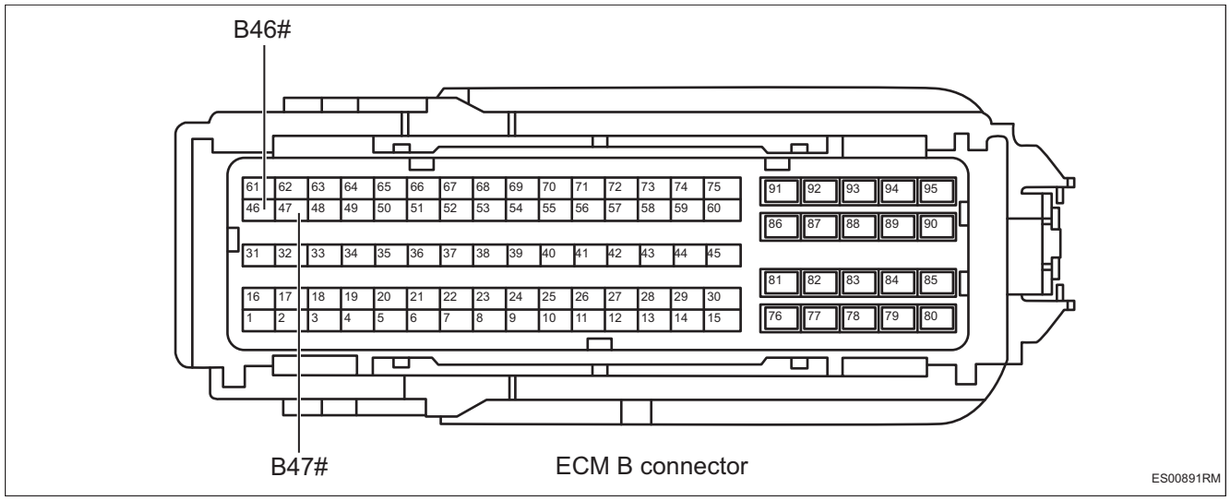
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B46# -body GND	Always connected	10 KΩ or greater
ECM connector B47# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

6	**Check whether knock sensor harness and connector circuit is shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B46# -body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B47# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

7	**Replace the knock sensor (See page ES-469)**

(a) Replace the knock sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG	Replace the ECM (See page ES-450)

OK

8	End

DTC	P033900	Speed sensor signal Implausible
DTC	P261700	Speed sensor signal lost
DTC	P033664	Crankshaft sensor pulse width signal implausible
DTC	P034A00	Crankshaft position sensor -crankshaft starting position incorrect (stop position implausible)
DTC	P034B00	Crankshaft position sensor -crankshaft rotation direction incorrect (reverse signal implausible)

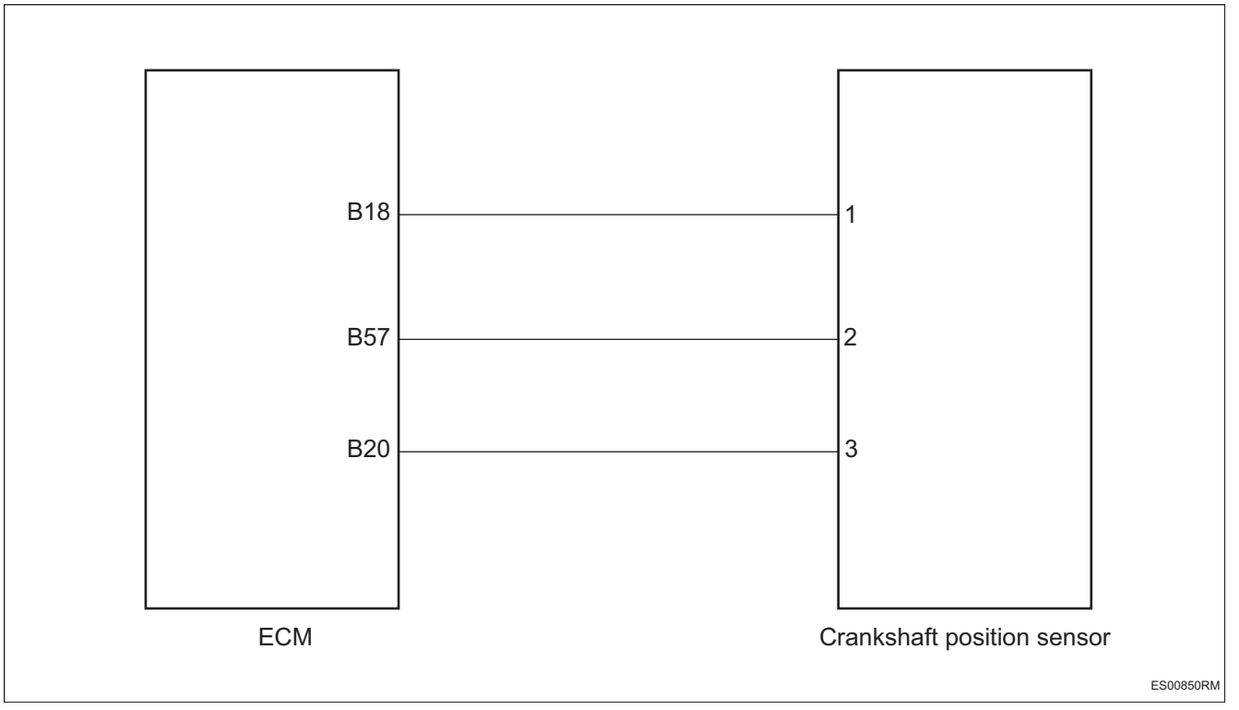
Description

When the speed sensor signal is abnormal or lost, the ECM records DTC.

DTC	DTC detection conditions	Faulty location
P033900	(a) Speed sensor signal failure counter above threshold.	• ECM • Harness and connector • Crankshaft position sensor
P261700	(a) Speed sensor signal failure counter above threshold.	• ECM • Harness and connector • Crankshaft position sensor
P033664	(a) Speed sensor DGI signal failure counter above threshold.	• ECM • Harness and connector • Crankshaft position sensor • Crankshaft position sensor signal plate
P034A00	(a) Hold the engine off or start it quickly after power-off for several times (generally more than 10 times).	• ECM • Harness and connector • Crankshaft position sensor • Crankshaft position sensor signal plate
P034B00	(a) Reverse rotation is detected when engine speed is above 2000 rpm.	• ECM • Harness and connector • Crankshaft position sensor • Crankshaft position sensor signal plate

ES

Circuit diagram



Inspection procedure

1	**Check crankshaft position sensor**

(a) Check whether the crankshaft position sensor is installed correctly.

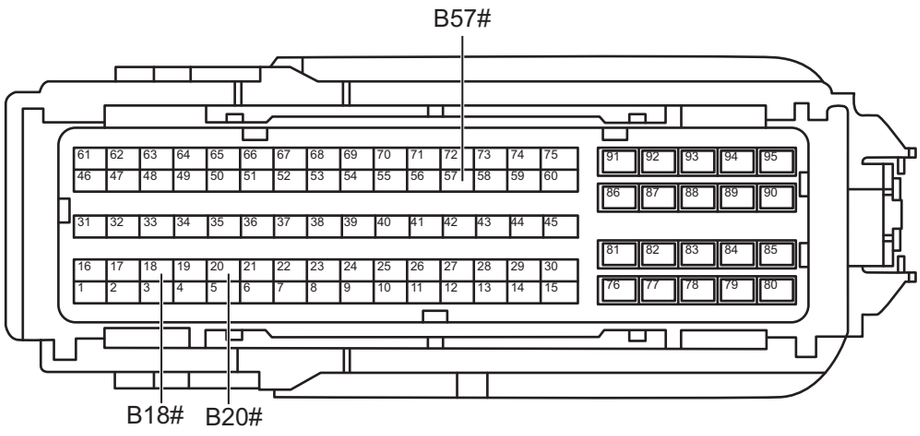
(b) Check whether the crankshaft position sensor is damaged.

(c) Check whether the crankshaft position sensor shield wire is damaged.

NG → **Repair or replace the crankshaft position sensor**

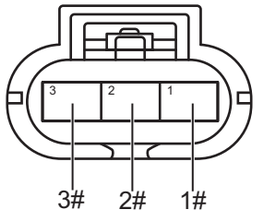
OK

2	**Check crankshaft position sensor harness and connector for open circuit**



ECM B connector

ES00861RM



Crankshaft position sensor connector

ES00870RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the crankshaft position sensor connector.

(e) Measure the resistance according to the values in the table below.

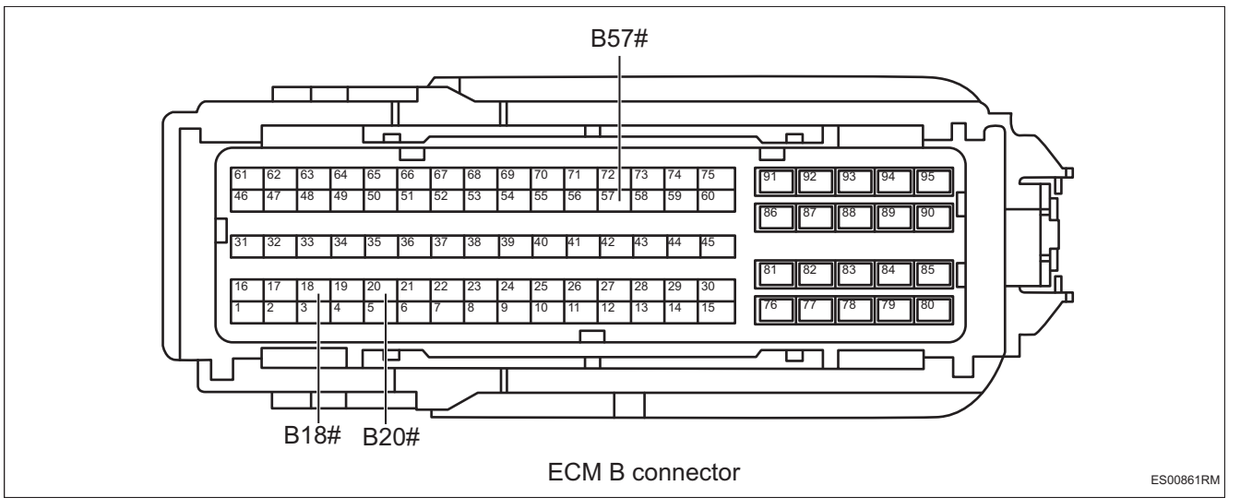
Standard value

Detector connection	Detection conditions	Specified state
Crankshaft position sensor connector 1# - ECM connector B18#	Always connected	Less than 1Ω
Crankshaft position sensor connector 2# - ECM connector B57#	Always connected	Less than 1Ω
Crankshaft position sensor connector 3# - ECM connector B20#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check whether crankshaft position sensor harness and connector circuit is shorted to ground**



(a) Measure the resistance according to the values in the table below.

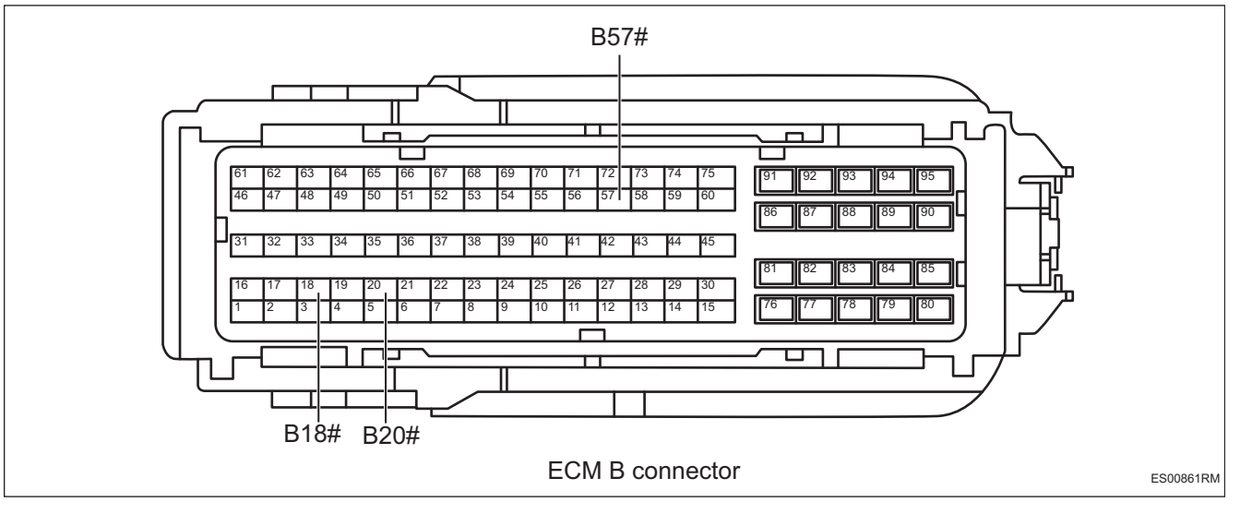
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B18# -body GND	Always connected	10 KΩ or greater
ECM connector B57# -body GND	Always connected	10 KΩ or greater
ECM connector B20# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check whether crankshaft position sensor harness and connector circuit is shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B18# -body GND	Set the ignition switch to "ON"	Less than 1 V
Engine control unit connector B57# -body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B20# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Check crankshaft position sensor signal plate**

(a) Check whether the crankshaft position sensor signal plate is installed correctly.

(b) Check whether the crankshaft position sensor signal plate is damaged.

NG → **Repair or replace the crankshaft position sensor signal plate**

OK

6	**Replace the crankshaft position sensor (See page ES-470)**

(a) Replace the crankshaft position sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

7	End

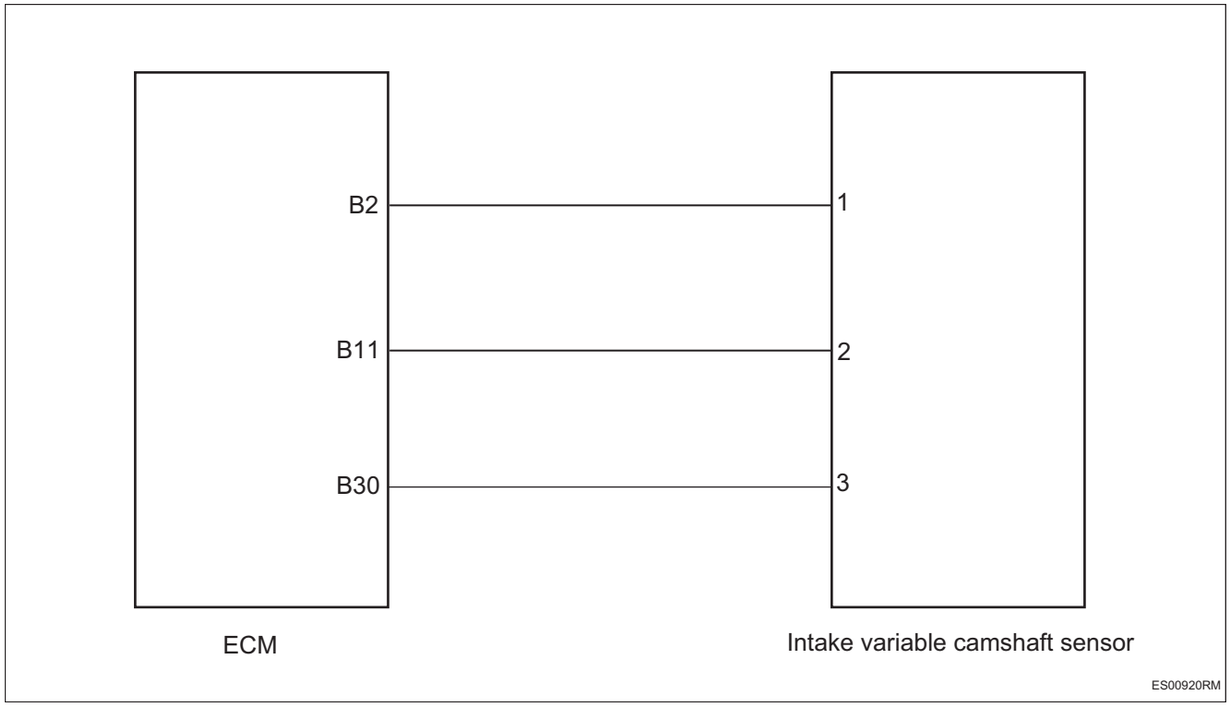
DTC	P034100	Intake camshaft sensor signal Implausible (Bank1)
DTC	P034200	Intake camshaft sensor signal circuit shorted to ground (Bank1)
DTC	P034300	Intake camshaft sensor signal circuit shorted to power supply (Bank1)

Description

When the intake variable camshaft sensor signal is abnormal or circuit is shorted, the ECM records DTC.

DTC	DTC detection conditions	Faulty location
P034100	(a) Intake camshaft phase sensor signal failure counter above threshold.	• ECM • Harness and connector • Intake variable camshaft sensor • Valve timing • Intake camshaft
P034200	(a) Intake camshaft phase sensor signal failure counter above threshold.	• ECM • Harness and connector • Intake variable camshaft sensor
P034300	(a) Intake camshaft phase sensor signal failure counter above threshold.	• ECM • Harness and connector • Intake variable camshaft sensor

Circuit diagram



Inspection procedure

1	Check intake variable camshaft sensor

ES

(a) Check whether the intake variable camshaft sensor is installed correctly.

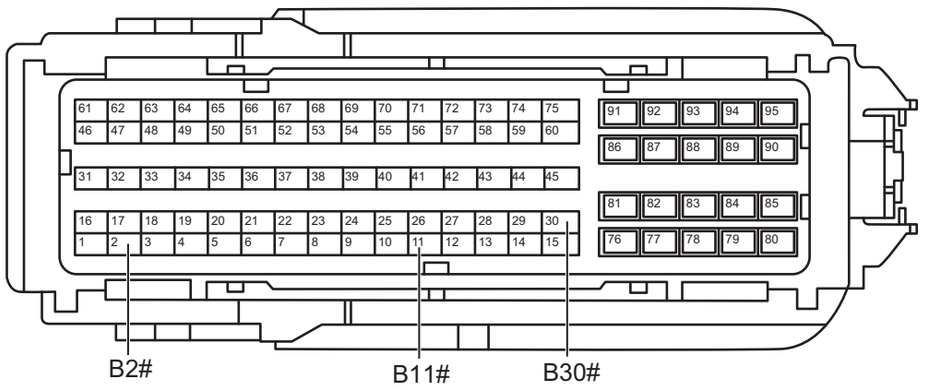
(b) Check whether the intake variable camshaft sensor is damaged.

(c) Check whether the intake variable camshaft sensor signal gear teeth are normal.

NG → **Repair or replace the intake variable camshaft sensor and signal gear**

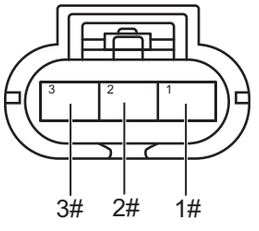
OK

2	Check intake variable camshaft sensor harness and connector for open circuit



ECM B connector

ES00931RM



Intake variable camshaft sensor connector

ES00940RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the intake variable camshaft sensor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B2# - intake variable camshaft sensor connector 1#	Always connected	Less than 1Ω
ECM connector B11# - intake variable camshaft sensor connector 2#	Always connected	Less than 1Ω

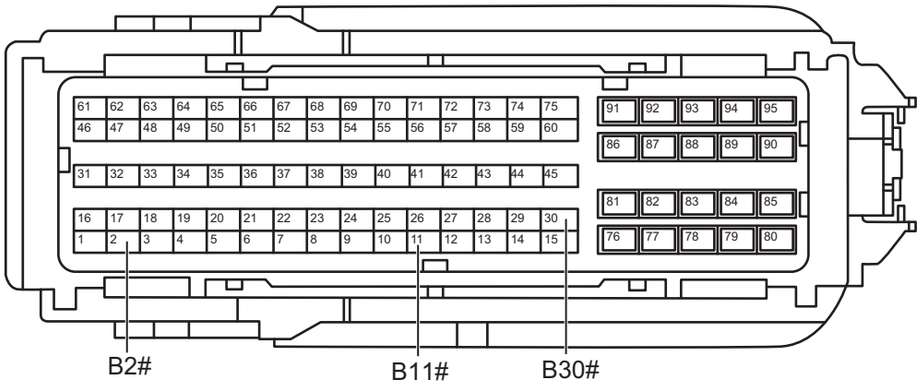
Detector connection	Detection conditions	Specified state
ECM connector B30# - intake variable camshaft sensor connector 3#	Always connected	Less than 1Ω

ES

NG → **Repair or replace the harness and connector**

OK

3	**Check intake variable camshaft sensor harness and connector for circuit shorted to ground**



ECM B connector

ES00931RM

(a) Measure the resistance according to the values in the table below.

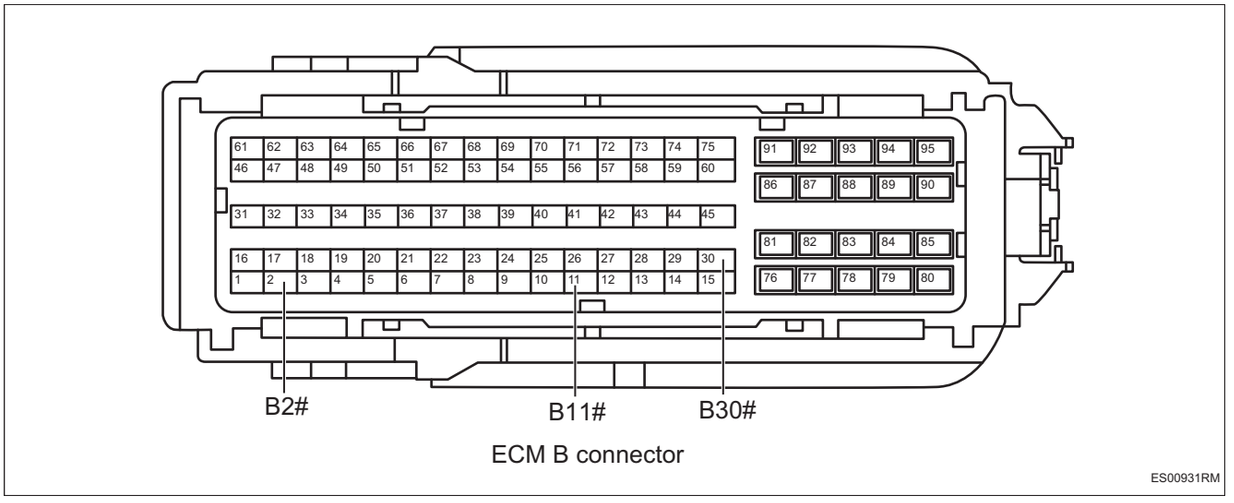
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B2# -body GND	Always connected	10 KΩ or greater
ECM connector B11# -body GND	Always connected	10 KΩ or greater
ECM connector B30# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check whether intake variable camshaft sensor harness and connector circuit is shorted to power supply**



ECM B connector

ES00931RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B2# -body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B11# -body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B30# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Check intake camshaft

(a) Check whether the intake camshaft is installed correctly.

(b) Check whether the intake camshaft is damaged or deformed.

NG → **Troubleshooting**

OK

6	**Check valve timing**

(a) Check whether the valve timing is correct.

(b) Check whether the timing chain is loose.

NG → **Adjust valve timing**

OK

7	**Replace the intake variable camshaft sensor (See page ES-452)**

(a) Replace the intake variable camshaft sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

8	**End**

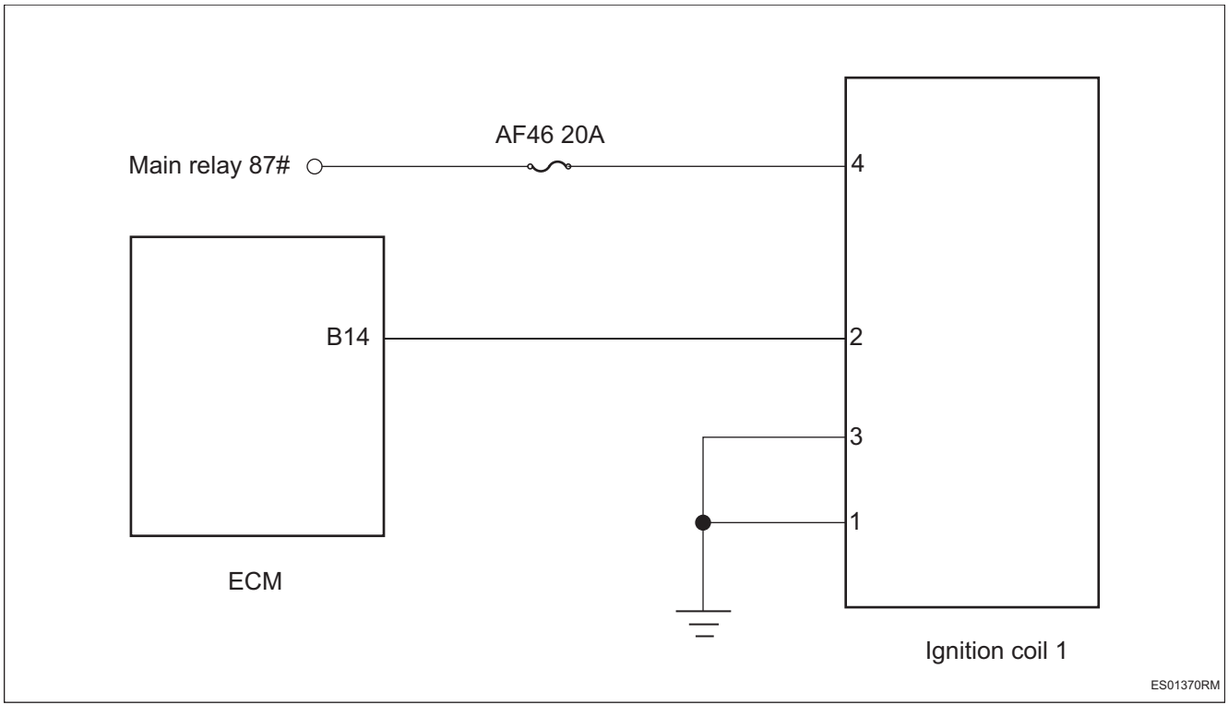
DTC	P035100	1# cylinder ignition coil control circuit open
DTC	P230000	1# cylinder ignition coil control circuit undervoltage
DTC	P230100	1# cylinder ignition coil control circuit over-voltage

Description

When 1# cylinder ignition coil control circuit is shorted or open, ECM will record DTC.

DTC	DTC detection conditions	Faulty location
P035100	(a) Ignition coil control circuit open.	• Ignition coil 1 • Harness and connector • ECM
P230000	(a) Ignition coil control circuit undervoltage.	• Ignition coil 1 • Harness and connector • ECM
P230100	(a) Ignition coil control circuit overvoltage.	• Ignition coil 1 • Harness and connector • ECM

Circuit diagram



Inspection procedure

1	Check ignition coil 1

(a) Check whether ignition coil 1 is installed correctly.

(b) Check whether the ignition coil 1 is deformed or damaged.

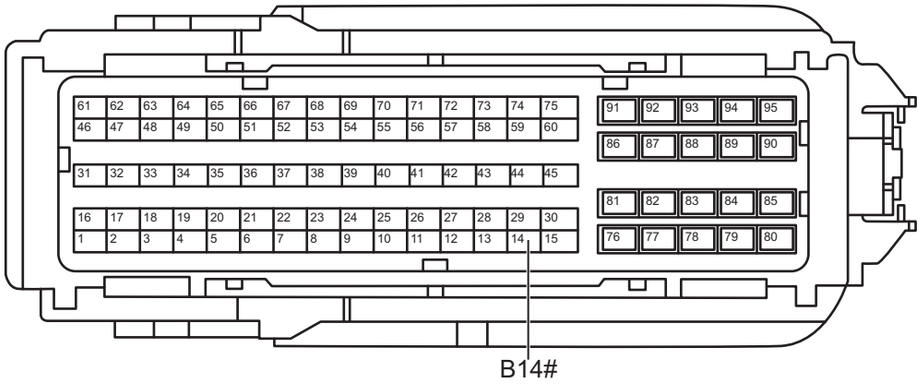
(c) Check ignition coil 1 insulator for aging and cracking.

NG → **Check or replace ignition coil 1**

ES

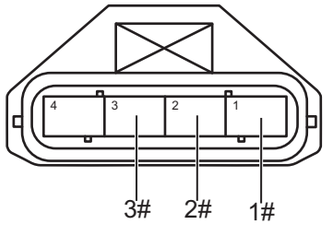
OK

2	Check ignition coil 1 harness and connector for open circuit



ECM B connector

ES01381RM



Ignition coil 1 connector

ES01390RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect ignition coil 1 connector.

(e) Measure the resistance according to the values in the table below.

Standard value

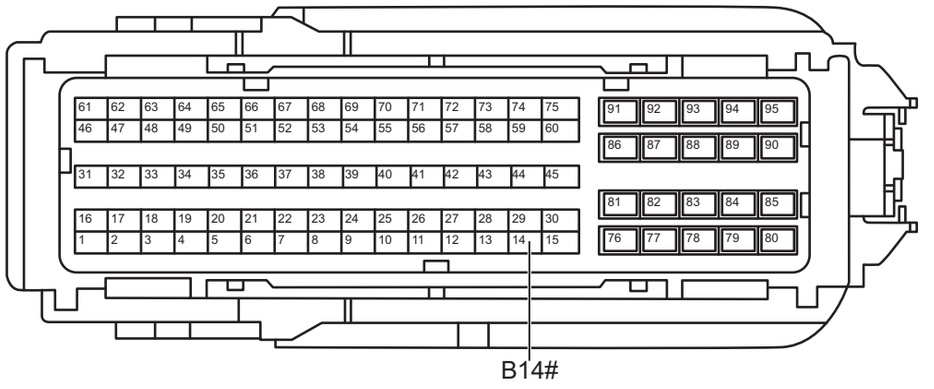
Detector connection	Detection conditions	Specified state
Ignition coil 1 connector 2# -ECM connector B14#	Always connected	Less than 1Ω
Ignition coil 1 connector 1# -body GND	Always connected	Less than 1Ω
Ignition coil 1 connector 3# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check whether ignition coil 1 harness and connector circuit is shorted to ground

ES



ECM B connector ES01381RM

(a) Measure the resistance according to the values in the table below.

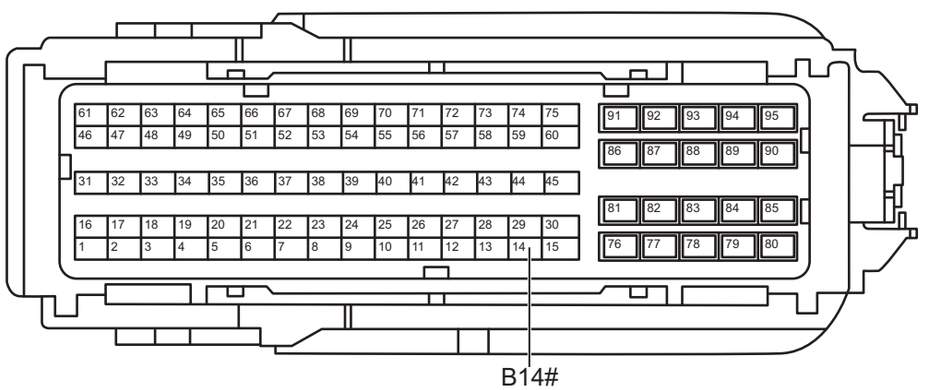
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B14# -body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

4	Check whether ignition coil 1 harness and connector circuit is shorted to power supply



ECM B connector ES01381RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

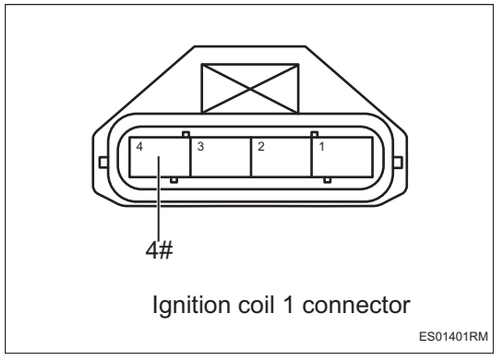
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B14# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Check ignition coil 1 power supply



Ignition coil 1 connector

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Connect ECM connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Ignition coil 1 connector 4# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector, fuse and relay**

OK

6	Replace the ignition coil 1 (See page IG-1)

(a) Replace ignition coil 1.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

ES

OK

7	**End**

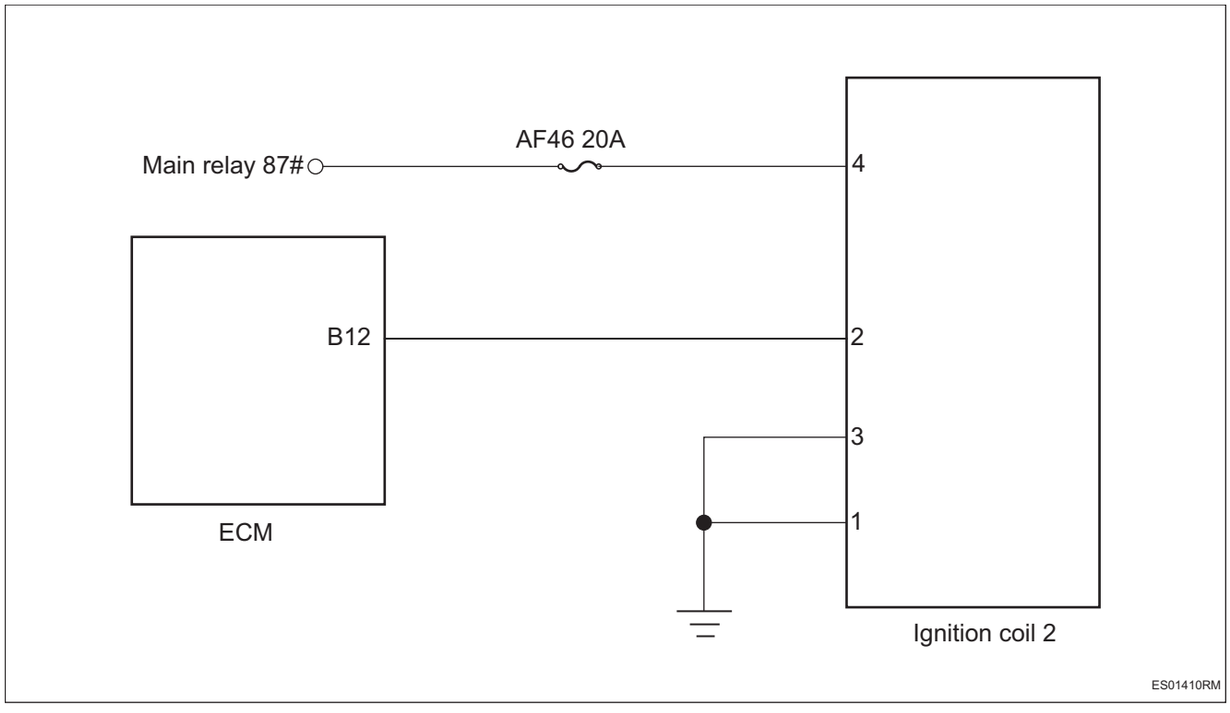
DTC	P035200	2# cylinder ignition coil control circuit open
DTC	P230300	2# cylinder ignition coil control circuit undervoltage
DTC	P230400	2# cylinder ignition coil control circuit over-voltage

Description

When 2# cylinder ignition coil control circuit is shorted or open, ECM will record DTC.

DTC	DTC detection conditions	Faulty location
P035200	(a) Ignition coil control circuit open.	• Ignition coil 2 • Harness and connector • ECM
P230300	(a) Ignition coil control circuit undervoltage.	• Ignition coil 2 • Harness and connector • ECM
P230400	(a) Ignition coil control circuit overvoltage.	• Ignition coil 2 • Harness and connector • ECM

Circuit diagram



Inspection procedure

1	Check ignition coil 2

(a) Check whether ignition coil 2 is installed correctly.

(b) Check whether the ignition coil 2 is deformed or damaged.

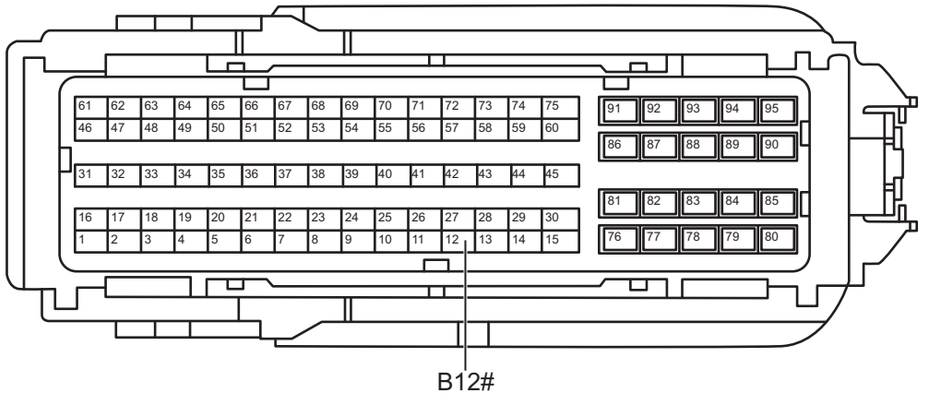
(c) Check ignition coil 2 insulator for aging and cracking.

ES

NG → **Check or replace ignition coil 2**

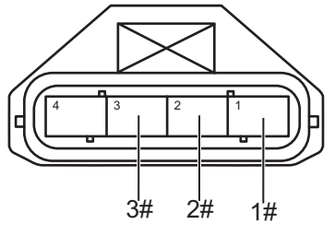
OK

2	Check ignition coil 2 harness and connector for open circuit



ECM B connector

ES01421RM



Ignition coil 2 connector

ES01431RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect ignition coil 2 connector.

(e) Measure the resistance according to the values in the table below.

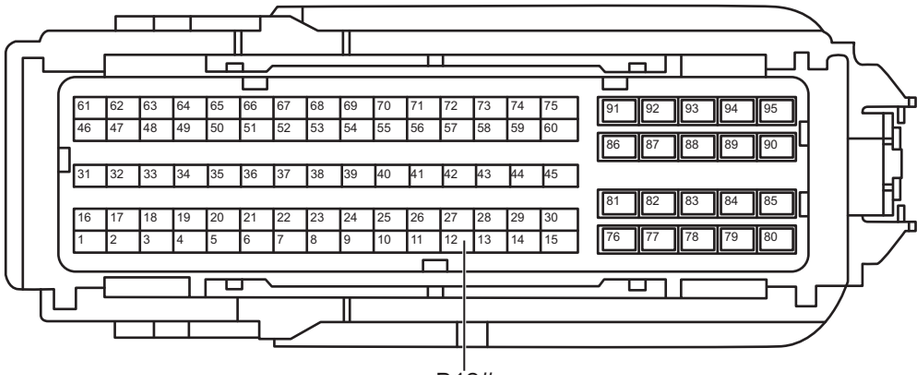
Standard value

Detector connection	Detection conditions	Specified state
Ignition coil 2 connector 2# -ECM connector B1 #	Always connected	Less than 1Ω
Ignition coil 2 connector 1# -body GND	Always connected	Less than 1Ω
Ignition coil 2 connector 3# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check whether ignition coil 2 harness and connector circuit is shorted to ground



ECM B connector

ES01421RM

(a) Measure the resistance according to the values in the table below.

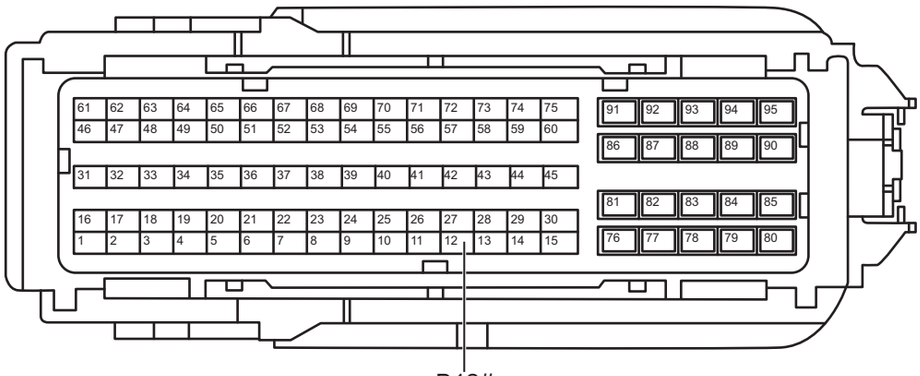
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B12# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check whether ignition coil 2 harness and connector circuit is shorted to power supply



ECM B connector

ES01421RM

ES

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

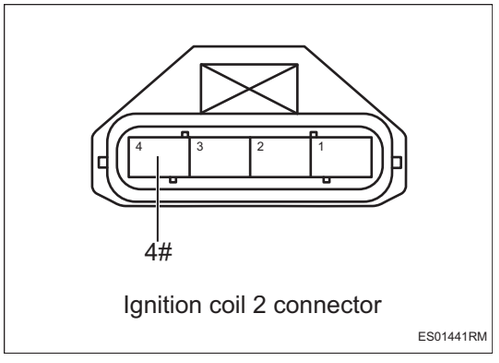
Standard value

Detector connection	Detection conditions	Specified state
ECM connector 12# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Check ignition coil 2 power supply



Ignition coil 2 connector

ES01441RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Connect ECM connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Ignition coil 2 connector 4# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector, fuse and relay**

OK

6	Replace the ignition coil 2 (See page IG-1)

(a) Replace ignition coil 2.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

7	**End**

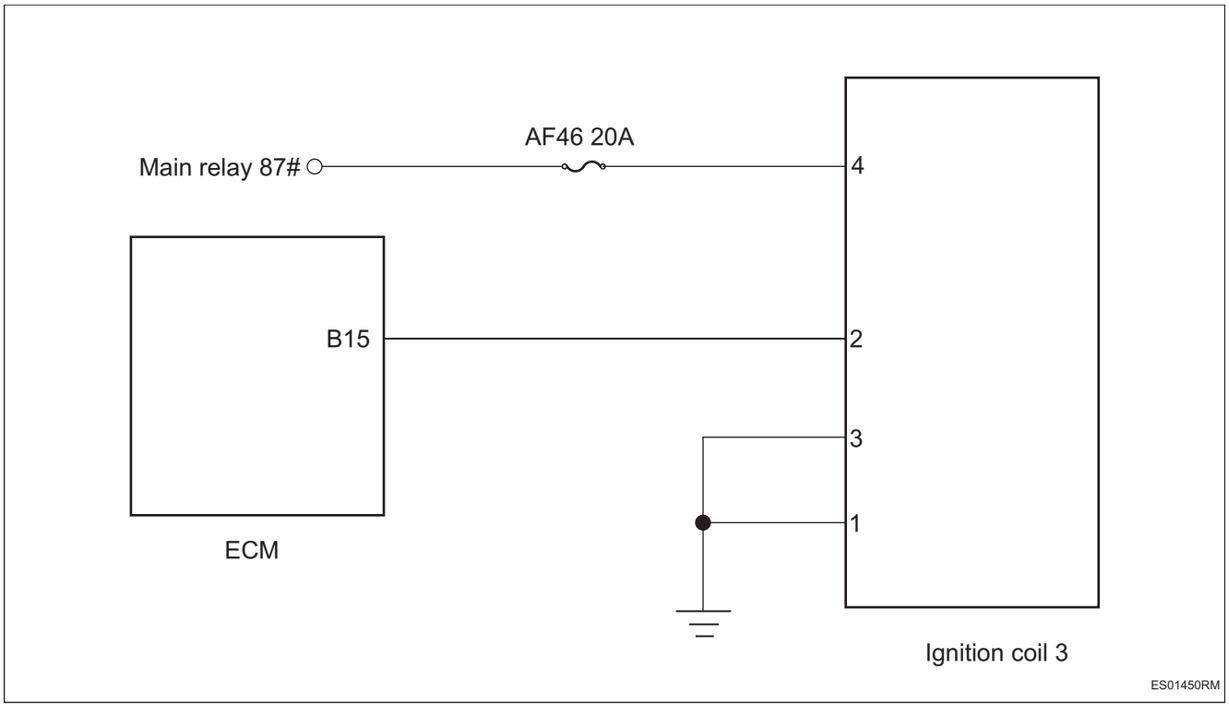
DTC	P035300	3# cylinder ignition coil control circuit open
DTC	P230600	3# cylinder ignition coil control circuit undervoltage
DTC	P230700	3# cylinder ignition coil control circuit over-voltage

Description

When 3# cylinder ignition coil control circuit is shorted or open, ECM will record DTC.

DTC	DTC detection conditions	Faulty location
P035300	(a) Ignition coil control circuit open.	• Ignition coil 3 • Harness and connector • ECM
P230600	(a) Ignition coil control circuit undervoltage.	• Ignition coil 3 • Harness and connector • ECM
P230700	(a) Ignition coil control circuit overvoltage.	• Ignition coil 3 • Harness and connector • ECM

Circuit diagram



Inspection procedure

1	Check ignition coil 3

(a) Check whether ignition coil 3 is installed correctly.

(b) Check whether the ignition coil 3 is deformed or damaged.

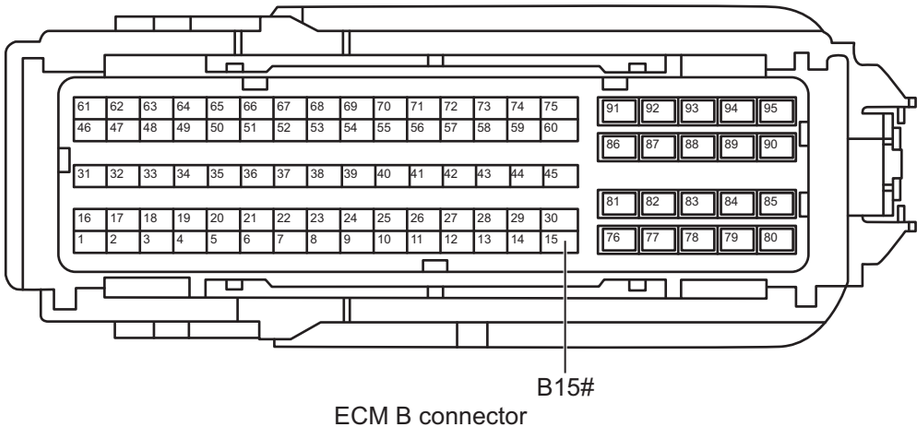
(c) Check ignition coil 3 insulator for aging and cracking.

NG → **Check or replace ignition coil 3**

ES

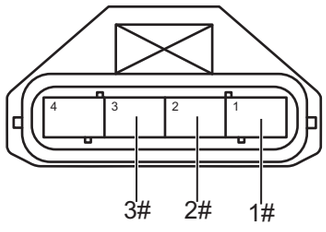
OK

2	Check ignition coil 3 harness and connector for open circuit



ECM B connector

ES01461RM



Ignition coil 3 connector

ES01471RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect ignition coil 3 connector.

(e) Measure the resistance according to the values in the table below.

Standard value

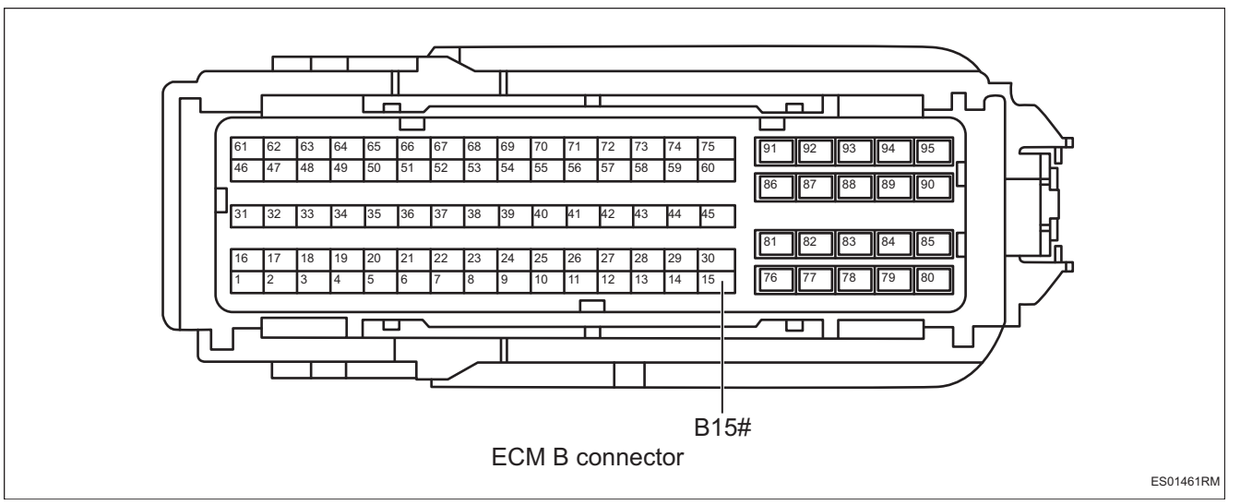
Detector connection	Detection conditions	Specified state
Ignition coil 3 connector 2# -ECM connector B15#	Always connected	Less than 1Ω
Ignition coil 3 connector 1# -body GND	Always connected	Less than 1Ω
Ignition coil 3 connector 3# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check whether ignition coil 3 harness and connector circuit is shorted to ground

ES



(a) Measure the resistance according to the values in the table below.

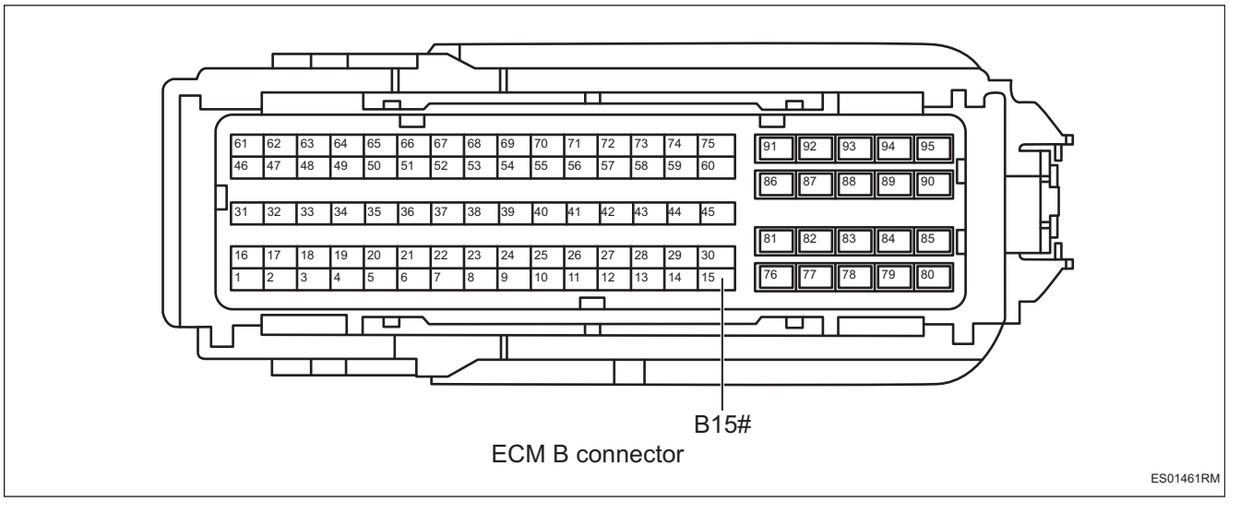
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B15# -body GND	Always connected	10KΩ or greater

NG **Repair or replace the harness and connector**

OK

4	Check whether ignition coil 3 harness and connector circuit is shorted to power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

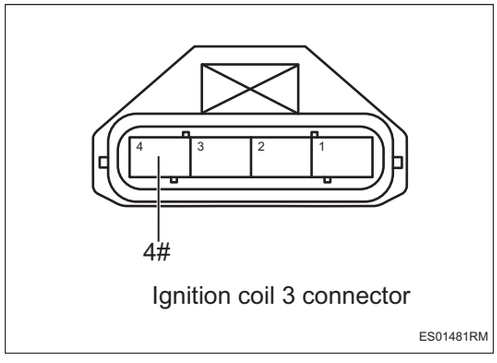
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B15# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Check ignition coil 3 power supply



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Connect ECM connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Ignition coil 3 connector 4# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector, fuse and relay**

OK

6	Replace the ignition coil 3 (See page IG-1)

(a) Replace ignition coil 3.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

ES

OK

7	**End**

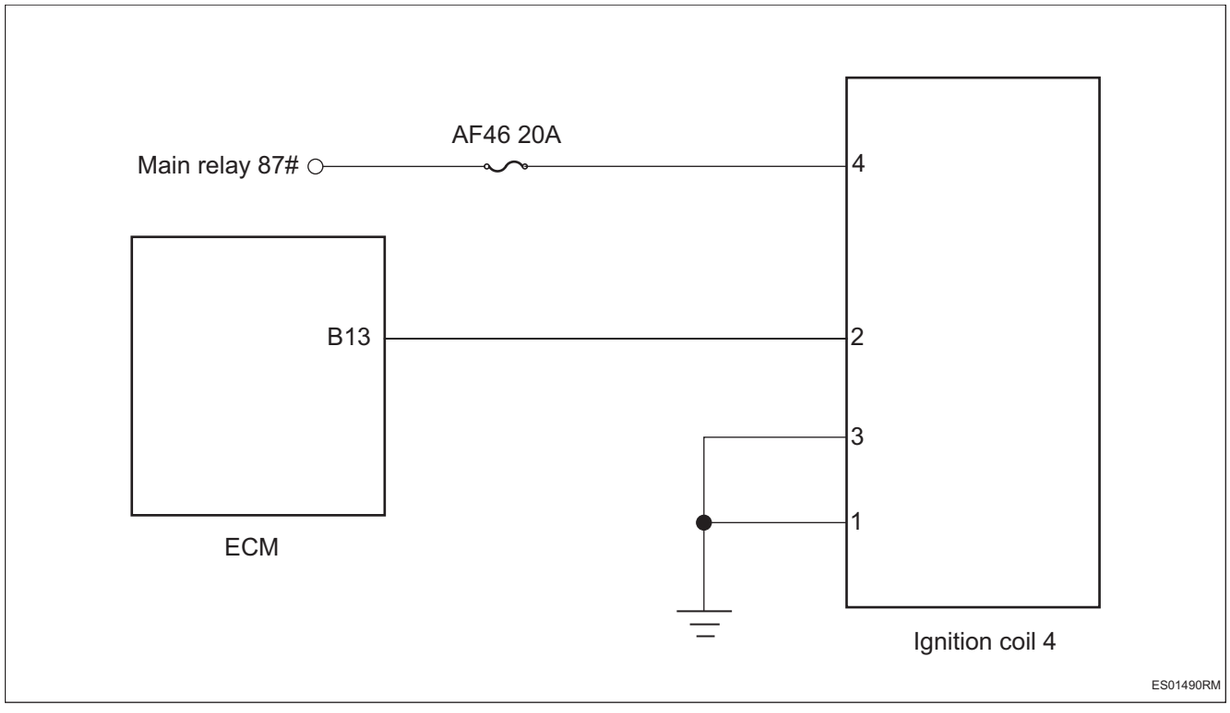
DTC	P035400	4# cylinder ignition coil control circuit open
DTC	P230900	4# cylinder ignition coil control circuit undervoltage
DTC	P231000	4# cylinder ignition coil control circuit over-voltage

Description

When 4# cylinder ignition coil control circuit is shorted or open, ECM will record DTC.

DTC	DTC detection conditions	Faulty location
P035400	(a) Ignition coil control circuit open.	• Ignition coil 4 • Harness and connector • ECM
P230900	(a) Ignition coil control circuit undervoltage.	• Ignition coil 4 • Harness and connector • ECM
P231000	(a) Ignition coil control circuit overvoltage.	• Ignition coil 4 • Harness and connector • ECM

Circuit diagram



Inspection procedure

1	**Check ignition coil 4**

(a) Check whether ignition coil 4 is installed correctly.

(b) Check whether the ignition coil 4 is deformed or damaged.

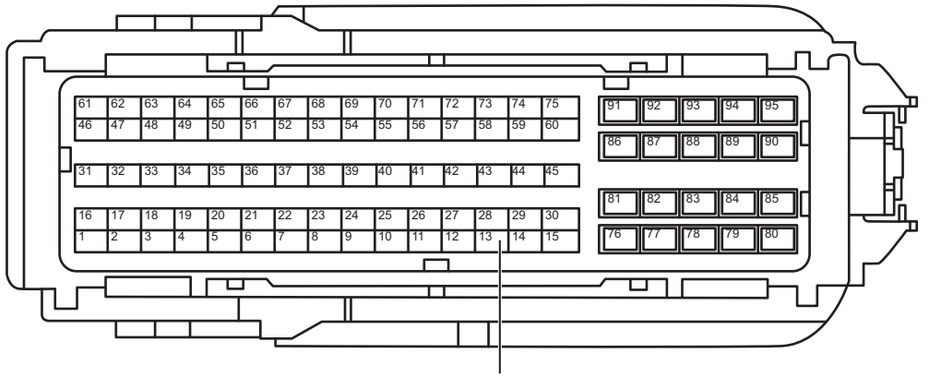
(c) Check ignition coil 4 insulator for aging and cracking.

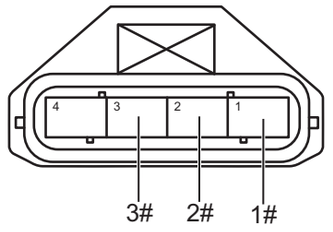
ES

NG → **Check or replace ignition coil 4**

OK

2	Check ignition coil 4 harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect ignition coil 4 connector.

(e) Measure the resistance according to the values in the table below.

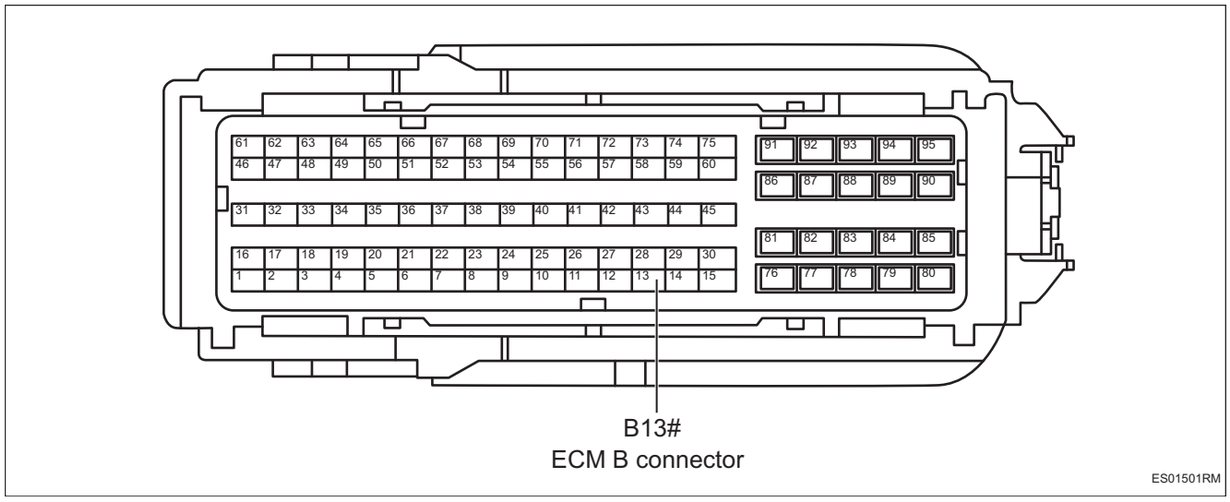
Standard value

Detector connection	Detection conditions	Specified state
Ignition coil 4 connector 2# -ECM connector B13#	Always connected	Less than 1Ω
Ignition coil 4 connector 1# -body GND	Always connected	Less than 1Ω
Ignition coil 4 connector 3# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check whether ignition coil 4 harness and connector circuit is shorted to ground



(a) Measure the resistance according to the values in the table below.

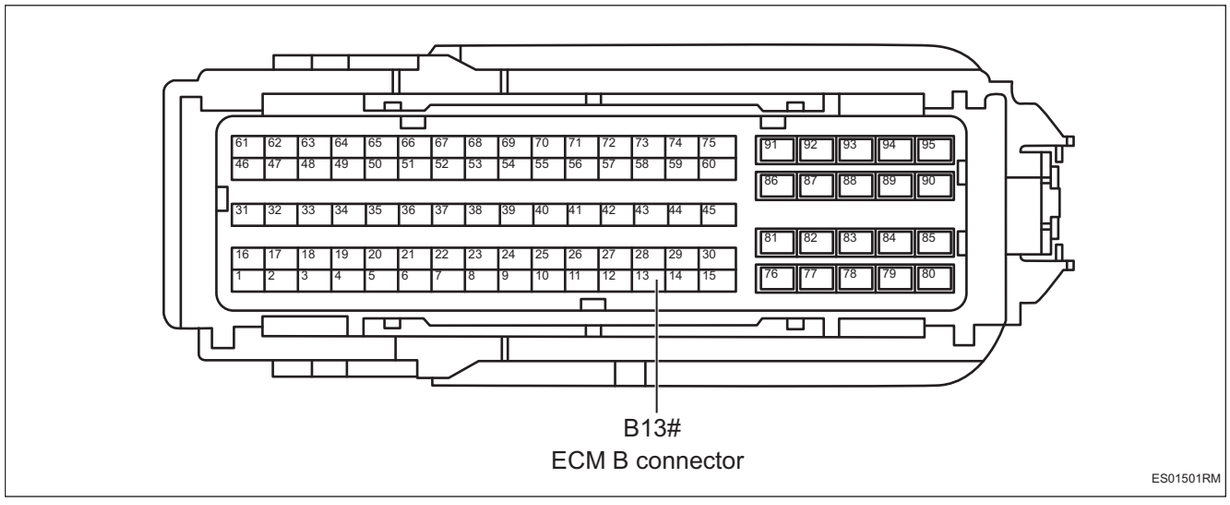
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B13# -body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

4	Check whether ignition coil 4 harness and connector circuit is shorted to power supply



ES

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

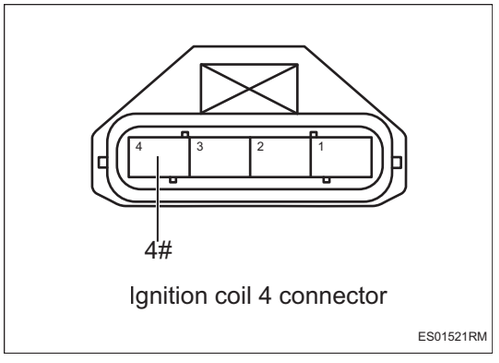
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B13# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Check ignition coil 4 power supply



Ignition coil 4 connector

ES01521RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Connect ECM connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Ignition coil 4 connector 4# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector, fuse and relay**

OK

6	Replace the ignition coil 4 (See page IG-1)

(a) Replace ignition coil 4.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

7	**End**

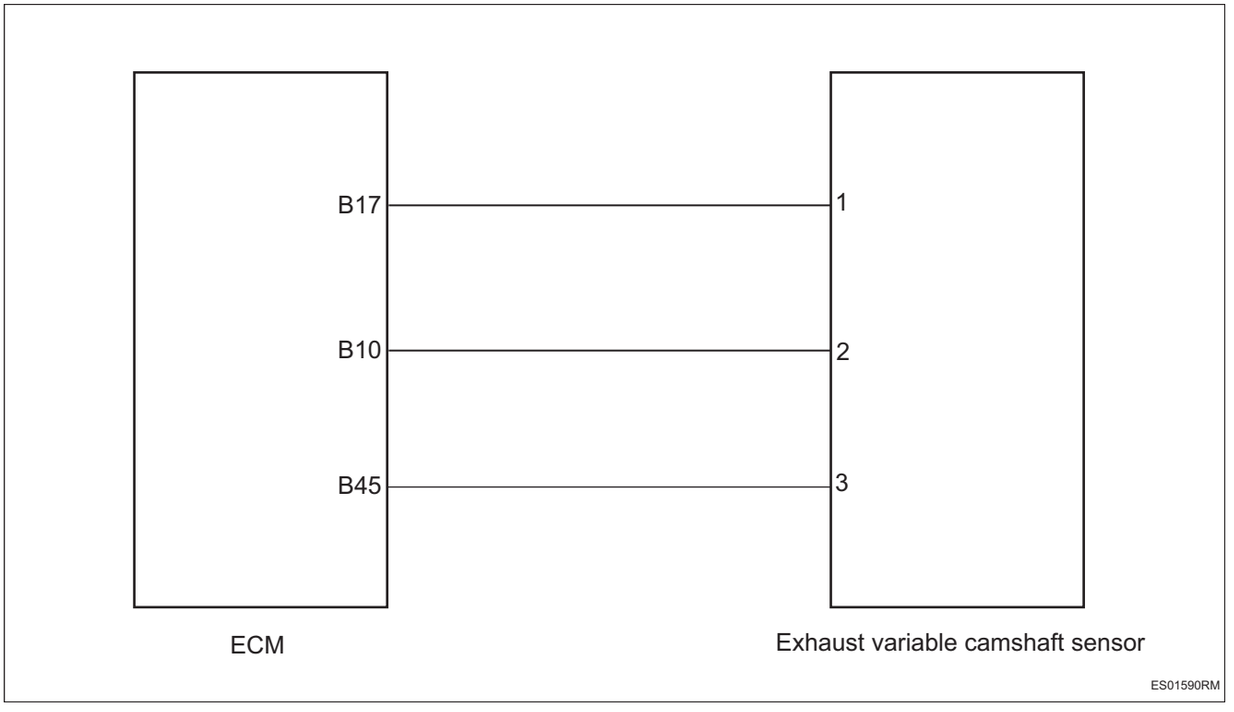
DTC	P036600	Exhaust camshaft sensor signal implausible (Bank1)
DTC	P036800	Exhaust camshaft sensor signal circuit shorted to power supply (Bank1)
DTC	P036700	Exhaust camshaft sensor signal circuit shorted to ground (Bank1)

Description

When the exhaust variable camshaft sensor signal is abnormal or circuit is shorted, the ECM records DTC.

DTC	DTC detection conditions	Faulty location
P036600	(a) Exhaust camshaft sensor signal implausible.	• ECM • Harness and connector • Exhaust variable camshaft sensor • Exhaust camshaft • Valve timing
P036800	(a) Exhaust camshaft sensor signal circuit shorted to power supply.	• ECM • Harness and connector • Exhaust variable camshaft sensor
P036700	(a) Exhaust camshaft sensor signal circuit shorted to ground.	• ECM • Harness and connector • Exhaust variable camshaft sensor

Circuit diagram



Inspection procedure

1	Check exhaust variable camshaft sensor

(a) Check whether the exhaust variable camshaft sensor is installed correctly.

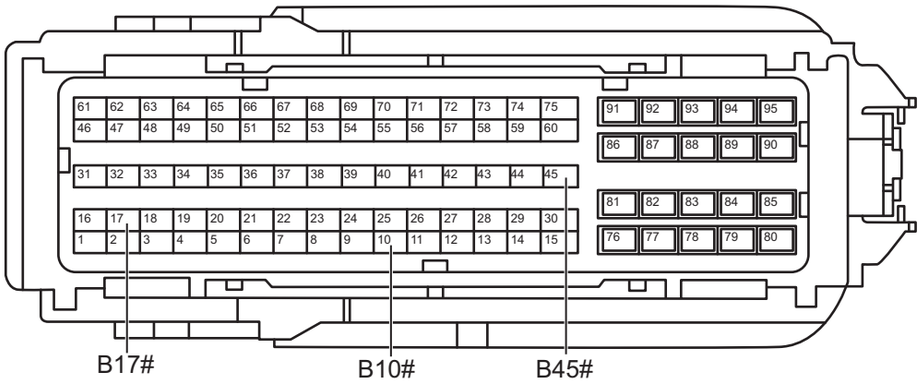
(b) Check whether the exhaust variable camshaft sensor is damaged.

(c) Check whether the exhaust variable camshaft sensor signal gear teeth are normal.

NG → **Repair or replace the exhaust variable camshaft sensor**

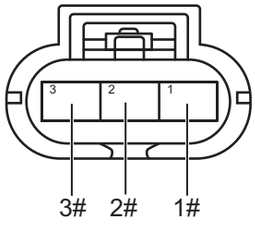
OK

2	Check exhaust variable camshaft sensor harness and connector for open circuit



ECM B connector

ES01601RM



Exhaust variable camshaft sensor connector

ES01611RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the exhaust variable camshaft sensor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B17# - exhaust variable camshaft sensor connector 1#	Always connected	Less than 1Ω
ECM connector B10# - exhaust variable camshaft sensor connector 2#	Always connected	Less than 1Ω

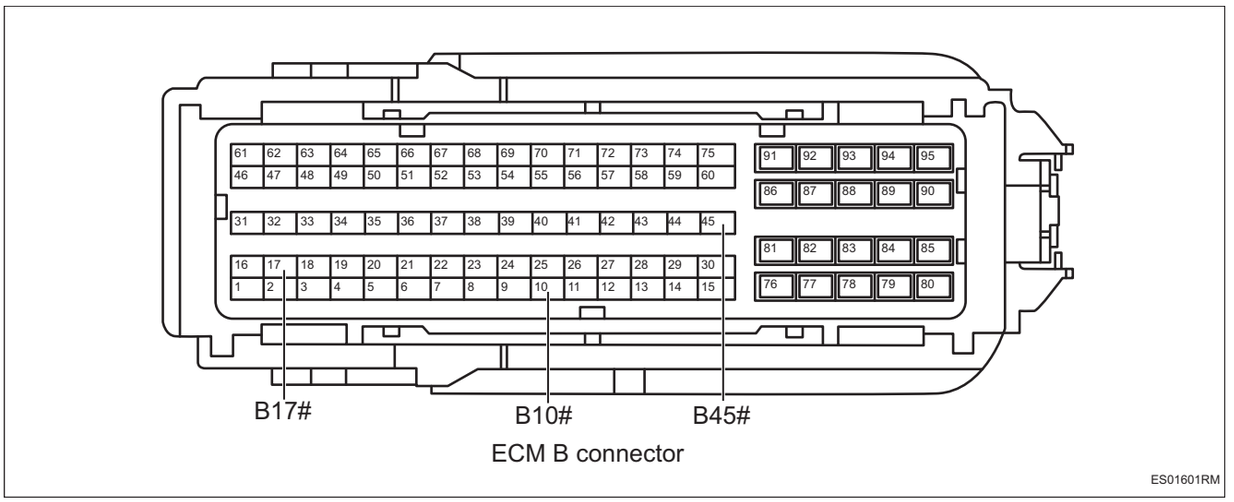
Detector connection	Detection conditions	Specified state
ECM connector B45# - exhaust variable camshaft sensor connector 3#	Always connected	Less than 1Ω

ES

NG → **Repair or replace the harness and connector**

OK

3	**Check exhaust variable camshaft sensor harness and connector for circuit shorted to ground**



ECM B connector

ES01601RM

(a) Measure the resistance according to the values in the table below.

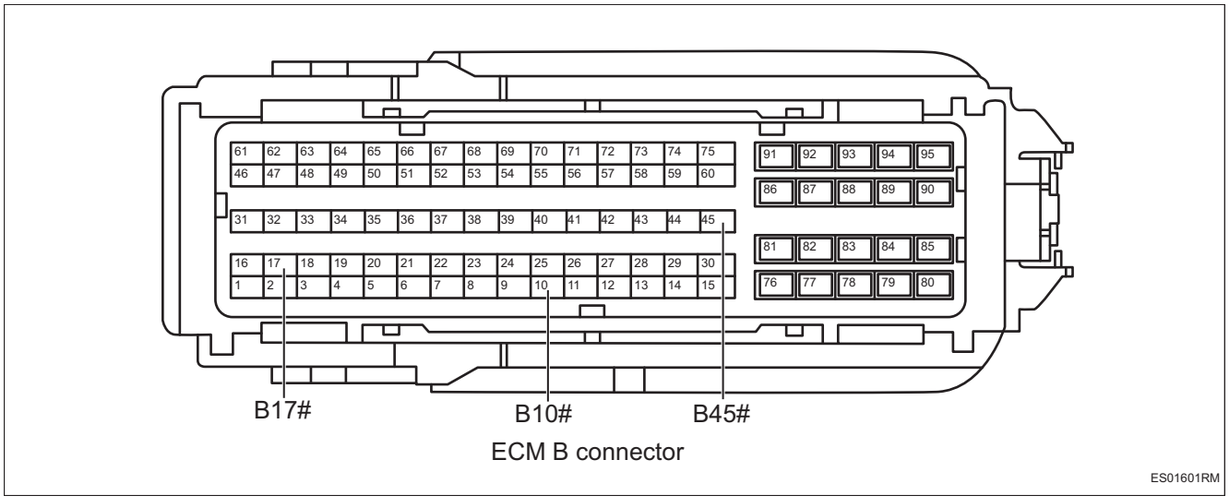
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B17# -body GND	Always connected	10 KΩ or greater
ECM connector B10# -body GND	Always connected	10 KΩ or greater
ECM connector B45# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check exhaust variable camshaft sensor harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B17# -body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B10# -body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B45# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Check exhaust camshaft

(a) Check whether the exhaust camshaft is installed correctly.

(b) Check whether the exhaust camshaft is damaged or deformed.

NG → **Repair or replace the exhaust camshaft**

OK

6	**Check valve timing**

ES

(a) Check whether the valve timing is correct.

(b) Check whether the timing chain is loose.

NG → **Adjust valve timing**

OK

7	**Replace the exhaust variable camshaft sensor (See page ES-452)**

(a) Replace the exhaust variable camshaft sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

8	**End**

DTC	P042000	TWC OSC aging

Description

The ECM monitors the operation of the TWC by means of oxygen sensor signals. When the upstream and downstream oxygen sensors detec that there is no significant difference in the oxygen content in the exhaust gas, the ECM determines the aging of the TWC, and the engine control unit records the DTC.

DTC	DTC detection conditions	Faulty location
P042000	(a) TWC aging.	• /downstream oxygen sensor • Exhaust system • Harness and connector • ECM • TWC

Inspection procedure

1	Check fuel quality

(a) Check whether the fuel quality complies with the vehicle requirements.

NG → **Repair according to the fault**

OK

2	Check the exhaust system

(a) Check whether the exhaust system pipeline is properly connected.

(b) Check the exhaust system for leakage damage.

NG → **Repair or replace the exhaust system components**

OK

3	Check oxygen sensor harness and connector

(a) Check whether the oxygen sensor harness and connector are properly connected.

(b) Check the oxygen sensor harness and connector for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

4	**Check oxygen sensor**

ES

(a) Check whether the oxygen sensor is aging.

(b) Check whether the oxygen sensor is deformed or damaged.

NG → **Replace oxygen sensor**

OK

5	**Replace the TWC (See page EX-2)**

(a) Replace the TWC.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

6	**End**

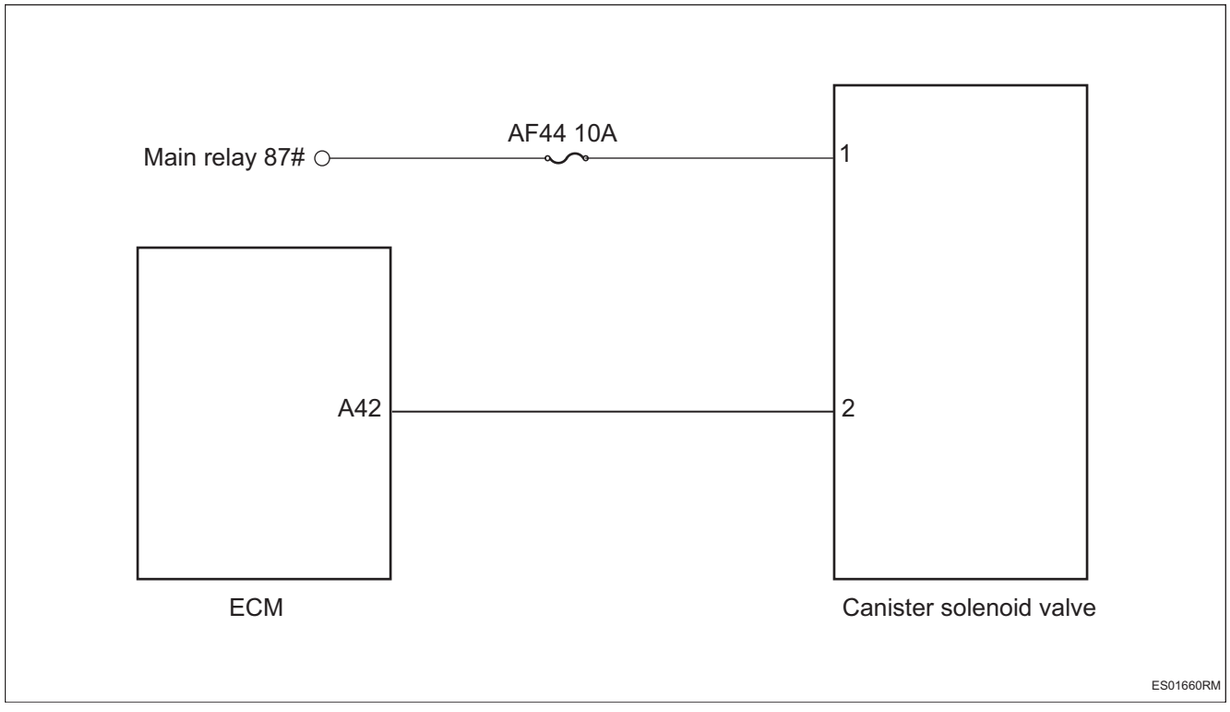
DTC	P044400	Canister control valve control circuit open
DTC	P045800	Canister control valve circuit undervoltage
DTC	P045900	Canister control valve circuit overvoltage
DTC	P049700	Canister solenoid valve stuck closed

Description

When the canister solenoid valve control circuit is shorted or open, ECM will record DTC.

DTC	DTC detection conditions	Faulty location
P044400	(a) Canister control valve control circuit open.	• ECM • Harness and connector • Canister solenoid valve
P045800	(a) Canister control valve control circuit undervoltage.	• ECM • Harness and connector • Canister solenoid valve
P045900	(a) Canister control valve control circuit over-voltage.	• ECM • Harness and connector • Canister solenoid valve
P049700	(a) Canister solenoid valve stuck closed.	• ECM • Harness and connector • Canister solenoid valve

Circuit diagram



Inspection procedure

1	Check EVAP system pipeline

ES

(a) Check whether the EVAP system pipeline is properly connected.

(b) Check whether the EVAP system pipeline leaks or is blocked.

(c) Check whether the EVAP system components are normal.

NG → **Repair according to the fault**

OK

2	Check high-/low-load desorption pipeline check valve

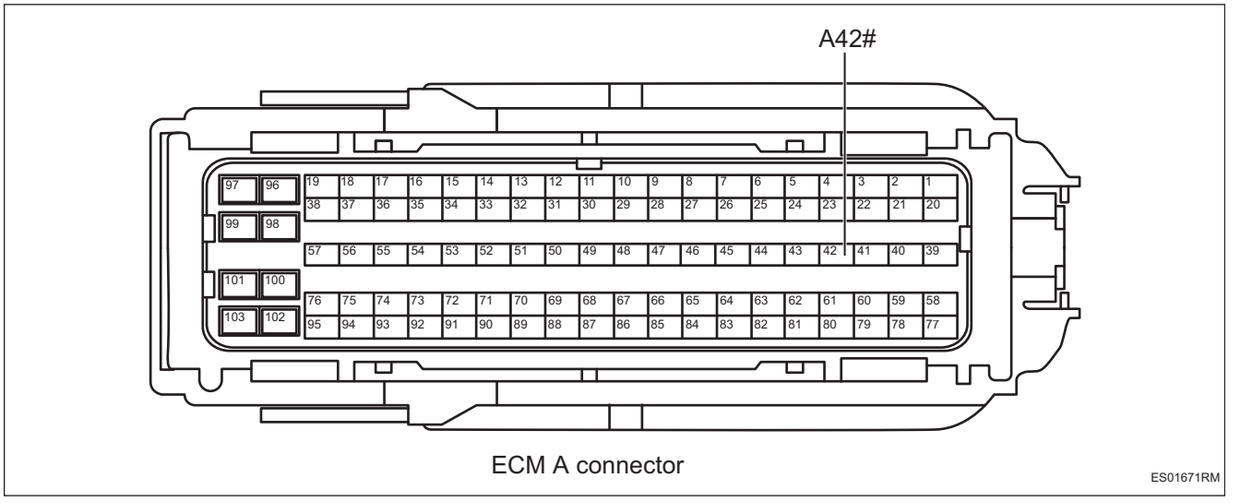
(a) Check whether the high-/low-load desorption pipeline check valve is blocked.

(b) Check whether the high-/low-load desorption pipeline check valve is unidirectionally conductive.

NG → **Repair according to the fault**

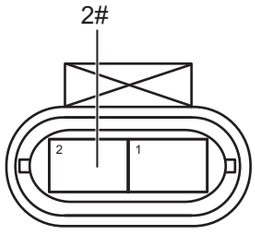
OK

3	Check canister solenoid valve harness and connector for open circuit



ECM A connector

ES01671RM



Canister solenoid valve connector

ES01680RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the canister solenoid valve connector.

(e) Measure the resistance according to the values in the table below.

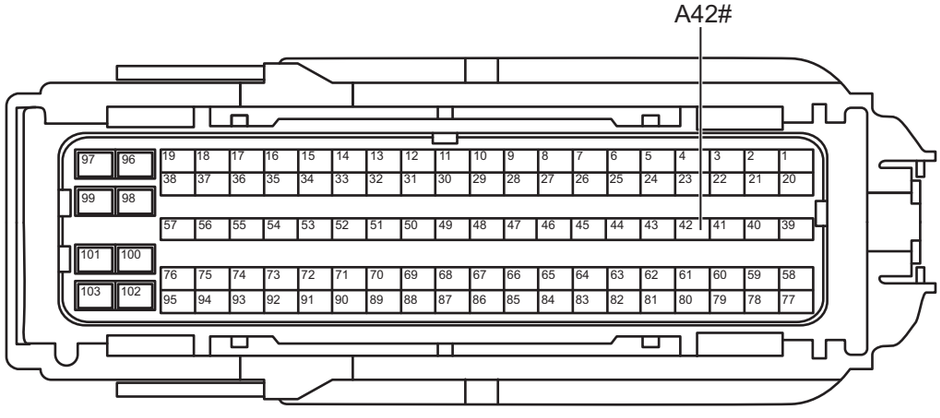
Standard value

Detector connection	Detection conditions	Specified state
Canister solenoid valve connector 2# -ECM connector A42#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	Check whether canister solenoid valve harness and connector circuit is shorted to ground



ECM A connector

ES01671RM

(a) Measure the resistance according to the values in the table below.

Standard value

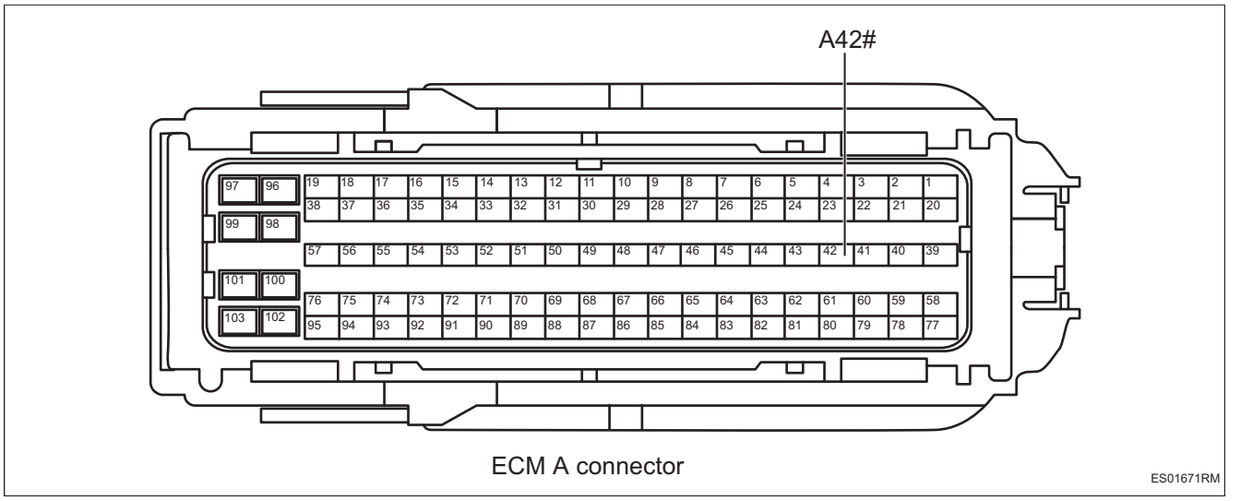
Detector connection	Detection conditions	Specified state
ECM connector A42# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	Check whether canister solenoid valve harness and connector circuit is shorted to power supply

ES



ECM A connector

ES01671RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

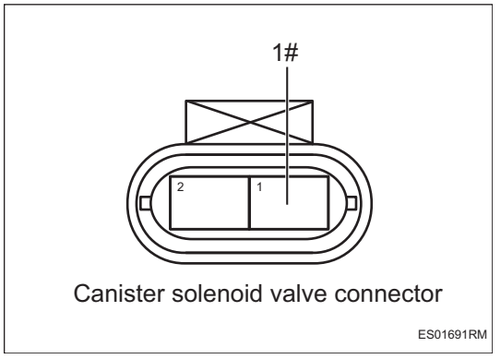
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A42# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG **Repair or replace the harness and connector**

OK

6	Check canister solenoid valve power supply



Canister solenoid valve connector

ES01691RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Connect ECM connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the voltage according to the values in the table below.

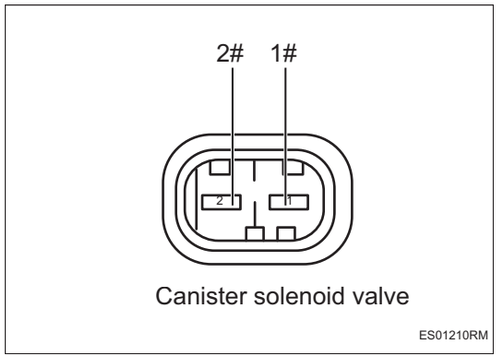
Standard value

Detector connection	Detection conditions	Specified state
Canister solenoid valve connector 1# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector, fuse and relay**

OK

7	Check canister solenoid valve



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Canister solenoid valve 1# -canister solenoid valve 2#	20 ℃	14 ~ 18Ω

NG → **Replace canister solenoid valve**

OK

8	Check canister solenoid valve

(a) Remove the canister solenoid valve.

(b) Apply battery positive voltage to terminal 1 and negative voltage to terminal 2 to check solenoid valve opening and closing.

Criteria:

Power on: Solenoid valve on; Power off: solenoid valve off.

NG → **Replace canister solenoid valve (See page ES-464)**

OK

9	Replace the ECM (See page ES-450)

ES

DTC	P046000	Fuel level sensor original signal out of range
DTC	P25B000	Fuel level sensor signal stuck
DTC	P128400	Fuel level signal out of range
DTC	P046129	Fuel level signal implausible
DTC	P046300	Fuel level sensor circuit overvoltage
DTC	P046200	Fuel level sensor circuit undervoltage
DTC	U067681	Fuel level sensor signal loss/failure/check error

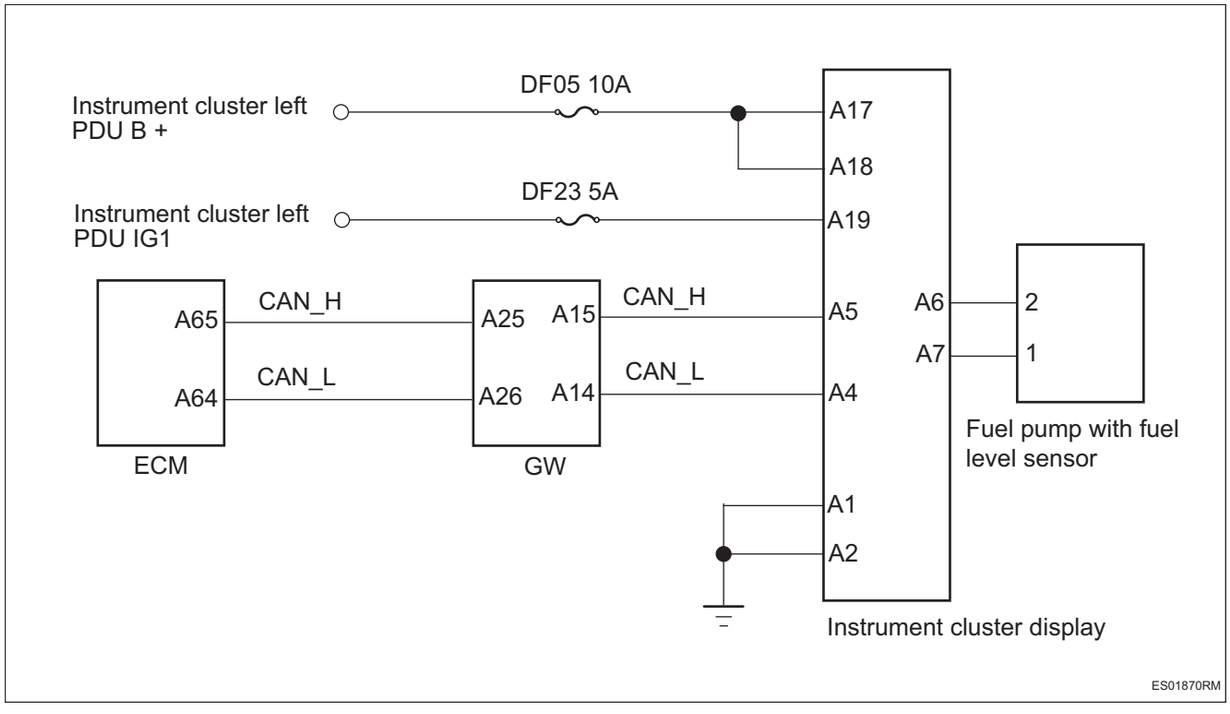
Description

When an abnormal fuel level sensor signal is detected or the power supply is out of the normal range, the ECM records DTC.

DTC	DTC detection conditions	Faulty location
P046000	(a) Fuel level sensor original signal out of range.	• Fuel pump with fuel level sensor • Harness and connector • ECM • Instrument cluster • GW
P25B000	(a) Fuel level sensor signal stuck.	• Fuel pump with fuel level sensor • Harness and connector • ECM • Instrument cluster • GW
P128400	(a) Fuel level signal out of range.	• Fuel pump with fuel level sensor • Harness and connector • ECM • Instrument cluster • GW
P046129	(a) The fuel level signal is implausible.	• Fuel pump with fuel level sensor • Harness and connector • ECM • Instrument cluster • GW
P046300	(a) Fuel level sensor circuit overvoltage.	• Fuel pump with fuel level sensor • Harness and connector • Instrument cluster
P046200	(a) Fuel level sensor circuit undervoltage.	• Fuel pump with fuel level sensor • Harness and connector • Instrument cluster

DTC	DTC detection conditions	Faulty location
U067681	(a) Abnormal fuel level sensor signal.	• Fuel pump with fuel level sensor • Harness and connector • ECM • Instrument cluster • GW

Circuit diagram



Inspection procedure

1	Check the fuel level sensor

(a) Check whether the fuel level sensor is installed correctly.

(b) Check whether the fuel level sensor (float) is stuck.

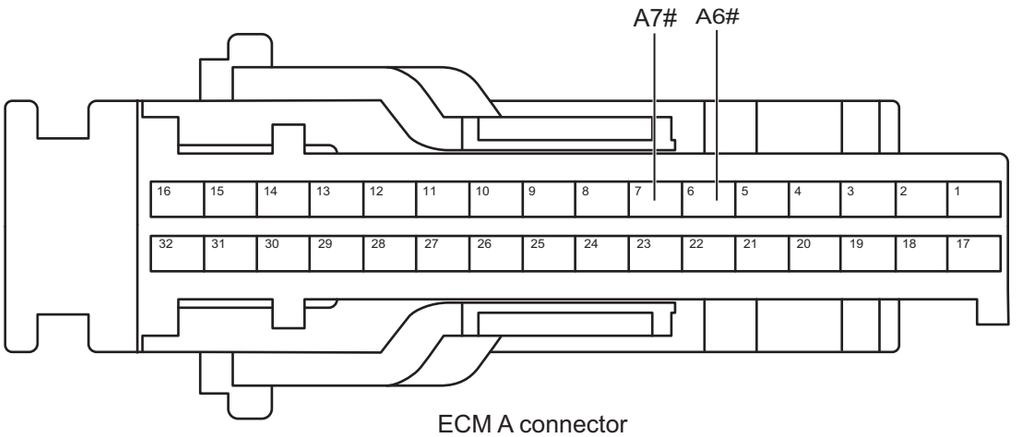
(c) Check whether the fuel level sensor is damaged.

NG → **Repair according to the fault**

OK

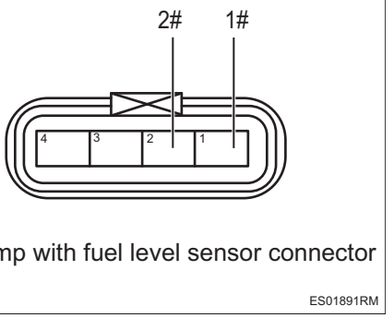
2	Check fuel level sensor harness and connector for open circuit

ES



ECM A connector

ES01881RM



Fuel pump with fuel level sensor connector

ES01891RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the instrument cluster display connector.

(d) Disconnect the fuel pump with fuel level sensor connector.

(e) Measure the resistance according to the values in the table below.

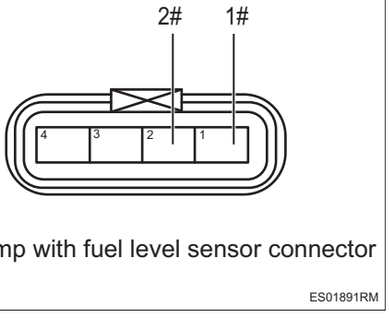
Standard value

Detector connection	Detection conditions	Specified state
Instrument cluster display connector A6# -fuel pump with fuel level sensor connector 2#	Always connected	Less than 1Ω
Instrument cluster display connector A7# -fuel pump with fuel level sensor connector 1#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	Check whether fuel level sensor harness and connector circuit is shorted to ground



Fuel pump with fuel level sensor connector

ES01891RM

(a) Measure the resistance according to the values in the table below.

Standard value

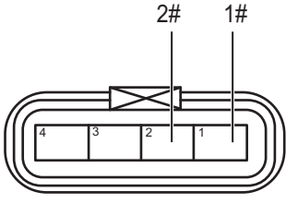
Detector connection	Detection conditions	Specified state
Fuel pump with fuel level sensor connector 1# - body GND	Always connected	10 KΩ or greater
Fuel pump with fuel level sensor connector 2# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

ES

4	**Check whether fuel level sensor harness and connector circuit is shorted to power supply**



Fuel pump with fuel level sensor connector

ES01891RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

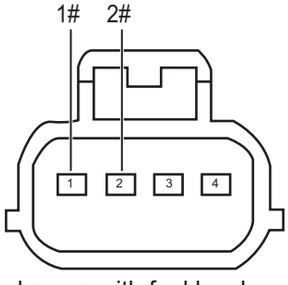
Standard value

Detector connection	Detection conditions	Specified state
Fuel pump with fuel level sensor connector 1# - body GND	Set the ignition switch to "ON"	Less than 1 V
Fuel pump with fuel level sensor connector 2# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Check fuel pump with fuel level sensor**



Fuel pump with fuel level sensor

ES01901RM

(a) Measure the resistance according to the values in the tablebelow.

Standard value

Applicable to traditional gasoline engine models

ES

Detector connection	Fuel gauge indication	Float center height (mm)	Resistance (Ω)
Fuel pump with fuel level sensor 1# - Fuel pump with fuel level sensor 2#	E STOP	9.2±2	267±3
	Empty	23.7±2	256±3
	1/4	71.3±2	208±3
	3/8	79.8±2	184±3
	1/2	91.3±2	161±3
	5/8	101.8±2	138±3
	3/4	112.8±2	114.5±2
	7/8	123.7±2	91.5±2
	Full	135.7±2	68±2
	F STOP	156.2±2	38±2

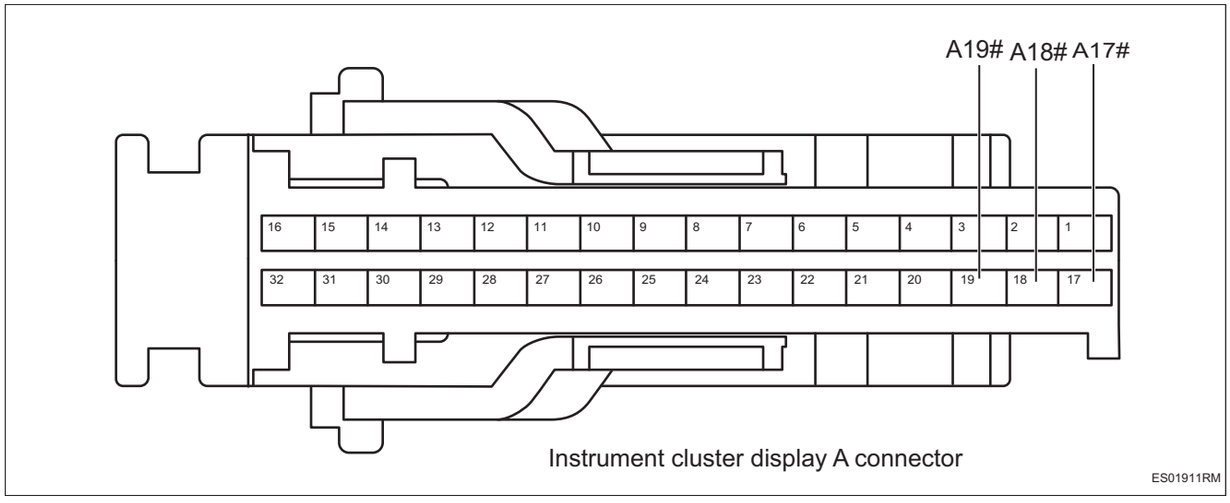
Applicable to HEV

Detector connection	Fuel gauge indication	Float center height (mm)	Resistance (Ω)
Fuel pump with fuel level sensor 1# - Fuel pump with fuel level sensor 2#	E STOP	10±2	271±3
	Empty	20.7±2	249.4±3
	1/4	41.3±2	203±3
	3/8	51.3±2	180±3
	1/2	61.8±2	156.5±3
	5/8	71.8±2	113.5±3
	3/4	85.8±2	110.5±2
	7/8	102.2±2	87.5±2
	Full	119.7±2	64±2
	F STOP	140.3±2	40±2

NG → **Replacement of fuel pump with fuel level sensor (See page FU-6)**

OK

6	**Check the instrument cluster display power supply**



(a) Measure the voltage according to the values in the tablebelow.

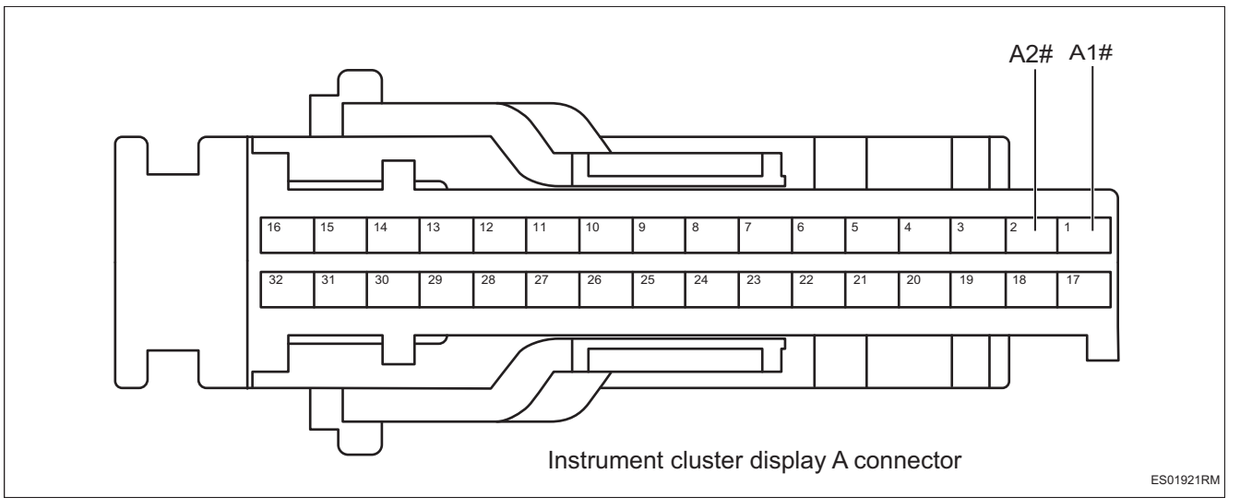
Standard value

Detector connection	Detection conditions	Specified state
Instrument cluster display connector A17# - body GND	Set the ignition switch to "ON"	Battery voltage
Instrument cluster display connector A18# - body GND	Set the ignition switch to "ON"	Battery voltage
Instrument cluster display connector A19# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

7	**Check the instrument cluster display ground**



(a) Measure the resistance according to the values in the table below.

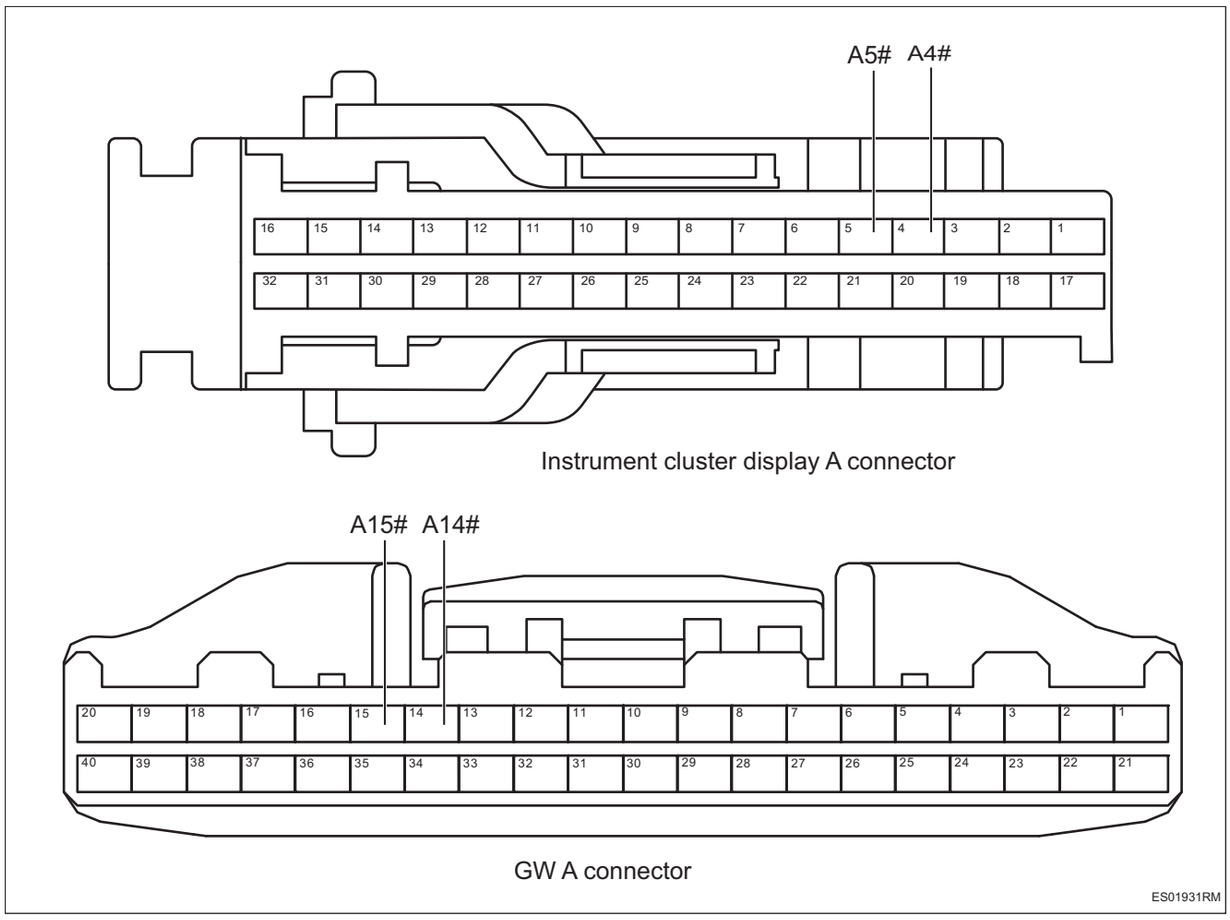
Standard value

Detector connection	Detection conditions	Specified state
Instrument cluster display connector A1# - body GND	Always connected	Less than 1Ω
Instrument cluster display connector A2# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

8	**Check information CAN bus for open circuit (GW-instrument cluster display)**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the information CAN bus.

(d) Measure the resistance according to the values in the table below.

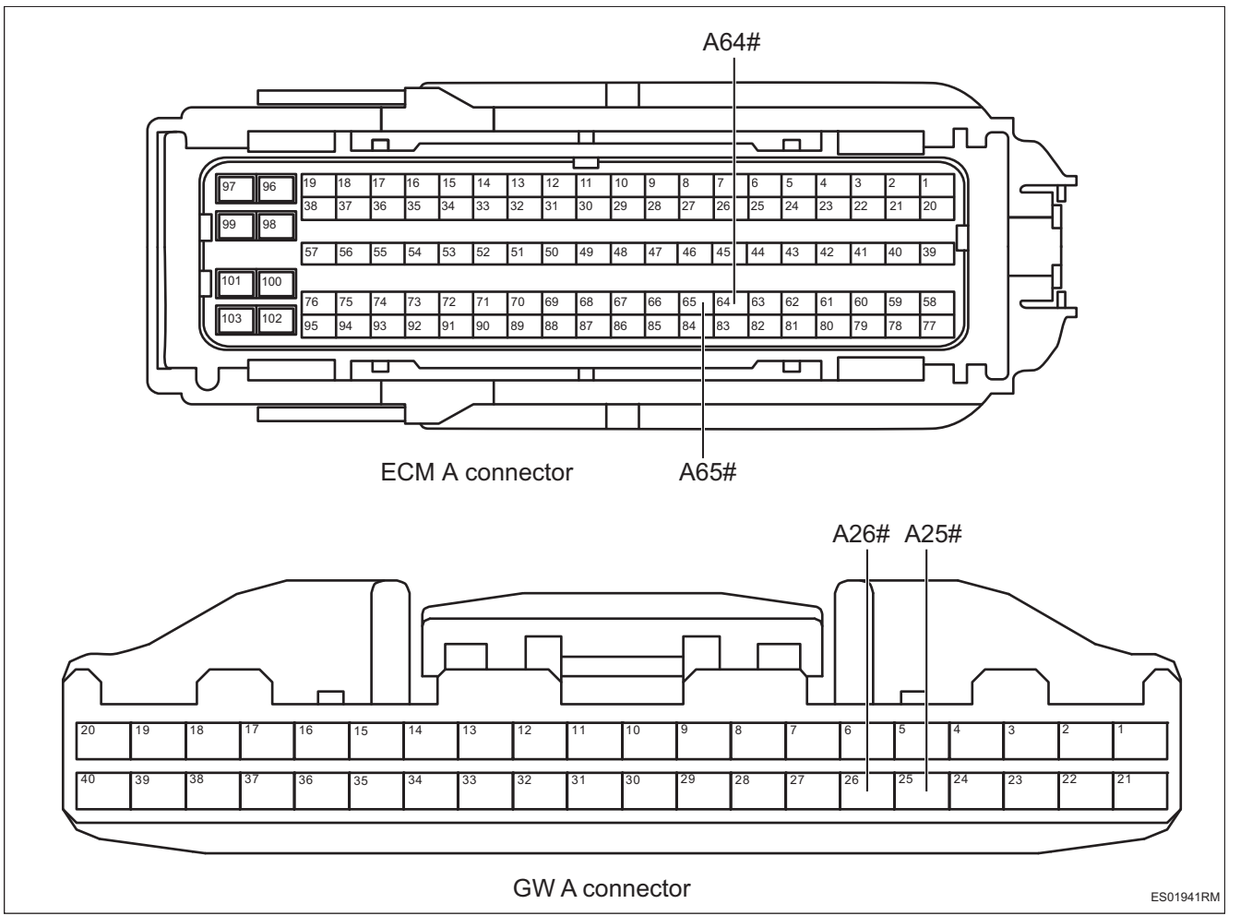
Standard value

Detector connection	Detection conditions	Specified state
GW connector A15# -instrument cluster display connector A5#	Always connected	Less than 1Ω
GW connector A14# -instrument cluster display connector A4#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

9	**Check powertrain CAN bus for open circuit (GW-ECM)**



(a) Measure the resistance according to the values in the table below.

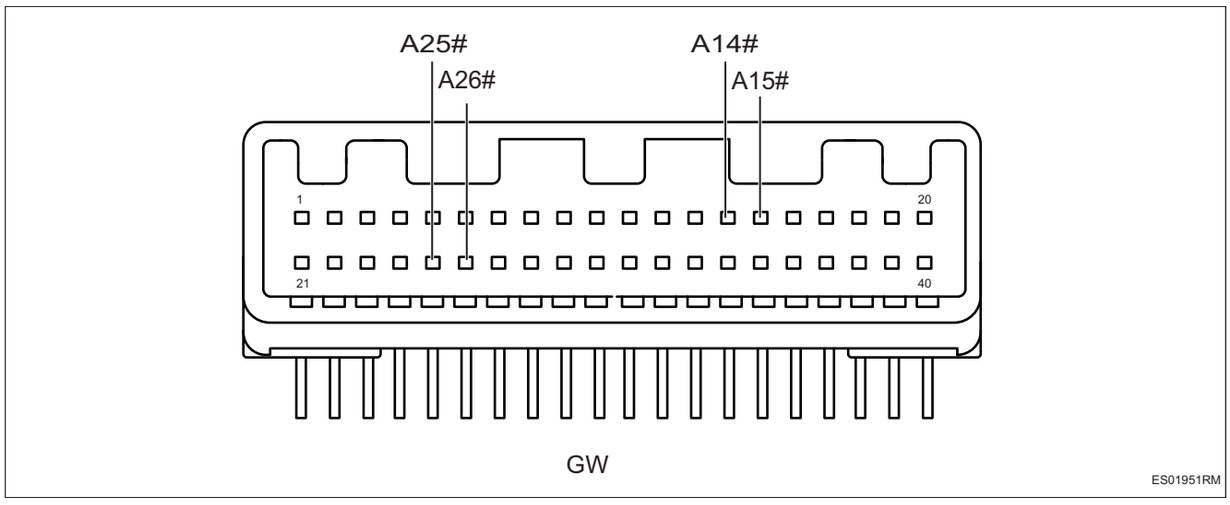
Standard value

Detector connection	Detection conditions	Specified state
GW connector A25# -ECM connector A65#	Always connected	Less than 1Ω
GW connector A26# -ECM connector A64#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

10	**Check GW terminal resistor**



(a) Measure the resistance according to the values in the table below.

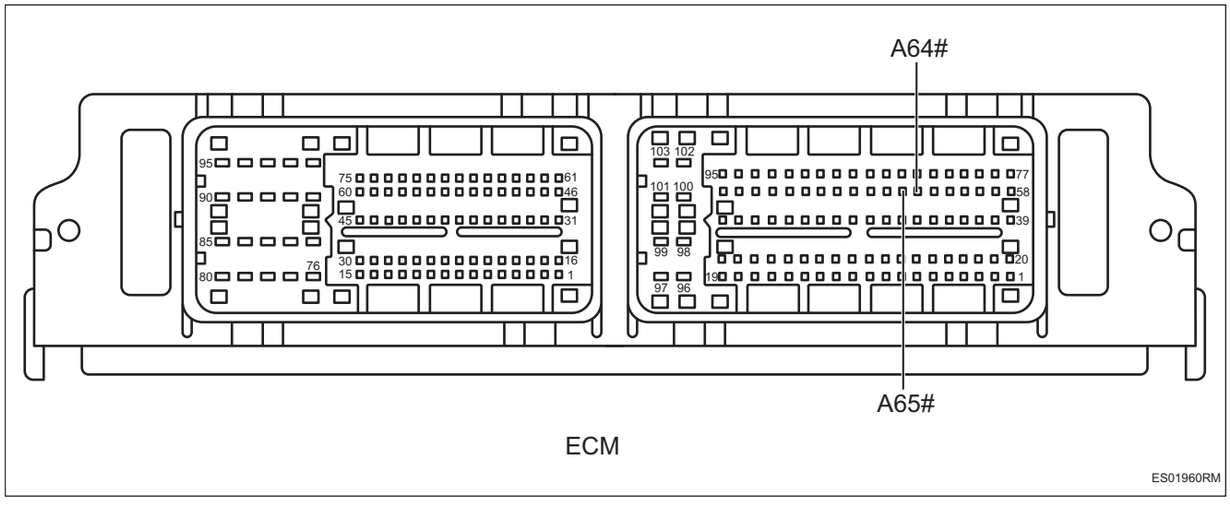
Standard value

Detector connection	Detection conditions	Specified state
GW A25#- GW A26#	Always connected	About 120Ω
GW A14#- GW A15#	Always connected	About 120Ω

NG → **Replace GW (See page CA-256)**

OK

11	Check ECM terminal resistor



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM A64#- ECM A65#	Always connected	About 120Ω

ES

NG → Replace the ECM (See page ES-450)

OK

12	Replace instrument cluster display (See page ME-39)

DTC	P046700	High-load desorption pipeline pressure sensor circuit undervoltage
DTC	P046800	High-load desorption pipeline pressure sensor circuit overvoltage
DTC	P128500	High-load desorption pipeline pressure sensor signal above upper threshold
DTC	P128600	High-load desorption pipeline pressure sensor signal below lower threshold

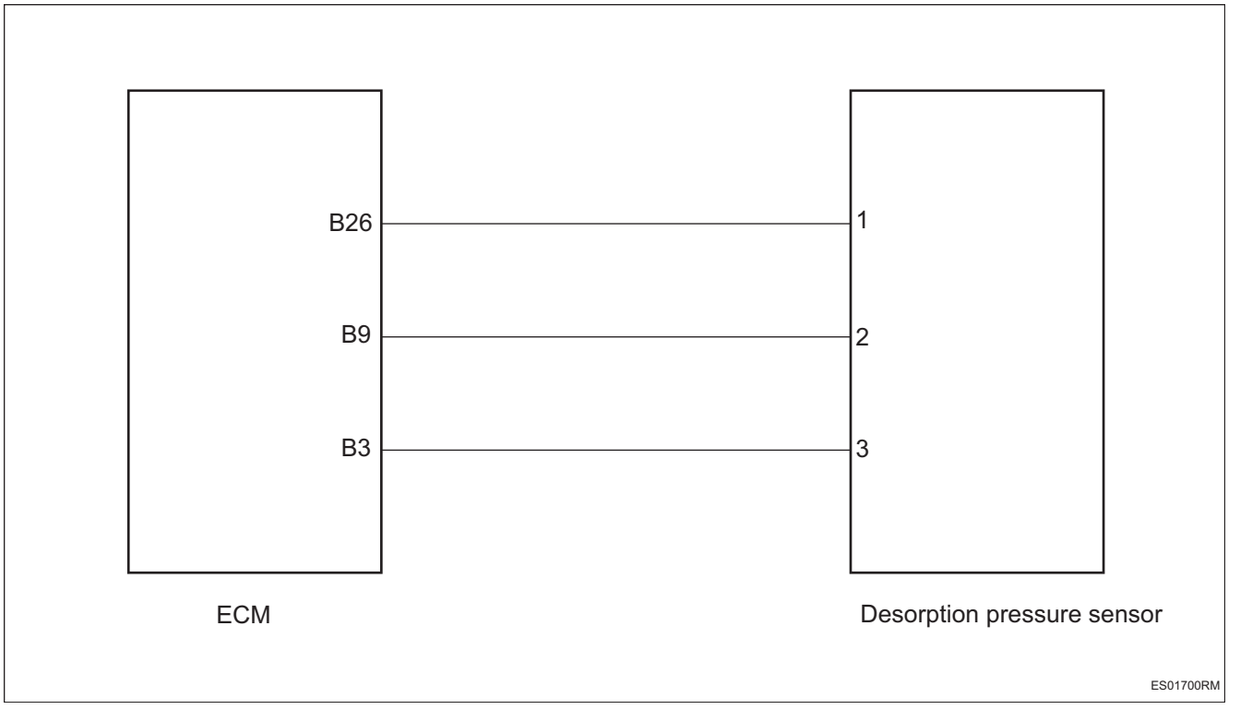
Description

When desorption pressure sensor circuit voltage abnormality or signal abnormality is detected, the ECM records DTC.

DTC	DTC detection conditions	Faulty location
P046700	(a) Desorption pressure sensor circuit undervoltage.	• ECM • Harness and connector • Desorption pressure sensor
P046800	(a) Desorption pressure sensor circuit overvoltage.	• ECM • Harness and connector • Desorption pressure sensor
P128500	(a) Desorption pressure sensor signal above upper threshold.	• ECM • Harness and connector • Desorption pressure sensor • Low-load desorption pipeline check valve • EVAP system pipeline
P128600	(a) Desorption pressure sensor signal below lower threshold.	• ECM • Harness and connector • Desorption pressure sensor • High-load desorption pipeline check valve • EVAP system pipeline

ES

Circuit diagram



Inspection procedure

1	Check EVAP system pipeline

(a) Check whether the EVAP system pipeline is properly connected.

(b) Check whether the EVAP system pipeline leaks or is blocked.

(c) Check whether the EVAP system components are normal.

NG → **Repair according to the fault**

OK

2	Check high-/low-load desorption pipeline check valve

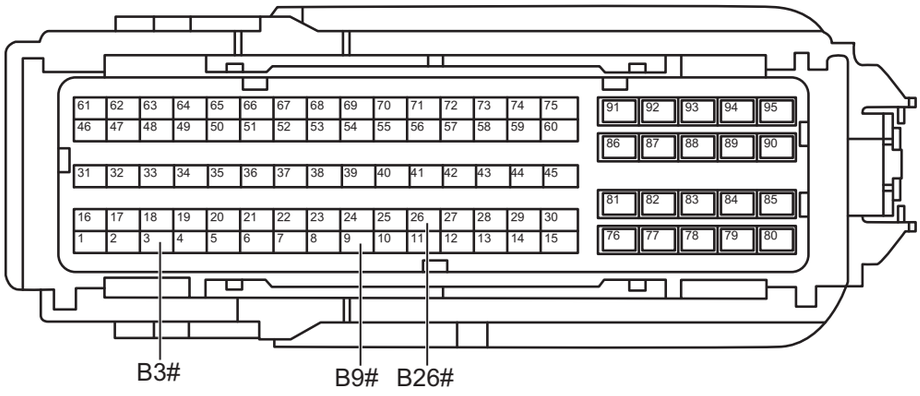
(a) Check whether the high-/low-load desorption pipeline check valve is aged and blocked.

(b) Check whether the high-/low-load desorption pipeline check valve is unidirectionally conductive.

NG → **Repair according to the fault**

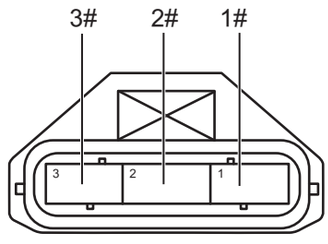
OK

3	Check desorption pressure sensor harness and connector for open circuit



ECM B connector

ES01711RM



Desorption pressure sensor connector

ES01720RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the desorption pressure sensor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

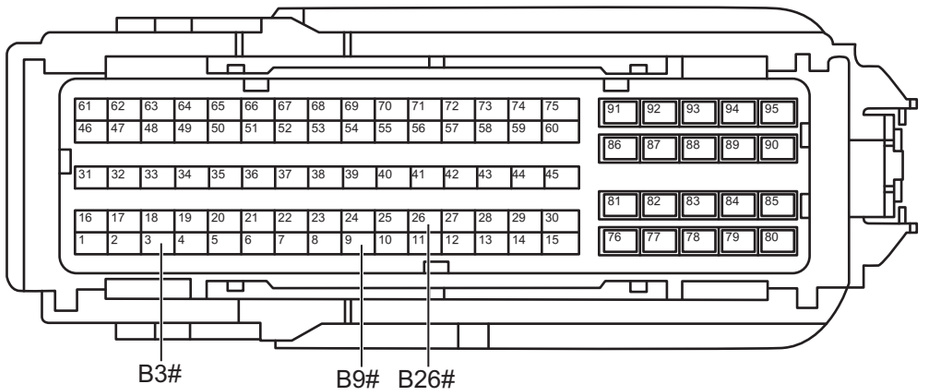
Detector connection	Detection conditions	Specified state
Desorption pressure sensor connector 1# - ECM connector B26#	Always connected	Less than 1Ω
Desorption pressure sensor connector 2# - ECM connector B9#	Always connected	Less than 1Ω
Desorption pressure sensor connector 3# - ECM connector B3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	Check whether desorption pressure sensor harness and connector circuit is shorted to ground

ES



(a) Measure the resistance according to the values in the table below.

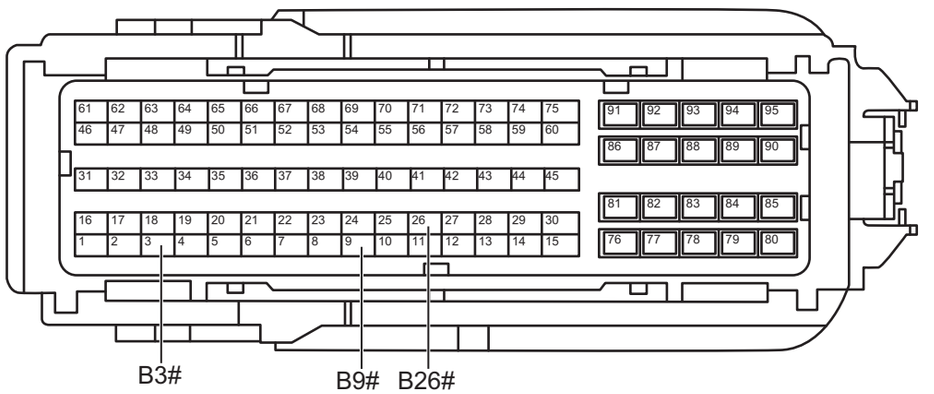
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B26# -body GND	Always connected	10 KΩ or greater
ECM connector B9# -body GND	Always connected	10 KΩ or greater
ECM connector B3# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	**Check whether desorption pressure sensor harness and connector circuit is shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B26# -body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B9# -body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B3# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Replace the desorption pressure sensor**

(See page EC-14)

(a) Replace the desorption pressure sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Driving under high load.

(e) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

7	**End**

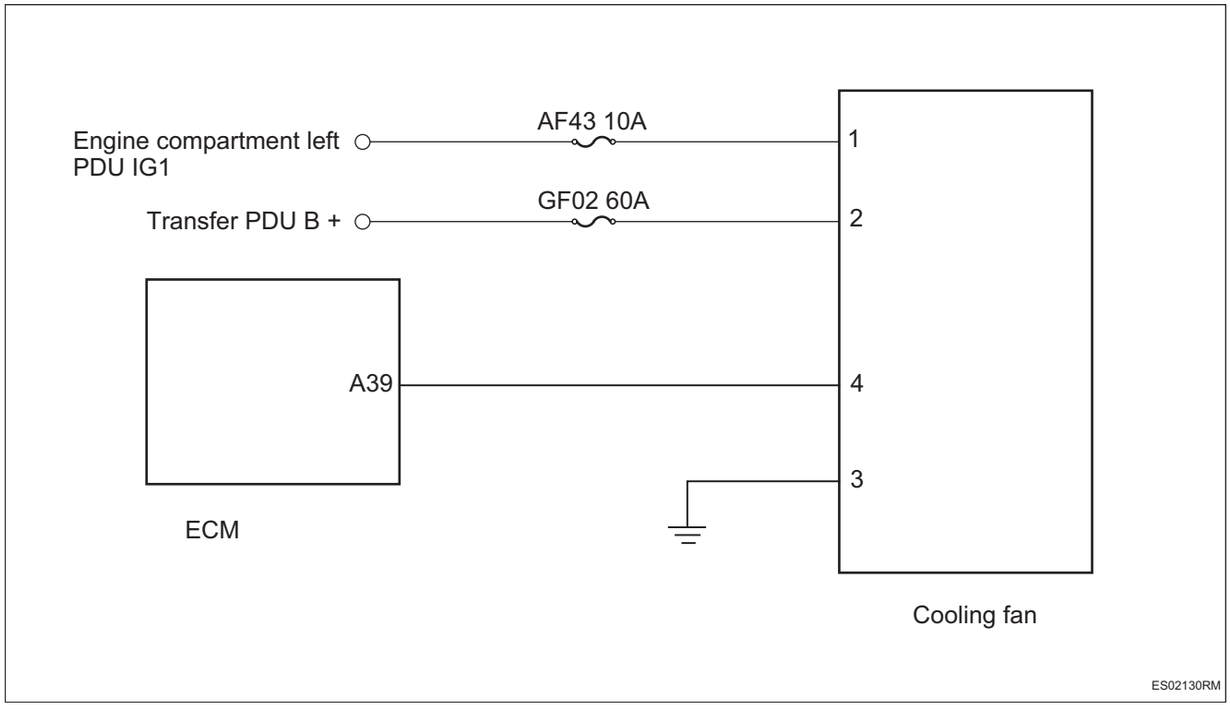
DTC	P048371	Cooling fan plausibility fault type 1
DTC	P048372	Cooling fan plausibility fault type 2
DTC	P048000	Cooling fan 1 control circuit open
DTC	P069200	Cooling fan 1 control circuit overvoltage
DTC	P069100	Cooling fan 1 control circuit undervoltage
DTC	P063400	Cooling fan 1 driver chip overheating

Description

When the cooling fan short circuit or open circuit occurs, and the cooling fan runs unreasonably, the ECM records the DTC.

DTC	DTC detection conditions	Faulty location
P048371	(a) Cooling fan implausible type 1.	• ECM • Harness and connector • Cooling fan
P048372	(a) Cooling fan implausible type 2.	• ECM • Harness and connector • Cooling fan
P048000	(a) Cooling fan control circuit open.	• ECM • Harness and connector • Cooling fan
P069200	(a) Cooling fan control circuit overvoltage.	• ECM • Harness and connector • Cooling fan
P069100	(a) Cooling fan control circuit undervoltage.	• ECM • Harness and connector • Cooling fan
P063400	(a) Cooling fan drive chip overheating.	• ECM • Harness and connector • Cooling fan

Circuit diagram



Inspection procedure

1	**Check cooling fan**

(a) Check whether the cooling fan is installed correctly.

(b) Check whether the cooling fan is damaged.

NG → **Repair according to the fault**

OK

2	**Check the working conditions of cooling fan**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the cooling fan connector.

(d) Apply the battery positive voltage to terminal 1# and 2#, and negative voltage to terminal 3#, to check the working conditions of cooling fan.

Criteria:

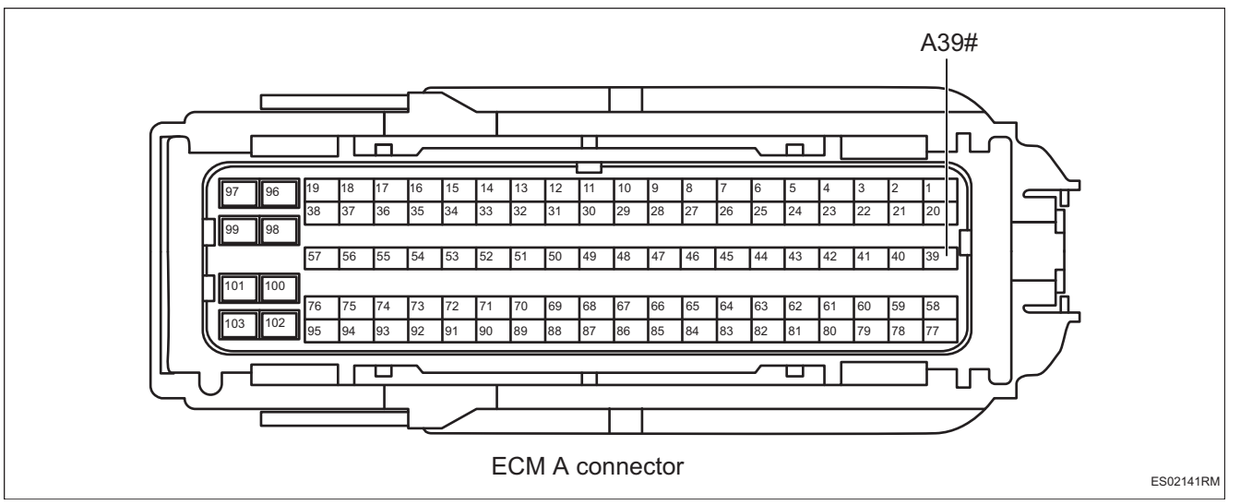
The fan runs at full speed.

NG → **Replace the cooling fan (See page CO-15)**

OK

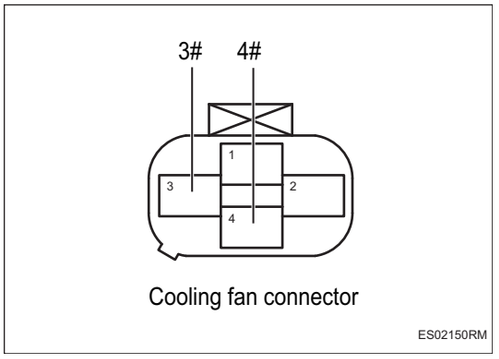
3	Check cooling fan harness and connector for open circuit

ES



ECM A connector

ES02141RM



Cooling fan connector

ES02150RM

(a) Disconnect the ECM connector.

(b) Measure the resistance according to the values in the table below.

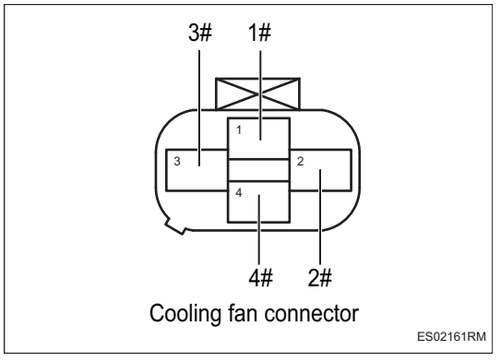
Standard value

Detector connection	Detection conditions	Specified state
Cooling fan connector 4# -ECM connector A39#	Always connected	Less than 1Ω
Cooling fan connector 3# -body GND	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

4	Check whether cooling fan harness and connector are shorted to each other



Cooling fan connector

ES02161RM

(a) Measure the resistance according to the values in the table below.

Standard value

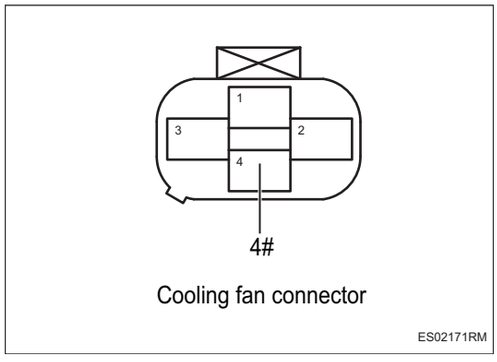
Detector connection	Detection conditions	Specified state
Cooling fan connector 1# -cooling fan connector 2#	Always connected	10 KΩ or greater
Cooling fan connector 1# -cooling fan connector 3#	Always connected	10 KΩ or greater
Cooling fan connector 1# -cooling fan connector 4#	Always connected	10 KΩ or greater

Detector connection	Detection conditions	Specified state
Cooling fan connector 2# -cooling fan connector 3#	Always connected	10 KΩ or greater
Cooling fan connector 2# -cooling fan connector 4#	Always connected	10 KΩ or greater
Cooling fan connector 3# -cooling fan connector 4#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5 Check whether cooling fan harness and connector circuit is shorted to ground



(a) Measure the resistance according to the values in the table below.

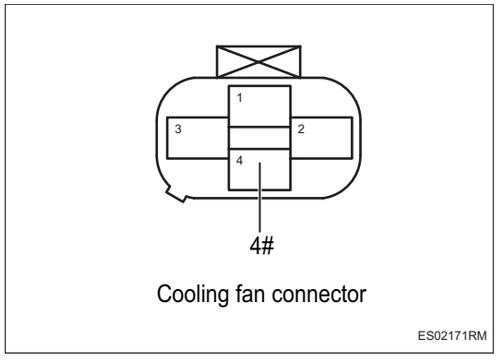
Standard value

Detector connection	Detection conditions	Specified state
Cooling fan connector 4# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

6 Check whether cooling fan harness and connector circuit is shorted to power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

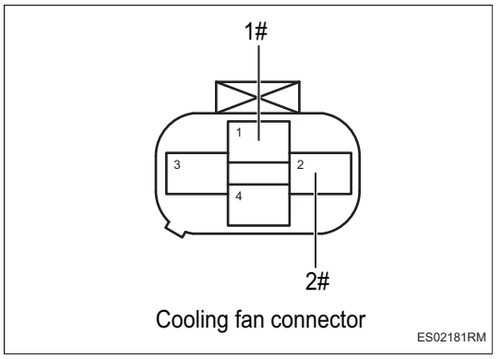
Detector connection	Detection conditions	Specified state
Cooling fan connector 4# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

7	Check cooling fan power supply

ES



(a) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Cooling fan connector 1# -body GND	Set the ignition switch to "ON"	Battery voltage
Cooling fan connector 2# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector, relay and fuse**

OK

8	Replace the ECM (See page ES-450)

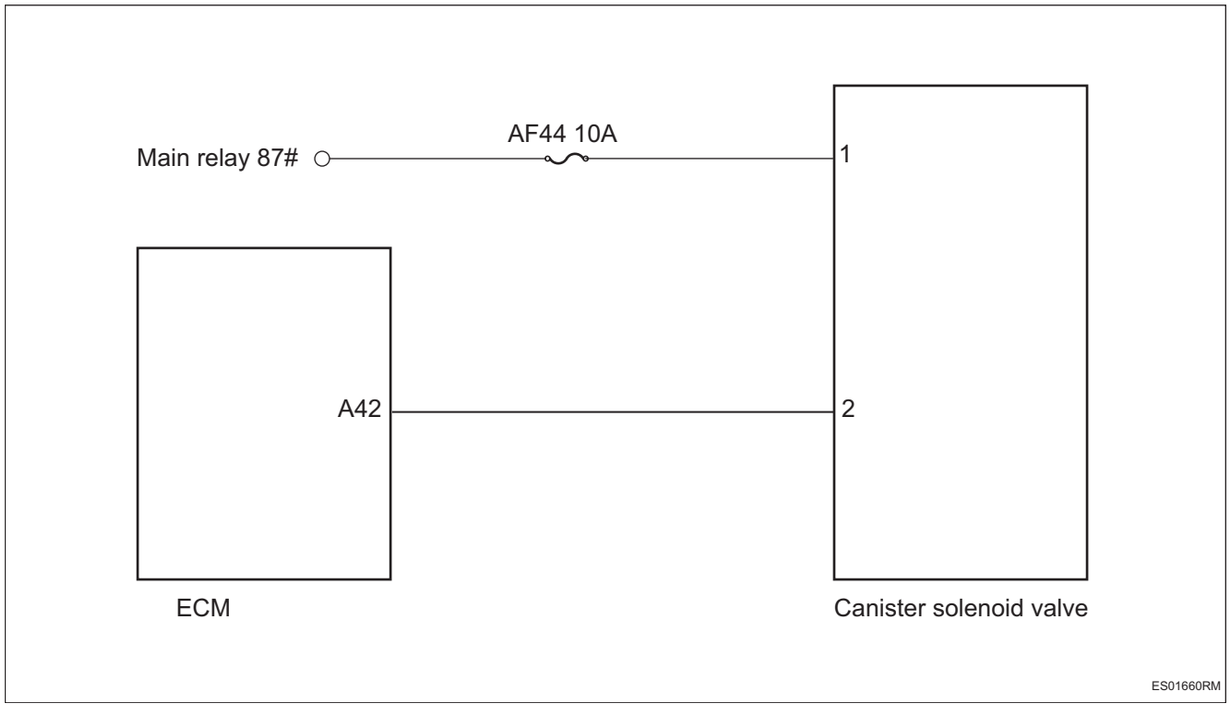
DTC	P04F000	High-load desorption pipeline fault - canister valve fault

Description

When the high load desorption line pressure is detected to be out of the normal range, the ECM records DTC.

DTC	DTC detection conditions	Faulty location
P04F000	(a) The pressure fluctuation of the high-load desorption pipe does not reach the thresh-old.	• Canister solenoid valve • High-/low-load desorption pipeline check valve • EVAP system pipeline

Circuit diagram



Inspection procedure

1	Check EVAP system pipeline

(a) Check whether the EVAP system pipeline is properly connected.

(b) Check whether the EVAP system pipeline leaks or is blocked.

(c) Check whether the EVAP system components are normal.

NG	Repair according to the fault

OK

2	Check high-/low-load desorption pipeline check valve

ES

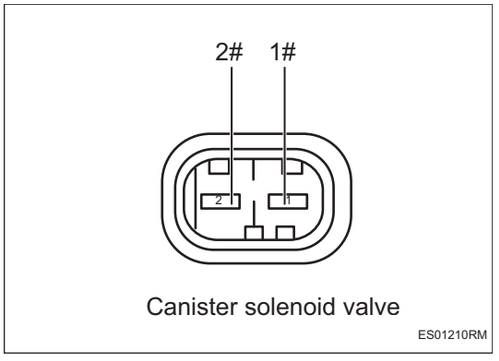
(a) Check whether the high-/low-load desorption pipeline check valve is blocked.

(b) Check whether the high-/low-load desorption pipeline check valve is unidirectionally conductive.

NG → **Repair according to the fault**

OK

3	Check canister solenoid valve



Canister solenoid valve
ES01210RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Canister solenoid valve 1# -canister solenoid valve 2#	20 ℃	14 ~ 18Ω

NG → **Replace canister solenoid valve (See page EC-14)**

OK

4	Check canister solenoid valve

(a) Remove the canister solenoid valve.

(b) Apply battery positive voltage to terminal 1 and negative voltage to terminal 2 to check solenoid valve opening and closing.

Criteria:

Power on: solenoid valve on; Power off: solenoid valve off.

NG → **Replace canister solenoid valve (See page EC-14)**

OK

5	Replace the ECM (See page ES-450)

DTC	P050B00	Ignition angle efficiency monitoring during catalytic converter heating (idle speed)
DTC	P050B20	Ignition angle efficiency monitoring during catalytic converter heating (partial load)
DTC	P053F22	High-pressure fuel passage pressure high during catalytic converter heating
DTC	P053F21	High-pressure fuel passage pressure low during catalytic converter heating
DTC	P050A22	High engine idle speed during catalytic converter heating
DTC	P050A21	Low engine idle speed during catalytic converter heating
DTC	P050D00	Parking idle speed fluctuation out of range during catalytic converter heating and without fuel cutoff
DTC	P05EC00	Multiple injection monitoring faults during catalytic converter heating
DTC	P050700	Engine idle speed high
DTC	P050600	Engine idle speed low
DTC	P050500	Engine idle speed fluctuation out of range

Description

When the engine data is abnormal during the heating of catalytic converter, the ECM will record the DTC.

DTC	DTC detection conditions	Faulty location
P050B00	(a) The ignition angle efficiency exceeds the set threshold during the heating process of the parking idle catalytic converter.	• ECM • Harness and connector • High-pressure fuel pump • Fuel pump with fuel level sensor • Electronic throttle body • Intake system pipeline • Exhaust system pipeline • Ignition coil • Spark plug • Fuel injector

DTC	DTC detection conditions	Faulty location
P050B20	(a) The ignition angle efficiency exceeds the set threshold during the heating process of the driving catalytic converter.	• ECM • Harness and connector • High-pressure fuel pump • Fuel pump with fuel level sensor • Electronic throttle body • Intake system pipeline • Exhaust system pipeline • Turbocharger system • Ignition coil • Spark plug • Fuel injector
P053F22	(a) In the heating stage of catalytic converter, the deviation between the target rail pressure and the actual rail pressure of high-pressure fuel rail is lower than the threshold.	• ECM • Harness and connector • High-pressure fuel pump • Fuel pump with fuel level sensor
P053F21	(a) In the heating stage of catalytic converter, the deviation between the target rail pressure and the actual rail pressure of high-pressure fuel rail is high than the threshold.	• ECM • Harness and connector • •High-pressure fuel pump Fuel pump with fuel level sensor • Fuel system pipeline
P050A22	(a) Catalytic converter heating process idle control speed higher than target idle speed by 200 r/min.	• ECM • Harness and connector • High-pressure fuel pump • Fuel pump with fuel level sensor • Electronic throttle body • Fuel injector • Intake system pipeline
P050A21	(a) Idle control speed lower than target idle speed by 100 r/min.	• ECM • Harness and connector • High-pressure fuel pump • Fuel pump with fuel level sensor • Electronic throttle body • Fuel injector • Intake system pipeline • Exhaust system pipeline
P050D00	(a) Excessive fluctuation of engine idle speed during catalytic converter heating.	• ECM • Harness and connector • High-pressure fuel pump • Fuel pump with fuel level sensor • Electronic throttle body • Fuel injector • Intake system pipeline
P05EC00	(a) In the process of catalytic converter heating, the corresponding control parameters such as injection pulse width/injection times exceed the set threshold.	• ECM • Harness and connector • •High-pressure fuel pump Fuel injector • Fuel system pipeline

ES

DTC	DTC detection conditions	Faulty location
P050700	(a) Idle control speed higher than target idle speed by 200 r/min.	• ECM • Harness and connector • High-pressure fuel pump • Fuel pump with fuel level sensor • Electronic throttle body • Fuel injector • Intake system pipeline
P050600	(a) Idle control speed lower than target idle speed.	• ECM • Harness and connector • High-pressure fuel pump • Fuel pump with fuel level sensor • Electronic throttle body • Fuel injector • Intake system pipeline • Exhaust system pipeline
P050500	(a) Excessive idle control speed fluctuations.	• ECM • Harness and connector • High-pressure fuel pump • Fuel pump with fuel level sensor • Electronic throttle body • Fuel injector • Intake system pipeline

Inspection procedure

1	Check whether the ECM has other DTC output

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Read the DTC.

Results	Go to
Other DTC exists	Abnormal
No other DTCs	Normal

NG → **Repair according to the DTC**

OK

2	Check electronic throttle body

(a) Check whether the electronic throttle body flap is stuck.

(b) Check whether the electronic throttle body is damaged.

NG → **Repair according to the fault**

OK

3	**Check the electronic throttle body harness and connector**

(a) Check whether the electronic throttle body connector is connected tightly.

(b) Check the electronic throttle body harness and connector for damage.

NG → **Repair or replace the harness and connector**

OK

4	**Check high-pressure pump harness and connector**

(a) Check whether the high-pressure pump connector is tightly connected.

(b) Check the high-pressure pump harness and connector for damage.

NG → **Repair or replace the harness and connector**

OK

5	**Check intake system pipeline**

(a) Check whether the intake system pipeline is properly connected.

(b) Check the intake system pipeline for leakage or damage.

NG → **Repair or replace the intake system pipeline**

OK

6	**Check exhaust system pipeline**

(a) Check whether the exhaust system pipeline is properly connected.

(b) Check whether the exhaust system pipeline is damaged, leaking or blocked.

NG → **Repair or replace the exhaust system pipeline**

ES

OK

7 Check turbocharger system

(a) Check whether the turbocharger system pipeline is properly connected.

(b) Check whether the turbocharger system pipeline is blocked or leaky.

(c) Check whether the turbocharger system works normally.

NG → **Repair according to the fault**

OK

8 Check fuel system pipeline

(a) Check whether the fuel system pipeline is properly connected.

(b) Check whether the fuel system pipeline is leaking or blocked.

NG → **Repair according to the fault**

OK

9 Check ignition system

(a) Check ignition coil and spark plug for damage.

NG → **Repair according to the fault**

OK

10 Check low-pressure fuel system pressure

(a) Measure the low-pressure fuel system pressure according to the values in the table below.

Standard value

Working conditions	Specified state
idle speed	4.5 ~ 5.5bar
Pressure maintaining (after 20 minutes shutdown)	Greater than 2.5 bar

NG → **Replacement of fuel pump with fuel level sensor**

OK

11	**Check the low-pressure fuel pump**

(a) Measure the low-pressure fuel pump resistance according to the values in the table below.

Standard value: 0.4 ~ 1.2Ω

NG → **Replacement of fuel pump with fuel level sensor (See page FU-6)**

OK

12	**Check fuel injector**

(a) Check whether the fuel injector is leaking or blocked.

NG → **Repair according to the fault**

OK

13	**Replace the high-pressure fuel pump (See page FU-1)**

(a) Replace the high-pressure fuel pump.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

14	**End**

ES

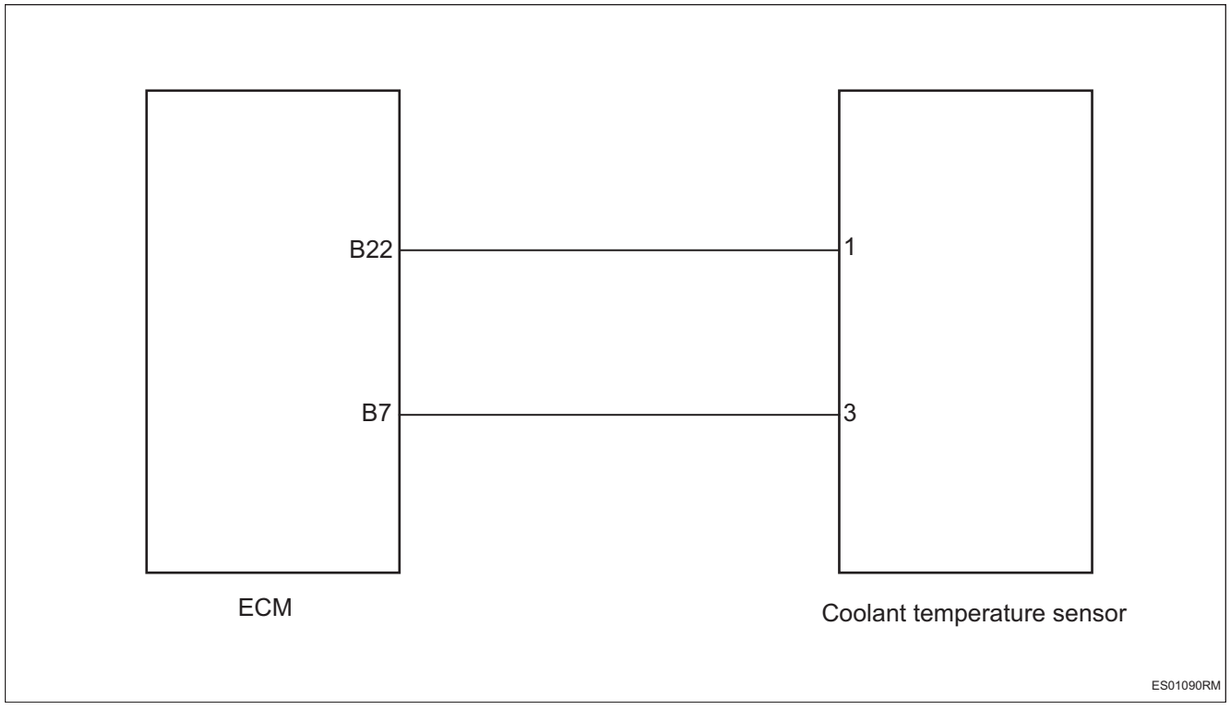
DTC	P050C24	Coolant temperature sensor 1 cold start check implausible (positive deviation)
DTC	P050C23	Coolant temperature sensor 1 cold start check implausible (negative deviation)
DTC	P011623	Coolant temperature sensor 1 signal implausible (low side)
DTC	P011626	Coolant temperature sensor 1 signal implausible (stuck)
DTC	P011800	Coolant temperature sensor 1 circuit overvoltage
DTC	P011700	Coolant temperature sensor 1 circuit undervoltage
DTC	P011900	Coolant temperature sensor 1 circuit voltage implausible

Description

When the coolant temperature sensor circuit voltage is abnormal or the signal is implausible, the ECM will record the DTC.

DTC	DTC detection conditions	Faulty location
P050C24	(a) Coolant temperature sensor cold start check implausible.	• ECM • Harness and connector • Coolant temperature sensor
P050C23	(a) Coolant temperature sensor cold start check implausible.	• ECM • Harness and connector • Coolant temperature sensor
P011623	(a) Coolant temperature sensor signal implausible.	• ECM • Harness and connector • Coolant temperature sensor
P011626	(a) Coolant temperature sensor signal implausible.	• ECM • Harness and connector • Coolant temperature sensor
P011800	(a) Coolant temperature sensor circuit overvoltage.	• ECM • Harness and connector • Coolant temperature sensor
P011700	(a) Coolant temperature sensor circuit undervoltage.	• ECM • Harness and connector • Coolant temperature sensor
P011900	(a) Coolant temperature sensor circuit voltage implausible.	• ECM • Harness and connector • Coolant temperature sensor

Circuit diagram



Inspection procedure

1	**Check coolant**

(a) Check whether the coolant level is normal.

(b) Check whether the coolant has deteriorated.

NG → **Repair according to the fault**

OK

2	**Check coolant temperature**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

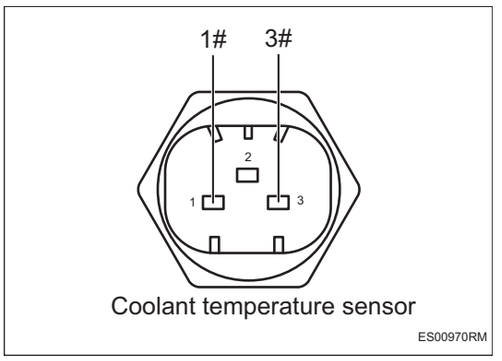
(c) Read and check whether the measured coolant temperature is within a reasonable range.

NG → **Repair according to the fault**

OK

3	**Check the coolant temperature sensor**

ES



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the coolant temperature sensor connector.

(d) Remove the coolant temperature sensor.

(e) Measure the resistance according to the values in the table below.

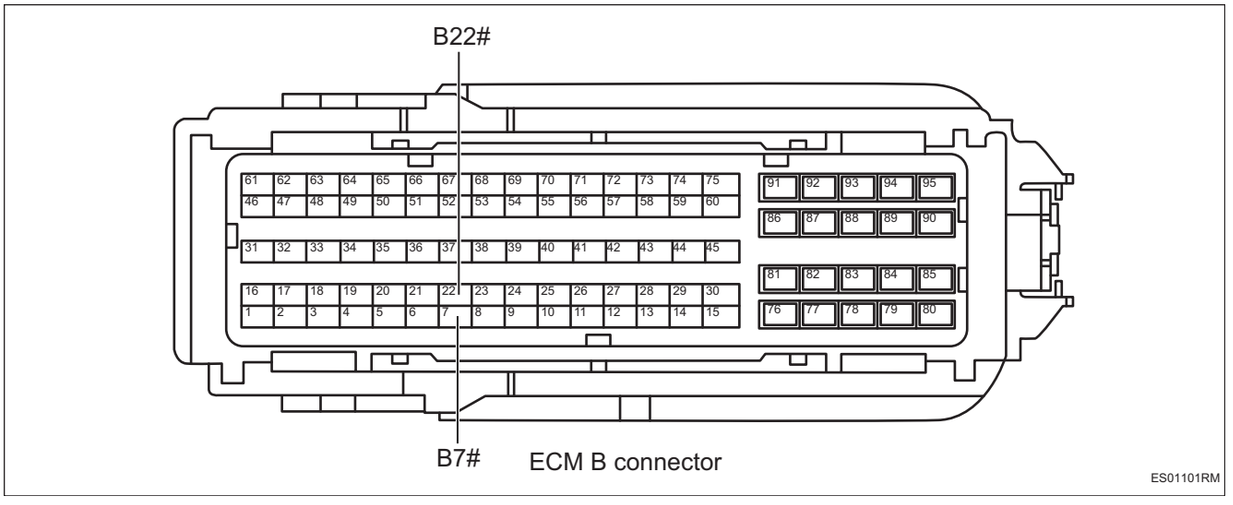
Standard value

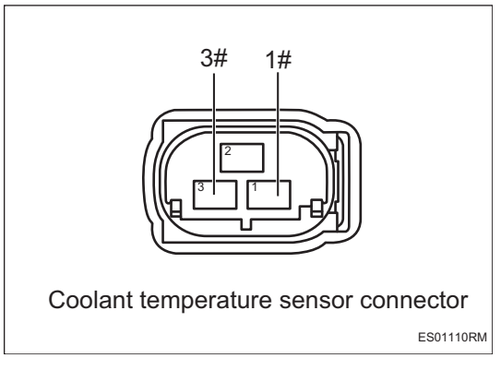
Detector connection	Detection conditions	Specified state
Coolant temperature sensor 1#-coolant temperature sensor 3#	20 ℃	2.2128KΩ ~ 2.6391KΩ
Coolant temperature sensor 1#-coolant temperature sensor 3#	80 ℃	0.3030KΩ ~ 0.3260KΩ

NG → **Replace the coolant temperature sensor**

OK

4	Check coolant temperature sensor harness and connector for open circuit





(a) Disconnect the ECM connector.

(b) Measure the resistance according to the values in the table below.

Standard value

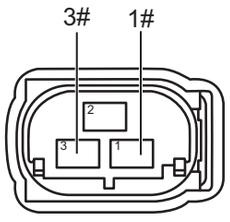
Detector connection	Detection conditions	Specified state
Coolant temperature sensor connector 1# - ECM connector B22#	Always connected	Less than 1Ω
Coolant temperature sensor connector 3# - ECM connector B7#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

ES

5	Check whether coolant temperature sensor harness and connector circuit is shorted to ground



Coolant temperature sensor connector

ES01110RM

(a) Measure the resistance according to the values in the table below.

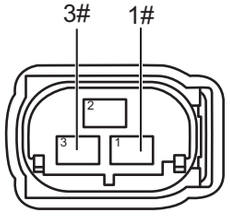
Standard value

Detector connection	Detection conditions	Specified state
Coolant temperature sensor connector 1# - body GND	Always connected	10 KΩ or greater
Coolant temperature sensor connector 3# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

6	Check coolant temperature sensor harness and connector for circuit shorted to each other



Coolant temperature sensor connector

ES01110RM

(a) Measure the resistance according to the values in the table below.

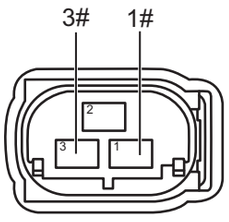
Standard value

Detector connection	Detection conditions	Specified state
Coolant temperature sensor connector 1# - coolant temperature sensor connector 3#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

7	Check coolant temperature sensor harness and connector for circuit shorted to power supply



Coolant temperature sensor connector

ES01110RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Coolant temperature sensor connector 1# - body GND	Set the ignition switch to "ON"	Less than 1 V
Coolant temperature sensor connector 3# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

8	**Replace the ECM (See page ES-450)**

DTC	P051300	Incorrect immobilizer authentication response and immobilizer authentication failure
DTC	P063300	ECM no IMMO matching
DTC	P163100	Immobilizer authentication communication error or no response from immobilizer
DTC	P161100	PIN input error

Description

The ECM records DTCs when the internal data of the ECM is illegally tampered with or the immobilizer is not correctly matched.

DTC	DTC detection conditions	Faulty location
P051300	(a) Incorrect immobilizer authentication response and immobilizer authentication failure.	• ECM
P063300	(a) ECM no IMMO matching.	• ECM
P163100	(a) Immobilizer authentication communication error or no response from immobilizer.	• ECM
P161100	(a) PIN entered incorrectly.	• ECM

Inspection procedure

1	**Check the harness and connector of anti-theft system related control unit**

(a) Check whether the harness and connector are properly connected.

(b) Check the harness and connector for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

2	**ECM executes automatic configuration module program**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON"

(c) ECM executes automatic configuration module program.

(d) Re-match the immobilizer.

(e) Clear the DTC.

(f) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

ES

OK

3	**End**

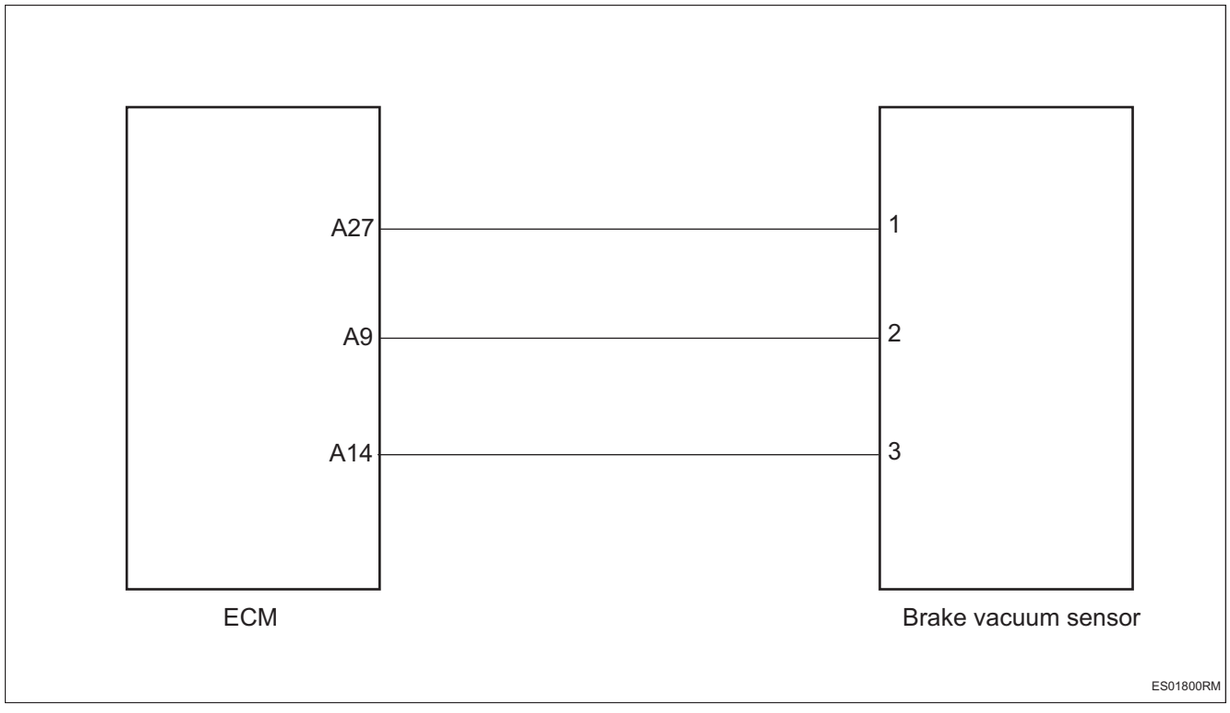
DTC	P055800	Brake chamber vacuum pressure sensor overvoltage
DTC	P055700	Brake chamber vacuum pressure sensor undervoltage
DTC	P145200	Unreasonable brake chamber pressure

Description

When the brake vacuum sensor voltage is abnormal and the pressure is implausible, the ECM will record the DTC.

DTC	DTC detection conditions	Faulty location
P055800	(a) Brake vacuum sensor overvoltage.	• ECM • Harness and connector • Brake vacuum sensor
P055700	(a) Brake vacuum sensor undervoltage.	• ECM • Harness and connector • Brake vacuum sensor
P145200	(a) The brake chamber pressure is unreasonable.	• ECM • Harness and connector • Brake vacuum sensor • Brake vacuum chamber

Circuit diagram



Inspection procedure

1	Check the brake vacuum chamber for leaks

(a) Check the brake vacuum chamber for leakage.

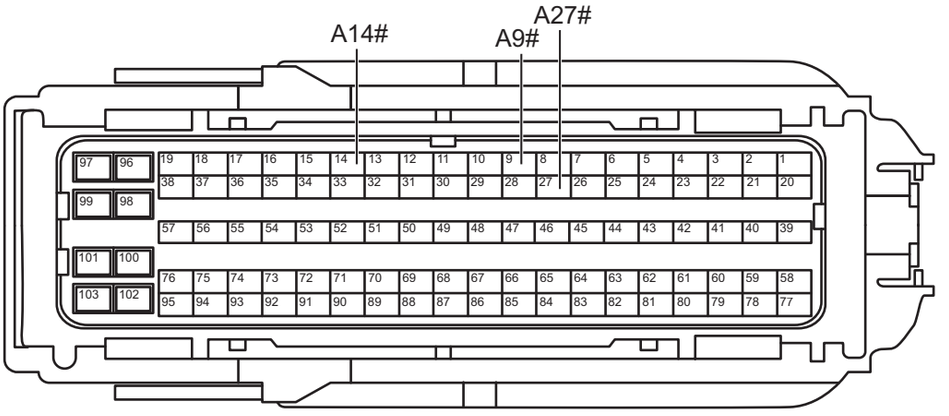
(b) Check the brake vacuum booster system for leaks.

NG → **Repair according to the fault**

ES

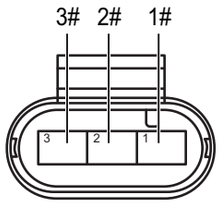
OK

2	Check brake vacuum sensor harness and connector for open circuit



ECM A connector

ES01811RM



Brake vacuum sensor connector

ES01820RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the brake vacuum sensor connector.

(e) Measure the resistance according to the values in the table below.

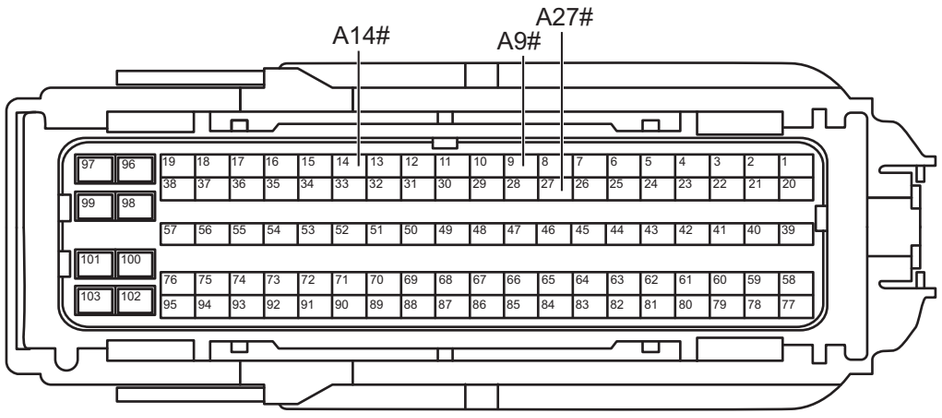
Standard value

Detector connection	Detection conditions	Specified state
Brake vacuum sensor connector 3# -ECM connector A14#	Always connected	Less than 1Ω
Brake vacuum sensor connector 1# -ECM connector A27#	Always connected	Less than 1Ω
Brake vacuum sensor connector 2# -ECM connector A9#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check brake vacuum sensor harness and connector for circuit shorted to ground



ECM A connector

ES01811RM

(a) Measure the resistance according to the values in the table below.

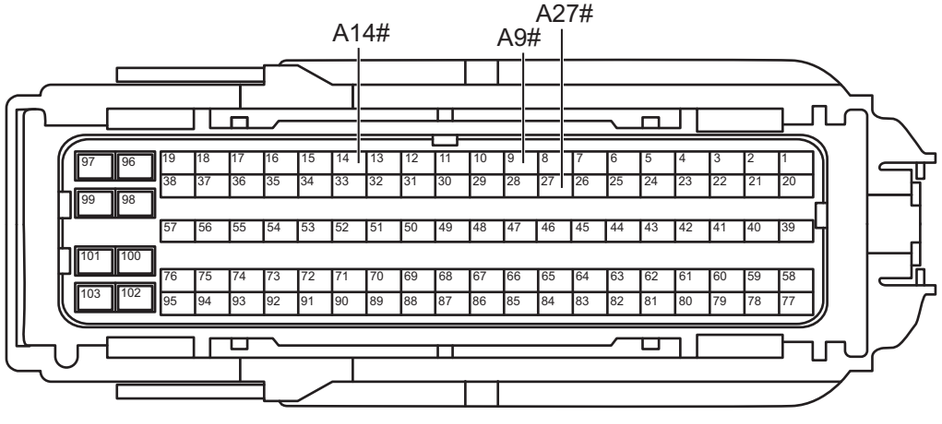
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A9# -body GND	Always connected	10 KΩ or greater
ECM connector A14# -body GND	Always connected	10 KΩ or greater
ECM connector A27# -body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

4	**Check brake vacuum sensor harness and connector for circuit shorted to power supply**



ECM A connector

ES01811RM

ES

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector A9# -body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A14# -body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A27# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the brake vacuum sensor (See page BR-26)**

(a) Replace the brake vacuum sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

6	**End**

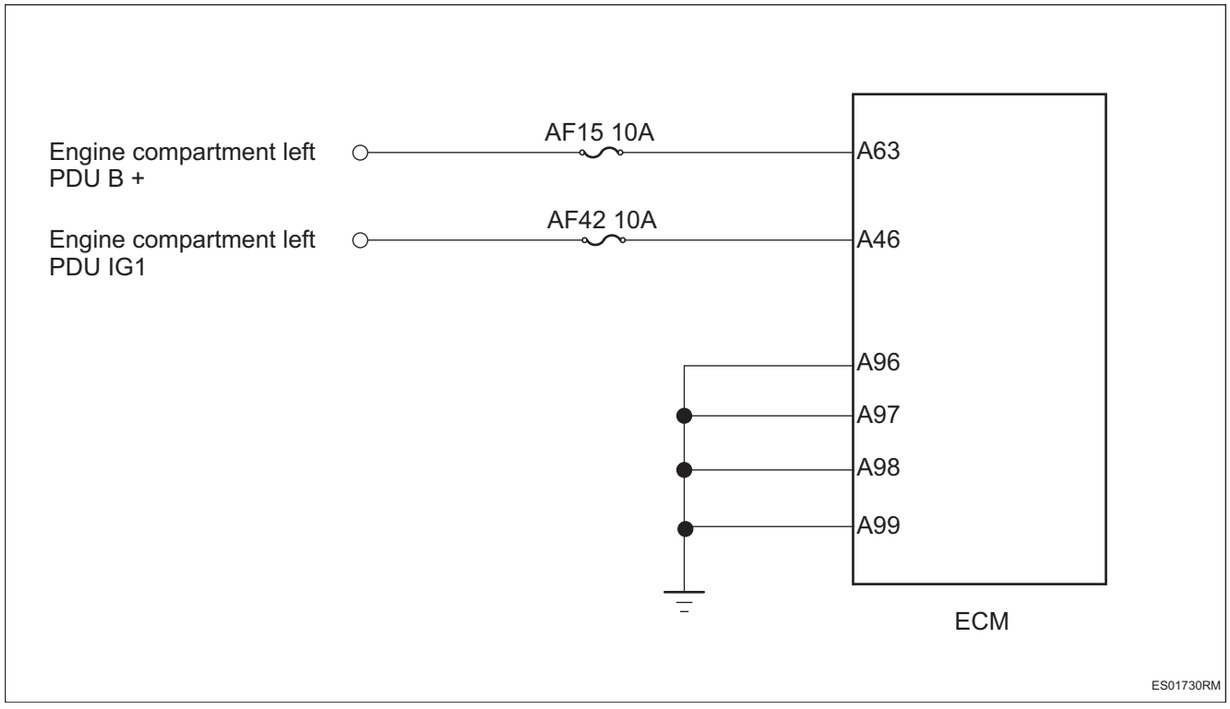
DTC	P056300	Battery overvoltage
DTC	P056200	Battery undervoltage

Description

When it is detected that the system power supply voltage is out of the normal range, the ECM records the DTC.

DTC	DTC detection conditions	Faulty location
P056300	(a) Battery overvoltage.	• ECM • Fuse • Harness and connector • Battery/charging system
P056200	(a) Battery undervoltage.	• ECM • Fuse • Harness and connector • Battery/charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

ES

Detector connection	Detection conditions	Specified state
Battery + - battery -	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2	Check ECM fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the ECM fuse.

(d) Measure the resistance according to the values in the table below.

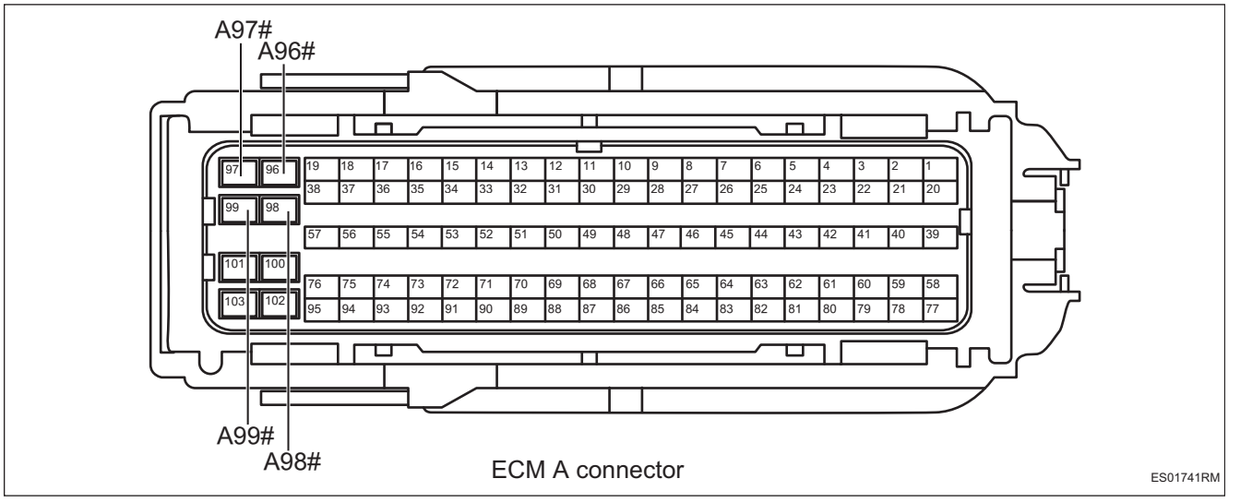
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3	Check ECM ground



ECM A connector

ES01741RM

(a) Measure the resistance according to the values in the table below.

Standard value

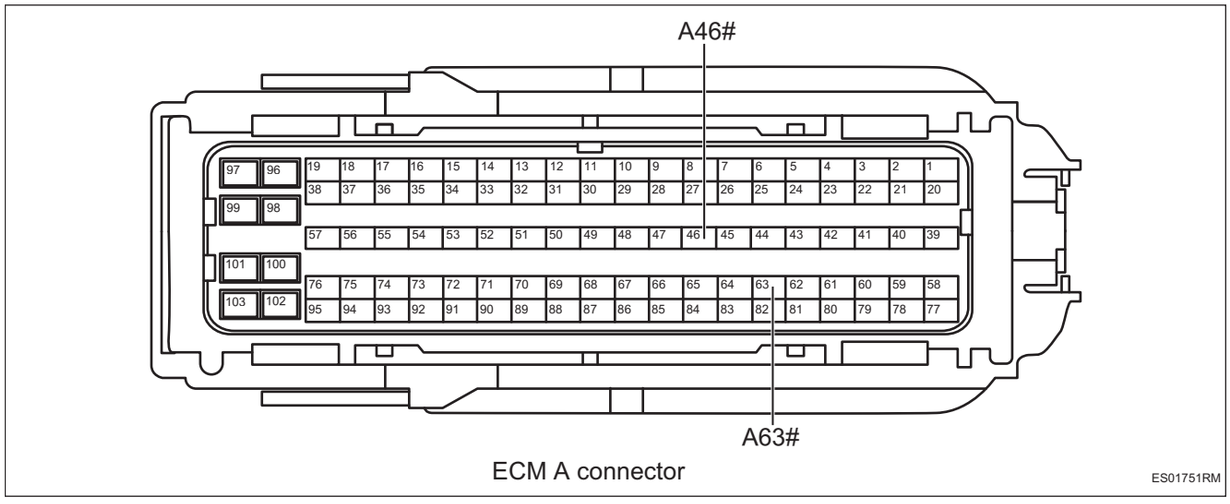
Detector connection	Detection conditions	Specified state
ECM connector A96# -body GND	Always connected	Less than 1Ω
ECM connector A97# - body GND	Always connected	Less than 1Ω
ECM connector A98# - body GND	Always connected	Less than 1Ω
ECM connector A99# - body GND	Always connected	Less than 1Ω

ES

NG → **Repair or replace the harness and connector**

OK

4	Check ECM power supply



ECM A connector

ES01751RM

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector A63# - body GND	Set the ignition switch to "ON"	Battery voltage
ECM connector A46# - body GND	Set the ignition switch to "ON"	Battery voltage

NG	Repair or replace the harness and connector

ES

OK

5	Replace the ECM (See page ES-450)

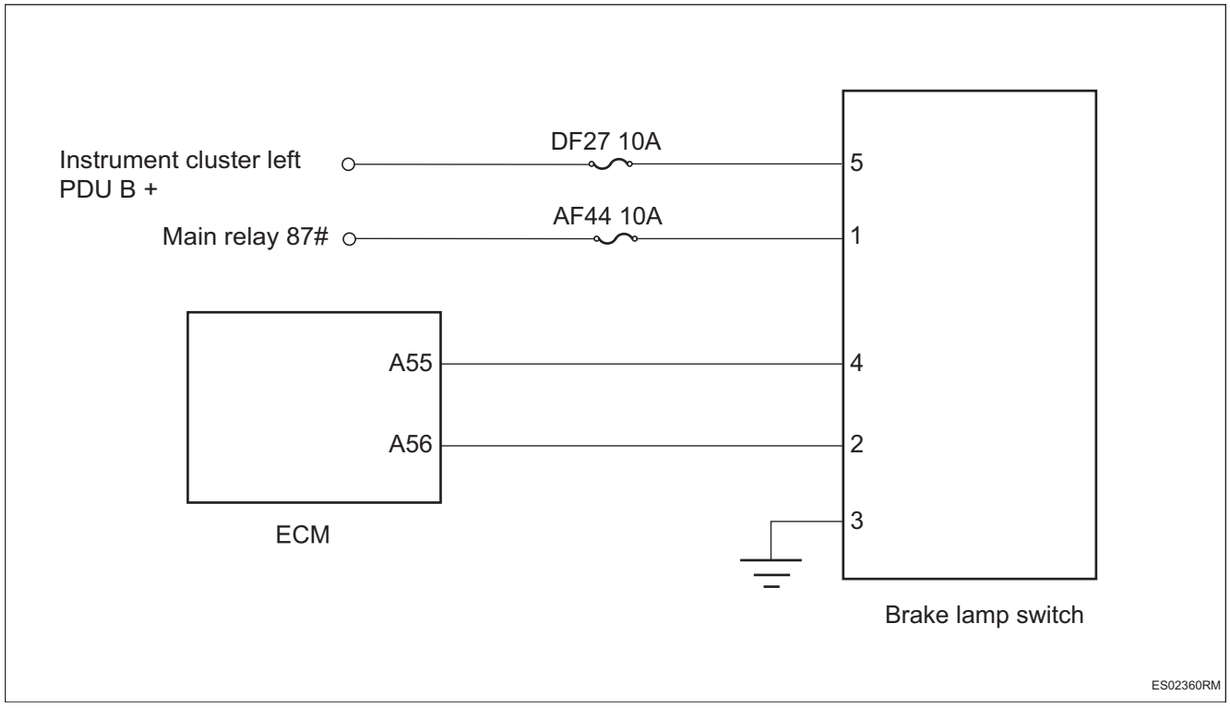
DTC	P057100	Asynchronous brake signal
DTC	P050400	Brake signal correlation failure

Description

When the brake lamp switch signal is abnormal or the circuit voltage is abnormal, the ECM will record the DTC.

DTC	DTC detection conditions	Faulty location
P057100	(a) The brake signals are not synchronized.	• Brake lamp switch • Fuse • Harness and connector • ECM • Brake pedal
P050400	(a) Abnormal brake signal.	• Brake lamp switch • Fuse • Harness and connector • ECM • Brake pedal

Circuit diagram



Inspection procedure

1	Check brake lamp switch

(a) Check whether the brake lamp switch is installed correctly.

(b) Check whether the brake lamp switch is damaged.

NG → **Repair according to the fault**

OK

ES

2	Check brake pedal

(a) Check whether the brake pedal mechanical parts are normal.

NG → **Repair according to the fault**

OK

3	Check brake lamp switch fuse

(a) Remove the brake lamp switch fuse.

(b) Measure the resistance according to the values in the table below.

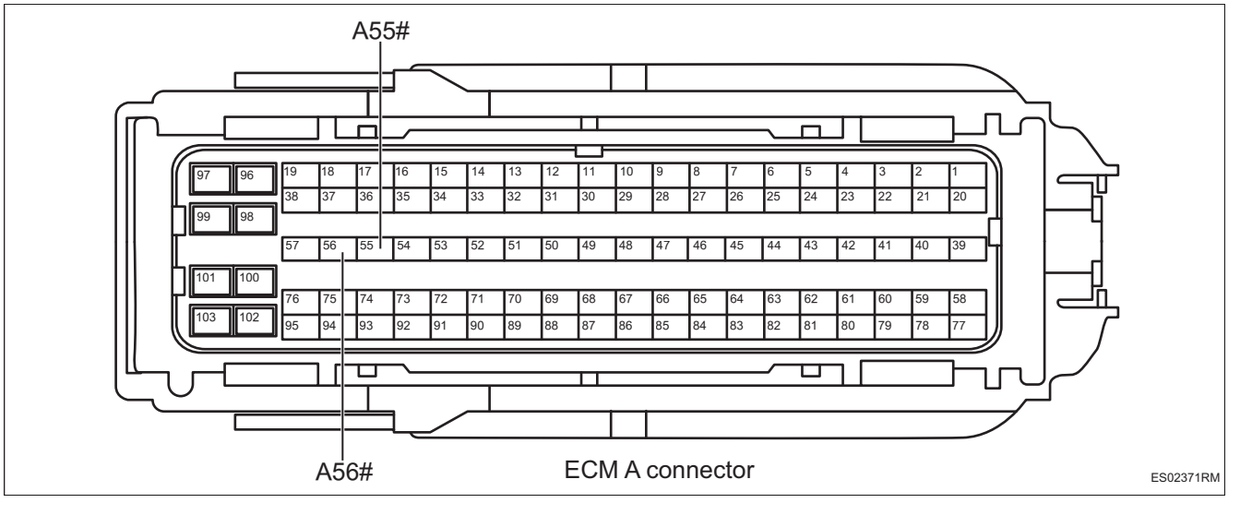
Standard value

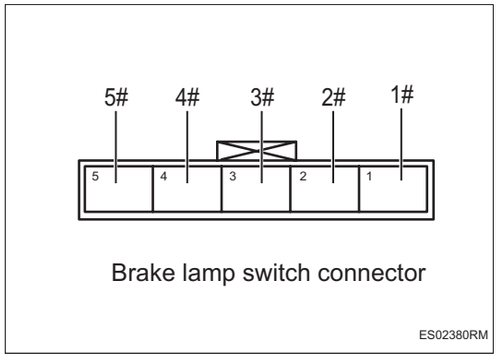
Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

4	Check brake lamp switch harness and connector for open circuit





Brake lamp switch connector

(a) Disconnect the ECM connector.

(b) Install the fuse.

(c) Remove the main relay.

(d) Measure the resistance according to the values in the table below.

ES

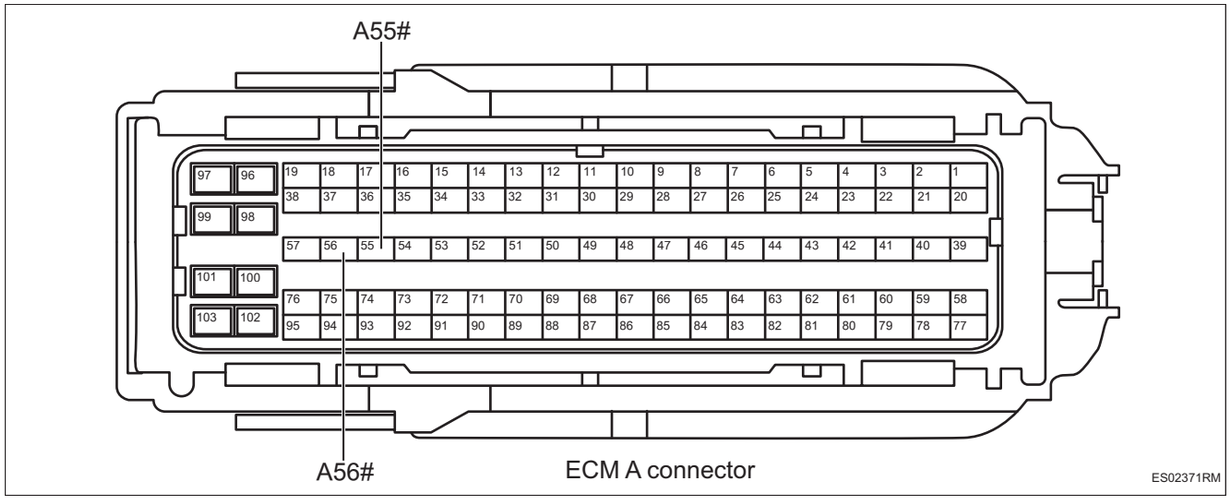
Standard value

Detector connection	Detection conditions	Specified state
Brake lamp switch connector 4# -ECM connector A55#	Always connected	Less than 1Ω
Brake lamp switch connector 2# -ECM connector A56#	Always connected	Less than 1Ω
Brake lamp switch connector 1# - main relay connector 87#	Always connected	Less than 1Ω
Brake lamp switch connector 3# - body GND	Always connected	Less than 1Ω
Brake lamp switch connector 5# - B +	Always connected	Less than 1Ω

NG → **Repair or replace harness and connector and fuse**

OK

5	Check brake lamp switch harness and connector for circuit shorted to ground



ECM A connector

(a) Measure the resistance according to the values in the table below.

Standard value

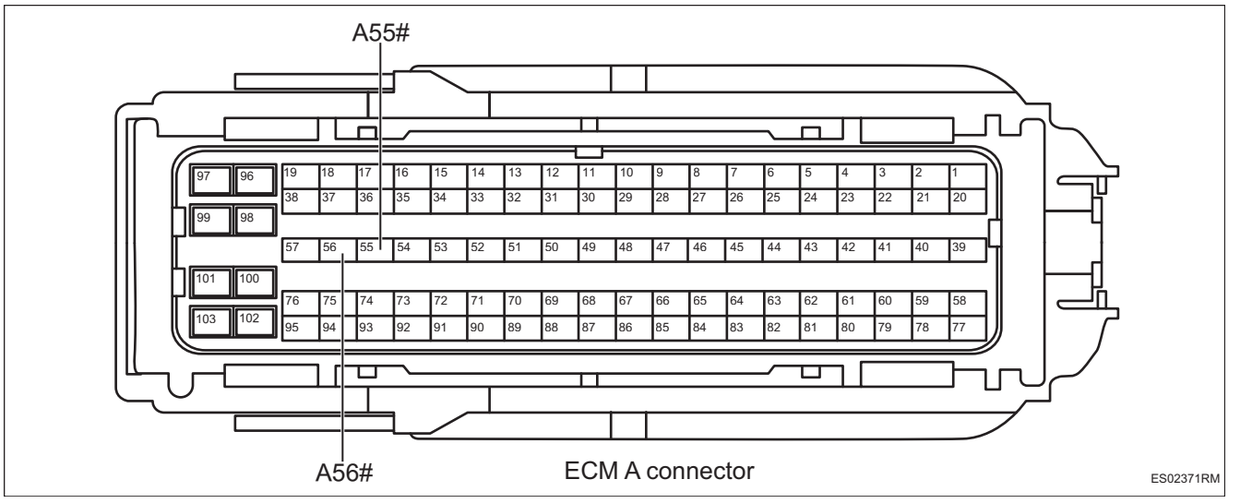
ES

Detector connection	Detection conditions	Specified state
ECM connector A55# - body GND	Always connected	10 KΩ or greater
ECM connector A56# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

6	Check brake lamp switch harness and connector for circuit shorted to power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector A55# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A56# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

7	**Replace brake lamp switch (See page BR-3)**

(a) Replace the brake lamp switch.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

8	**End**

ES

DTC	P061A00	Second layer torque monitoring fault (torque comparison fault)
DTC	P060D00	Second accelerator pedal signal implausible
DTC	P152000	Load forecast monitoring fault
DTC	P152100	Pipe monitoring fault in fuel cutoff mode
DTC	P152200	Pipe monitoring fault in fuel supply mode
DTC	P153900	Synchronization process plausibility check (based on speed and sync count)
DTC	P153700	Load comparison monitoring fault
DTC	P153500	Mixture monitoring fault
DTC	P153600	Operating mode monitoring fault

Description

When the EGAS safety monitoring function is not matched or the application layer data does not match the monitoring layer data during the preset data setting, the engine control unit records DTC.

DTC	DTC detection conditions	Faulty location
P061A00	(a) Second layer torque monitoring fault.	• ECM
P060D00	(a) Second layer accelerator pedal signal implausible.	• ECM
P152000	(a) Load forecast monitoring fault.	• ECM
P152100	(a) Pipe monitoring fault in fuel cutoff mode.	• ECM
P152200	(a) Pipe monitoring fault in fuel supply mode.	• ECM
P153900	(a) Synchronization process plausibility check failure.	• ECM
P153700	(a) Load comparison monitoring fault.	• ECM
P153500	(a) Mixture monitoring fault.	• ECM
P153600	(a) Operating mode monitoring fault.	• ECM

Inspection procedure

1	**Clear the DTC**

(a) Connect the HQ-VDS.

(b) Clear the DTC.

(c) Restart the vehicle and check whether the DTC is eliminated.

Criteria:

No DTC is output.

NG → Replace the ECM (See page ES-450)

OK

2	End

DTC	P062900	Fuel pump relay control circuit overvoltage
DTC	P062800	Fuel pump relay control circuit undervoltage
DTC	P062700	Fuel pump relay control circuit open

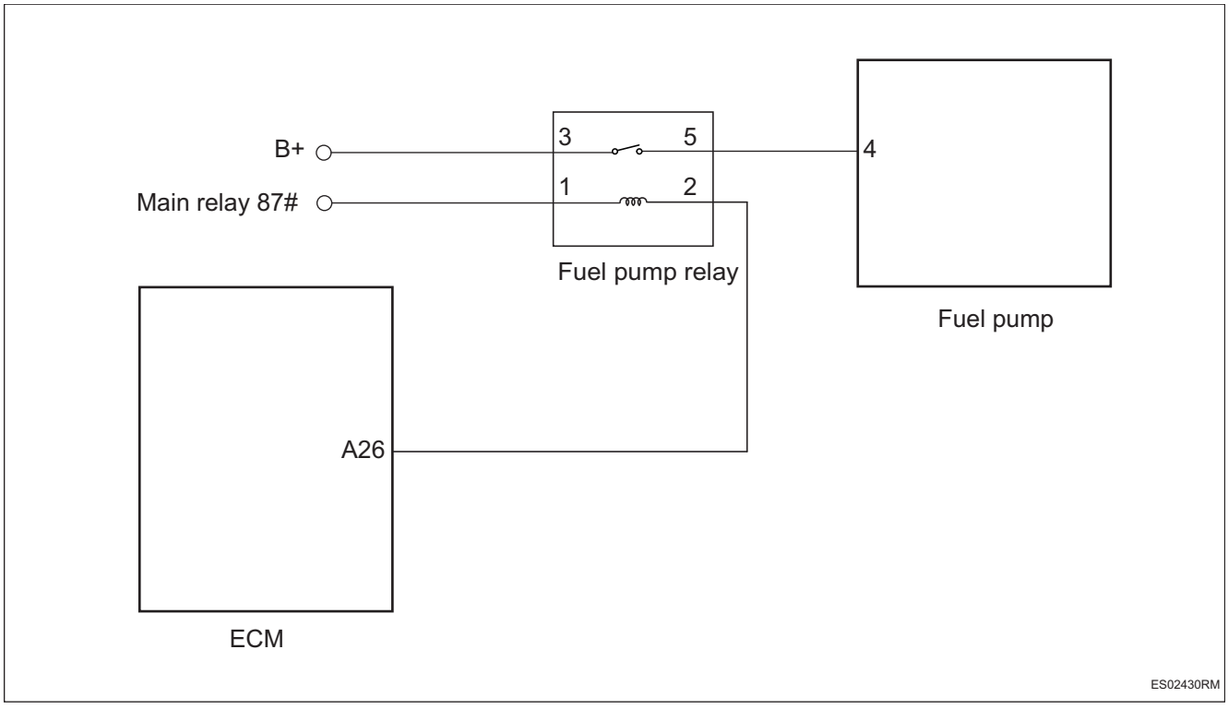
ES

Description

When the fuel relay control circuit is shorted or open, ECM will record DTC.

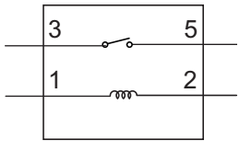
DTC	DTC detection conditions	Faulty location
P062900	(a) Fuel pump relay control circuit overvoltage.	• ECM • Harness and connector • Fuel pump relay
P062800	(a) Fuel pump relay control circuit undervoltage.	• ECM • Harness and connector • Fuel pump relay
P062700	(a) Fuel pump relay control circuit open.	• ECM • Harness and connector • Fuel pump relay

Circuit diagram



Inspection procedure

1	Check fuel pump relay



Fuel pump relay

ES02451RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the fuel pump relay.

(d) Measure the resistance according to the values in the table below.

ES

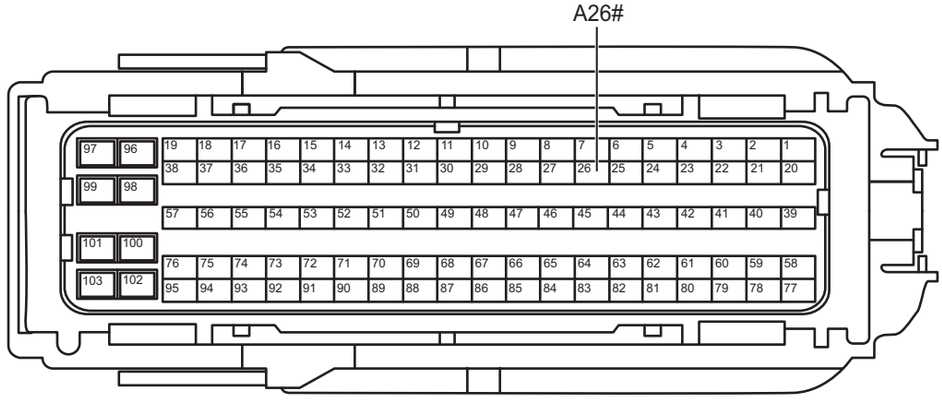
Standard value

Detector connection	Detection conditions	Specified state
Fuel pump relay 3# -fuel pump relay 5#	Apply battery voltage between 1# and 2#	Less than 1Ω
Fuel pump relay 3# -fuel pump relay 5#	No battery voltage is applied between 1# and 2#	10KΩ or greater

NG **Replace fuel pump relay**

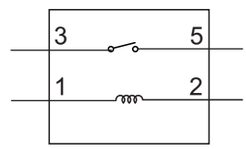
OK

2 Check fuel pump relay harness and connector for open circuit



ECM A connector

ES02441RM



Fuel pump relay connector

ES02461RM

(a) Disconnect the ECM connector.

(b) Measure the resistance according to the values in the table below.

Standard value

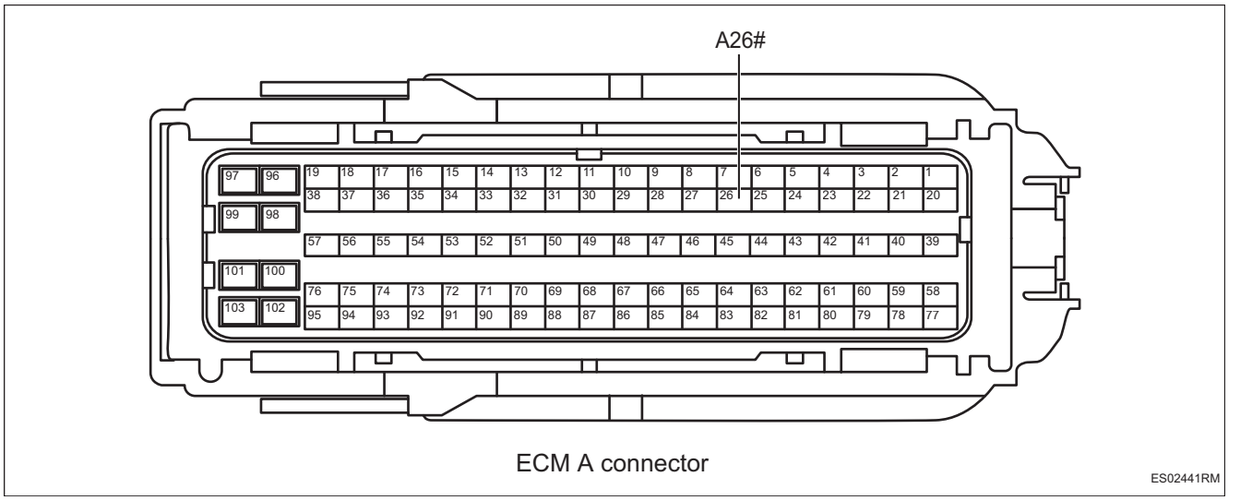
Detector connection	Detection conditions	Specified state
Fuel pump relay connector 2# -ECM connector A26#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

ES

OK

3	Check fuel pump relay harness and connector for circuit shorted to ground



ECM A connector

ES02441RM

(a) Measure the resistance according to the values in the table below.

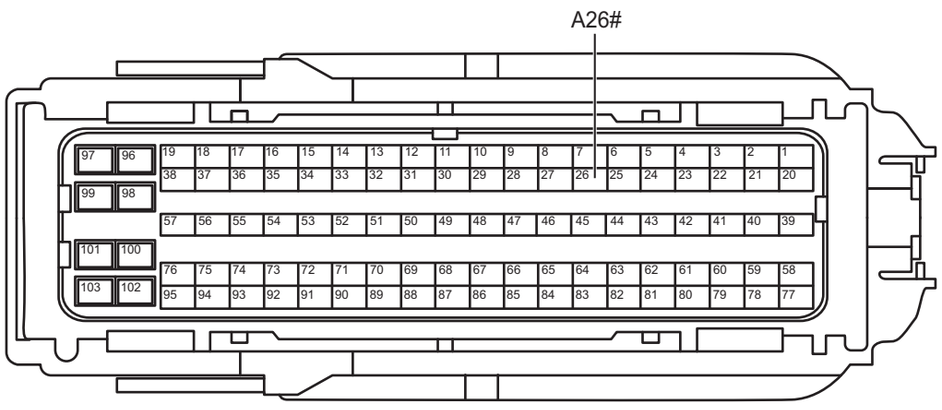
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A26# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check fuel pump relay harness and connector for circuit shorted to power supply



ECM A connector

ES02441RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector A26# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the ECM (See page ES-450)**

ES

DTC	P062B9A	Similar working condition path of self-learning adjustment out of limit
DTC	P062B64	Similar working condition path of circuit signal implausible
DTC	P062B96	ECU fault (CVO failure in all cylinders)

Description

When the internal operation of the ECM is abnormal, the ECM records the DTC.

DTC	DTC detection conditions	Faulty location
P062B9A	(a) Similar working condition path of self-learning adjustment out of limit.	• ECM • Harness and connector • Fuel injector
P062B64	(a) Similar working condition path of implausible circuit signal.	• ECM • Harness and connector • Fuel injector
P062B96	(a) ECU fault (CVO failure in all cylinders).	• ECM • Harness and connector • Fuel injector

Inspection procedure

1	**Check harness and connector**

(a) Check whether the fuel injector connector is connected tightly.

(b) Check the fuel injector harness and connector for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

2	**Replace all cylinder fuel injectors (See page FU-4)**

(a) Replace all cylinder fuel injectors.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG	Replace the ECM (See page ES-450)

OK

3	End

DTC	P063000	VIN not written or incompatible

Description

When the ECM detects a VIN related fault, the ECM records the DTC.

DTC	DTC detection conditions	Faulty location
P063000	(a) VIN not written or incompatible.	• ECM

Inspection procedure

1	Check VIN

(a) Compare and check whether the read VIN of HQ-VDS is consistent with the actual VIN of the vehicle.

(b) Rewrite according to the actual VIN of the vehicle.

(c) Set the ignition switch to "OFF" and fully power off the control unit.

(d) Set the ignition switch to "ON" and clear the DTC.

Criteria:

VIN is written successfully, and DTC can be cleared.

NG → **Replace the ECM (See page ES-450)**

OK

2	End

DTC	P064100	5V power supply module 1 faulty
DTC	P065100	Chip 5 V power supply voltage 2 fault
DTC	P069700	5V power supply module 3 faulty

ES

Description

In case of the 5 V power supply module overvoltage or undervoltage, the ECM will record the DTC.

DTC	DTC detection conditions	Faulty location
P064100	(a) The 5 V power supply module 1 is faulty.	• ECM
P065100	(a) The 5 V power supply module 2 is faulty.	• ECM
P069700	(a) The 5 V power supply module 3 is faulty.	• ECM

Inspection procedure

1	**Clear the DTC**

(a) Check whether there is harness signal interference.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Restart the vehicle and check whether the DTC is eliminated.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

2	**End**

ES

DTC	P064D00	LSU integrated chip register writing failure
DTC	P223700	LSU type oxygen sensor APE circuit open (near ECU end)
DTC	P225100	Upstream oxygen sensor IPE circuit open
DTC	P224300	Upstream oxygen sensor RE circuit open
DTC	P013200	Upstream oxygen sensor signal circuit overvoltage (APE / IPE / RE circuit shorted to power supply)
DTC	P013100	Upstream oxygen sensor signal circuit undervoltage (APE / IPE / RE circuit shorted to ground)
DTC	P241400	Upstream oxygen sensor output voltage implausible
DTC	P064D13	LSU integrated chip SPI communication failure
DTC	P262600	Upstream oxygen sensor MES circuit open
DTC	P223713	LSU type oxygen sensor APE circuit open
DTC	P013000	Upstream oxygen sensor compensation resistor circuit open

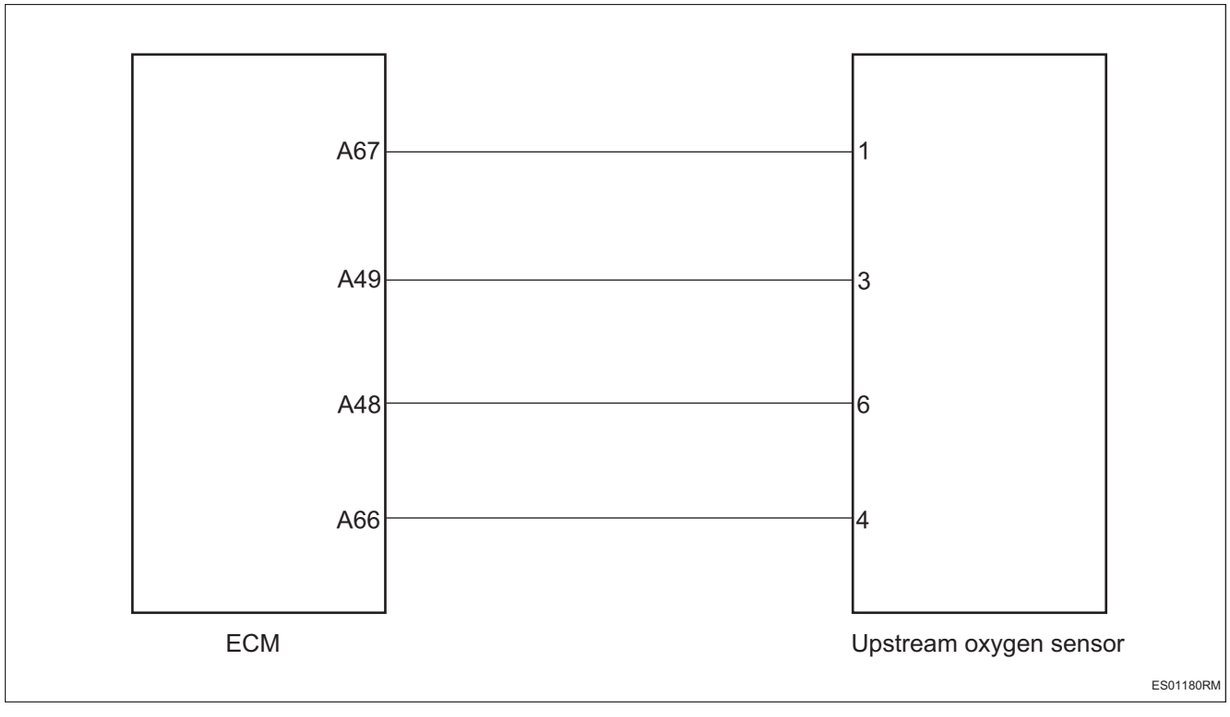
Description

When the upstream oxygen sensor short circuit or open circuit occurs or there is an internal fault in the oxygen sensor, the ECM records the DTC.

DTC	DTC detection conditions	Faulty location
P064D00	(a) LSU integrated chip failure.	• ECM • Upstream oxygen sensor
P223700	(a) LSU type oxygen sensor APE circuit open (near ECU end).	• ECM • Upstream oxygen sensor
P225100	(a) Upstream oxygen sensor IPE circuit open.	• ECM • Harness and connector • Upstream oxygen sensor
P224300	(a) Upstream oxygen sensor RE circuit open.	• ECM • Harness and connector • Upstream oxygen sensor
P013200	(a) Upstream oxygen sensor signal circuit overvoltage (APE IPE RE line circuit shorted to power supply).	• ECM • Harness and connector • Upstream oxygen sensor

DTC	DTC detection conditions	Faulty location
P013100	(a) Upstream oxygen sensor signal circuit undervoltage (APE IPE RE line circuit shorted to ground).	• ECM • Harness and connector • Upstream oxygen sensor
P241400	(a) The upstream oxygen sensor output voltage implausible.	• ECM • Harness and connector • Upstream oxygen sensor
P064D13	(a) LSU integrated chip SPI communication failure.	• ECM • Upstream oxygen sensor
P262600	(a) Upstream oxygen sensor MES circuit open.	• ECM • Harness and connector • Upstream oxygen sensor • Canister solenoid valve
P223713	(a) LSU type oxygen sensor APE circuit open.	• ECM • Harness and connector • Upstream oxygen sensor
P013000	(a) Upstream oxygen sensor compensation resistor circuit open.	• ECM • Harness and connector • Upstream oxygen sensor

Circuit diagram



Inspection procedure

1	**Check the exhaust system**

(a) Check whether the oxygen sensor is installed correctly.

(b) Check whether the exhaust system pipeline is properly connected.

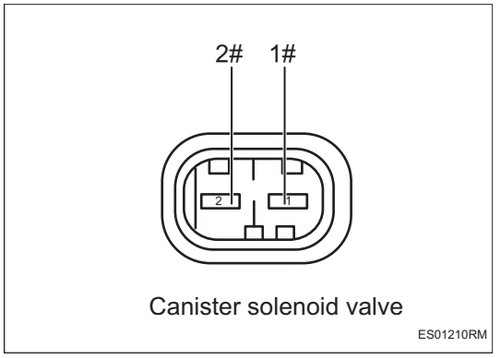
(c) Check the exhaust system for leakage or damage.

ES

NG → **Repair or replace the exhaust system components**

OK

2	Check canister solenoid valve



Canister solenoid valve

ES01210RM

(a) Remove the canister solenoid valve.

(b) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Canister solenoid valve 1# -canister solenoid valve 2#	20 ℃	14 ~ 18Ω

NG → **Replace canister solenoid valve (See page EC-14)**

OK

3	Check canister solenoid valve

(a) Apply battery positive voltage to canister solenoid valve terminal 1 and negative voltage to terminal 2 to check the solenoid valve opening and closing.

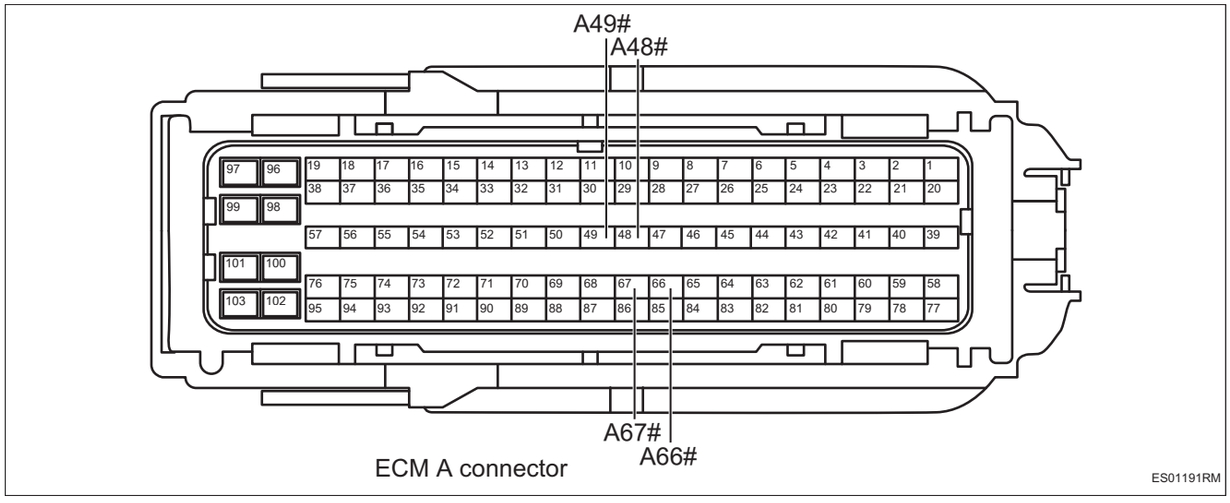
Criteria:

Power on: solenoid valve on; Power off: solenoid valve off.

NG → **Replace canister solenoid valve (See page EC-14)**

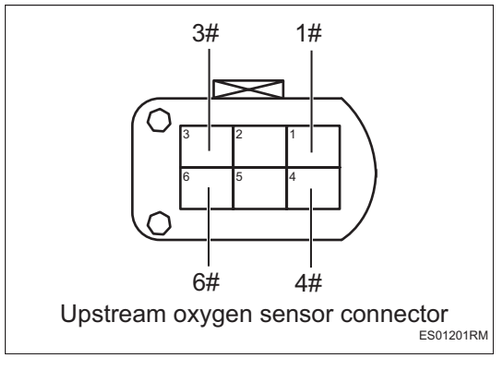
OK

4	Check upstream oxygen sensor harness and connector for open circuit



ECM A connector

ES01191RM



Upstream oxygen sensor connector

ES01201RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the upstream oxygen sensor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

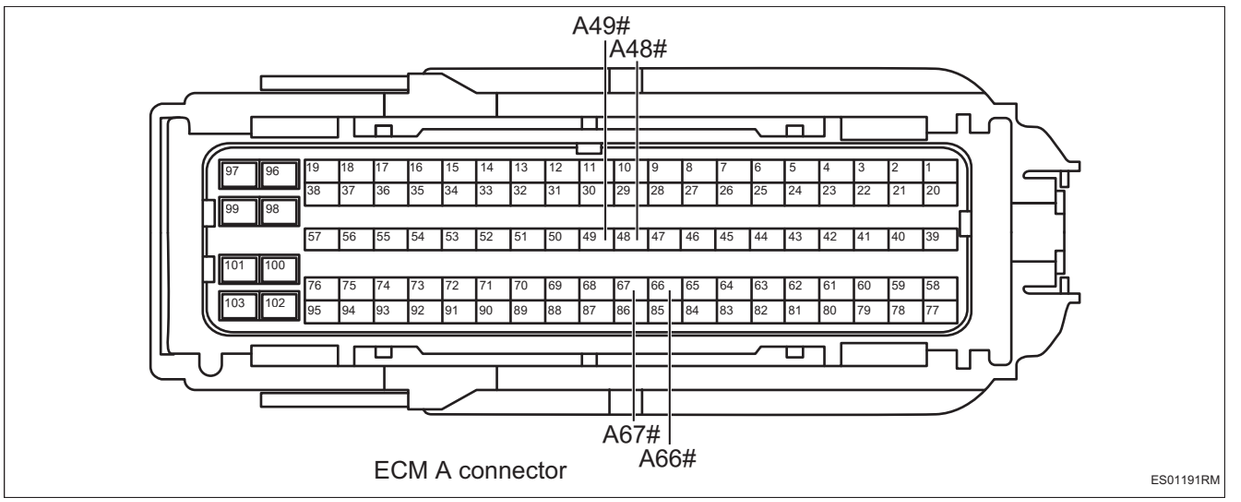
Detector connection	Detection conditions	Specified state
ECM connector A67# -upstream oxygen sensor connector 1#	Always connected	Less than 1Ω
ECM connector A49# -upstream oxygen sensor connector 3#	Always connected	Less than 1Ω
ECM connector A48# -upstream oxygen sensor connector 6#	Always connected	Less than 1Ω
ECM connector A66# -upstream oxygen sensor connector 4#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

5	**Check upstream oxygen sensor harness and connector for circuit shorted to ground**

ES



(a) Measure the resistance according to the values in the table below.

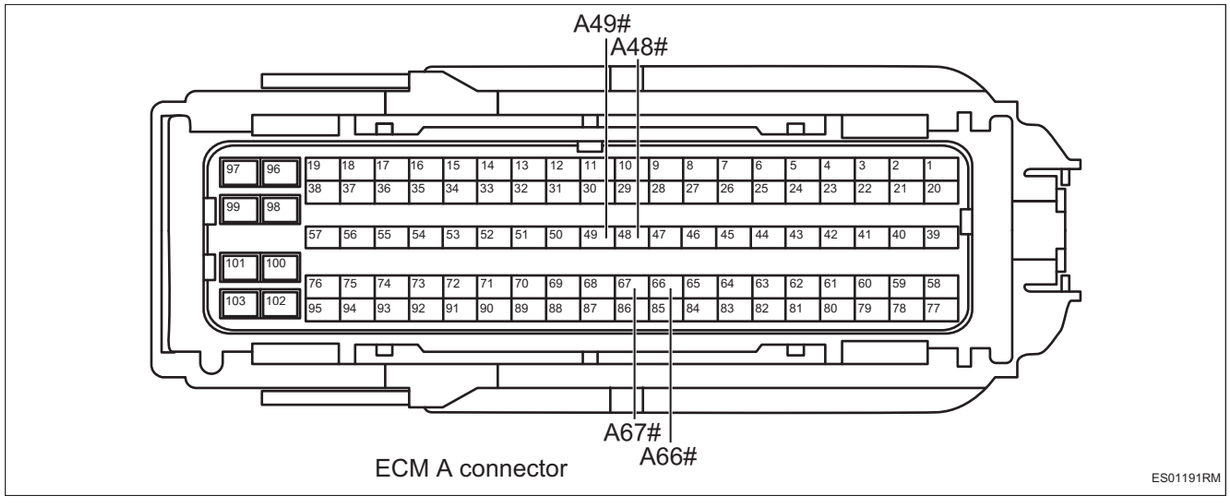
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A67# - body GND	Always connected	10 KΩ or greater
ECM connector A49# - body GND	Always connected	10 KΩ or greater
ECM connector A48# - body GND	Always connected	10 KΩ or greater
ECM connector A66# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

6	**Check upstream oxygen sensor harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector A67# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A49# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A48# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A66# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

7	**Replace the upstream oxygen sensor (See page ES-455)**

(a) Replace the upstream oxygen sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Start the vehicle, and run it to reach normal coolant temperature.

(e) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

ES

OK

8	**End**

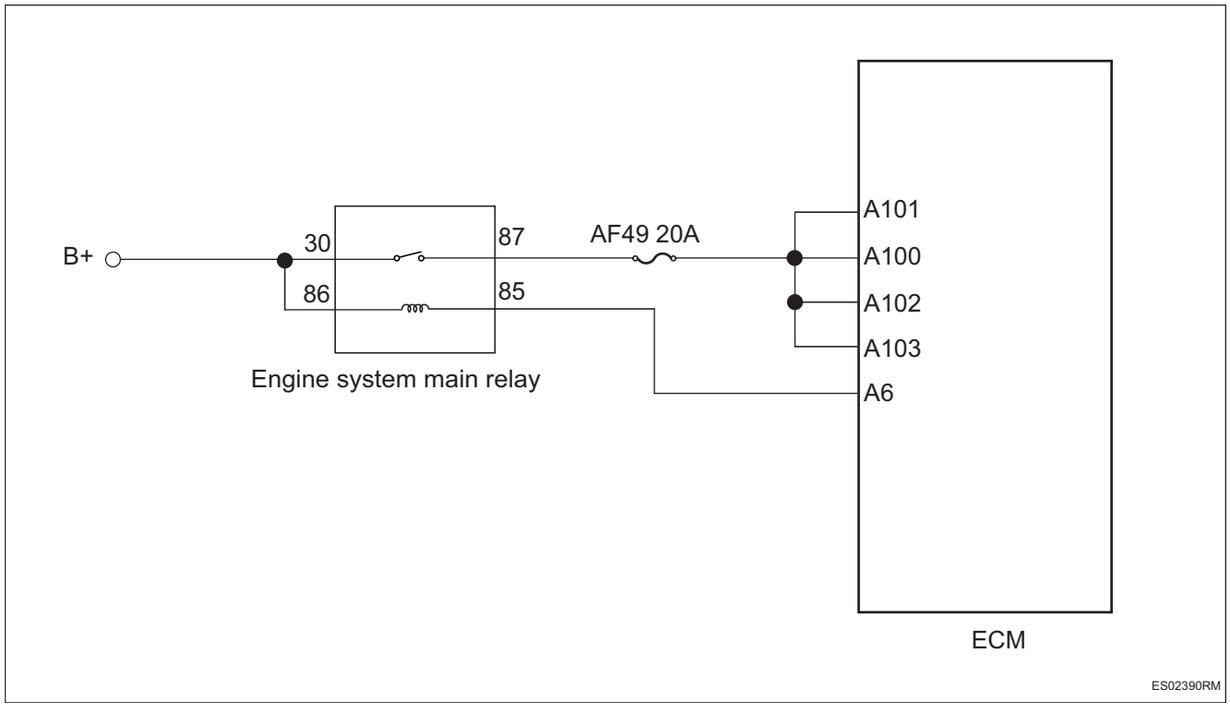
DTC	P068500	Main relay open circuit
DTC	P068700	Main relay circuit shorted to power supply
DTC	P068600	Main relay circuit shorted to ground
DTC	P06869E	ECM/PCM main relay stuck or circuit shorted to ground

Description

When engine main relay circuit is shorted or open, ECM will record DTC.

DTC	DTC detection conditions	Faulty location
P068500	(a) Main relay open circuit.	• ECM • Harness and connector • Engine system main relay
P068700	(a) Main relay circuit shorted to power supply.	• ECM • Harness and connector • Engine system main relay
P068600	(a) Main relay circuit shorted to ground.	• ECM • Harness and connector • Engine system main relay
P06869E	(a) ECM/PCM main relay stuck or circuit shorted to ground.	• ECM • Harness and connector • Engine system main relay

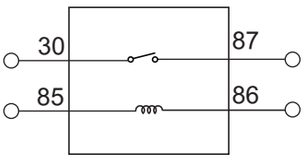
Circuit diagram



Inspection procedure

1	Check the main relay of the engine system

ES



Engine system main relay

ES02401RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the engine system main relay.

(d) Measure the resistance according to the values in the table below.

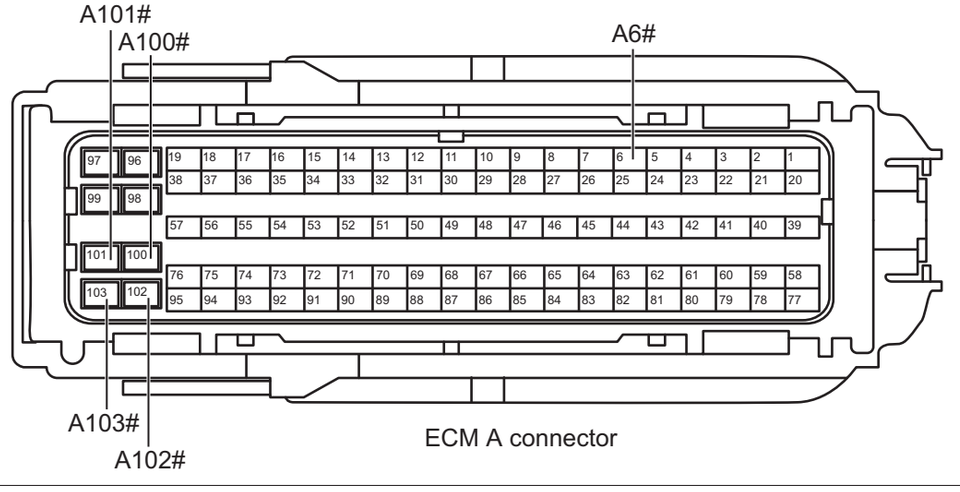
Standard value

Detector connection	Detection conditions	Specified state
Engine system main relay 30# -engine system main relay 87#	Apply battery voltage between 86# and 85#	Less than 1Ω
Engine system main relay 30# -engine system main relay 87#	No battery voltage is applied between 86# and 85#	10 KΩ or greater

NG → **Replace engine system main relay**

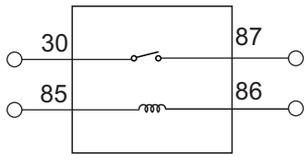
OK

2	Check engine system main relay harness and connector for open circuit



ECM A connector

ES02411RM



Engine system main relay connector

ES02421RM

(a) Disconnect the ECM connector.

(b) Measure the resistance according to the values in the table below.

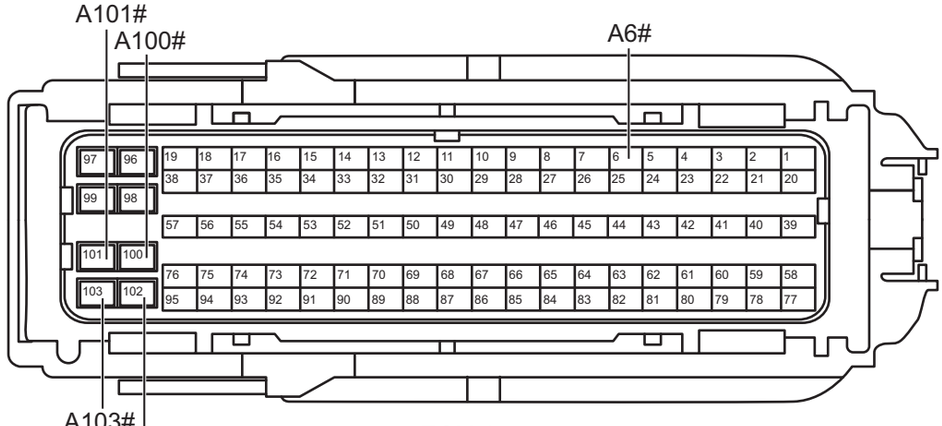
Standard value

Detector connection	Detection conditions	Specified state
Engine system main relay connector 87# - ECM connector A100#	Always connected	Less than 1Ω
Engine system main relay connector 87# - ECM connector A101#	Always connected	Less than 1Ω
Engine system main relay connector 87# - ECM connector A102#	Always connected	Less than 1Ω
Engine system main relay connector 87# - ECM connector A103#	Always connected	Less than 1Ω
Engine system main relay connector 85# - ECM connector A6#	Always connected	Less than 1Ω

NG → **Repair or replace harness and connector and fuse**

OK

3	Check engine system main relay harness and connector for circuit shorted to ground



ECM A connector

ES02411RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector A100# - body GND	Always connected	10 KΩ or greater
ECM connector A101# - body GND	Always connected	10 KΩ or greater

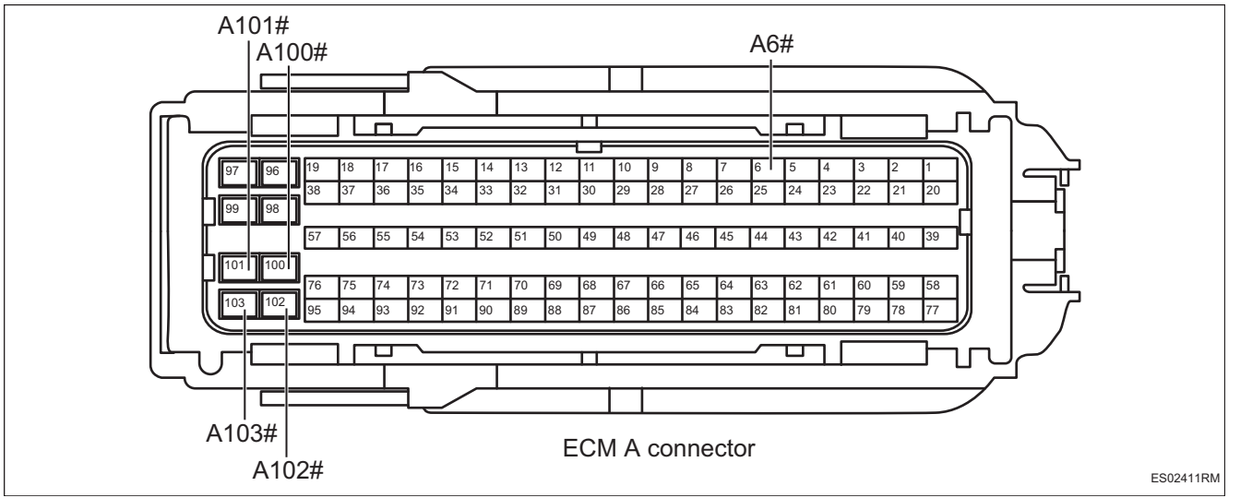
ES

Detector connection	Detection conditions	Specified state
ECM connector A102# - body GND	Always connected	10 KΩ or greater
ECM connector A103# - body GND	Always connected	10 KΩ or greater
ECM connector A6# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

4	Check engine system main relay harness and connector for circuit shorted to power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector A100# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A101# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A102# - body GND	Set the ignition switch to "ON"	Less than 1 V

Detector connection	Detection conditions	Specified state
ECM connector A103# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A6# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the ECM (See page ES-450)**

DTC	P06B842	Error in reading NVM Block
DTC	P06B843	Error in writing NVM Block

ES

Description

The ECM records a DTC when there is a failure in reading/writing Flash Block.

DTC	DTC detection conditions	Faulty location
P06B842	(a) During the power-on phase of ECU, a fault occurs during reading/writing of Flash Block.	• ECM
P06B843	(a) During the power-on phase of ECU, a fault occurs during reading/writing of Flash Block.	• ECM

Inspection procedure

1	Clear the DTC

(a) Set the ignition switch to "OFF" and fully power off the control unit.

(b) Connect the HQ-VDS.

(c) Set the ignition switch to "ON".

(d) Clear the DTC.

(e) Check whether the DTC is eliminated.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

2	End

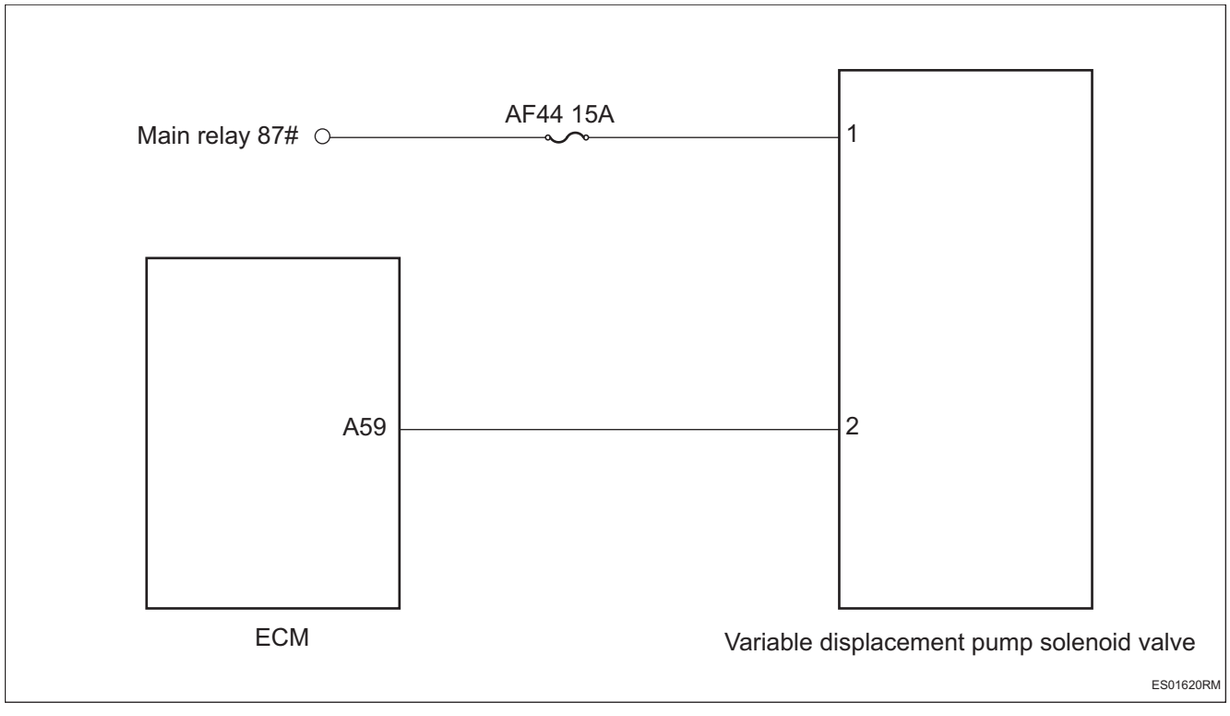
DTC	P06DC00	Two-stage oil pump control circuit overvoltage
DTC	P06DB00	Two-stage oil pump control circuit undervoltage
DTC	P06DA00	Two-stage oil pump control circuit open

Description

When the two-stage oil pump control voltage is outside the normal range, the ECM records the DTC.

DTC	DTC detection conditions	Faulty location
P06DC00	(a) Two-stage oil pump control circuit overvoltage.	• ECM • Harness and connector • Variable displacement pump solenoid valve
P06DB00	(a) Two-stage oil pump control circuit undervoltage.	• ECM • Harness and connector • Variable displacement pump solenoid valve
P06DA00	(a) Two-level oil pump control open circuit.	• ECM • Harness and connector • Variable displacement pump solenoid valve

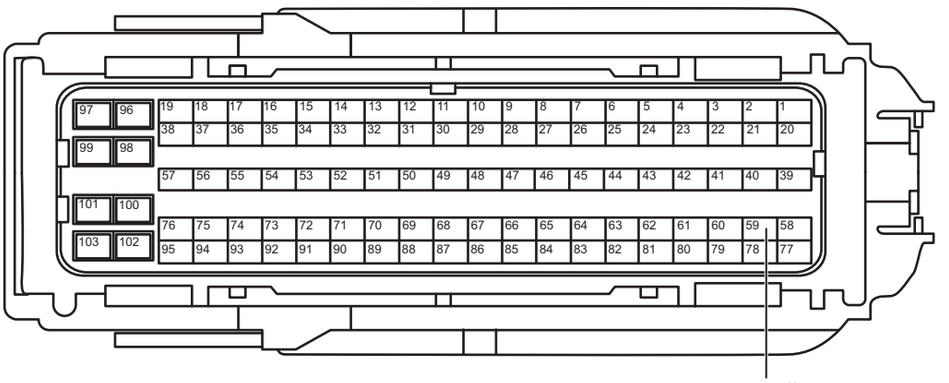
Circuit diagram



Inspection procedure

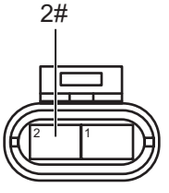
1	**Check variable displacement pump solenoid valve harness and connector for open circuit**

ES



ECM A connector

ES01631RM



Variable displacement pump solenoid valve connector

ES01640RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the variable displacement pump solenoid valve connector.

(e) Measure the resistance according to the values in the table below.

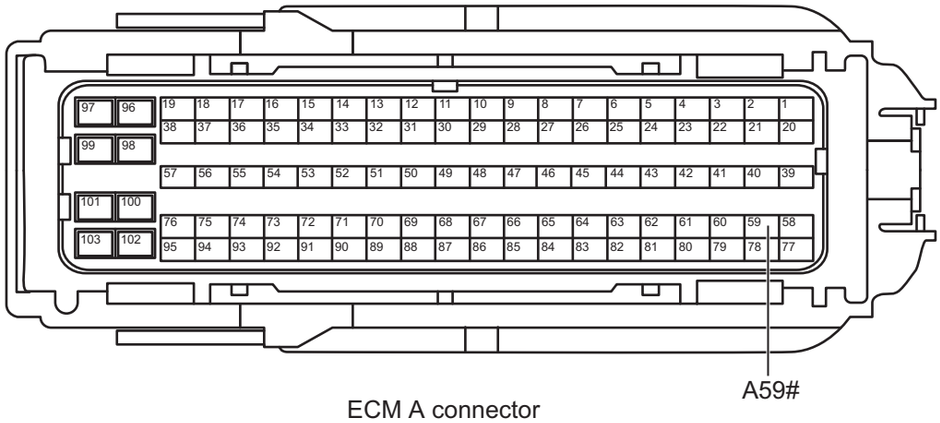
Standard value

Detector connection	Detection conditions	Specified state
Variable displacement pump solenoid valve connector 2# -ECM connector A59#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check variable displacement pump solenoid valve harness and connector for circuit shorted to ground**



ECM A connector

ES01631RM

(a) Measure the resistance according to the values in the table below.

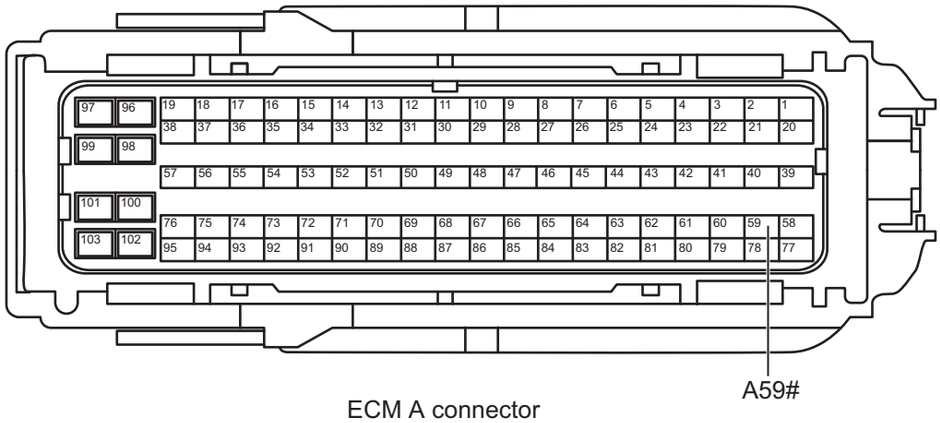
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A59# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check variable displacement pump solenoid valve harness and connector for circuit shorted to power supply**



ECM A connector

ES01631RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

ES

(c) Measure the voltage according to the values in the table below.

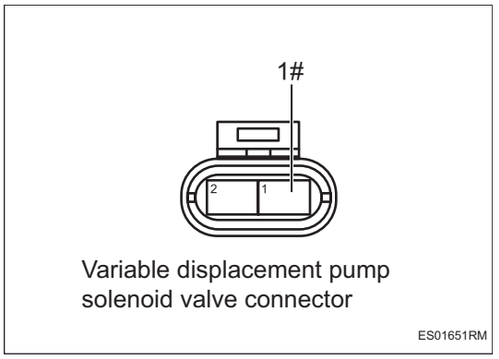
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A59# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	Check variable displacement pump solenoid valve power supply



Variable displacement pump solenoid valve connector

ES01651RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Connect ECM connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Variable displacement pump solenoid valve connector 1# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector, fuse and relay**

OK

5	Replace variable displacement pump solenoid valve (See page EM-12)

(a) Replace the variable displacement pump solenoid valve.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG	Replace the ECM (See page ES-450)

OK

6	End

DTC	P070000	Transmission control fault request to illuminate MIL

Description

The ECM records a DTC when there is a failure in TCU.

DTC	DTC detection conditions	Faulty location
P070000	(a) TCU failure.	• TCU

Inspection procedure

1	Check whether the TCU has other DTC output

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Read the DTC.

Results	Go to
Other DTC exists	Abnormal
No other DTCs	Normal

NG → **Repair according to the DTC**

OK

2	Replace TCU (See page AX-155)

DTC	P120400	Charge air pressure above upper limit
DTC	P120500	Charge air pressure below lower limit
DTC	P023622	Charge air pressure implausibly high
DTC	P023621	Charge air pressure implausible, low

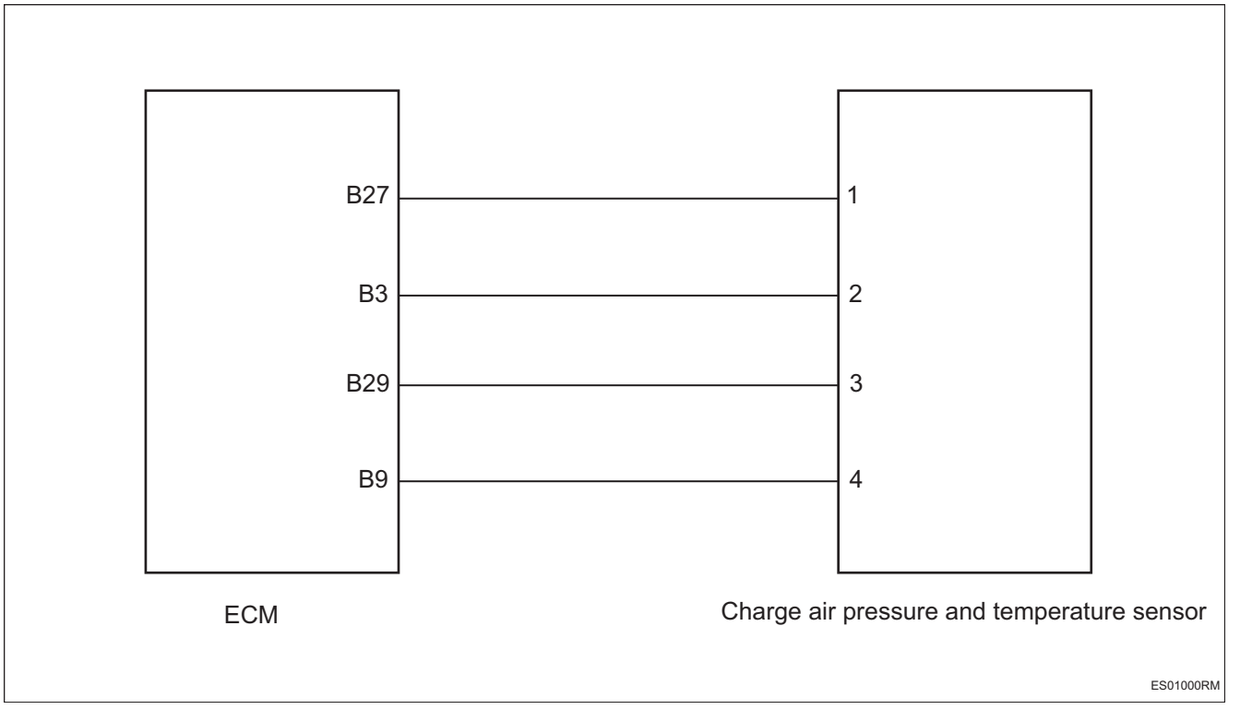
Description

When the turbocharger pressure is abnormal, the ECM will record the DTC.

DTC	DTC detection conditions	Faulty location
P120400	(a) The charge air pressure exceeds reasonable range.	• ECM • Harness and connector • Charge air pressure and temperature sensor_ • Intake system pipeline
P120500	(a) The charge air pressure exceeds reasonable range.	• ECM • Harness and connector • Charge air pressure and temperature sensor_ • Intake system pipeline
P023622	(a) The charge air pressure exceeds reasonable range.	• ECM • Harness and connector • Charge air pressure and temperature sensor_ • Intake system pipeline
P023621	(a) The charge air pressure exceeds reasonable range.	• ECM • Harness and connector • Charge air pressure and temperature sensor_ • Intake system pipeline

ES

Circuit diagram



Inspection procedure

1	**Check turbocharger system pipeline**

(a) Check whether the turbocharger system pipeline is properly connected.

(b) Check whether the turbocharger system pipeline is blocked or leaky.

NG → **Repair according to the fault**

OK

2	**Check charge air pressure and temperature sensor**

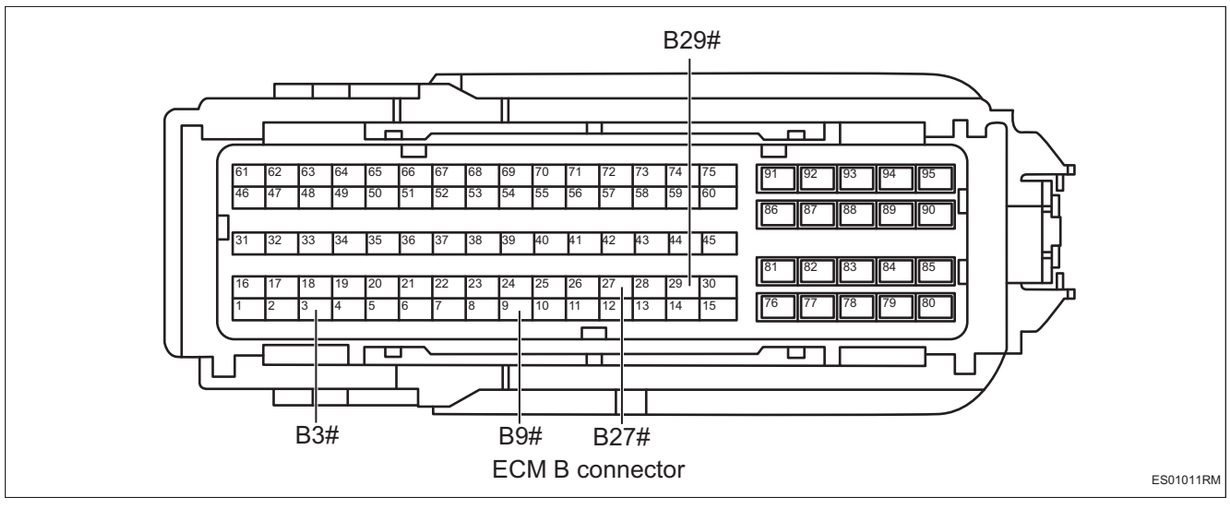
(a) Check whether the charge air pressure and temperature sensor is installed correctly.

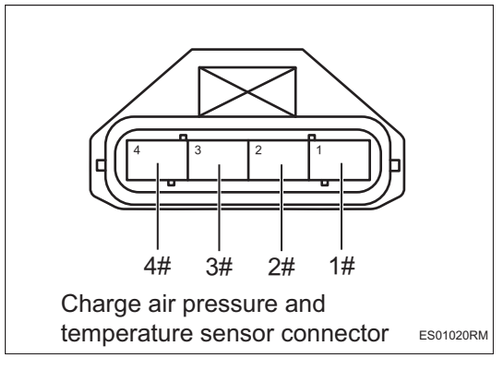
(b) Check whether the charge air pressure and temperature sensor is soiled.

NG → **Repair according to the fault**

OK

3	**Check charge air pressure and temperature sensor harness and connector for open circuit**





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the charge air pressure and temperature sensor connector.

(e) Measure the resistance according to the values in the table below.

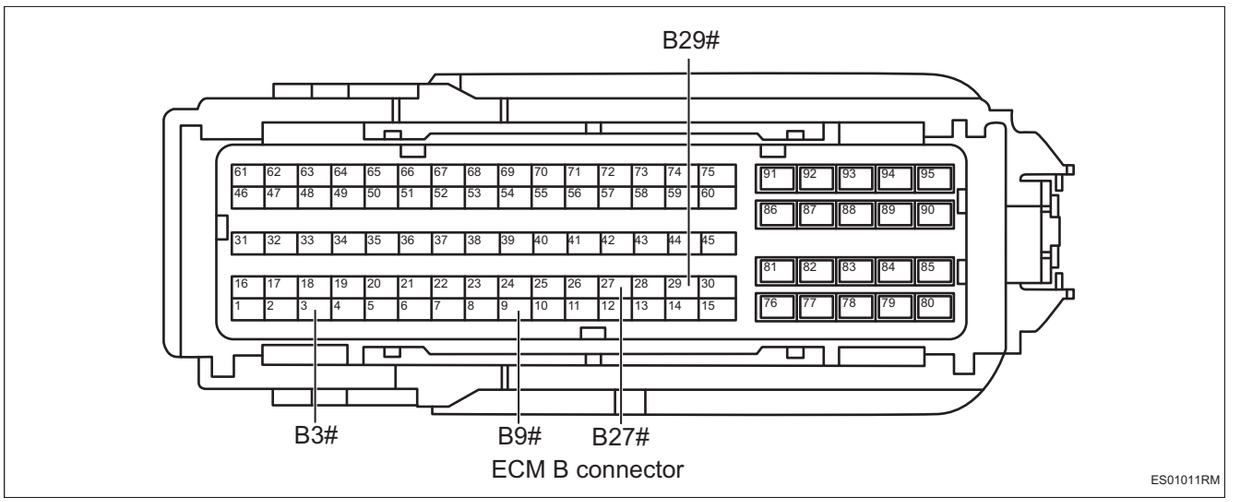
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B27# - charge air pressure and temperature sensor connector 1#	Always connected	Less than 1Ω
ECM connector B3# -charge air pressure and temperature sensor 2#	Always connected	Less than 1Ω
ECM connector B29# - charge air pressure and temperature sensor connector 3#	Always connected	Less than 1Ω
ECM connector B9# - charge air pressure and temperature sensor connector 4#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check charge air pressure and temperature sensor harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

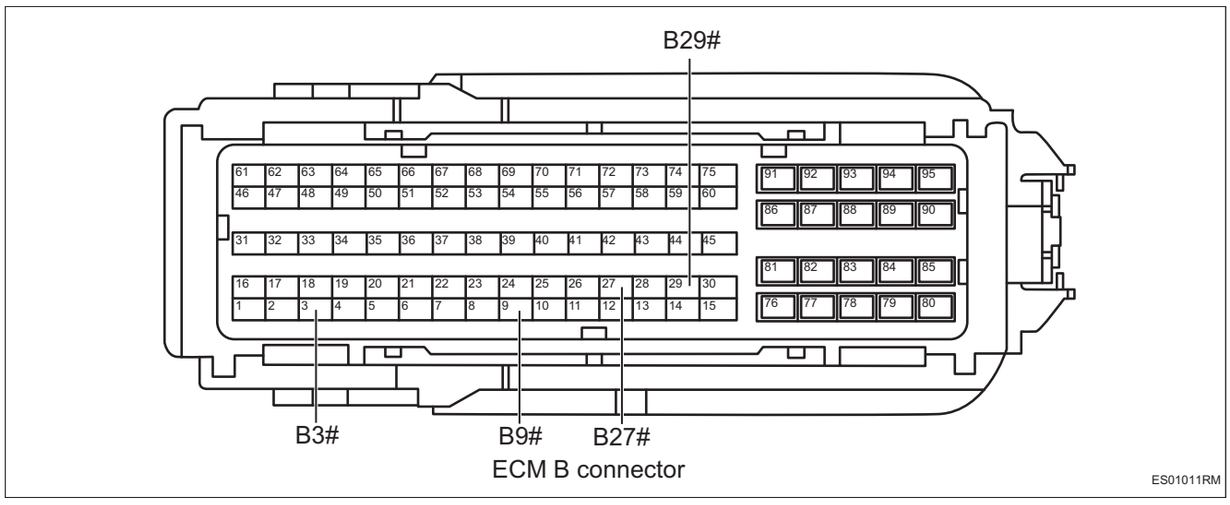
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B27# - body GND	Always connected	10 KΩ or greater
ECM connector B3# -body GND	Always connected	10 KΩ or greater
ECM connector B29# -body GND	Always connected	10 KΩ or greater
ECM connector B9# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	**Check charge air pressure and temperature sensor harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

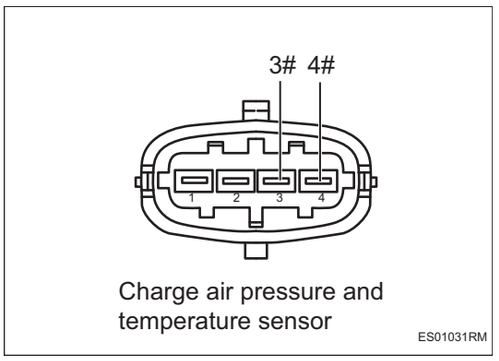
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B27# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B3# -body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B29# -body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B9# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Check charge air pressure and temperature sensor**



Charge air pressure and temperature sensor
ES01031RM

(a) Measure the resistance according to the values in the table below.

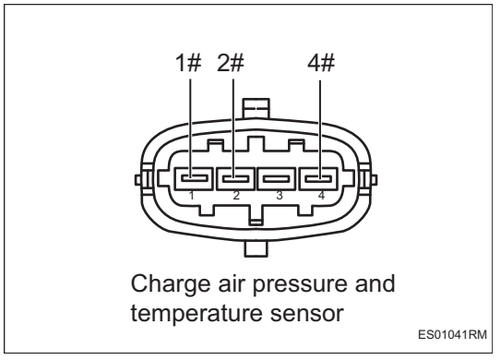
Standard value

Detector connection	Detection conditions	Specified state
Charge air pressure and temperature sensor #3 -charge air pressure and temperature sensor #4	20 ℃	About 2.5 KΩ ± 5%

NG → **Replace charge air pressure and temperature sensor (See page IT-10)**

OK

7	Check charge air pressure and temperature sensor



Charge air pressure and temperature sensor
ES01041RM

(a) Set the ignition switch to "OFF".

(b) Connect charge air pressure and temperature sensor connector.

(c) Connect ECM connector.

(d) Connect the battery negative terminal.

(e) Start engine.

(f) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Charge air pressure and temperature sensor #2 -charge air pressure and temperature sensor #4	idle speed	About 5 V
Charge air pressure and temperature sensor #1 -charge air pressure and temperature sensor #4	Throttle is opened quickly	Instantly reach about 4 V, then drop to about 1.5 V

NG → **Replace charge air pressure and temperature sensor (See page IT-10)**

OK

8	Replace the ECM (See page ES-450)

DTC	**P121200**	**Vehicle speed sensor performance failure (vehicle speed above upper limit)**
DTC	**P050000**	**Vehicle speed sensor input signal failure**
DTC	**P050165**	**Vehicle speed sensor performance failure (vehicle speed low during coasting with fuel off)**
DTC	**P050166**	**Vehicle speed implausible - Low vehicle speed during high engine load**

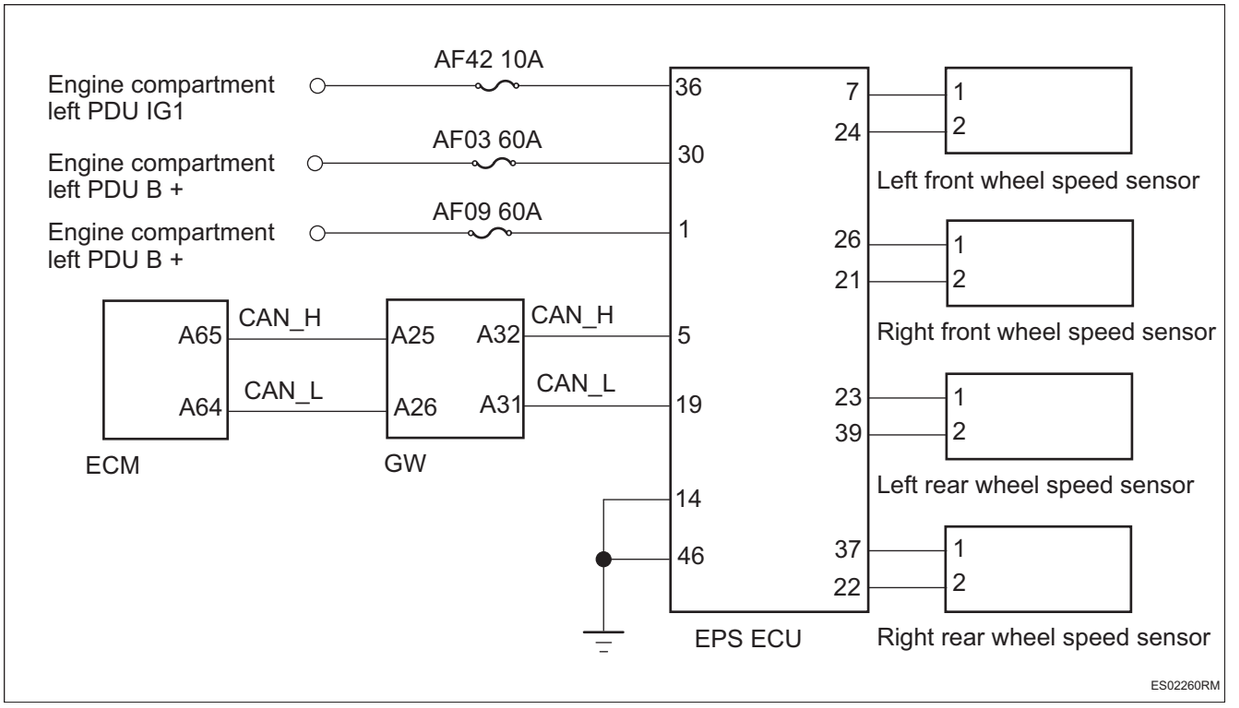
Description

In case of short or open circuit, abnormal signal or communication of the wheel speed sensor, the ECM will record the DTC.

DTC	DTC detection conditions	Faulty location
P121200	(a) Vehicle speed sensor performance failure.	• ECM • Harness and connector • GW • GW • ESC • Wheel speed sensor
P050000	(a) Vehicle speed sensor input signal failure.	• ECM • Harness and connector • GW • GW • ESC • Wheel speed sensor
P050165	(a) Vehicle speed sensor performance failure.	• ECM • Harness and connector • GW • GW • ESC • Wheel speed sensor
P050166	(a) Vehicle speed implausible.	• ECM • Harness and connector • GW • GW • ESC • Wheel speed sensor

ES

Circuit diagram



Inspection procedure

1	Check vehicle tire

(a) Check whether the tire air pressure is insufficient.

(b) Check whether the tire size meets the specification.

(c) Check whether the tires are seriously worn.

NG → **Repair according to the fault**

OK

2	Check the wheel speed sensor signal ring gear

(a) Check whether the gap between wheel speed sensor and ring gear is correct.

(b) Check the wheel speed sensor ring gear for dirt and foreign matter.

(c) Check each wheel speed sensor ring gear for damage.

NG → **Repair according to the fault**

OK

3	**Check wheel speed sensor harness and connector**

(a) Check whether the wheel speed sensor harness and connector are properly connected.

(b) Check the wheel speed sensor harness and connector for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

4	**Check wheel speed sensor**

(a) Check whether the wheel speed sensor is installed correctly.

(b) Check whether the wheel speed sensor is damaged.

NG → **Replace wheel speed sensor**

OK

5	**Check chassis CAN bus (GW-ESC)**

(a) Check the CAN line for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

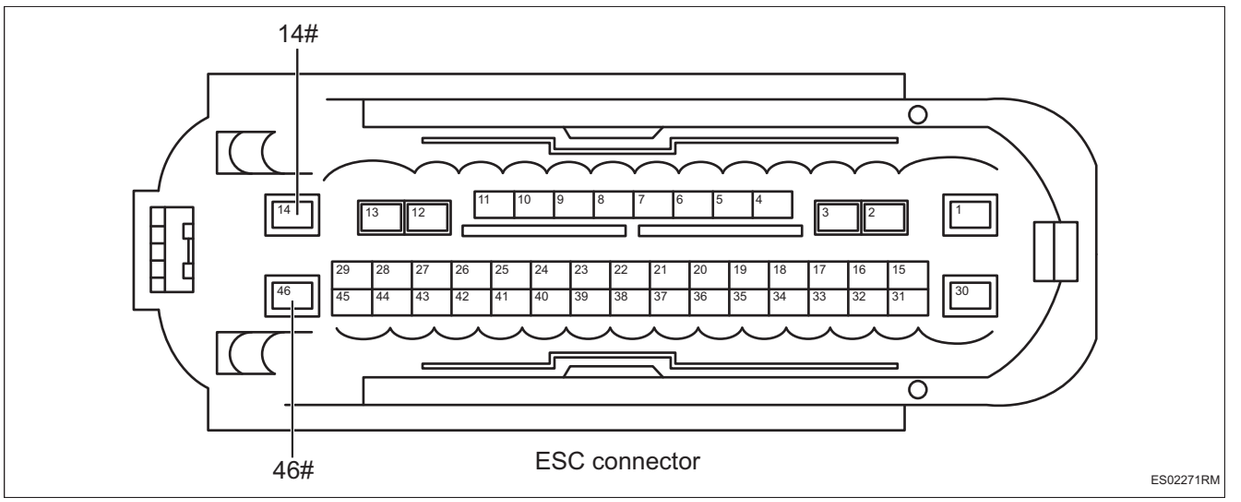
6	**Check powertrain CAN bus (ECM-GW)**

(a) Check the CAN line for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

7	**Check ESC ground**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ESC connector.

(d) Measure the resistance according to the values in the table below.

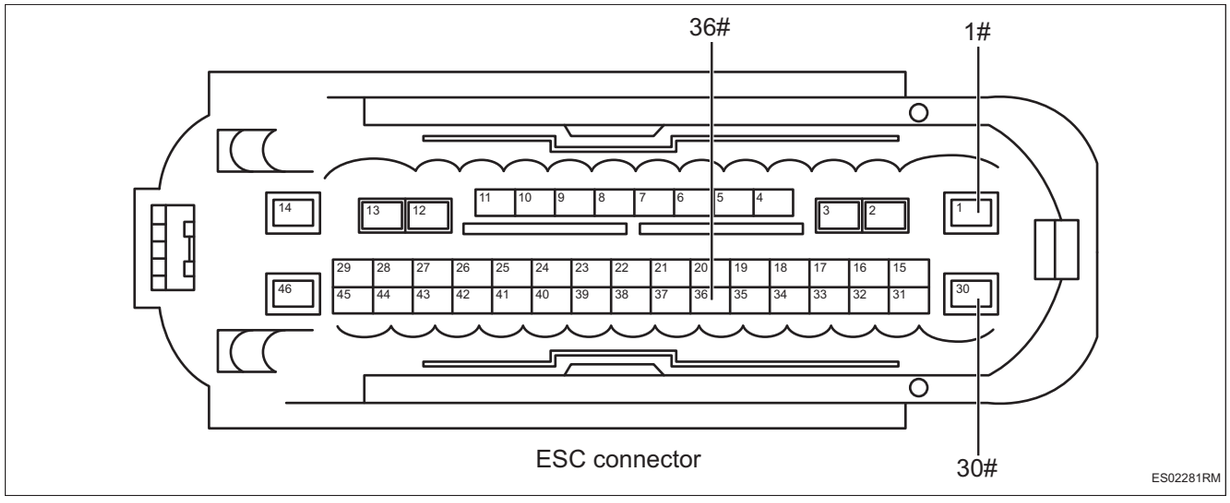
Standard value

Detector connection	Detection conditions	Specified state
ESC connector 14# - body GND	Always connected	Less than 1Ω
ESC connector 46# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

8	**Check the ESC power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

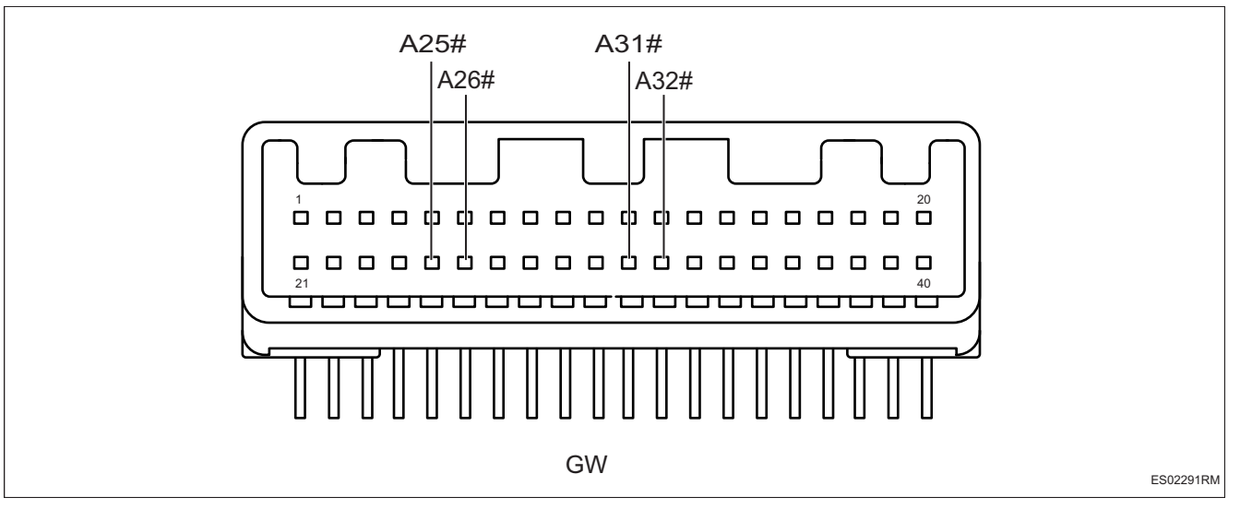
Standard value

Detector connection	Detection conditions	Specified state
ESC connector 1# - body GND	Set the ignition switch to "ON"	Battery voltage
ESC connector 30# - body GND	Set the ignition switch to "ON"	Battery voltage
ESC connector 36# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector, relay and fuse**

OK

9	**Check GW terminal resistor**



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
GW 31#- GW 32#	Always connected	About 120 Ω
GW 25#- GW 26#	Always connected	About 120 Ω

NG → **Replace GW (See page CA-256)**

OK

10	**Replace ESC (See page BC-87)**

(a) Replace the ESC.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

11	**End**

DTC	P019000	High-pressure fuel rail pressure sensor voltage signal implausible
DTC	P019128	Negative deviation of characteristic curve of high-pressure fuel rail pressure sensor
DTC	P019129	Positive deviation of characteristic curve of high-pressure fuel rail pressure sensor
DTC	P019200	High-pressure fuel rail pressure sensor circuit undervoltage
DTC	P019300	High-pressure fuel rail pressure sensor circuit overvoltage
DTC	P019400	High-pressure fuel rail pressure sensor signal stuck
DTC	P127000	Rail pressure signal of high-pressure fuel rail pressure sensor above upper limit

Description

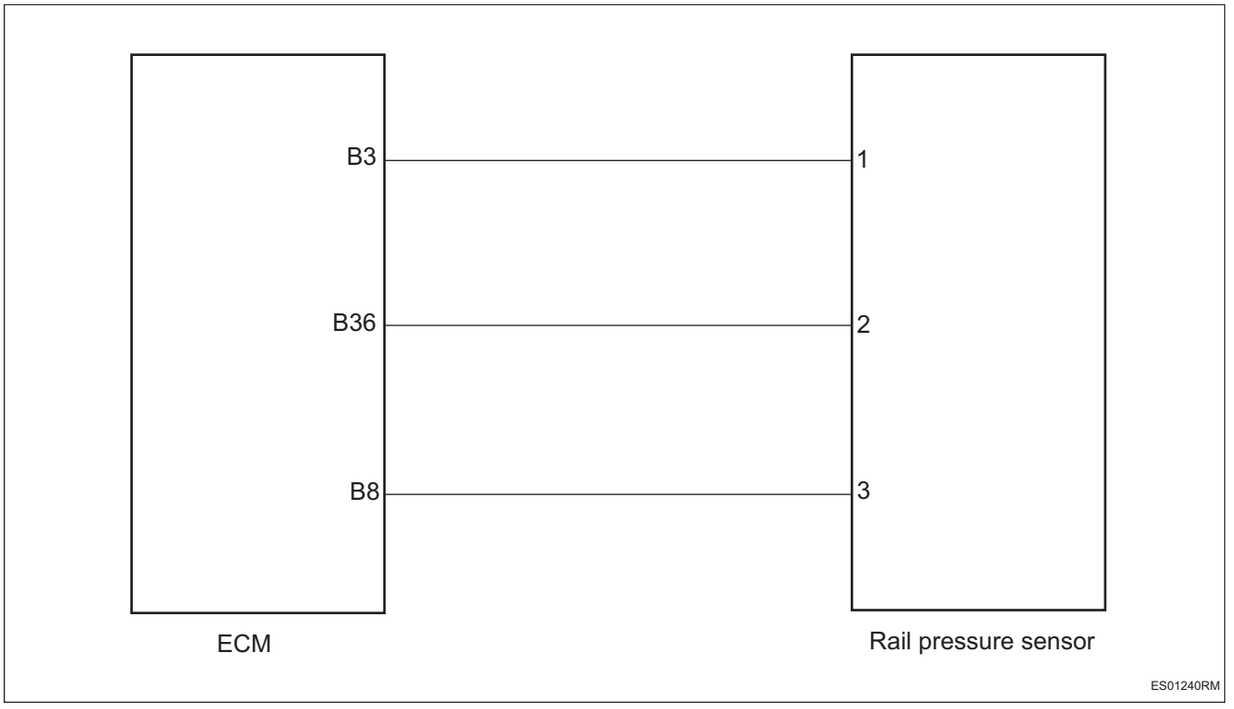
When the rail pressure sensor signal is abnormal or the circuit is shorted or open, the ECM will record the DTC.

DTC	DTC detection conditions	Faulty location
P019000	(a) Fuel rail pressure sensor circuit voltage below 0.2 V or above 4.8 V.	• ECM • Harness and connector • Rail pressure sensor
P019128	(a) Negative offset of characteristic curve of rail pressure sensor.	• ECM • Harness and connector • Fuel rail • Rail pressure sensor
P019129	(a) Positive offset of characteristic curve of rail pressure sensor.	• ECM • Harness and connector • Rail pressure sensor
P019200	(a) Fuel rail pressure sensor circuit voltage below 0.2 V.	• ECM • Harness and connector • Rail pressure sensor
P019300	(a) Fuel rail pressure sensor circuit voltage above 4.8 V.	• ECM • Harness and connector • Rail pressure sensor
P019400	(a) Maximum fluctuation value of rail pressure sensor signal voltage before and after fuel injection below threshold.	• ECM • Harness and connector • Rail pressure sensor

ES

DTC	DTC detection conditions	Faulty location
P127000	(a) Rail pressure signal of high-pressure fuel rail pressure sensor above upper limit.	• ECM • Harness and connector • Rail pressure sensor • High-pressure fuel pump

Circuit diagram



Inspection procedure

1	Check high-pressure fuel rail

(a) Check whether the fuel injector is blocked or damaged.

(b) Check whether there is gas inside the fuel rail.

(c) Check whether the fuel rail is deformed or damaged.

NG → **Repair according to the fault**

OK

2	Check the high-pressure fuel pump

(a) Check whether the high-pressure fuel pump is damaged.

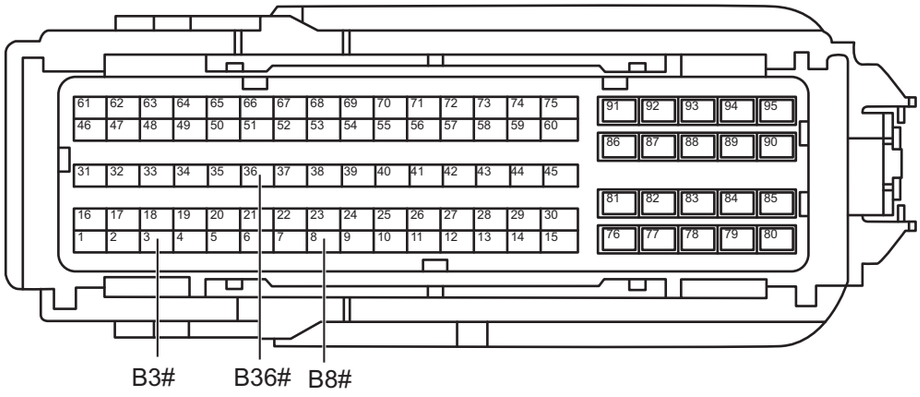
(b) Check if the high-pressure fuel pump relief valve fails to relieve pressure.

NG → **Repair according to the fault**

OK

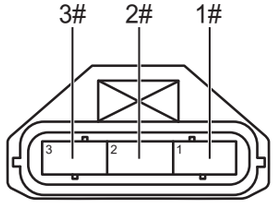
ES

3	Check rail pressure sensor harness and connector for open circuit



ECM B connector

ES00831RM



Rail pressure sensor connector

ES00840RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the rail pressure sensor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

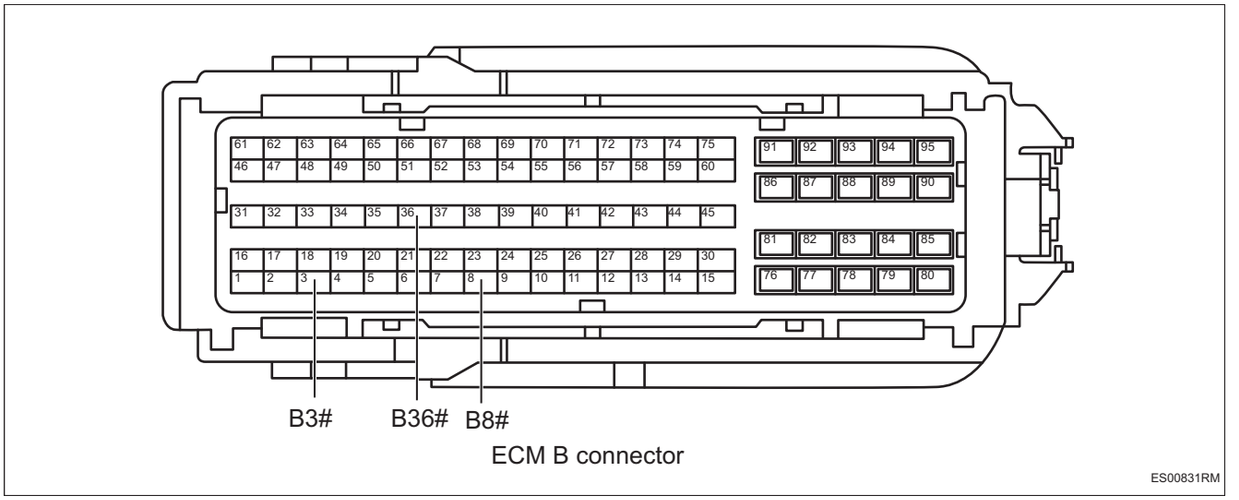
Detector connection	Detection conditions	Specified state
ECM connector B3# -rail pressure sensor connector 1#	Always connected	Less than 1Ω
ECM connector B36# -rail pressure sensor connector 2#	Always connected	Less than 1Ω
ECM connector B8# -rail pressure sensor connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	Check rail pressure sensor harness and connector for circuit shorted to ground

ES



(a) Measure the resistance according to the values in the table below.

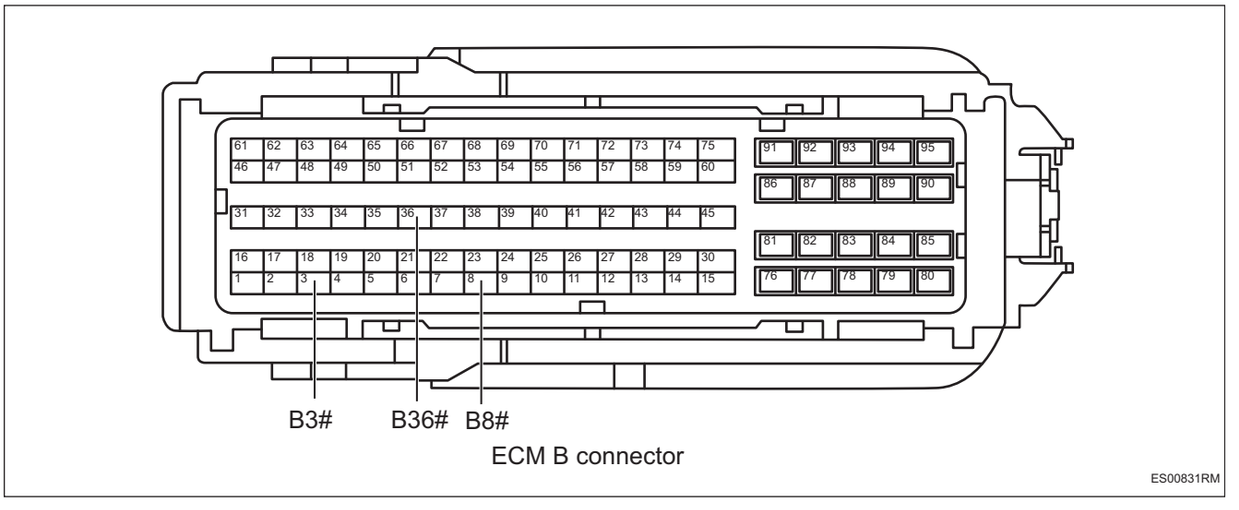
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B3# -body GND	Always connected	10 KΩ or greater
ECM connector B36# - body GND	Always connected	10 KΩ or greater
ECM connector B8# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

5	**Check rail pressure sensor harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B3# -body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B36# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B8# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Replace the rail pressure sensor (See page FU-4)**

(a) Replace the rail pressure sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC 10 min after starting the vehicle.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

7	**End**

ES

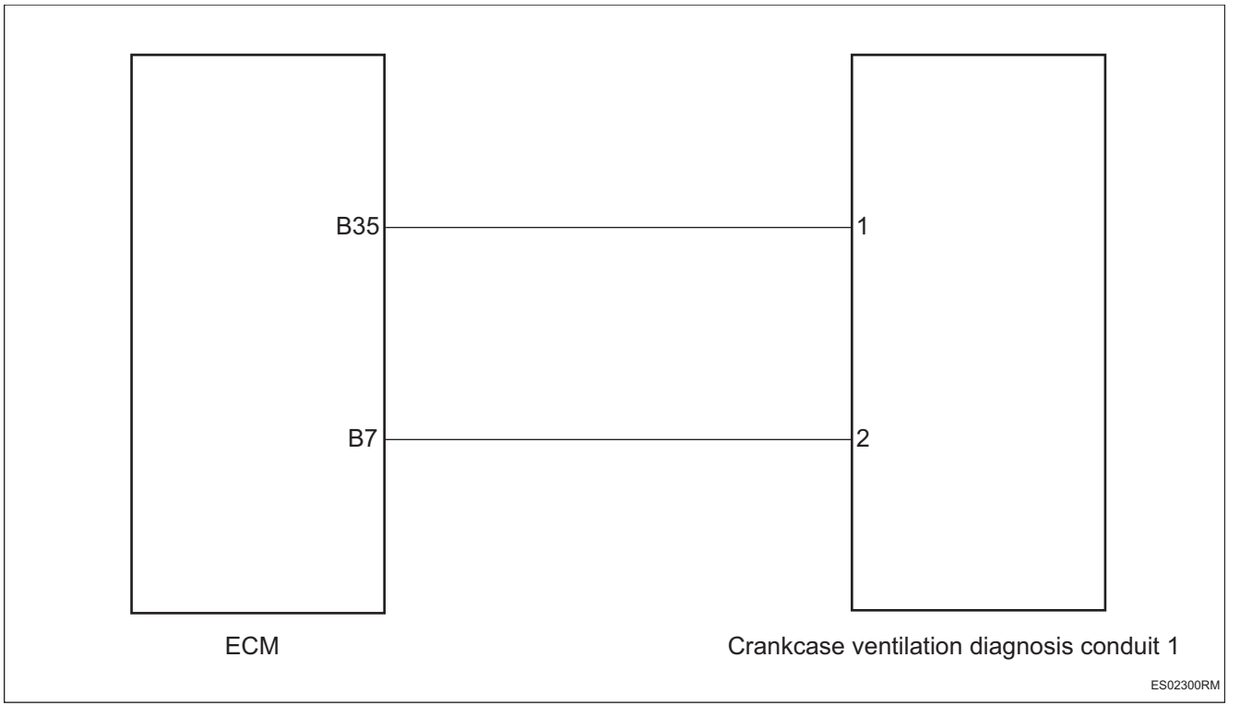
DTC	P12C200	Crankcase ventilation pipe diagnosis circuit overvoltage
DTC	P12C300	Crankcase ventilation pipe diagnosis circuit undervoltage

Description

When the crankcase ventilation diagnosis conduit 1 circuit voltage is out of the normal range, the ECM records the DTC.

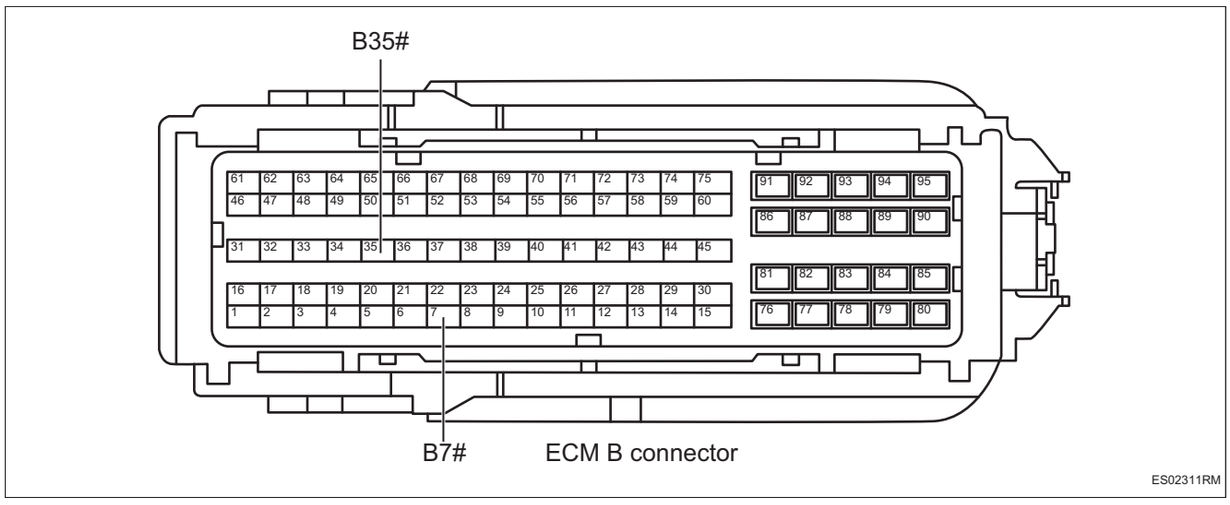
DTC	DTC detection conditions	Faulty location
P12C200	(a) Ventilation pipe diagnostic circuit voltage high.	• ECM • Harness and connector • Crankcase ventilation diagnosis conduit 1
P12C300	(a) Ventilation pipe diagnostic circuit voltage low.	• ECM • Harness and connector • Crankcase ventilation diagnosis conduit 1

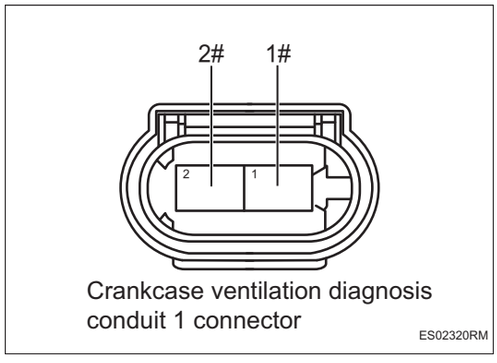
Circuit diagram



Inspection procedure

1	Check crankcase ventilation diagnosis conduit 1 harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the crankcase ventilation diagnosis conduit 1 connector.

(e) Measure the resistance according to the values in the table below.

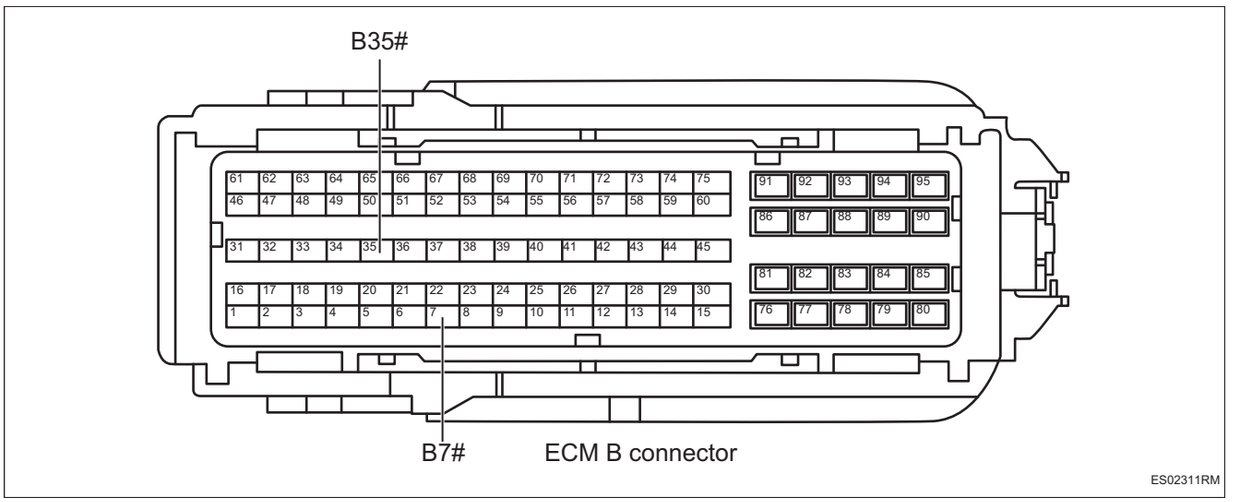
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B35# -crankcase ventilation diagnosis conduit 1 connector 1#	Always connected	Less than 1Ω
ECM connector B7# -crankcase ventilation diagnosis conduit 1 connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check crankcase ventilation diagnosis conduit 1 harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

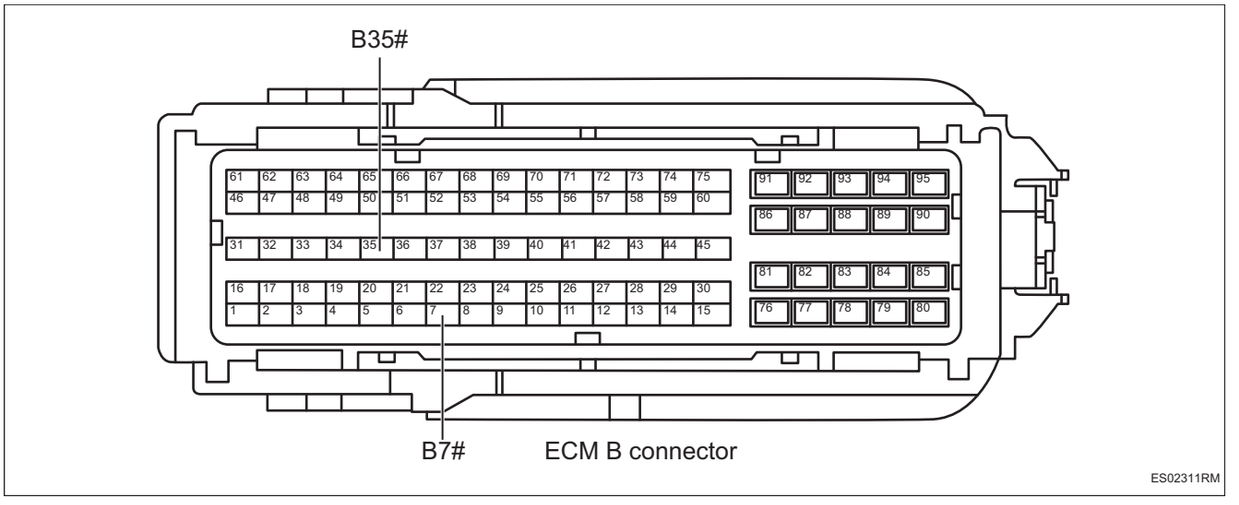
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B35# - body GND	Always connected	10 KΩ or greater
ECM connector B7# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check crankcase ventilation diagnosis conduit 1 harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B35# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B7# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the crankcase ventilation diagnosis conduit 1 (See page EC-5)**

(a) Replace the crankcase ventilation diagnosis conduit 1.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

5	**End**

DTC	P139D00	TMM position sensor signal value out of range (SENT input)
DTC	P139C00	TMM position sensor signal fault (SENT signal wire shorted to power supply)
DTC	P139B00	TMM position sensor signal fault (SENT signal line shorted to ground)
DTC	P139A00	TMM position sensor signal fault (communication protocol not satisfied)
DTC	P139E00	TMM position sensor closed position self-learning out of limit
DTC	P26CD00	TMM control circuit overvoltage or undervoltage
DTC	P170100	TMM control circuit overcurrent
DTC	P170200	TMM control circuit communication failure
DTC	P26CA00	TMM control circuit open
DTC	P138E00	TMM valve body stuck

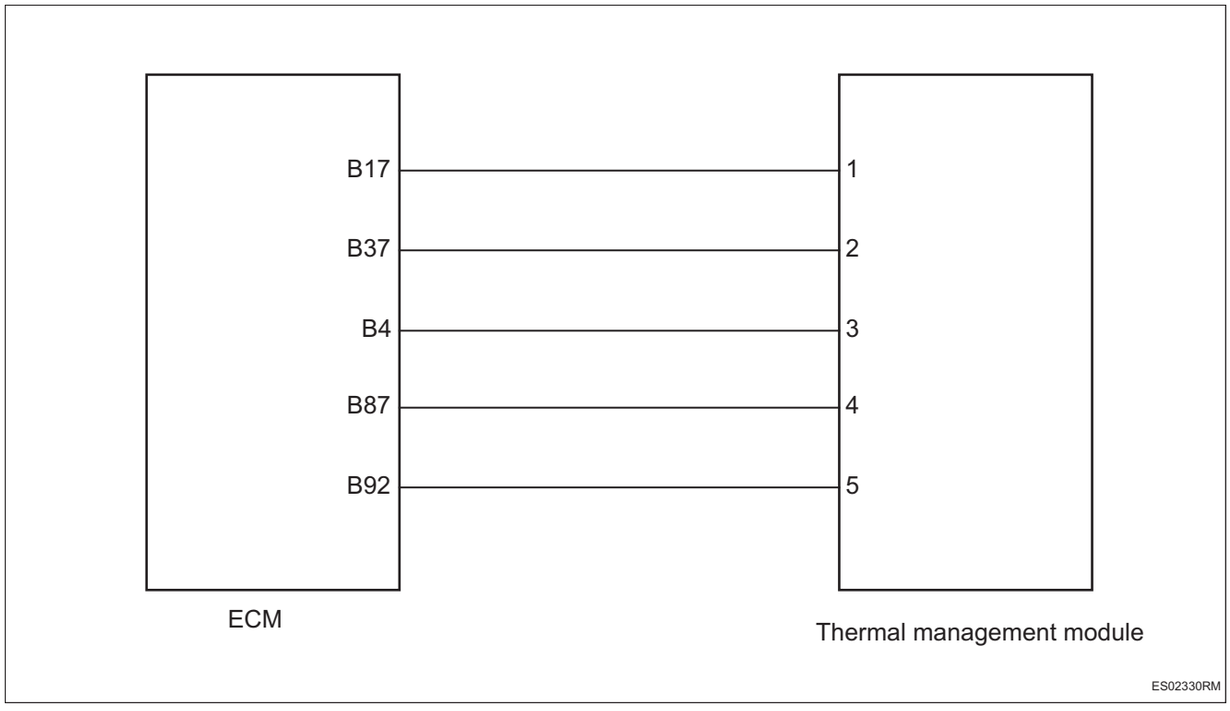
Description

When the thermal management module signal is abnormal, circuit is shorted or open, and the communication with the ECM is abnormal, the ECM will record the DTC.

DTC	DTC detection conditions	Faulty location
P139D00	(a) The TMM position sensor signal status value is out of range.	• Harness and connector • Thermal management module
P139C00	(a) TMM position sensor signal wire shorted to power supply.	• ECM • Harness and connector • Thermal management module
P139B00	(a) TMM position sensor signal wire shorted to ground.	• ECM • Harness and connector • Thermal management module
P139A00	(a) Failure to meet TMM position sensor signal wire communication protocol.	• Harness and connector • Thermal management module
P139E00	(a) TMM position sensor closed position self-learning out of limit.	• Harness and connector • Thermal management module
P26CD00	(a) TMM control circuit overvoltage or undervoltage.	• ECM • Harness and connector • Thermal management module
P170100	(a) TMM control circuit overcurrent.	• ECM • Harness and connector

DTC	DTC detection conditions	Faulty location
P170200	(a) TMM control circuit communication failure.	• ECM • Harness and connector • Thermal management module
P26CA00	(a) TMM control circuit open.	• ECM • Harness and connector • Thermal management module
P138E00	(a) TMM valve body stuck	• Harness and connector • Thermal management module

Circuit diagram



Inspection procedure

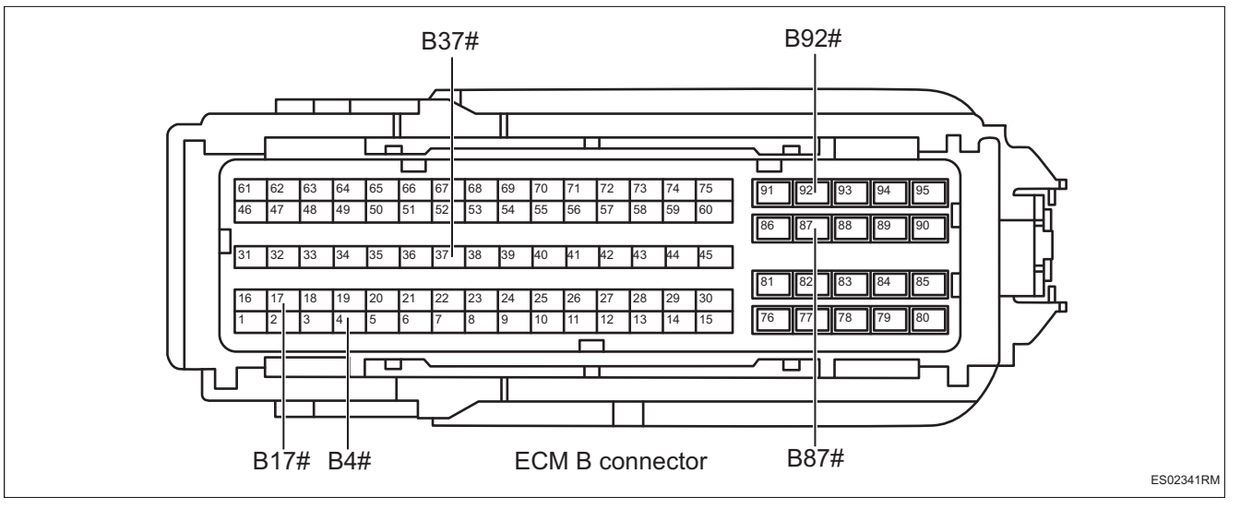
1	**Check the thermal management module**

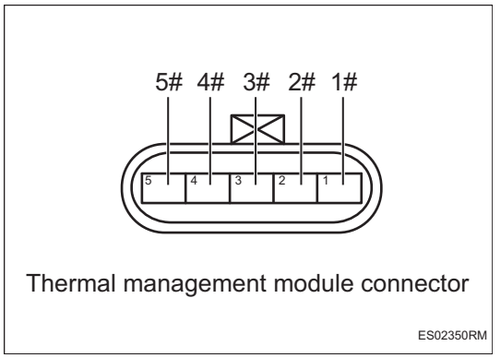
(a) Check whether the thermal management module is damaged.

NG → **Repair according to the fault**

OK

2	**Check thermal management module harness and connector for open circuit**





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the thermal management module connector.

(e) Measure the resistance according to the values in the table below.

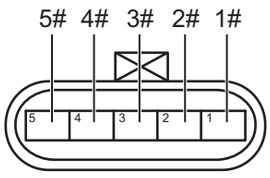
Standard value

Detector connection	Detection conditions	Specified state
Thermal management module connector 1# - ECM connector B17#	Always connected	Less than 1Ω
Thermal management module connector 2# - ECM connector B37#	Always connected	Less than 1Ω
Thermal management module connector 3# - ECM connector B4#	Always connected	Less than 1Ω
Thermal management module connector 4# - ECM connector B87#	Always connected	Less than 1Ω
Thermal management module connector 5# - ECM connector B92#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check thermal management module harness and connector for circuit shorted to each other**



Thermal management module connector

ES02350RM

(a) Measure the resistance according to the values in the table below.

Standard value

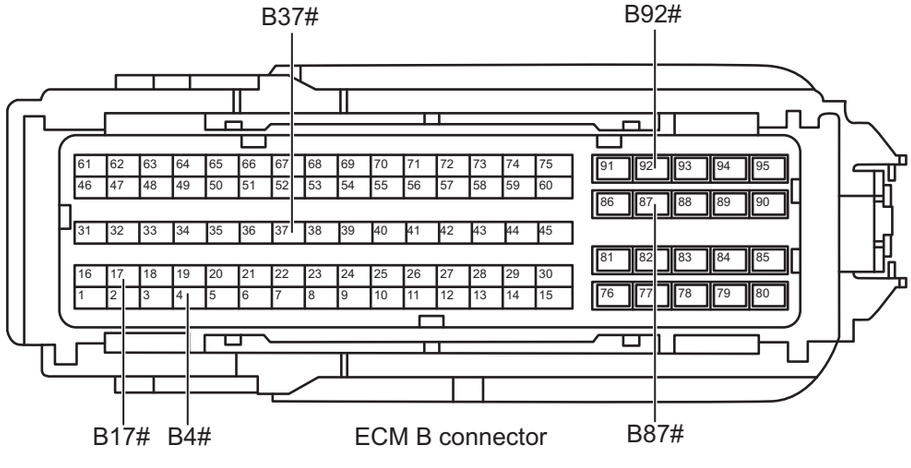
Detector connection	Detection conditions	Specified state
Thermal management module connector 1# - Thermal management module connector 2#	Always connected	10 KΩ or greater
Thermal management module connector 1# - Thermal management module connector 3#	Always connected	10 KΩ or greater
Thermal management module connector 1# - Thermal management module connector 4#	Always connected	10 KΩ or greater
Thermal management module connector 1# - Thermal management module connector 5#	Always connected	10 KΩ or greater
Thermal management module connector 2# - Thermal management module connector 3#	Always connected	10 KΩ or greater
Thermal management module connector 2# - Thermal management module connector 4#	Always connected	10 KΩ or greater
Thermal management module connector 2# - Thermal management module connector 5#	Always connected	10 KΩ or greater
Thermal management module connector 3# - Thermal management module connector 4#	Always connected	10 KΩ or greater
Thermal management module connector 3# - Thermal management module connector 5#	Always connected	10 KΩ or greater
Thermal management module connector 4# - Thermal management module connector 5#	Always connected	10 KΩ or greater

ES

NG → **Repair or replace the harness and connector**

OK

4	**Check thermal management module harness and connector for circuit shorted to ground**



ES02341RM

ES

(a) Measure the resistance according to the values in the table below.

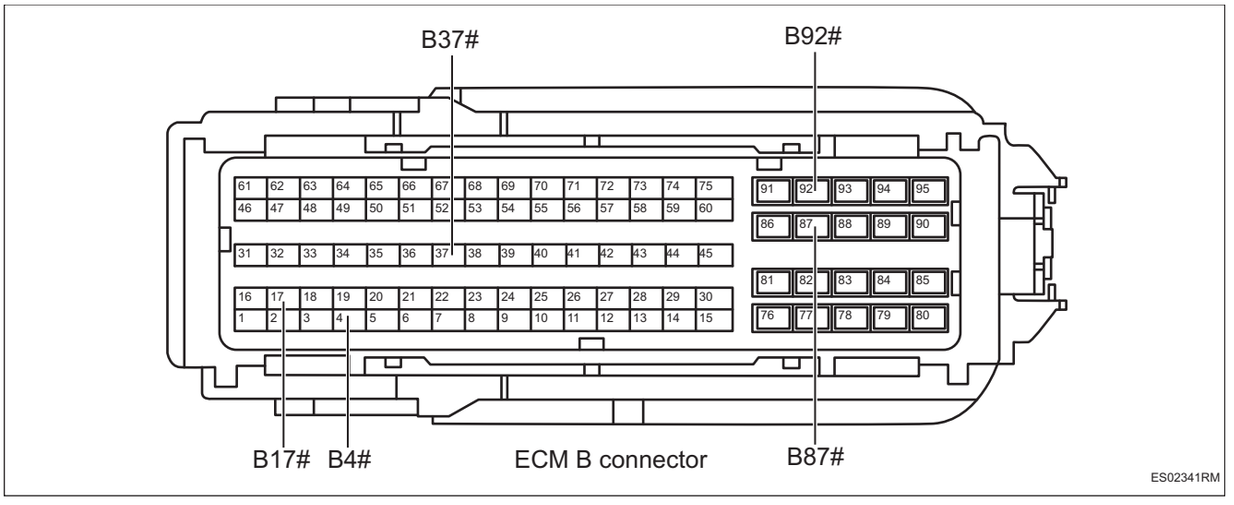
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B17# - body GND	Always connected	10 KΩ or greater
ECM connector B37# - body GND	Always connected	10 KΩ or greater
ECM connector B4# - body GND	Always connected	10 KΩ or greater
ECM connector B87# - body GND	Always connected	10 KΩ or greater
ECM connector B92# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	**Check thermal management module harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B17# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B37# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B4# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B87# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B92# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Replace the thermal management module (See page CO-25)**

(a) Replace the thermal management module.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

7	**End**

DTC	P142000	CAN hardware register response timeout
DTC	P142100	LIN hardware register response timeout

ES

Description

When the internal operation of the ECM is abnormal, the ECM records the DTC.

DTC	DTC detection conditions	Faulty location
P142000	(a) CAN hardware register response time-out.	• ECM
P142100	(a) LIN hardware register response timeout.	• ECM

Inspection procedure

1	Power off the control unit and clear the DTC

(a) Set the ignition switch to "OFF" until the ECM is fully powered off.

(b) Connect the HQ-VDS.

(c) Set the ignition switch to "ON".

(d) Clear the DTC.

(e) Re-read the DTC.

Criteria:

no DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

2	End

DTC	P14AE00	Starter feedback voltage signal line (KL50r) circuit shorted to power supply or R1 relay stuck
DTC	P14AF00	Starter feedback voltage signal line (KL50r) circuit shorted to ground
DTC	P26F200	Drive chain status relay R2 (PT State Relay) stuck closed
DTC	P26F100	Crank relay R1 or PT state relay R2 stuck open
DTC	P14AC00	Starter damage or starter power supply circuit interrupted
DTC	P14AD00	Engine stalling or starter failure to mesh with flywheel

Description

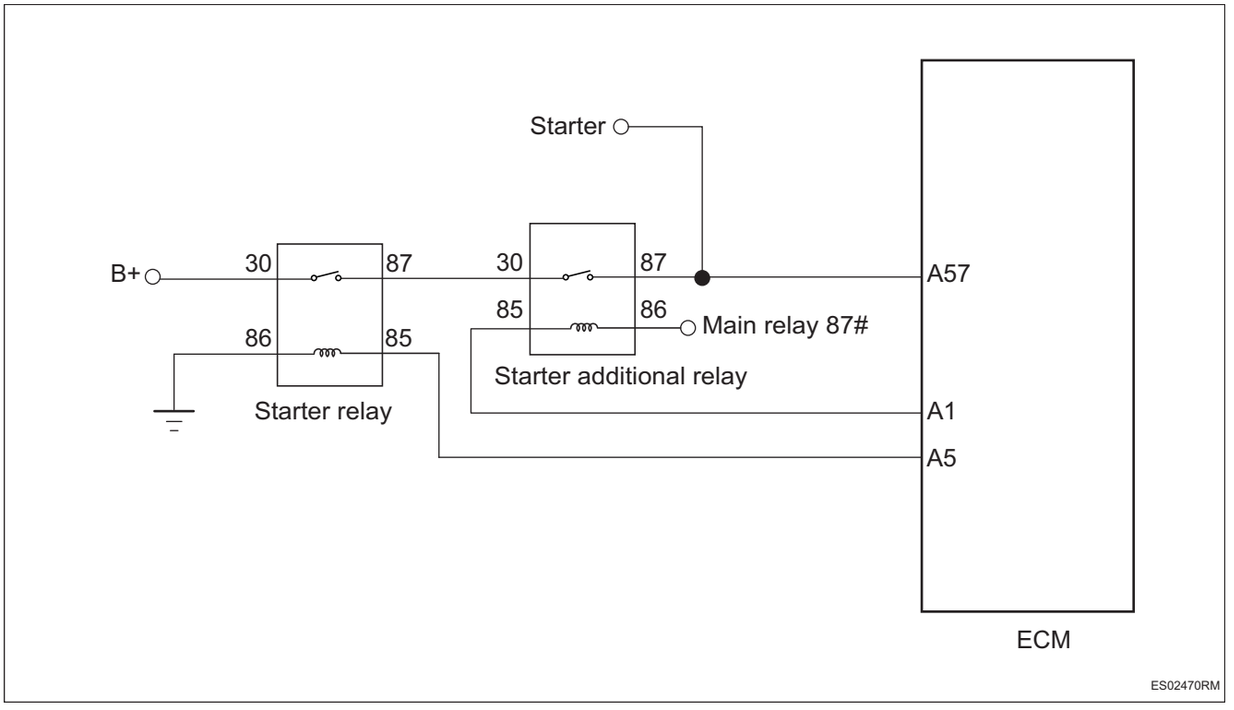
When the circuits of starter additional relay and starter relay are shorted or open and the start is abnormal, the ECM records the DTC.

DTC	DTC detection conditions	Faulty location
P14AE00	(a) Abnormal relay operation.	• ECM • Harness and connector • Starter relay • Starter additional relay • Starter • Engine mechanical system
P14AF00	(a) Abnormal relay operation.	• ECM • Harness and connector • Starter additional relay • Starter • Engine mechanical system
P26F200	(a) Abnormal relay operation.	• ECM • Harness and connector • Starter additional relay
P26F100	(a) Abnormal relay operation.	• ECM • Harness and connector • Starter relay • Starter additional relay
P14AC00	(a) Starting abnormal.	• ECM • Harness and connector • Starter additional relay • Starter • Engine mechanical system

ES

DTC	DTC detection conditions	Faulty location
P14AD00	(a) Starting abnormal.	• ECM • Harness and connector • Starter relay • Starter additional relay • Starter • Engine mechanical system

Circuit diagram



Inspection procedure

1	Check starter

(a) Check whether the starter ground and positive wire are tightly connected.

(b) Check whether the starter is damaged.

(c) Check whether the starter is installed correctly.

NG → **Repair according to the fault**

OK

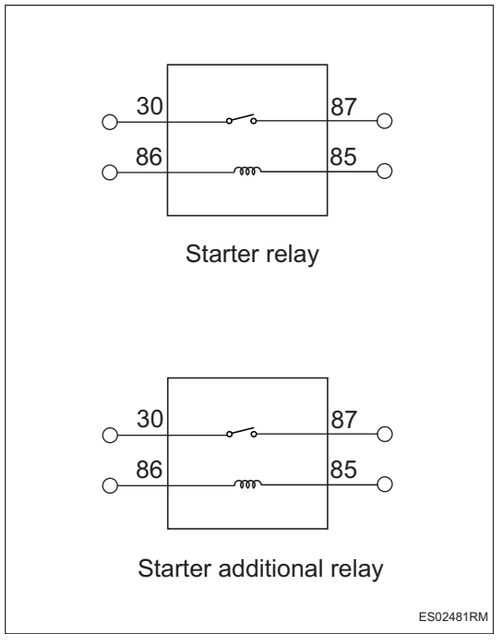
2	Check the engine

(a) Check the engine for stalling.

NG → **Repair according to the fault**

OK

3	Check the starter relay/starter additional relay



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Starter relay/starter additional relay.

(d) Measure the resistance according to the values in the table below.

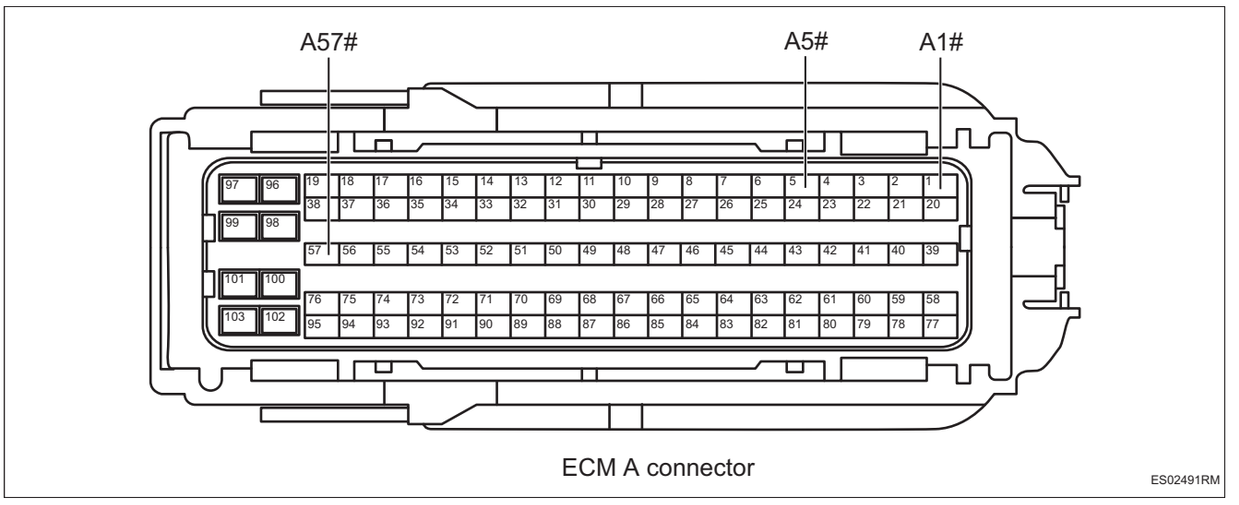
Standard value

Detector connection	Detection conditions	Specified state
Starter relay 30# -starter relay 87#	Apply battery voltage between 86# and 85#	Less than 1Ω
Starter relay 30# -starter relay 87#	No battery voltage is applied between 86# and 85#	10 KΩ or greater
Starter additional relay 30# -starter additional relay 87#	Apply battery voltage between 86# and 85#	Less than 1Ω
Starter additional relay 30# -starter additional relay 87#	No battery voltage is applied between 86# and 85#	10 KΩ or greater

NG → **Replace the starter relay/starter additional relay**

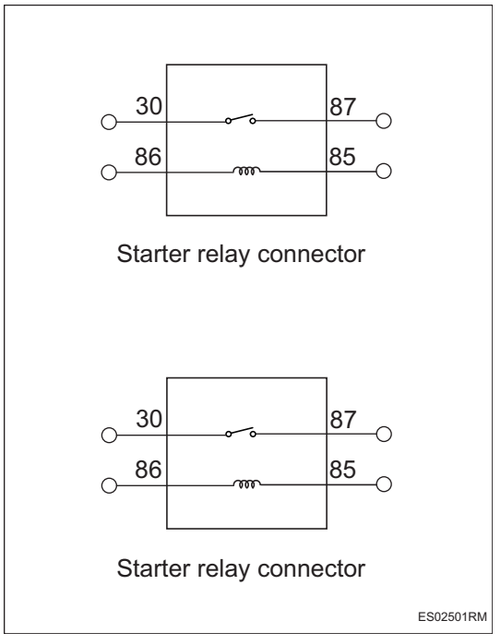
OK

4	Check starter relay/starter additional relay harness and connector for open circuit



ECM A connector

ES02491RM



ES02501RM

(a) Disconnect the ECM connector.

(b) Measure the resistance according to the values in the table below.

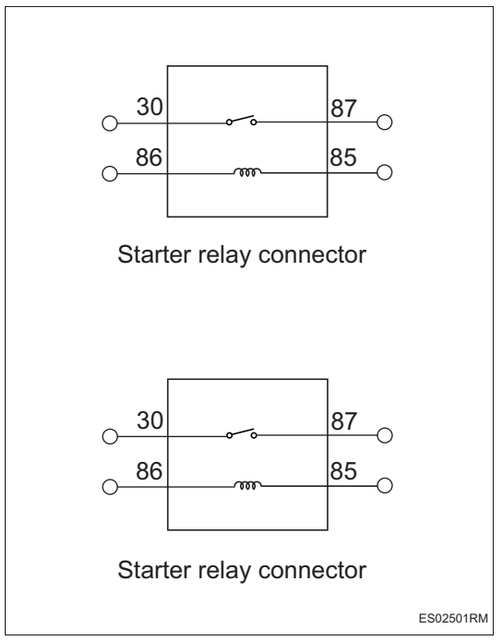
Standard value

Detector connection	Detection conditions	Specified state
Starter additional relay connector 87# -ECM connector A57#	Always connected	Less than 1Ω
Starter additional relay connector 85# -ECM connector A1#	Always connected	Less than 1Ω
Starter relay connector 85# -ECM connector A5#	Always connected	Less than 1Ω
Starter relay connector 87# - starter additional relay connector 30#	Always connected	Less than 1Ω

NG → **Repair or replace harness and connector and fuse**

OK

5	**Check starter relay/starter additional relay harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

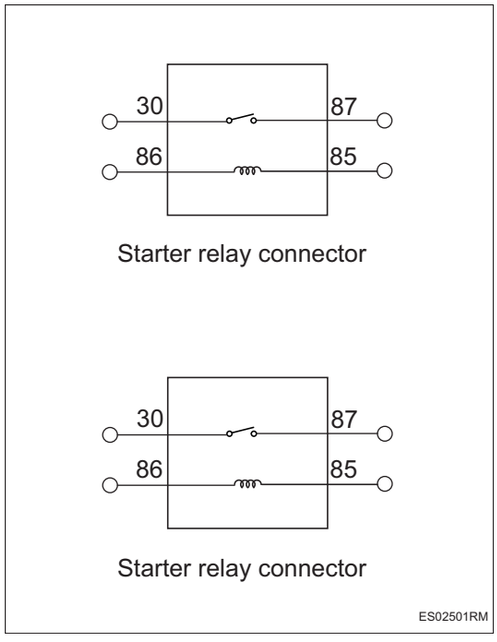
Detector connection	Detection conditions	Specified state
Starter additional relay connector 87# - body GND	Always connected	10 KΩ or greater
Starter additional relay connector 85# - body GND	Always connected	10 KΩ or greater
Starter relay connector 87# - body GND	Always connected	10 KΩ or greater
Starter relay connector 85# - body GND	Always connected	10 KΩ or greater

ES

NG **Repair or replace the harness and connector**

OK

6	Check starter relay/starter additional relay harness and connector for circuit shorted to power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Starter additional relay connector 87# - body GND	Set the ignition switch to "ON"	Less than 1 V
Starter additional relay connector 85# - body GND	Set the ignition switch to "ON"	Less than 1 V
Starter relay connector 87# - body GND	Set the ignition switch to "ON"	Less than 1 V
Starter relay connector 85# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG **Repair or replace the harness and connector**

OK

7	**Replace the ECM (See page ES-450)**

DTC	P153800	Ignition angle signal, harness or ECU fault
DTC	P152700	First layer safety fuel cutoff monitoring fault
DTC	P152800	Second layer safety fuel cutoff monitoring fault
DTC	P061C00	Second layer engine speed monitoring fault
DTC	P152900	Starter control monitoring fault
DTC	P153000	AD converter zero test monitoring fault
DTC	P153100	AD converter set voltage test monitoring fault
DTC	P157100	Drive stage check fault or communication failure in the shutdown path check
DTC	P157200	ABE activated at normal voltage
DTC	P157300	Monitoring error response fault
DTC	P157400	Errorpin activated with normal monitoring communication
DTC	P261000	Engine off timer implausible
DTC	P157500	DVE drive cutoff due to overvoltage

Description

The ECM records a DTC when there is a failure inside the ECM.

DTC	DTC detection conditions	Faulty location
P153800	(a) Ignition angle signal, harness or ECU failure.	• ECM
P152700	(a) Layer 1 safety fuel cutoff monitoring fault.	• ECM
P152800	(a) Layer 2 safety fuel cutoff monitoring fault.	• ECM
P061C00	(a) Second layer engine speed monitoring fault.	• ECM
P152900	(a) Starter control monitoring fault.	• ECM
P153000	(a) AD converter zero test monitoring fault.	• ECM
P153100	(a) AD converter set voltage test monitoring fault.	• ECM
P157100	(a) Drive stage check fault or communication failure in the shutdown path check.	• ECM
P157200	(a) ABE activated at normal voltage.	• ECM
P157300	(a) Monitoring error response fault.	• ECM

DTC	DTC detection conditions	Faulty location
P157400	(a) Errorpin activated with normal monitoring communication.	• ECM
P261000	(a) Engine off timer implausible.	• ECM
P157500	(a) DVE drive cutoff fault due to overvoltage	• ECM

ES

Inspection procedure

1	Clear the DTC

(a) Connect the HQ-VDS.

(b) Clear the DTC.

(c) Restart the vehicle and check whether the DTC is eliminated.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

2	End

DTC	P155000	Electronic throttle self-learning condition not met
DTC	P155100	Electronic throttle lower limit position initialization self-learning fault
DTC	P155600	Throttle mechanical BDC re-self-learning maximum error
DTC	P155700	Throttle mechanical BDC re-self-learning ninimum value error
DTC	P155800	Deviation of throttle limp home position from initial self-learning value out of limit
DTC	P155900	Throttle limp position above upper limit
DTC	P155A00	Deviation of throttle limp home position from last self-learning value out of limit
DTC	P155B00	Throttle limp position below lower limit

Description

When the electronic throttle does not match or fails to match, and there is an internal fault, the ECM records DTC.

DTC	DTC detection conditions	Faulty location
P155000	(a) Throttle self-learning conditions are not met.	• ECM • Harness and connector • Electronic throttle body
P155100	(a) Throttle lower limit position initialization self-learning fault.	• ECM • Harness and connector • Electronic throttle body
P155600	(a) Throttle mechanical BDC re-self-learning maximum error.	• ECM • Harness and connector • Electronic throttle body
P155700	(a) Throttle mechanical BDC re-self-learning minimum error.	• ECM • Harness and connector • Electronic throttle body
P155800	(a) Deviation of throttle limp home position from initial self-learning value out of limit.	• ECM • Harness and connector • Electronic throttle body
P155900	(a) Throttle limp position above upper limit.	• ECM • Harness and connector • Electronic throttle body
P155A00	(a) Deviation of throttle limp home position from last self-learning value out of limit.	• ECM • Harness and connector • Electronic throttle body

DTC	DTC detection conditions	Faulty location
P155B00	(a) Throttle limp position below lower limit.	• ECM • Harness and connector • Electronic throttle body

ES

Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2	Check electronic throttle body

(a) Check whether the electronic throttle body is damaged.

(b) Check whether the electronic throttle body is soiled.

(c) Check whether the electronic throttle body flap is stuck.

NG → **Repair according to the fault**

OK

3	Match the electronic throttle body

(a) Check if the vehicle speed is "0".

(b) Check whether the engine speed is "0".

(c) Check whether the battery voltage is between 10 V and 16 V.

(d) Check whether the intake air temperature is between 5°C and 100°C.

(e) Check whether the engine coolant temperature is between 5°C and 100°C.

(f) Use the HQ-VDS to trigger a throttle self-learning and observe whether the throttle can successfully complete the self-learning.

OK → End

NG

4	Replace the electronic throttle body (See page ES-461)

(a) Replace the electronic throttle body.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → Replace the ECM (See page ES-450)

OK

5	End

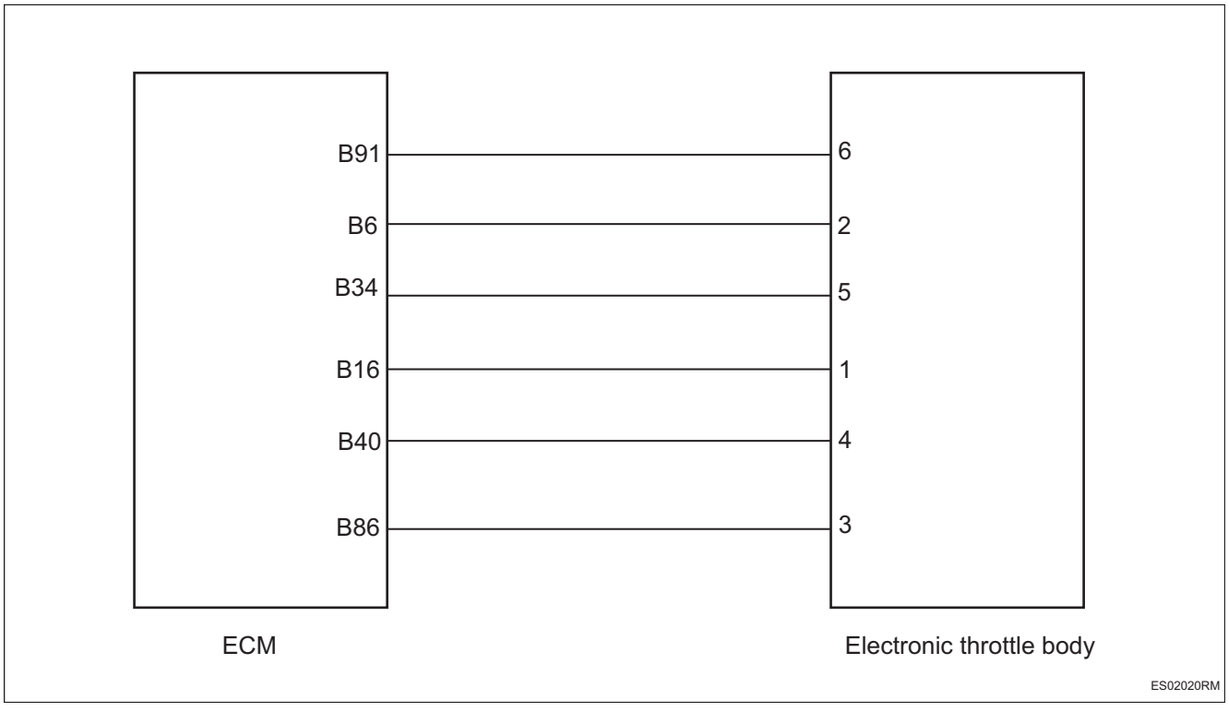
DTC	P155400	Return spring stuck in maximum position
DTC	P155500	Return spring stuck in minimum position
DTC	P156100	DVE position control deviation
DTC	P156000	Throttle body PID adjustment out of limit

Description

When the throttle is not turned on within the specified time or returns to a certain opening degree, or the deviation between target position and actual position is too large, and the duty cycle signal is abnormal and lasts for a certain time, the ECM will record DTC.

DTC	DTC detection conditions	Faulty location
P155400	(a) Return spring failure.	• ECM • Harness and connector • Electronic throttle body
P155500	(a) Return spring failure.	• ECM • Harness and connector • Electronic throttle body
P156100	(a) DVE position control deviation error.	• ECM • Harness and connector • Electronic throttle body
P156000	(a) Throttle body PID adjustment out of limit.	• ECM • Harness and connector • Electronic throttle body

Circuit diagram



Inspection procedure

1	Check electronic throttle body

(a) Check whether the electronic throttle body is damaged.

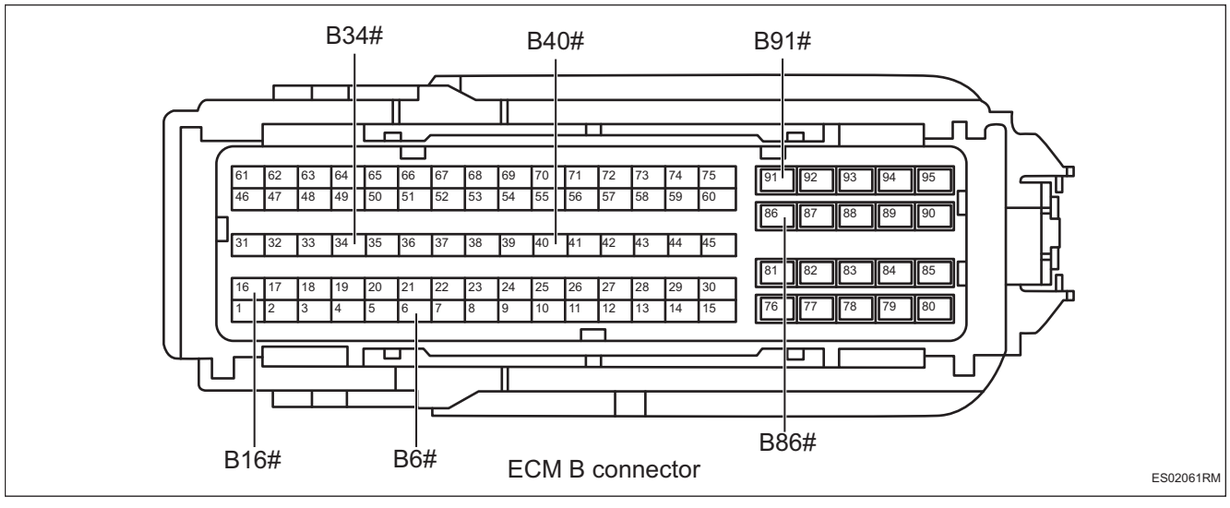
(b) Check whether the electronic throttle body is soiled.

(c) Check whether the electronic throttle body flap is stuck.

NG → **Repair according to the fault**

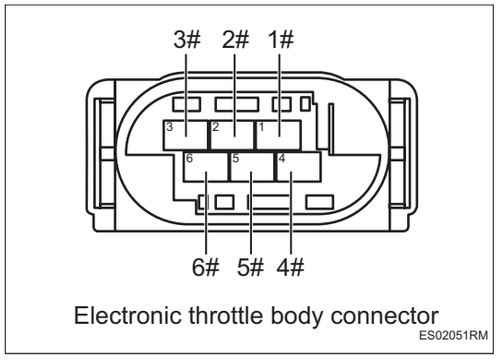
OK

2	Check electronic throttle body harness and connector for open circuit



ECM B connector

ES02061RM



Electronic throttle body connector

ES02051RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the electronic throttle body connector.

(e) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Electronic throttle body connector 2# - ECM connector B6#	Always connected	Less than 1Ω
Electronic throttle body connector 3# -ECM connector B16#	Always connected	Less than 1Ω
Electronic throttle body connector 6# -ECM connector B40#	Always connected	Less than 1Ω

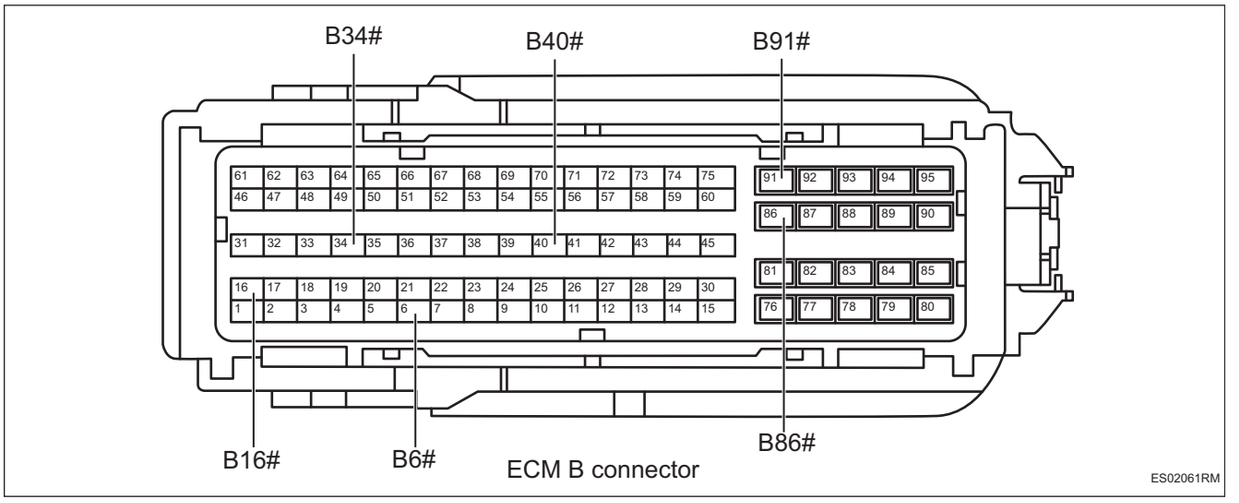
ES

Detector connection	Detection conditions	Specified state
Electronic throttle body connector 4# -ECM connector B91#	Always connected	Less than 1Ω
Electronic throttle body connector 1# -ECM connector B86#	Always connected	Less than 1Ω
Electronic throttle body connector 5# -ECM connector B34#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3 Check electronic throttle body harness and connector for circuit shorted to ground



(a) Measure the resistance according to the values in the table below.

Standard value

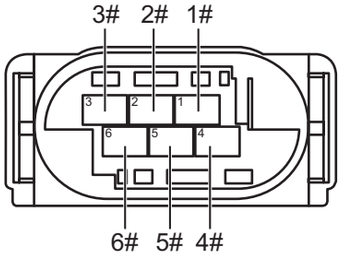
Detector connection	Detection conditions	Specified state
ECM connector B6# - body GND	Always connected	10 KΩ or greater
ECM connector B16# - body GND	Always connected	10 KΩ or greater
ECM connector B86# - body GND	Always connected	10 KΩ or greater
ECM connector B91# - body GND	Always connected	10 KΩ or greater
ECM connector B34# - body GND	Always connected	10 KΩ or greater
ECM connector B40# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

ES

4	**Check electronic throttle body harness and connector for circuit shorted to each other**



Electronic throttle body connector
ES02051RM

(a) Measure the resistance according to the values in the table below.

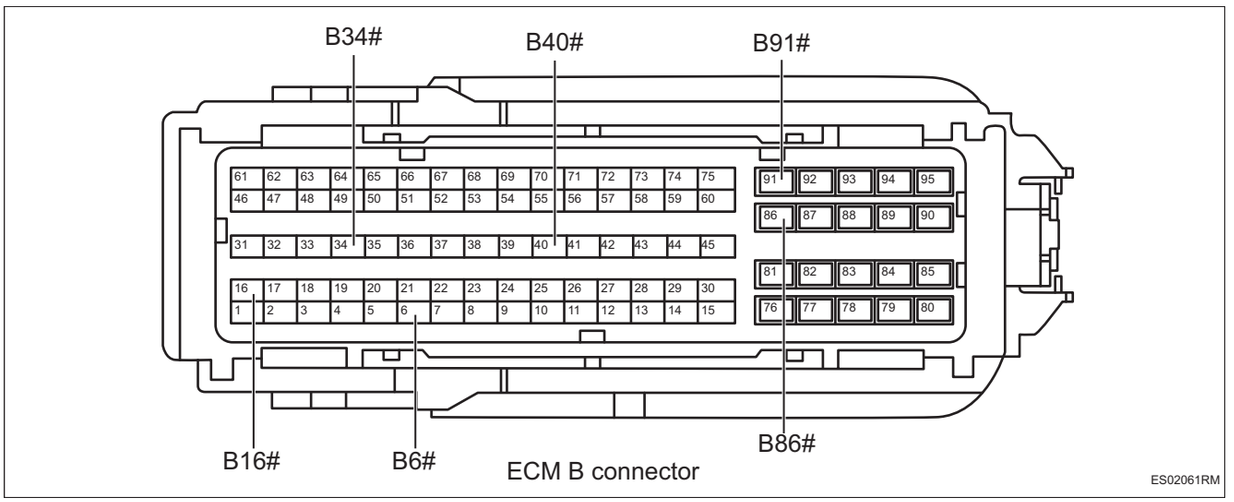
Standard value

Detector connection	Detection conditions	Specified state
Electronic throttle body connector 1# -electronic throttle body connector 2#	Always connected	10 KΩ or greater
Electronic throttle body connector 1# -electronic throttle body connector 3#	Always connected	10 KΩ or greater
Electronic throttle body connector 1# -electronic throttle body connector 4#	Always connected	10 KΩ or greater
Electronic throttle body connector 1# -electronic throttle body connector 5#	Always connected	10 KΩ or greater
Electronic throttle body connector 1# -electronic throttle body connector 6#	Always connected	10 KΩ or greater
Electronic throttle body connector 4# -electronic throttle body connector 2#	Always connected	10 KΩ or greater
Electronic throttle body connector 4# -electronic throttle body connector 3#	Always connected	10 KΩ or greater
Electronic throttle body connector 4# -electronic throttle body connector 5#	Always connected	10 KΩ or greater
Electronic throttle body connector 4# -electronic throttle body connector 6#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	**Check electronic throttle body harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B6# - body GND	The ignition switch is set to "ON"	Less than 1 V
ECM connector B16# - body GND	The ignition switch is set to "ON"	Less than 1 V
ECM connector B86# - body GND	The ignition switch is set to "ON"	Less than 1 V
ECM connector B91# - body GND	The ignition switch is set to "ON"	Less than 1 V
ECM connector B34# - body GND	The ignition switch is set to "ON"	Less than 1 V
ECM connector B40# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Replace the electronic throttle body (See page ES-461)**

(a) Replace the electronic throttle body.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

7	**End**

ES

DTC	P15A000	CPU0: MPU fault (register, DSPR, PSPR)
DTC	P15A100	CPU0: DCACHE/DSPRECC uncorrectable
DTC	P15A200	CPU0: DCACHE/DSPR address failure
DTC	P15A300	CPU0: DCACHE TAG SRAM ECC uncorrectable
DTC	P15A400	CPU0: DCACHE TAG SRAM address failure
DTC	P15A500	CPU0: PCACHE TAGRAM ECC uncorrectable
DTC	P15A600	CPU0: PCACHE TAGRAM address failure
DTC	P15A700	CPU0: PCACHE/PSPR ECC uncorrectable
DTC	P15A800	CPU0: PCACHE/PSPR address failure
DTC	P15A900	CPU1: Lockstep comparator fault
DTC	P15AA00	CPU1: MPU fault (register, DSPR, PSPR)
DTC	P15AB00	CPU1: DCACHE/DSPR ECC uncorrectable
DTC	P15AC00	CPU1: DCACHE/DSPR address failure
DTC	P15AD00	CPU1: DCACHE TAGRAM ECC uncorrectable
DTC	P15AE00	CPU1: DCACHE TAGRAM address failure
DTC	P15AF00	CPU1: PCACHE TAGRAM ECC uncorrectable
DTC	P15B000	CPU1: PCACHE TAGRAM address failure
DTC	P15B100	CPU1: PCACHE/PSPR ECC uncorrectable
DTC	P15B200	CPU1:PCACHE/PSPR address failure
DTC	P15B300	LMU: SRAM ECC monitoring fault
DTC	P15B400	LMU: SRAM ECC uncorrectable
DTC	P15B500	LMU: SRAM address failure
DTC	P15B600	SMU: Timer0 recovery timeout
DTC	P15B700	SMU: Timer1 recovery timeout
DTC	P15B800	PMU: PFLASH ECC uncorrectable multiple bit faults

DTC	P15B900	PMU: PFLASH address failure
DTC	P15BA00	PMU: PFLASH ECC monitoring fault (covering all ECC modules)
DTC	P15BB00	PMU: PFLASH EDC comparator failure (covering all PFLASH instances)
DTC	P15BC00	SCU/CGU: system PLL OSC_WDT: input clock out of limit
DTC	P15BD00	SCU/CGU: system PLL VCO clock event loss
DTC	P15BE00	SCU/EVR: EVR 1.3 V digital undervoltage
DTC	P15BF00	SCU/EVR: EVR 3.3 V overvoltage
DTC	P15C000	SCU/EVR: external power supply overvoltage
DTC	P15C100	SCU/WDTS: safety watchdog timeout
DTC	P15C200	SCU/WDTCPU0: watchdog CPU0 timeout
DTC	P15C300	SCU/WDTCPU1: watchdog CPU1 timeout
DTC	P15C400	SCU/CGU: PLL_ERAY VCO clock event loss
DTC	P15C500	SCU/WDTCPU2: watchdog CPU2 timeout
DTC	P15C600	SCU/ DTS: temperature sensor overflow
DTC	P15C700	Registers: fault detected by register monitoring
DTC	P15C800	SCU/LSCU: SCU configuration failure: monitoring dual-rail property (reversesignal) from lockstep comparator (LSCU) alarm
DTC	P15C900	SCU/CGU: clock monitoring: STM out of frequency range
DTC	P15CA00	SCU/CGU: clock monitoring: PLL_ERAY out of frequency range
DTC	P15CB00	SCU/CGU: clock monitoring: PLL out of frequency range
DTC	P15CC00	SCU/CGU: clock monitoring: SRI out of frequency range

ES

DTC	P15CD00	SCU/CGU: clock monitoring: SPB out of frequency range
DTC	P15CE00	SCU/CGU: clock monitoring: GTM out of frequency range
DTC	P15CF00	SCU/CGU: clock monitoring: ADC out of frequency range
DTC	P15D000	GTM: SRAMs uncorrectable
DTC	P15D100	FLEXRAY: SRAM address failure
DTC	P15D200	Misc SRAMs: SRAM ECC uncorrectable
DTC	P15D300	Misc SRAMs: SRAM address failure
DTC	P15D400	GTM: SRAMs address failure
DTC	P15D500	CAN: SRAM uncorrectable
DTC	P15D600	CAN: SRAM address failure
DTC	P15D700	FLEXRAY: SRAM ECC uncorrectable
DTC	P15D800	CPU2: MPU fault (register, DSPR, PSPR)
DTC	P15D900	CPU2: DCACHE/DSPR ECC uncorrectable
DTC	P15DA00	CPU2: DCACHE/DSPR address failure
DTC	P15DB00	CPU2: DCACHE TAG SRAM ECC uncorrectable
DTC	P15DC00	CPU2:DCACHE TAG SRAM address failure
DTC	P15DD00	CPU2: 121 PCACHE TAGRAM ECC uncorrectable
DTC	P15DE00	CPU2: PCACHE TAGRAM address failure
DTC	P15DF00	CPU2: PCACHE/PSPR ECC uncorrectable
DTC	P15E000	CPU2 PCACHE/PSPR address failure

Description

When the internal operation of the ECM is abnormal, the ECM records the DTC.

DTC	DTC detection conditions	Faulty location
P15A000	(a) CPU0: MPU fault (register, DSPR, PSPR).	• ECM • Harness and connector

DTC	DTC detection conditions	Faulty location
P15A100	(a) CPU0: DCACHE/DSPR ECC uncorrectable.	• ECM • Harness and connector
P15A200	(a) CPU0: DCACHE/DSPR address failure.	• ECM • Harness and connector
P15A300	(a) CPU0: DCACHE TAG SRAM ECC uncorrectable.	• ECM • Harness and connector
P15A400	(a) CPU0: DCACHE TAG SRAM address failure.	• ECM • Harness and connector
P15A500	(a) CPU0: PCACHE TAGRAM ECC uncorrectable.	• ECM • Harness and connector
P15A600	(a) CPU0: PCACHE TAGRAM address failure.	• ECM • Harness and connector
P15A700	(a) CPU0: PCACHE/PSPR ECC uncorrectable.	• ECM • Harness and connector
P15A800	(a) CPU0: PCACHE/PSPR address failure.	• ECM • Harness and connector
P15A900	(a) CPU1: Lockstep comparator failure.	• ECM • Harness and connector
P15AA00	(a) CPU1: MPU fault (register, DSPR, PSPR).	• ECM • Harness and connector
P15AB00	(a) CPU1: DCACHE/DSPR ECC uncorrectable.	• ECM • Harness and connector
P15AC00	(a) CPU1: DCACHE/DSPR address failure.	• ECM • Harness and connector
P15AD00	(a) CPU1: DCACHE TAGRAM ECC uncorrectable.	• ECM • Harness and connector
P15AE00	(a) CPU1: DCACHE TAGRAM address failure.	• ECM • Harness and connector
P15AF00	(a) CPU1: PCACHE TAGRAM ECC uncorrectable.	• ECM • Harness and connector
P15B000	(a) CPU1: PCACHE TAGRAM address failure.	• ECM • Harness and connector
P15B100	(a) CPU1: PCACHE/PSPR ECC uncorrectable.	• ECM • Harness and connector
P15B200	(a) CPU1: PCACHE/PSPR address failure.	• ECM • Harness and connector
P15B300	(a) LMU: SRAM ECC monitoring fault.	• ECM • Harness and connector
P15B400	(a) LMU: SRAM ECC uncorrectable.	• ECM • Harness and connector
P15B500	(a) LMU: SRAM address failure.	• ECM • Harness and connector

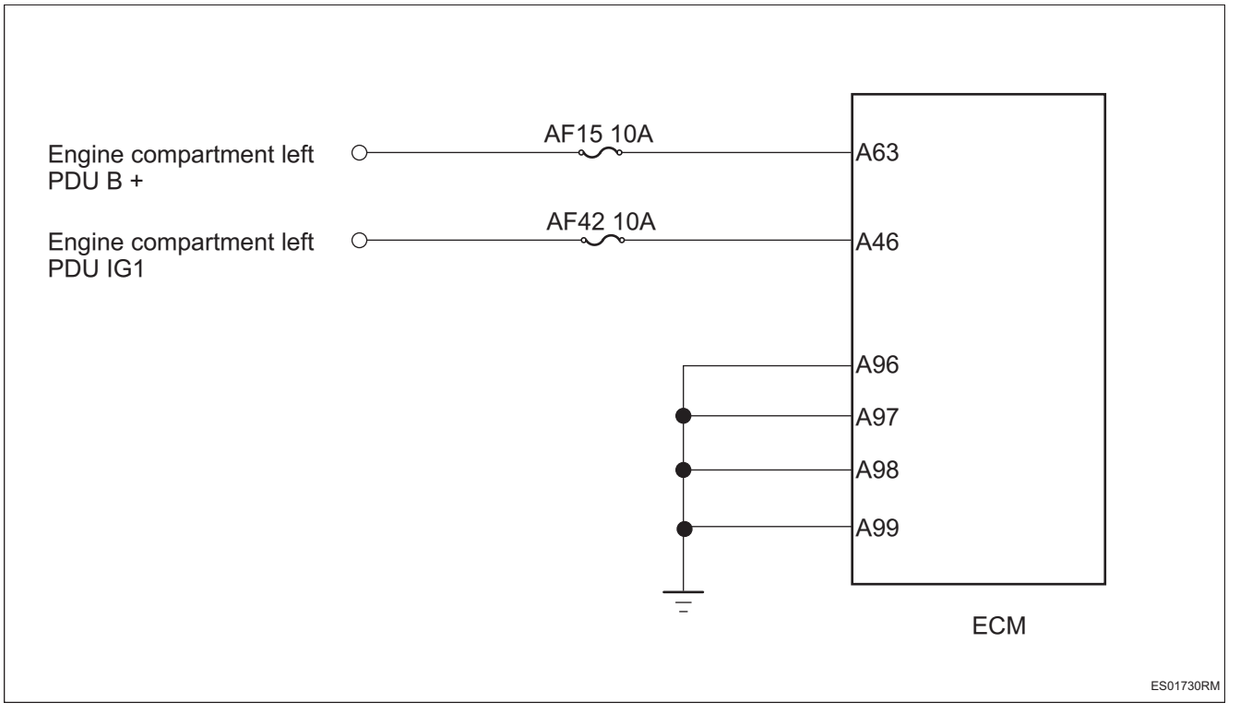
DTC	DTC detection conditions	Faulty location
P15B600	(a) SMU: resuming Timer 0 timeout.	• ECM • Harness and connector
P15B700	(a) SMU: resuming Timer 1 timeout.	• ECM • Harness and connector
P15B800	(a) PMU: PFLASH ECC uncorrectable multiple bit faults.	• ECM • Harness and connector
P15B900	(a) PMU: PFLASH address failure.	• ECM • Harness and connector
P15BA00	(a) PMU: PFLASH ECC monitoring fault (covering all ECC modules).	• ECM • Harness and connector
P15BB00	(a) PMU: PFLASH EDC comparator failure (covering all PFLASH instances).	• ECM • Harness and connector
P15BC00	(a) SCU/CGU: system PLL OSC_WDT: input clock out of limit.	• ECM • Harness and connector
P15BD00	(a) SCU/CGU: system PLL VCO clock event loss.	• ECM • Harness and connector
P15BE00	(a) SCU / EVR: EVR 1.3V digital undervoltage.	• ECM • Harness and connector
P15BF00	(a) SCU/EVR: EVR 3.3 V overvoltage.	• ECM • Harness and connector
P15C000	(a) SCU/EVR: external power supply overvoltage.	• ECM • Harness and connector
P15C100	(a) SCU/WDTS: safety watchdog timeout.	• ECM • Harness and connector
P15C200	(a) SCU/WDTCPU0: watchdog CPU0 timeout.	• ECM • Harness and connector
P15C300	(a) SCU/WDTCPU1: watchdog CPU1 timeout.	• ECM • Harness and connector
P15C400	(a) SCU/CGU: PLL_ERAY VCO clock event loss.	• ECM • Harness and connector
P15C500	(a) SCU/WDTCPU2: watchdog CPU2 timeout.	• ECM • Harness and connector
P15C600	(a) SCU/ DTS: temperature sensor overflow.	• ECM • Harness and connector
P15C700	(a) Registers: fault detected by register monitoring.	• ECM • Harness and connector
P15C800	(a) SCU/LSCU: SCU configuration failure: monitoring dual-rail property (reverse signal) from lockstep comparator (LSCU) alarm.	• ECM • Harness and connector
P15C900	(a) SCU/CGU: clock monitoring: STM out of frequency range.	• ECM • Harness and connector
P15CA00	(a) SCU/CGU: clock monitoring: PLL_ERAY out of frequency range.	• ECM • Harness and connector

DTC	DTC detection conditions	Faulty location
P15CB00	(a) SCU/CGU: clock monitoring: PLL out of frequency range.	• ECM • Harness and connector
P15CC00	(a) SCU/CGU: clock monitoring: SRI out of frequency range.	• ECM • Harness and connector
P15CD00	(a) SCU/CGU: clock monitoring: SPB out of frequency range.	• ECM • Harness and connector
P15CE00	(a) SCU/CGU: clock monitoring: GTM out of frequency range.	• ECM • Harness and connector
P15CF00	(a) SCU/CGU: clock monitoring: ADC out of frequency range.	• ECM • Harness and connector
P15D000	(a) GTM: SRAMs uncorrectable.	• ECM • Harness and connector
P15D100	(a) FLEXRAY: SRAM address failure.	• ECM • Harness and connector
P15D200	(a) Misc SRAMs: SRAM ECC uncorrectable.	• ECM • Harness and connector
P15D300	(a) Misc SRAMs: SRAM address failure.	• ECM • Harness and connector
P15D400	(a) GTM: SRAMs address failure.	• ECM • Harness and connector
P15D500	(a) CAN: SRAM uncorrectable.	• ECM • Harness and connector
P15D600	(a) CAN: SRAM address failure.	• ECM • Harness and connector
P15D700	(a) FLEXRAY: SRAM ECC uncorrectable.	• ECM • Harness and connector
P15D800	(a) CPU2: MPU fault (register, DSPR, PSPR).	• ECM • Harness and connector
P15D900	(a) CPU2: DCACHE/DSPR ECC uncorrectable.	• ECM • Harness and connector
P15DA00	(a) CPU2: DCACHE/DSPR address failure.	• ECM • Harness and connector
P15DB00	(a) CPU2 DCACHE TAG SRAM ECC uncorrectable.	• ECM • Harness and connector
P15DC00	(a) CPU2: DCACHE TAG SRAM address failure.	• ECM • Harness and connector
P15DD00	(a) CPU2: 121 PCACHE TAGRAM ECC uncorrectable.	• ECM • Harness and connector
P15DE00	(a) CPU2: PCACHE TAGRAM address failure.	• ECM • Harness and connector
P15DF00	(a) CPU2: PCACHE/PSPR ECC uncorrectable.	• ECM • Harness and connector

DTC	DTC detection conditions	Faulty location
P15E000	(a) CPU2: PCACHE/PSPR address failure.	• ECM • Harness and connector

ES

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery + - battery -	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2	Check ECM fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the ECM fuse.

(d) Measure the resistance according to the values in the table below.

Standard value

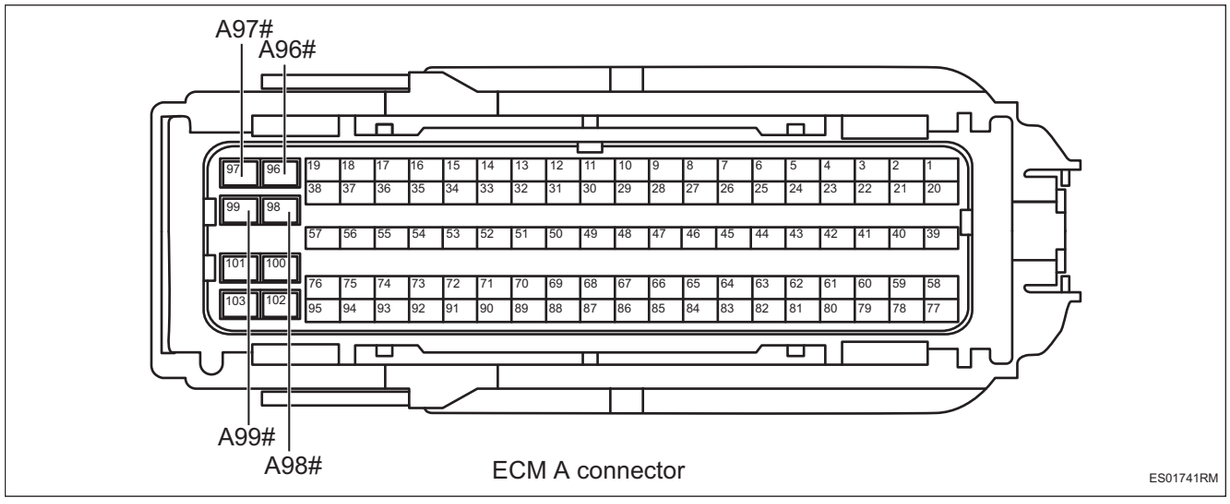
Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

ES

NG → **Replace fuse**

OK

3 Check ECM ground



ECM A connector

ES01741RM

(a) Measure the resistance according to the values in the table below.

Standard value

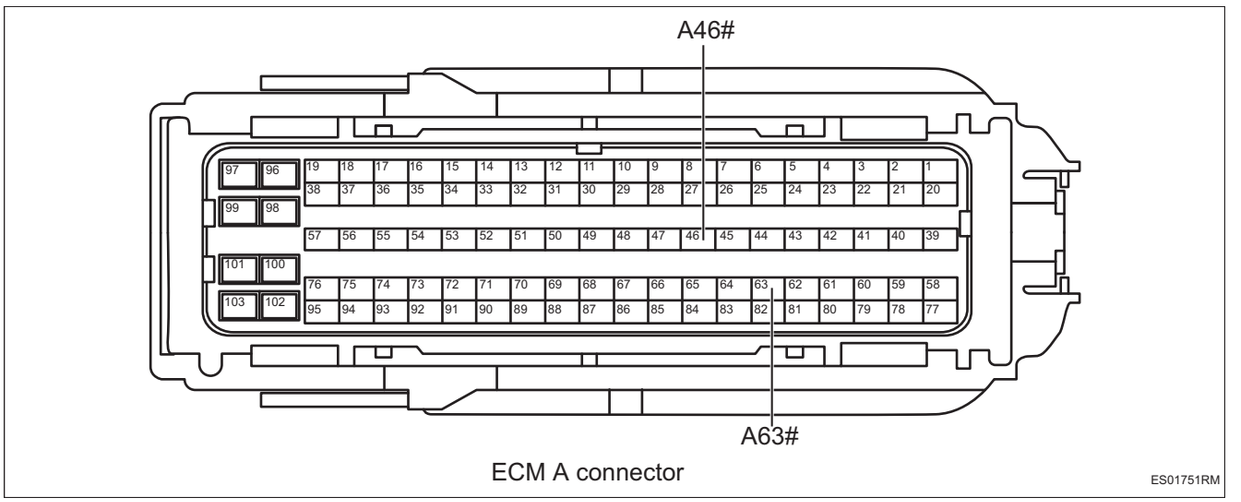
Detector connection	Detection conditions	Specified state
ECM connector A96# -body GND	Always connected	Less than 1Ω
ECM connector A97# - body GND	Always connected	Less than 1Ω
ECM connector A98# - body GND	Always connected	Less than 1Ω
ECM connector A99# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4 Check ECM power supply

ES



ECM A connector

ES01751RM

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector A63# - body GND	Set the ignition switch to "ON"	Battery voltage
ECM connector A46# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace the ECM (See page ES-450)**

DTC	P210300	Electronic throttle drive stage fault (short circuit)
DTC	P211800	Electronic throttle drive stage fault (overheat or overcurrent)
DTC	P210600	Electronic throttle drive stage fault (implausible)
DTC	P210000	Electronic throttle drive stage fault (open circuit)

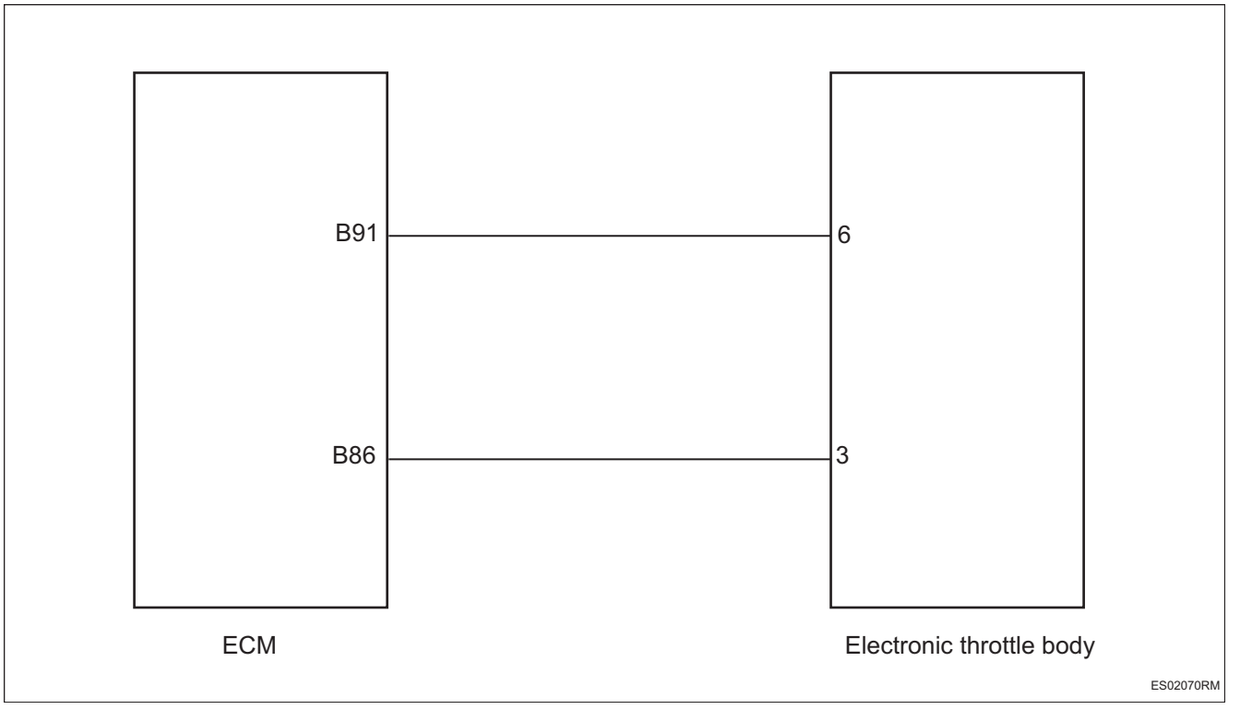
Description

When the electronic throttle drive motor circuit is shorted or open, the ECM records the DTC.

DTC	DTC detection conditions	Faulty location
P210300	(a) Electronic throttle drive motor short circuit.	• ECM • Harness and connector • Electronic throttle body
P211800	(a) Electronic throttle drive motor overheating or overcurrent.	• ECM • Harness and connector • Electronic throttle body
P210600	(a) Electronic throttle drive motor implausible.	• ECM • Harness and connector • Electronic throttle body
P210000	(a) Electronic throttle drive motor open circuit.	• ECM • Harness and connector • Electronic throttle body

ES

Circuit diagram



Inspection procedure

1	**Check electronic throttle body**

(a) Check whether the electronic throttle body flap is stuck.

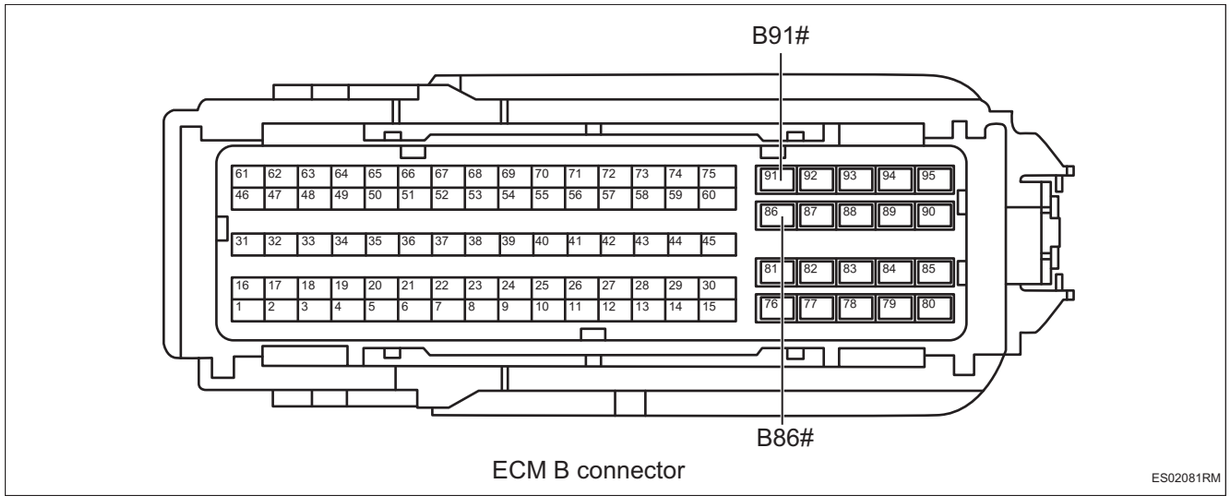
(b) Check the electronic throttle body flap for foreign matter.

(c) Check whether the opening and closing operations of the throttle body are smooth.

NG → **Repair according to the fault**

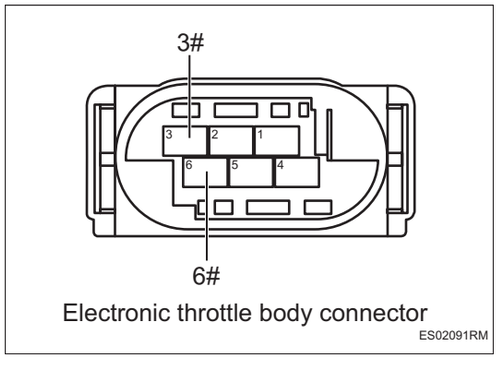
OK

2	**Check electronic throttle body harness and connector for open circuit**



ECM B connector

ES02081RM



Electronic throttle body connector

ES02091RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the electronic throttle body connector.

(e) Measure the resistance according to the values in the table below.

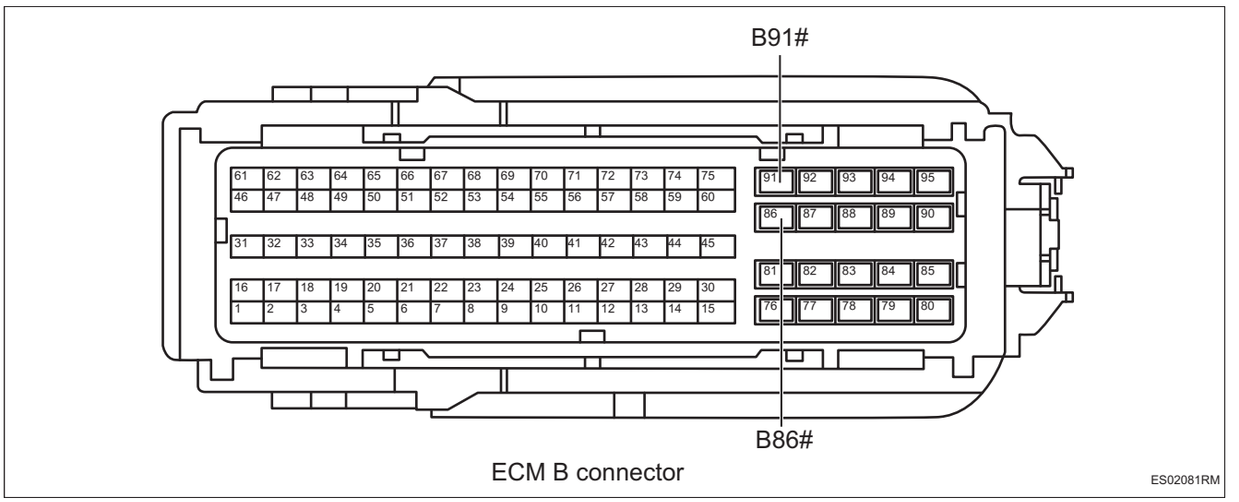
Standard value

Detector connection	Detection conditions	Specified state
Electronic throttle body connector 3# -ECM connector B86#	Always connected	Less than 1Ω
Electronic throttle body connector 6# -ECM connector B91#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check electronic throttle body harness and connector for circuit shorted to ground**



ECM B connector

(a) Measure the resistance according to the values in the table below.

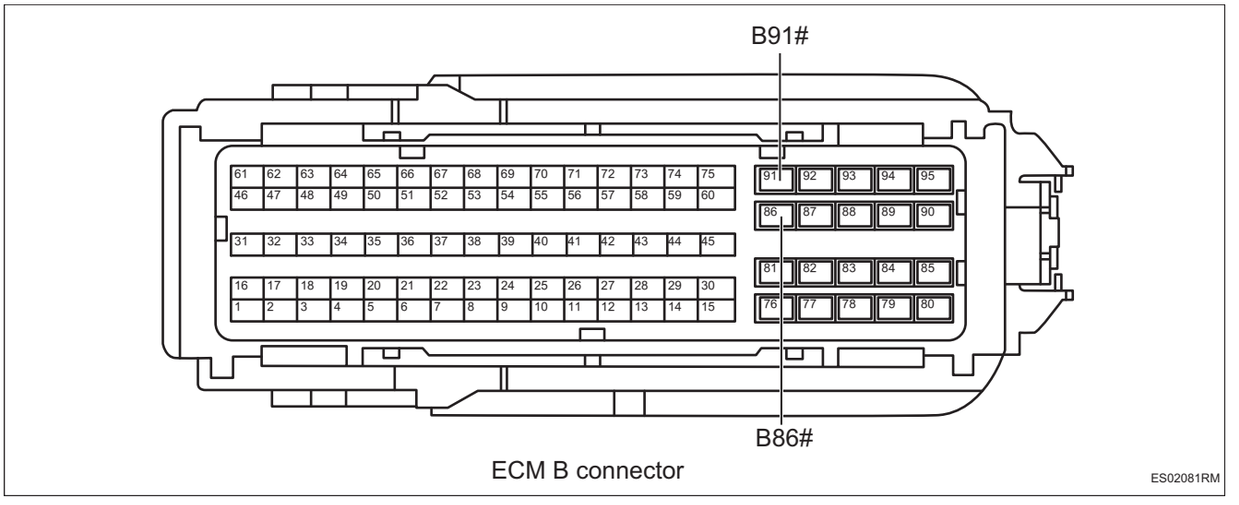
Standard value

Detector connection	Detection conditions	Specified state
ECM connector B86# - body GND	Always connected	10 KΩ or greater
ECM connector B91# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check electronic throttle body harness and connector for circuit shorted to power supply**



ECM B connector

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B86# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector B91# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the electronic throttle body (See page ES-461)**

(a) Replace the electronic throttle body.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

6	**End**

ES

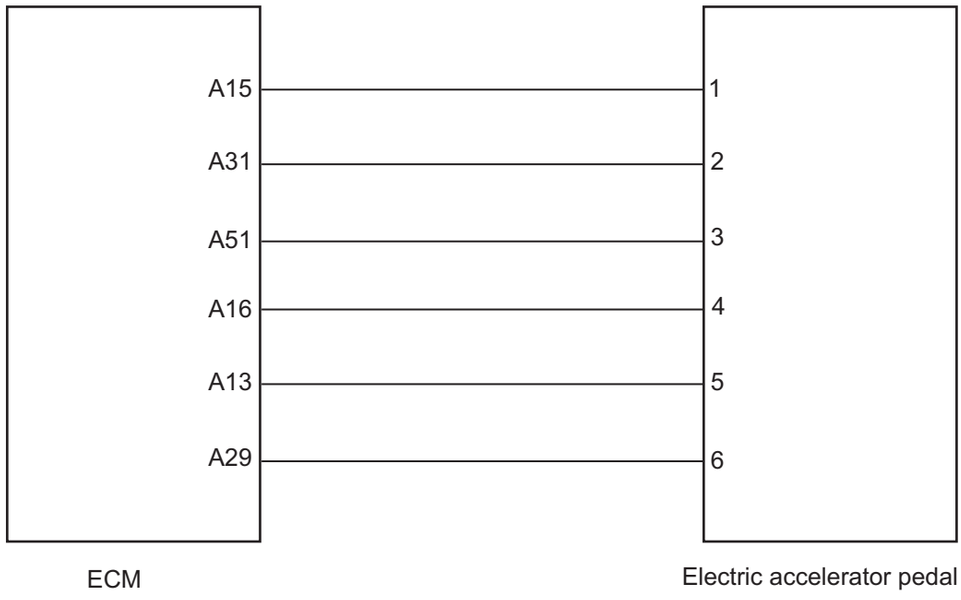
DTC	P213800	Electronic accelerator pedal position sensor signal implausible
DTC	P212300	Electronic accelerator pedal position sensor 1 signal overvoltage
DTC	P212800	Electronic accelerator pedal position sensor 2 signal overvoltage
DTC	P212200	Electronic accelerator pedal position sensor 1 signal undervoltage
DTC	P212700	Electronic accelerator pedal position sensor 2 signal undervoltage

Description

When the electronic accelerator pedal circuit is shorted or open, the ECM records the DTC.

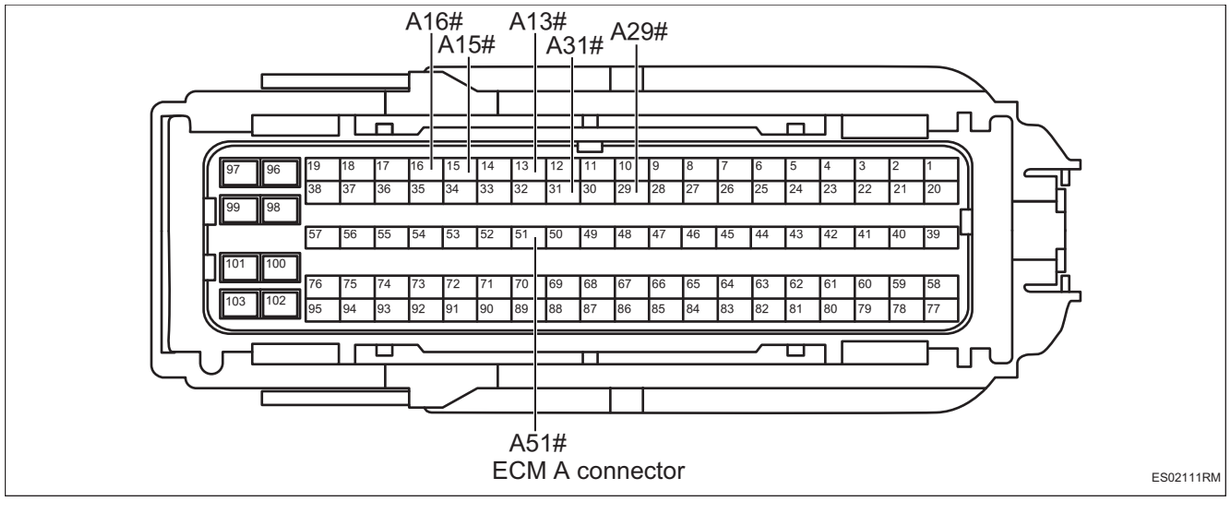
DTC	DTC detection conditions	Faulty location
P213800	(a) Accelerator pedal position sensor signal implausible.	• ECM • Harness and connector • Electric accelerator pedal
P212300	(a) Accelerator pedal position sensor 1 signal overvoltage.	• ECM • Harness and connector • Electric accelerator pedal
P212800	(a) Accelerator pedal position sensor 2 signal overvoltage.	• ECM • Harness and connector • Electric accelerator pedal
P212200	(a) Accelerator pedal position sensor 1 signal undervoltage.	• ECM • Harness and connector • Electric accelerator pedal
P212700	(a) Accelerator pedal position sensor 2 signal undervoltage.	• ECM • Harness and connector • Electric accelerator pedal

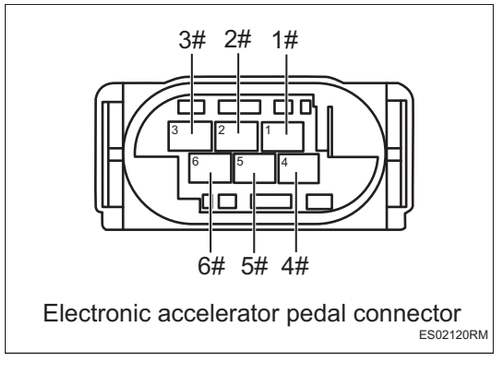
Circuit diagram



Inspection procedure

1	Check electronic accelerator pedal harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the electronic accelerator pedal connector.

(e) Measure the resistance according to the values in the table below.

Standard value

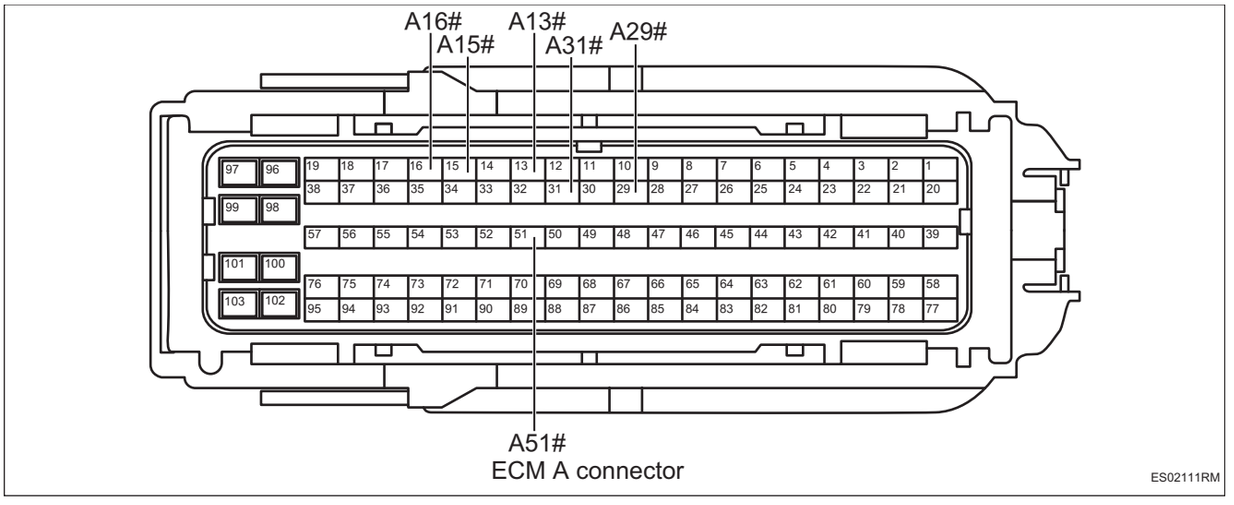
ES

Detector connection	Detection conditions	Specified state
ECM connector A15# -electronic accelerator pedal connector 1#	Always connected	Less than 1Ω
ECM connector A31# -electronic accelerator pedal connector 2#	Always connected	Less than 1Ω
ECM connector A51# -electronic accelerator pedal connector 3#	Always connected	Less than 1Ω
ECM connector A16# -electronic accelerator pedal connector 4#	Always connected	Less than 1Ω
ECM connector A13# -electronic accelerator pedal connector 5#	Always connected	Less than 1Ω
ECM connector A29# -electronic accelerator pedal connector 6#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check electronic accelerator pedal harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

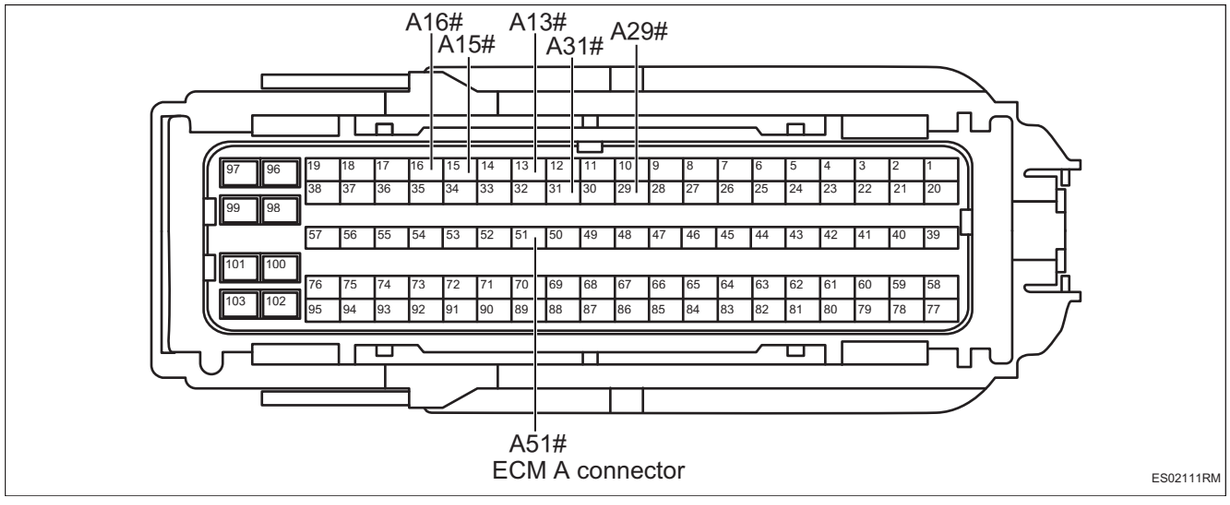
Detector connection	Detection conditions	Specified state
ECM connector A15# - body GND	Always connected	10 KΩ or greater
ECM connector A31# - body GND	Always connected	10 KΩ or greater
ECM connector A51# - body GND	Always connected	10 KΩ or greater

Detector connection	Detection conditions	Specified state
ECM connector A16# - body GND	Always connected	10 KΩ or greater
ECM connector A13# - body GND	Always connected	10 KΩ or greater
ECM connector A29# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check electronic accelerator pedal harness and connector for circuit shorted to each other**



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector A15# -ECM connector A31#	Always connected	10 KΩ or greater
ECM connector A15# -ECM connector A51#	Always connected	10 KΩ or greater
ECM connector A15# -ECM connector A16#	Always connected	10 KΩ or greater
ECM connector A15# -ECM connector A13#	Always connected	10 KΩ or greater
ECM connector A15# -ECM connector A29#	Always connected	10 KΩ or greater
ECM connector A31# -ECM connector A51#	Always connected	10 KΩ or greater

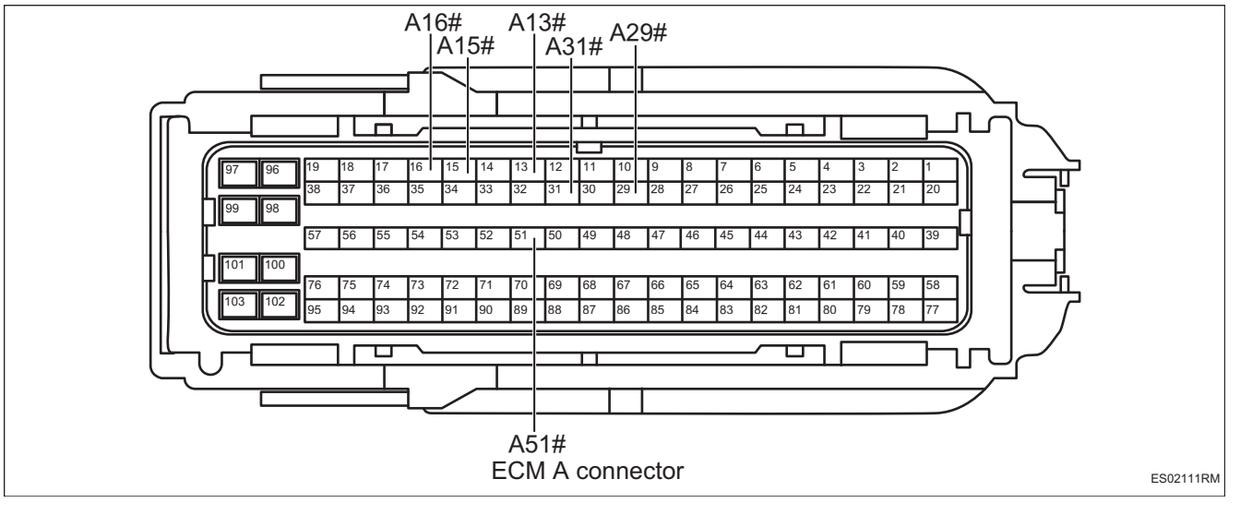
ES

Detector connection	Detection conditions	Specified state
ECM connector A31# - ECM connector A16#	Always connected	10 KΩ or greater
ECM connector A31# - ECM connector A13#	Always connected	10 KΩ or greater
ECM connector A31# - ECM connector A29#	Always connected	10 KΩ or greater
ECM connector A51# - ECM connector A16#	Always connected	10 KΩ or greater
ECM connector A51# - ECM connector A13#	Always connected	10 KΩ or greater
ECM connector A51# - ECM connector A29#	Always connected	10 KΩ or greater
ECM connector A16# - ECM connector A13#	Always connected	10 KΩ or greater
ECM connector A16# - ECM connector A29#	Always connected	10 KΩ or greater
ECM connector A13# - ECM connector A29#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check electronic accelerator pedal harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector A15# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A31# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A51# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A16# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A13# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A29# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace electronic accelerator pedal (See page ES-459)**

(a) Replace the electronic accelerator pedal.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

6	**End**

ES

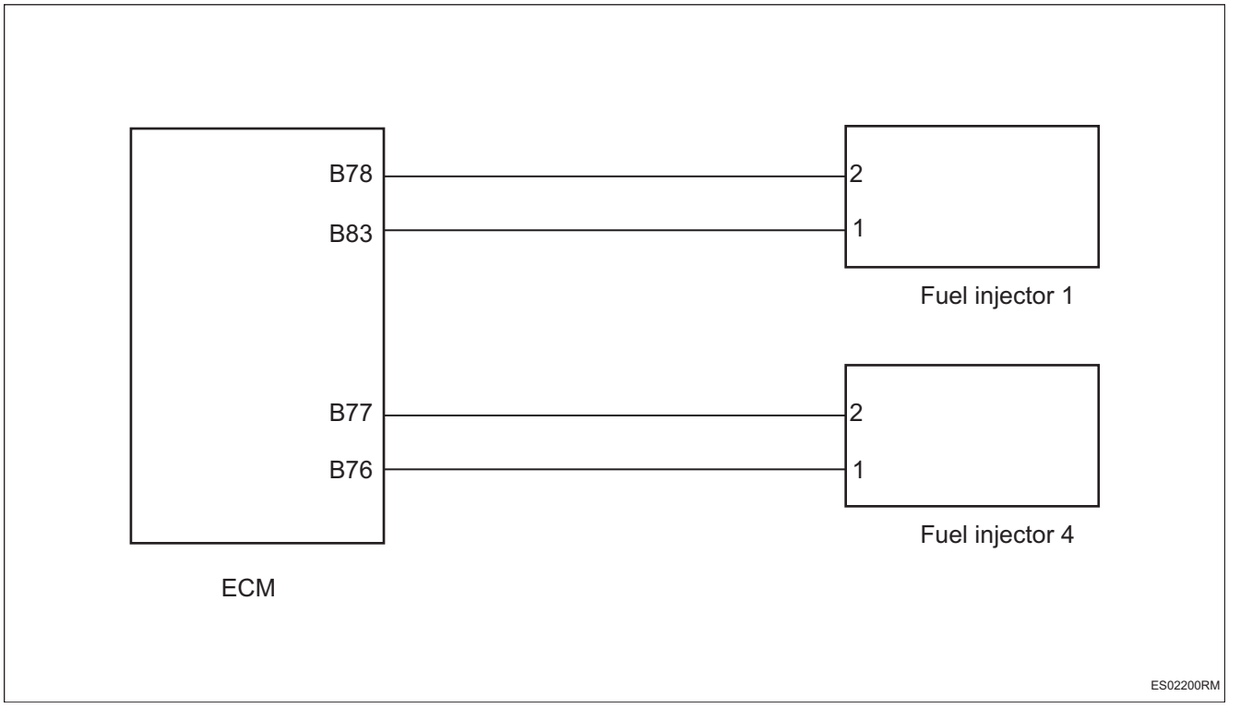
DTC	P214800	1# and 4# cylinder fuel injector high side control circuit overvoltage/undervoltage or 4# cylinder fuel injector low side control circuit overvoltage/undervoltage

Description

When 1# and 4# cylinder fuel injector control circuit voltage is abnormal, the ECM will record the DTC.

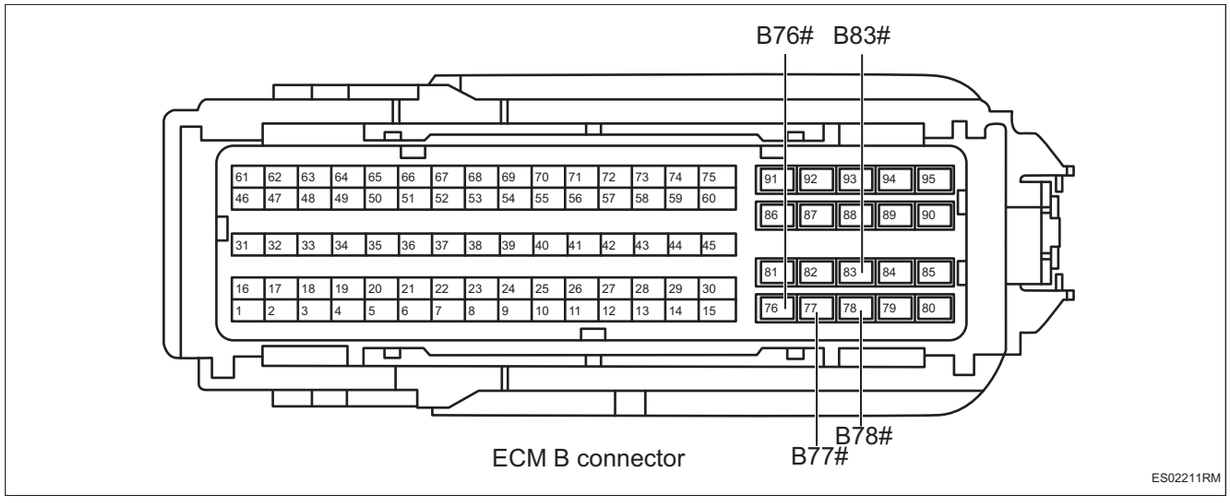
DTC	DTC detection conditions	Faulty location
P214800	(a) Drive channel self-diagnosing fault.	• ECM • Harness and connector • Fuel injector 1 • Fuel injector 4

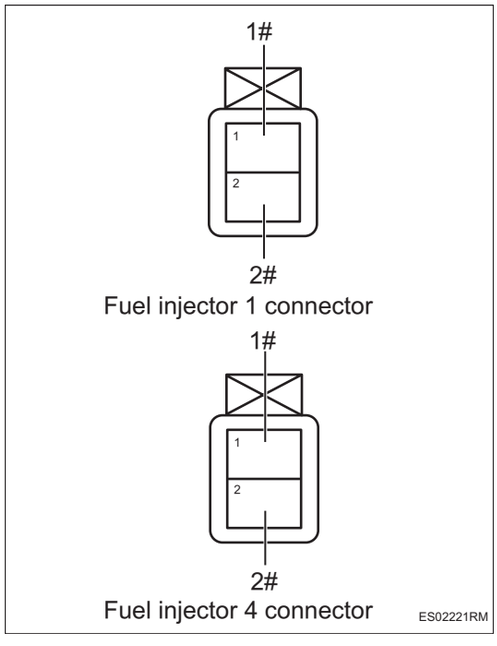
Circuit diagram



Inspection procedure

1	Check fuel injector harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the fuel injector connector.

(e) Measure the resistance according to the values in the table below.

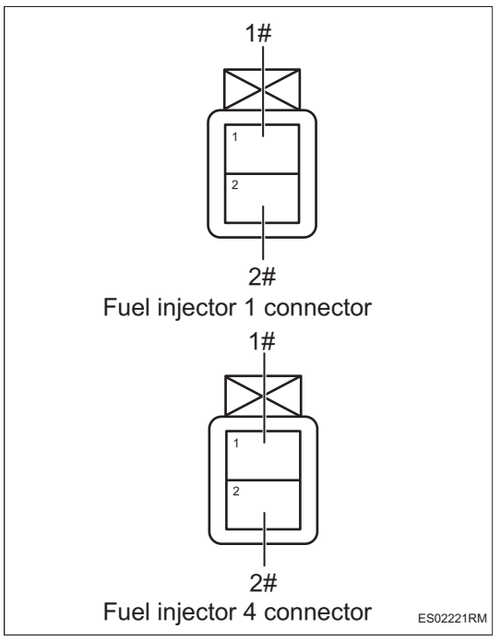
Standard value

Detector connection	Detection conditions	Specified state
Fuel injector 1 connector 2# -ECM connector B78#	Always connected	Less than 1Ω
Fuel injector 1 connector 1# -ECM connector B83#	Always connected	Less than 1Ω
Fuel injector 4 connector 2# -ECM connector B77#	Always connected	Less than 1Ω
Fuel injector 4 connector 1# -ECM connector B76#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check fuel injector harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

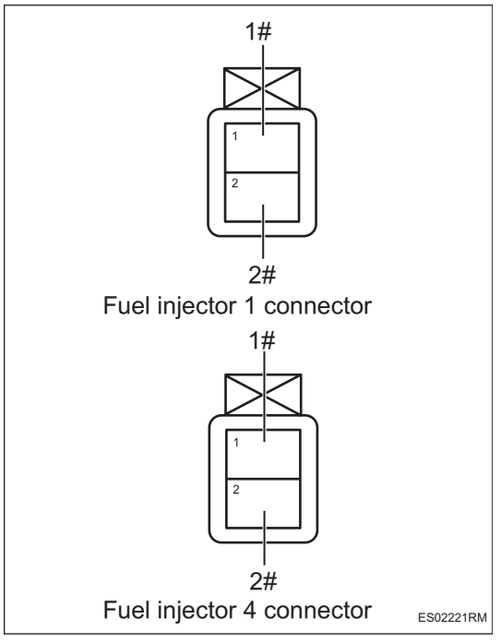
Standard value

Detector connection	Detection conditions	Specified state
Fuel injector 1 connector 1# -body GND	Always connected	10 KΩ or greater
Fuel injector 1 connector 2# -body GND	Always connected	10 KΩ or greater
Fuel injector 4 connector 1# -body GND	Always connected	10 KΩ or greater
Fuel injector 4 connector 2# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	Check fuel injector harness and connector for circuit shorted to each other



(a) Measure the resistance according to the values in the table below.

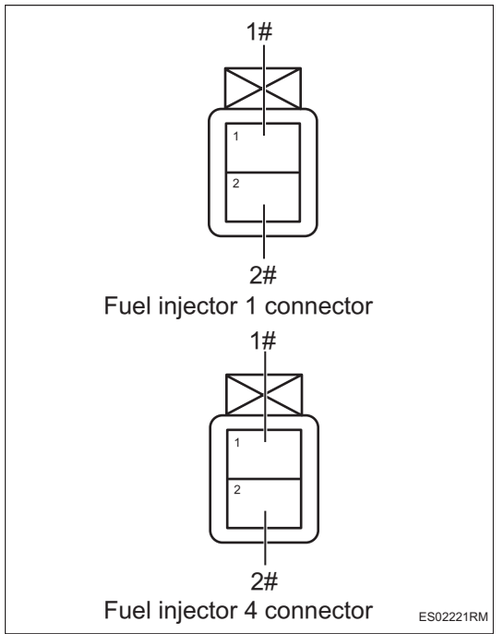
Standard value

Detector connection	Detection conditions	Specified state
Fuel injector 1 connector 1# -fuel injector 1 connector 2#	Always connected	10 KΩ or greater
Fuel injector 1 connector 1# -fuel injector 4 connector 1#	Always connected	10 KΩ or greater
Fuel injector 1 connector 1# -fuel injector 4 connector 2#	Always connected	10 KΩ or greater
Fuel injector 1 connector 2# -fuel injector 4 connector 1#	Always connected	10 KΩ or greater
Fuel injector 1 connector 2# -fuel injector 4 connector 2#	Always connected	10 KΩ or greater
Fuel injector 4 connector 1# -fuel injector 4 connector 2#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check fuel injector harness and connector for circuit shorted to power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

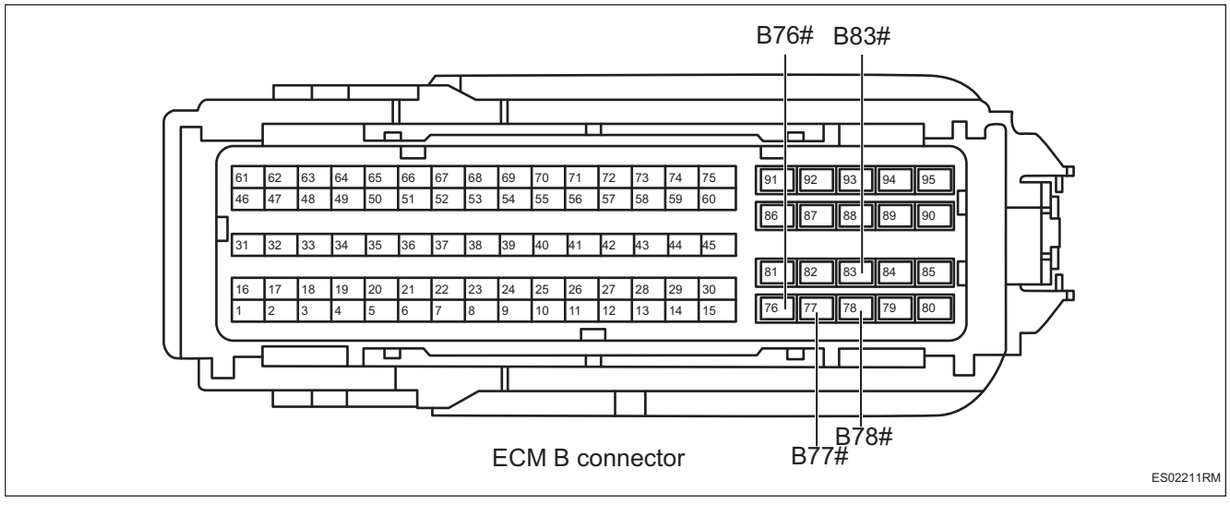
Standard value

Detector connection	Detection conditions	Specified state
Fuel injector 1 connector 1# -body GND	Set the ignition switch to "ON"	Less than 1 V
Fuel injector 1 connector 2# -body GND	Set the ignition switch to "ON"	Less than 1 V
Fuel injector 4 connector 1# -body GND	Set the ignition switch to "ON"	Less than 1 V
Fuel injector 4 connector 2# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG **Repair or replace the harness and connector**

OK

5	Check fuel injector



(a) Connect fuel injector connector.

(b) Measure the resistance according to the values in the table below.

ES

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B78# - ECM connector B83#	Always connected	1.83±5%Ω
ECM connector B77# - ECM connector B76#	Always connected	1.83±5%Ω

NG → **Replace the fuel injector (1, 4) (See page FU-4)**

OK

6	**Replace the ECM (See page ES-450)**

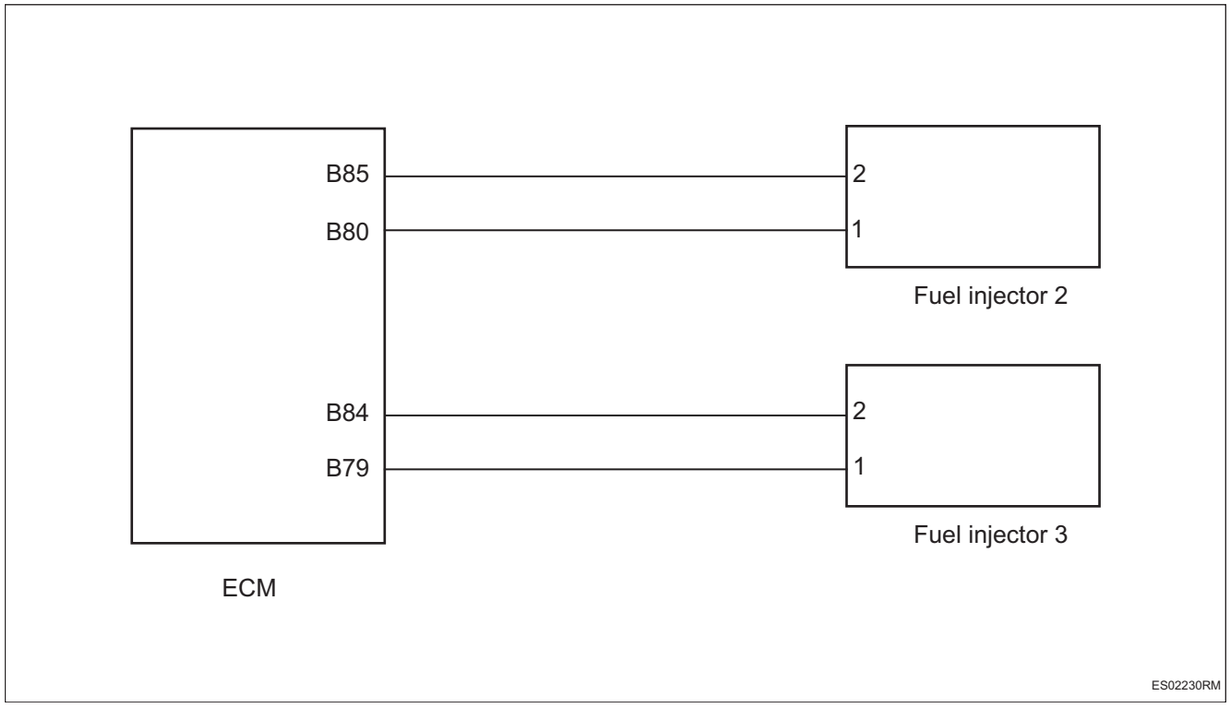
DTC	P215100	2# and 3# cylinder fuel injector high side control circuit overvoltage/undervoltage or #2 cylinder fuel injector low side control circuit overvoltage/undervoltage

Description

When 2# and 3# cylinder fuel injector control circuit voltage is abnormal, the ECM will record the DTC.

DTC	DTC detection conditions	Faulty location
P215100	(a) Drive channel self-diagnosing fault.	• ECM • Harness and connector • Fuel injector 2 • Fuel injector 3

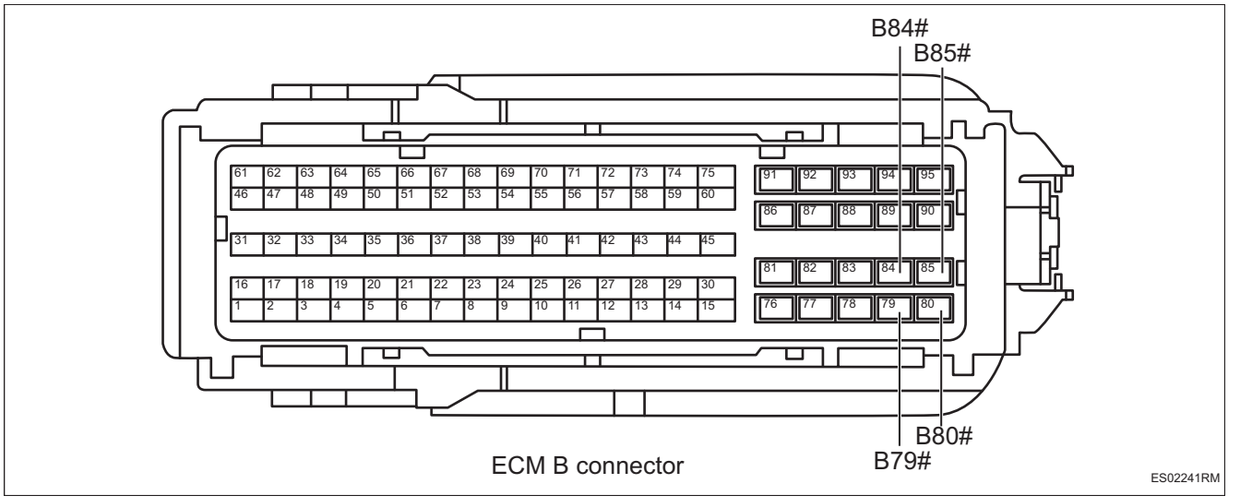
Circuit diagram



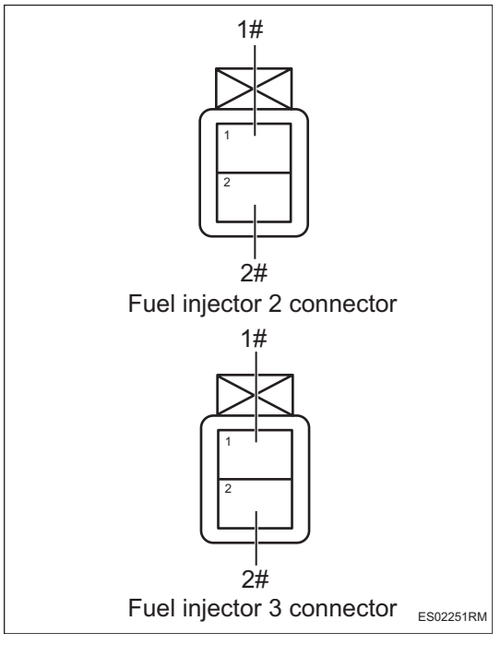
Inspection procedure

1	Check fuel injector harness and connector for open circuit

ES



ECM B connector



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the fuel injector connector.

(e) Measure the resistance according to the values in the table below.

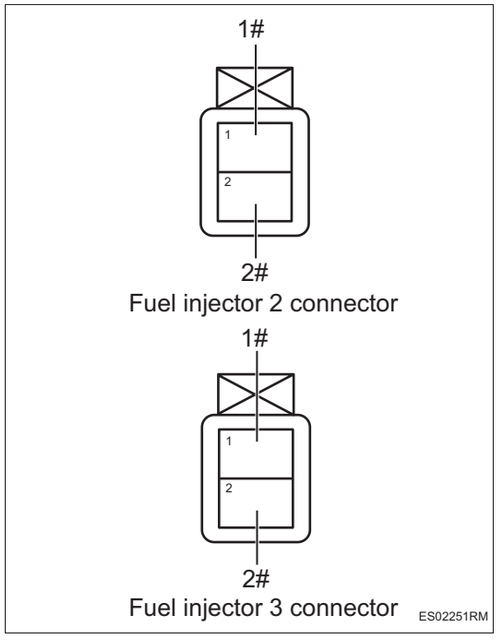
Standard value

Detector connection	Detection conditions	Specified state
Fuel injector 2 connector 2# -ECM connector B85#	Always connected	Less than 1Ω
Fuel injector 2 connector 1# -ECM connector B80#	Always connected	Less than 1Ω
Fuel injector 3 connector 2# -ECM connector B84#	Always connected	Less than 1Ω
Fuel injector 3 connector 1# -ECM connector B79#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check fuel injector harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

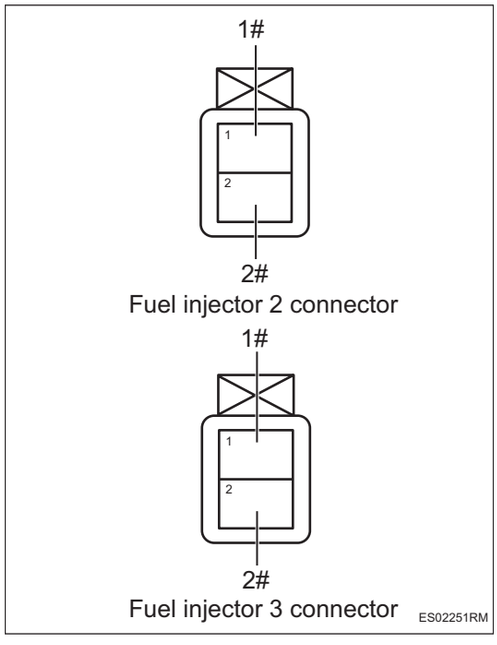
Detector connection	Detection conditions	Specified state
Fuel injector 2 connector 1# -body GND	Always connected	10 KΩ or greater
Fuel injector 2 connector 2# -body GND	Always connected	10 KΩ or greater
Fuel injector 3 connector 1# -body GND	Always connected	10 KΩ or greater
Fuel injector 3 connector 2# -body GND	Always connected	10 KΩ or greater

ES

NG → **Repair or replace the harness and connector**

OK

3	Check fuel injector harness and connector for circuit shorted to each other



(a) Measure the resistance according to the values in the table below.

Standard value

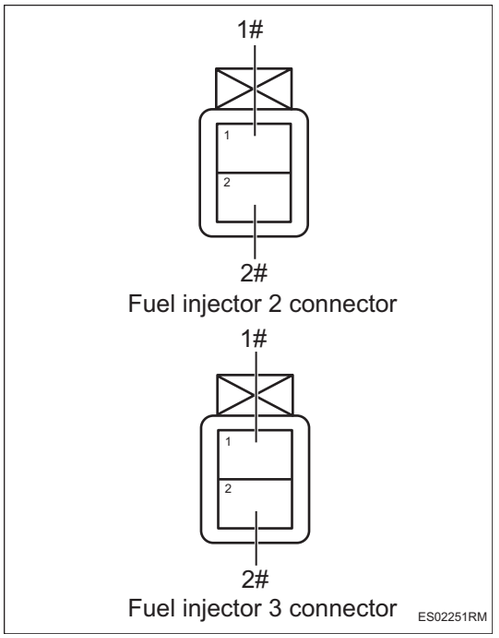
Detector connection	Detection conditions	Specified state
Fuel injector 2 connector 1# -fuel injector 2 connector 2#	Always connected	10 KΩ or greater
Fuel injector 2 connector 1# -fuel injector 3 connector 1#	Always connected	10 KΩ or greater
Fuel injector 2 connector 1# -fuel injector 3 connector 2#	Always connected	10 KΩ or greater
Fuel injector 2 connector 2# -fuel injector 3 connector 1#	Always connected	10 KΩ or greater
Fuel injector 2 connector 2# -fuel injector 3 connector 2#	Always connected	10 KΩ or greater
Fuel injector 3 connector 1# -fuel injector 3 connector 2#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check fuel injector harness and connector for circuit shorted to power supply

ES



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

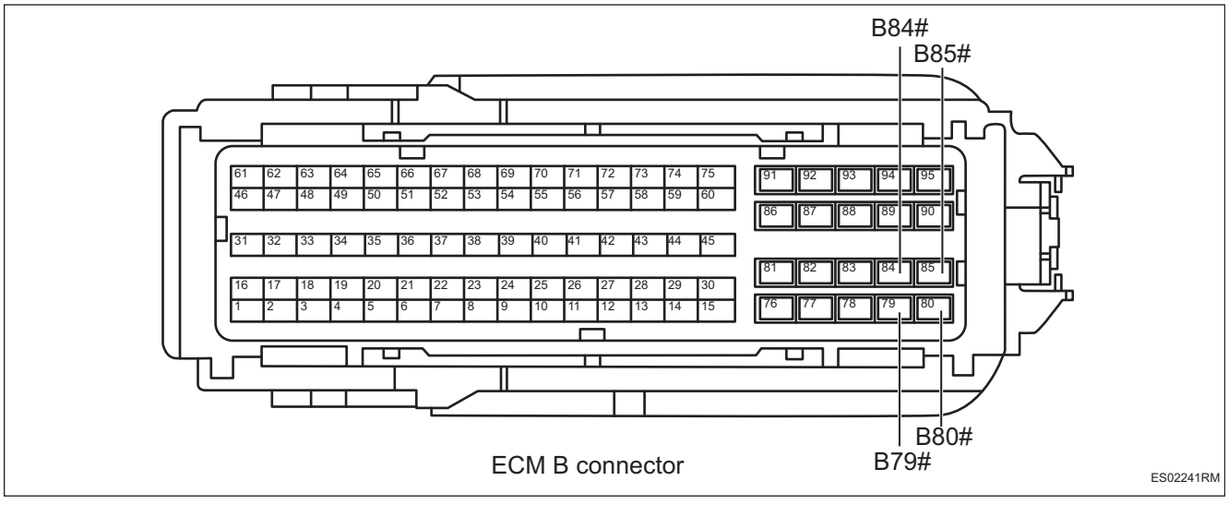
Standard value

Detector connection	Detection conditions	Specified state
Fuel injector 2 connector 1# -body GND	Set the ignition switch to "ON"	Less than 1 V
Fuel injector 2 connector 2# -body GND	Set the ignition switch to "ON"	Less than 1 V
Fuel injector 3 connector 1# -body GND	Set the ignition switch to "ON"	Less than 1 V
Fuel injector 3 connector 2# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG **Repair or replace the harness and connector**

OK

5	Check fuel injector



(a) Connect fuel injector connector.

(b) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector B85# - ECM connector B80#	Always connected	1.83±5%Ω
ECM connector B84# - ECM connector B79#	Always connected	1.83±5%Ω

NG → **Replace the fuel injector (2, 3) (See page FU-4)**

OK

6	**Replace the ECM (See page ES-450)**

ES

DTC	**P217700**	**Air-fuel ratio closed-loop control self-learning value above upper limit (medium load zone)**
DTC	**P217800**	**Air-fuel ratio closed-loop control self-learning value below lower limit (medium load zone)**
DTC	**P218700**	**Air-fuel ratio closed-loop control self-learning value above upper limit (idle speed)**
DTC	**P218800**	**Air-fuel ratio closed-loop control self-learning value below lower limit (idle speed)**

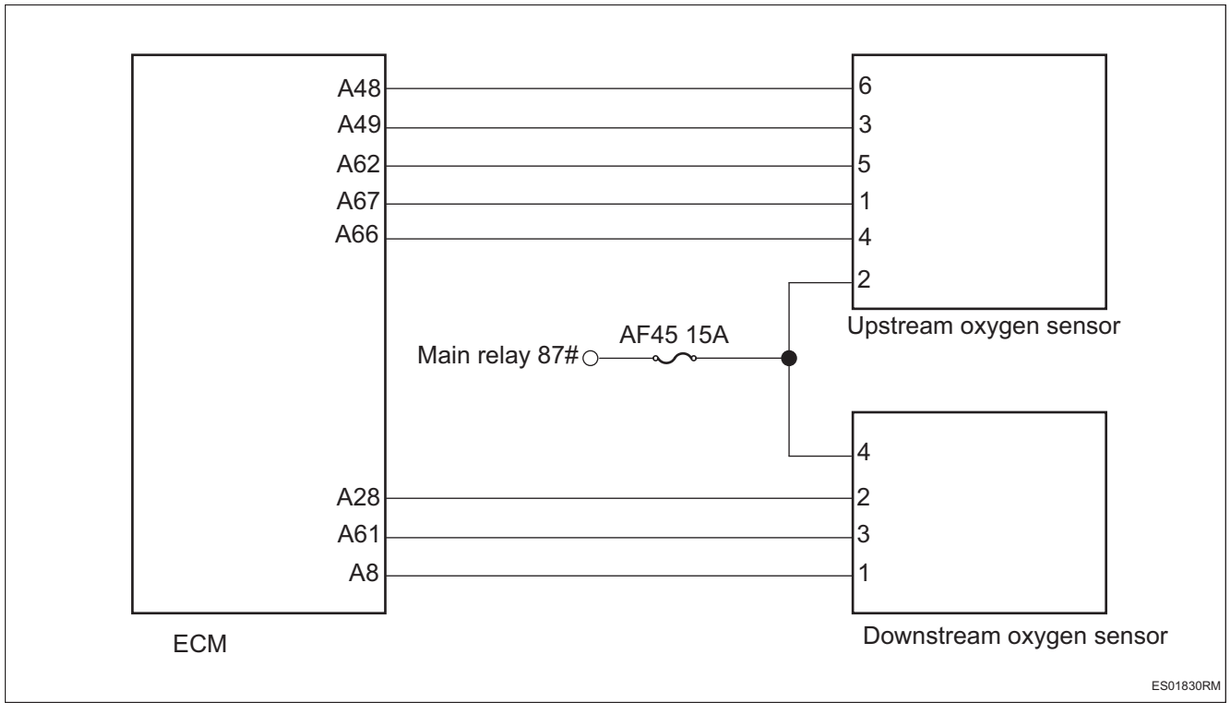
Description

The EMS corrects and conducts self-learning to the fuel injection quantity according to the deviation degree and characteristics of the air-fuel ratio. When the self-learning value exceeds the upper limit or lower limit value set by the system, the system will judge that the self-learning value is above upper limit or below lower limit, and ECM will record the DTC.

DTC	DTC detection conditions	Faulty location
P217700	(a) Air-fuel ratio closed-loop control self-learning value above upper limit.	• Harness and connector • Oxygen sensor • Canister solenoid valve • Fuel system • Intake system • Ignition system • VVT system • Engine mechanical system • ECM
P217800	(a) Air-fuel ratio closed-loop control self-learning value below lower limit.	• Harness and connector • Oxygen sensor • Canister solenoid valve • Fuel system • intake system • Ignition system • VVT system • Engine mechanical system • ECM

DTC	DTC detection conditions	Faulty location
P218700	(a) Air-fuel ratio closed-loop control self-learning value above upper limit.	• Harness and connector • Oxygen sensor • Canister solenoid valve • Fuel system • intake system • Ignition system • VVT system • Engine mechanical system • ECM
P218800	(a) Air-fuel ratio closed-loop control self-learning value below lower limit.	• Harness and connector • Oxygen sensor • Canister solenoid valve • Fuel system • intake system • Ignition system • VVT system • Engine mechanical system • ECM

Circuit diagram



Inspection procedure

1	**Check whether there is other DTC output**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Read the DTC.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

ES

NG → **Repair according to the DTC**

OK

2	Check fuel quality

(a) Check whether the fuel grade meets the requirements.

NG → **Repair according to the fault**

OK

3	Check canister solenoid valve

(a) Check whether the canister solenoid valve is stuck.

NG → **Replace canister solenoid valve**

OK

4	Check intake system

(a) Check whether the throttle is dirty.

(b) Check whether the intake system pipeline is properly connected.

(c) Check whether the intake system is leaking and blocked.

NG → **Repair or replace the intake system components**

OK

5	Check VVT system

(a) Check whether the VVT system is working properly.

NG → **Repair or replace VVT system components**

OK

6	Check valve clearance

(a) Check whether the valve clearance is outside the normal range.

NG → **Repair according to the fault**

OK

7	Check spark

(a) Remove the ignition coil and spark plug.

(b) Install the spark plug to the ignition coil and connect the ignition coil connector.

(c) Disconnect the fuel injector connector.

(d) Ground the spark plug.

(e) Do visual inspection and confirm the occurrence of sparks while engine start.

Hint:

When checking, be sure to ground the hexagon or thread parts of the spark plug. Do not start the engine for more than 2 seconds.

NG → **Repair or replace ignition system components**

OK

8	Check low-pressure fuel system pressure

(a) Measure the low-pressure fuel system pressure according to the values in the table below.

Standard value

Working conditions	Specified state
idle speed	4.5~5.5 bar
Pressure maintaining (after 20 minutes shutdown)	Greater than 2.5 bar

NG → **Replacement of fuel pump with fuel level sensor**

OK

9	Check the low-pressure fuel pump

ES

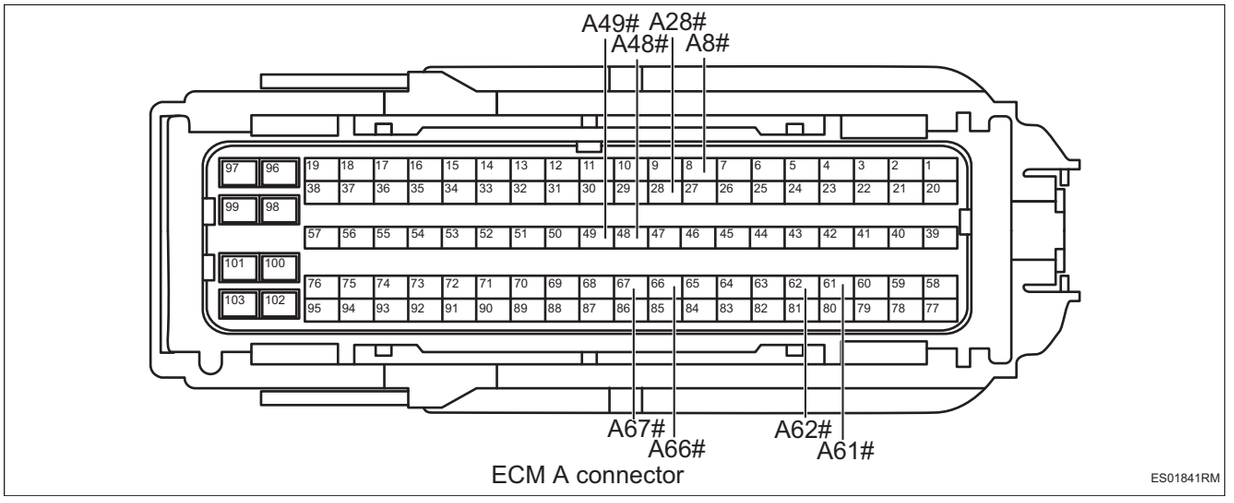
(a) Measure the low-pressure fuel pump resistance according to the values in the table below.

Standard value: 0.4 ~ 1.2 Ω

NG → **Replacement of fuel pump with fuel level sensor**

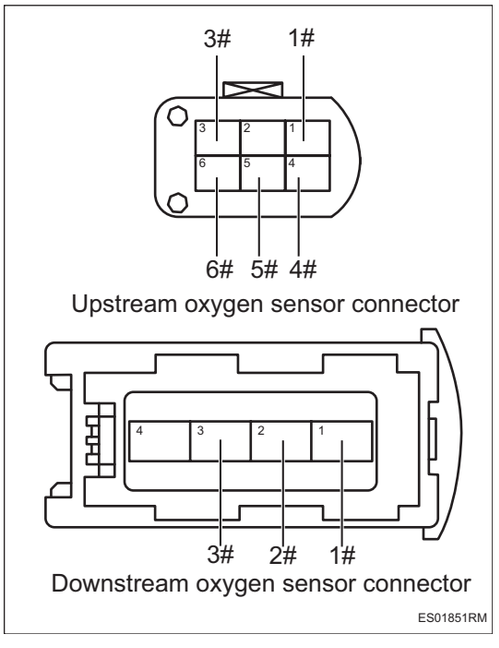
OK

10	Check oxygen sensor harness and connector for open circuit



ECM A connector

ES01841RM



Upstream oxygen sensor connector

Downstream oxygen sensor connector

ES01851RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the oxygen sensor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector A67# -upstream oxygen sensor connector 1#	Always connected	Less than 1Ω
ECM connector A49# -upstream oxygen sensor connector 3#	Always connected	Less than 1Ω
ECM connector A66# -upstream oxygen sensor connector 4#	Always connected	Less than 1Ω
ECM connector A62# - upstream oxygen sensor connector 5#	Always connected	Less than 1Ω

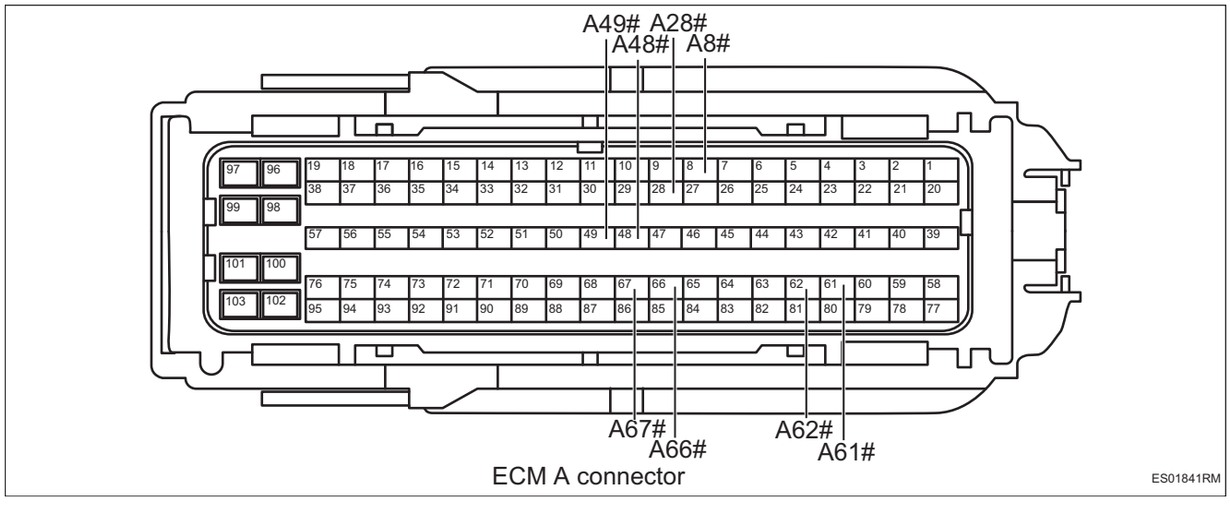
Detector connection	Detection conditions	Specified state
ECM connector A48# -upstream oxygen sensor connector 6#	Always connected	Less than 1Ω
ECM connector A28# - downstream oxygen sensor connector 2#	Always connected	Less than 1Ω
ECM connector A61# - downstream oxygen sensor connector 3#	Always connected	Less than 1Ω
ECM connector A8# - downstream oxygen sensor connector 1#	Always connected	Less than 1Ω

ES

NG → **Repair or replace the harness and connector**

OK

11 **Check oxygen sensor harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector A48# - body GND	Always connected	10 KΩ or greater
ECM connector A49# - body GND	Always connected	10 KΩ or greater
ECM connector A62# - body GND	Always connected	10 KΩ or greater
ECM connector A67# - body GND	Always connected	10 KΩ or greater
ECM connector A66# - body GND	Always connected	10 KΩ or greater

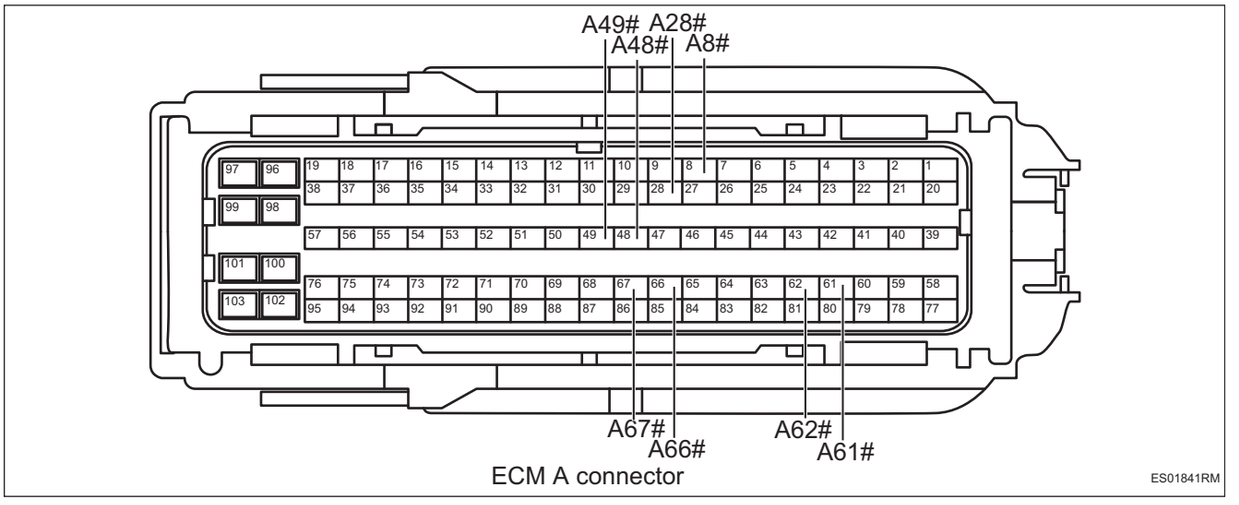
ES

Detector connection	Detection conditions	Specified state
ECM connector A28# - body GND	Always connected	10 KΩ or greater
ECM connector A61# - body GND	Always connected	10 KΩ or greater
ECM connector A8# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

12	Check oxygen sensor harness and connector for circuit shorted to power supply



ECM A connector

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

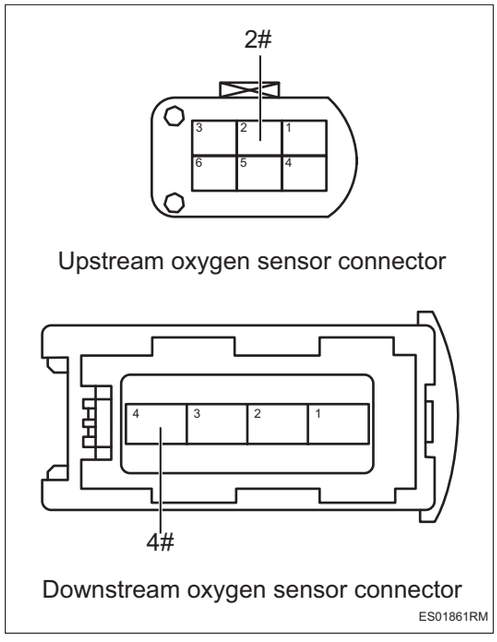
Detector connection	Detection conditions	Specified state
ECM connector A48# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A49# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A62# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A67# - body GND	Set the ignition switch to "ON"	Less than 1 V

Detector connection	Detection conditions	Specified state
ECM connector A66# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A28# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A61# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A8# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

13 Check the oxygen sensor power supply



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Connect ECM connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the voltage according to the values in the table below.

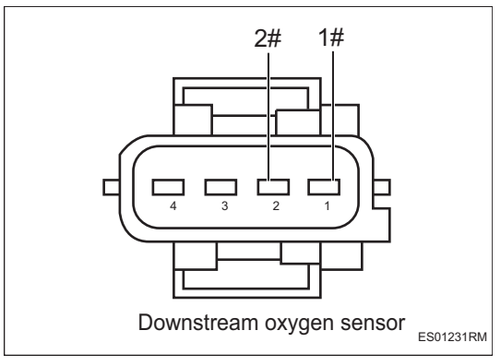
Standard value

Detector connection	Detection conditions	Specified state
Upstream oxygen sensor connector 2# - body GND	Set the ignition switch to "ON"	Battery voltage
Downstream oxygen sensor connector 4# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector, fuse and relay**

OK

14 Check the downstream oxygen sensor



(a) Set the ignition switch to "OFF".

(b) Connect the oxygen sensor connector.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

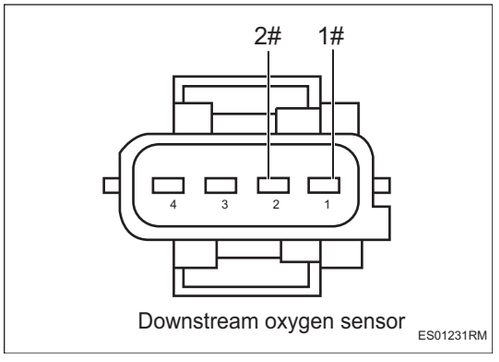
Standard value

Detector connection	Detection conditions	Specified state
Downstream oxygen sensor 1# -downstream oxygen sensor 2#	Always connected	About 0.45 V

NG → **Replace the downstream oxygen sensor**

OK

15	Check the downstream oxygen sensor



(a) Start the vehicle (idle).

(b) Run the vehicle until the coolant temperature is normal.

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Downstream oxygen sensor 1# -downstream oxygen sensor 2#	Always connected	Jump between 0~1 V

NG → **Replace the downstream oxygen sensor (See page ES-457)**

OK

16	Replace the upstream oxygen sensor (See page ES-455)

(a) Replace the upstream oxygen sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Results

Results	Go to
DTC reappears	Abnormal

Results	Go to
DTC does not reappear	Normal

OK → **End**

NG

17	**Replace the fuel injector (See page FU-4)**

(a) Replace the fuel injector.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

18	**End**

ES

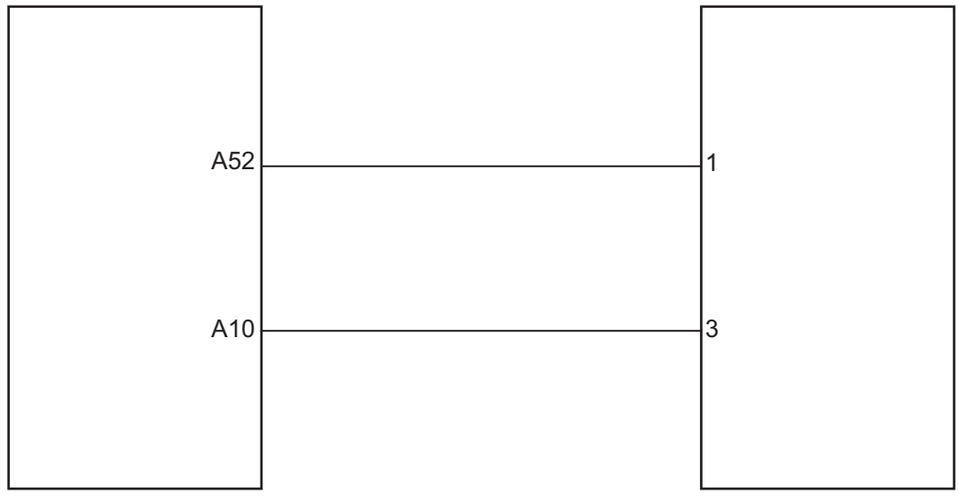
DTC	P218500	Coolant temperature sensor 2 circuit over-voltage
DTC	P218400	Coolant temperature sensor 2 circuit under-voltage
DTC	P218324	Coolant temperature sensor 2 cold start check implausible (positive deviation)
DTC	P218323	Coolant temperature sensor 2 cold start check implausible (negative deviation)

Description

When the radiator coolant temperature sensor circuit voltage is abnormal or the signal is unreasonable, the ECM will record the DTC.

DTC	DTC detection conditions	Faulty location
P218500	(a) Radiator coolant temperature sensor circuit overvoltage.	• ECM • Harness and connector • Radiator coolant temperature sensor
P218400	(a) Radiator coolant temperature sensor circuit undervoltage.	• ECM • Harness and connector • Radiator coolant temperature sensor
P218324	(a) Radiator coolant temperature sensor cold start check implausible.	• ECM • Harness and connector • Radiator coolant temperature sensor
P218323	(a) Radiator coolant temperature sensor cold start check implausible.	• ECM • Harness and connector • Radiator coolant temperature sensor

Circuit diagram



Inspection procedure

1	Check coolant

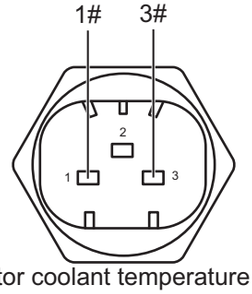
(a) Check whether the coolant level is normal.

(b) Check whether the coolant has deteriorated.

NG → **Repair according to the fault**

OK

2	Check radiator coolant temperature sensor



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the radiator coolant temperature sensor connector.

(d) Remove the radiator coolant temperature sensor.

(e) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Radiator coolant temperature sensor #1 -radiator coolant temperature sensor #3	20 ℃	2.2128KΩ ~ 2.6391KΩ

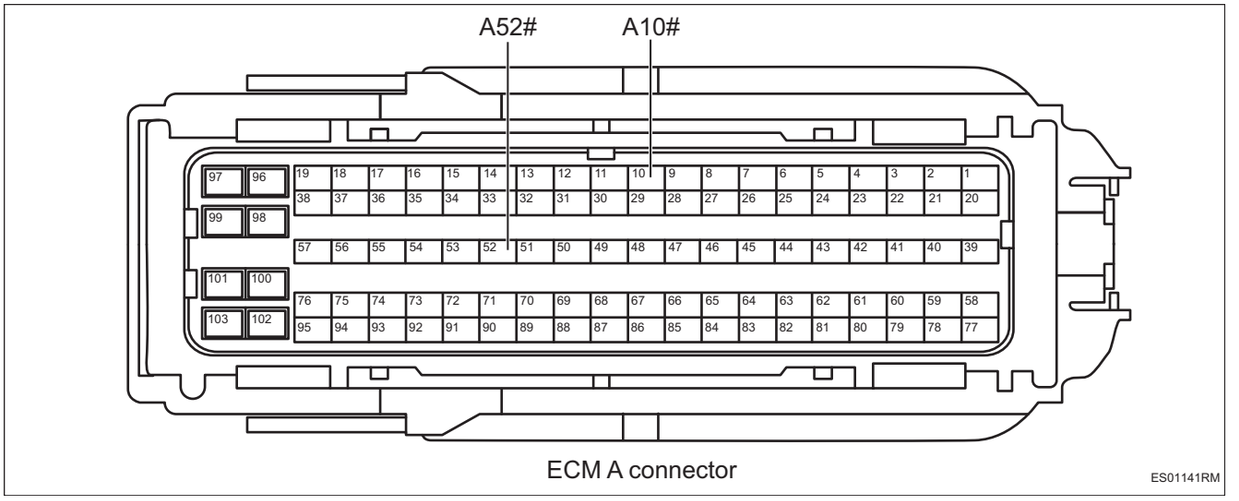
ES

Detector connection	Detection conditions	Specified state
Radiator coolant temperature sensor #1 -radiator coolant temperature sensor #3	80 ℃	0.3030KΩ ~ 0.3260KΩ

NG → **Replace the radiator coolant temperature sensor (See page CO-15)**

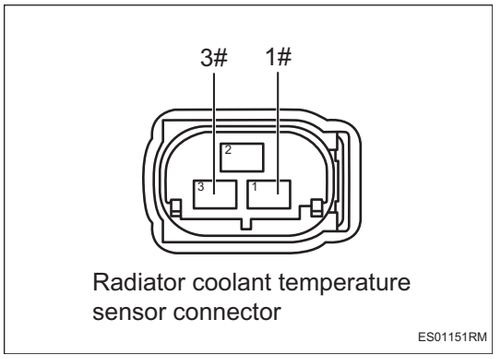
OK

3	Check radiator coolant temperature sensor harness and connector for open circuit



ECM A connector

ES01141RM



Radiator coolant temperature sensor connector

ES01151RM

(a) Disconnect the ECM connector.

(b) Measure the resistance according to the values in the table below.

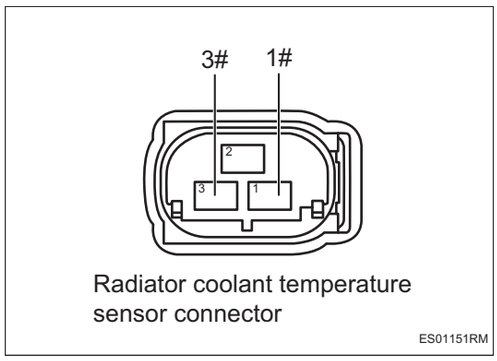
Standard value

Detector connection	Detection conditions	Specified state
Radiator coolant temperature sensor connector 1# - ECM connector A52#	Always connected	Less than 1Ω
Radiator coolant temperature sensor connector 3# -ECM connector A10#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	Check radiator coolant temperature sensor harness and connector for circuit shorted to ground



(a) Measure the resistance according to the values in the table below.

Standard value

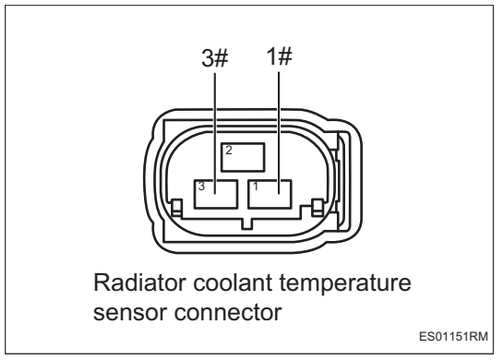
Detector connection	Detection conditions	Specified state
Radiator coolant temperature sensor connector 1# -body GND	Always connected	10 KΩ or greater
Radiator coolant temperature sensor connector 3# -body GND	Always connected	10 KΩ or greater

ES

NG → **Repair or replace the harness and connector**

OK

5	Check radiator coolant temperature sensor harness and connector for circuit shorted to each other



(a) Measure the resistance according to the values in the table below.

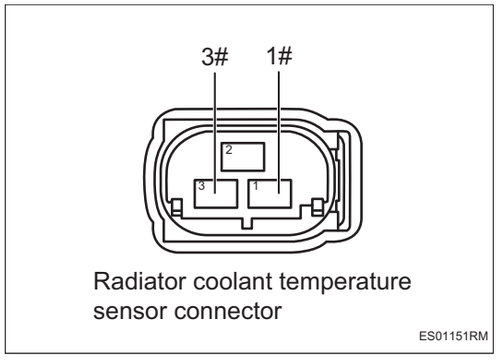
Standard value

Detector connection	Detection conditions	Specified state
Radiator coolant temperature sensor connector 1# -radiator coolant temperature sensor connector 3#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

6	Check radiator coolant temperature sensor harness and connector for circuit shorted to power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Radiator coolant temperature sensor connector 1# -body GND	Set the ignition switch to "ON"	Less than 1 V

Detector connection	Detection conditions	Specified state
Radiator coolant temperature sensor connector 3# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

7	**Replace the ECM (See page ES-450)**

DTC	P222900	Ambient pressure sensor circuit shorted to power supply
DTC	P222800	Ambient pressure sensor circuit shorted to ground
DTC	P222729	Ambient pressure sensor signal fault
DTC	P222722	Ambient pressure sensor pressure implausibly high
DTC	P222721	Ambient pressure sensor pressure implausibly low
DTC	P222785	Ambient pressure sensor signal pressure value high during starting
DTC	P222784	Ambient pressure sensor signal pressure value low during starting
DTC	P120200	Ambient pressure sensor pressure above upper limit
DTC	P120300	Ambient pressure sensor pressure below lower limit

Description

The ambient pressure sensor is built in the ECM. When the ambient pressure sensor has abnormal short circuit or open circuit and signal faults, the ECM records DTC.

DTC	DTC detection conditions	Faulty location
P222900	(a) Ambient pressure sensor circuit shorted to power supply.	• ECM
P222800	(a) Ambient pressure sensor circuit shorted to ground.	• ECM
P222729	(a) Ambient pressure sensor signal fault.	• ECM
P222722	(a) The ambient pressure sensor pressure is implausible.	• ECM
P222721	(a) The ambient pressure sensor pressure is implausible.	• ECM
P222785	(a) Ambient pressure sensor signal pressure value high during starting.	• ECM
P222784	(a) Ambient pressure sensor signal pressure value low during starting.	• ECM
P120200	(a) The ambient pressure sensor pressure is out of range.	• ECM
P120300	(a) The ambient pressure sensor pressure is out of range.	• ECM

ES

Inspection procedure

1	**Confirm and clear the DTC**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Check whether the ambient pressure sensor signal value is significantly different from the current atmospheric pressure.

(d) Check whether the ambient pressure sensor signal value is too high or too low.

(e) Record and clear the DTC.

(f) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

2	**Replace the ECM (See page ES-450)**

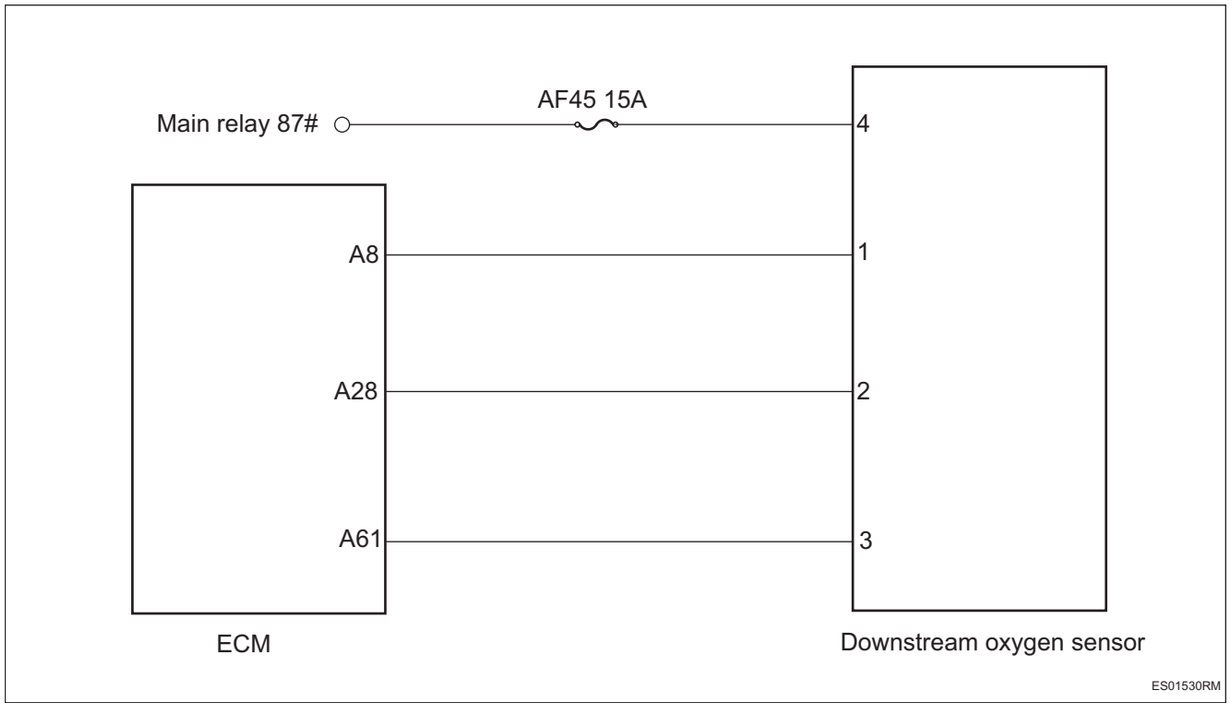
DTC	P223200	Coupling of downstream oxygen sensor signal line to heater wire

Description

When the downstream oxygen sensor circuit is shorted, the ECM will record the DTC.

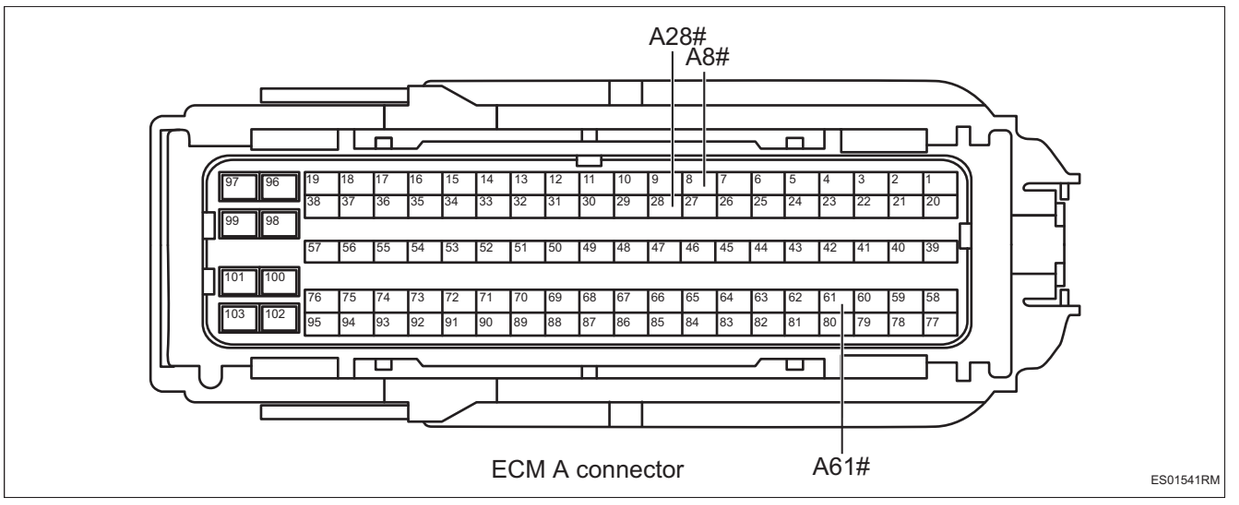
DTC	DTC detection conditions	Faulty location
P223200	(a) Coupling of downstream oxygen sensor signal line to heater wire.	• ECM • Harness and connector • Downstream oxygen sensor

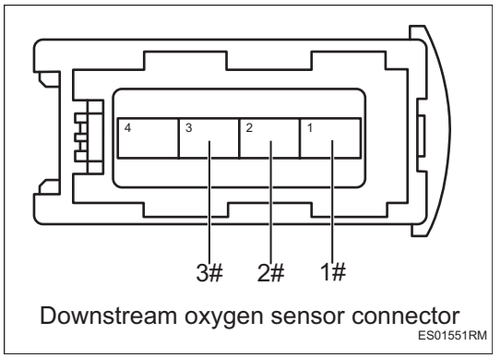
Circuit diagram



Inspection procedure

1	Check downstream oxygen sensor harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the downstream oxygen sensor connector.

(e) Measure the resistance according to the values in the table below.

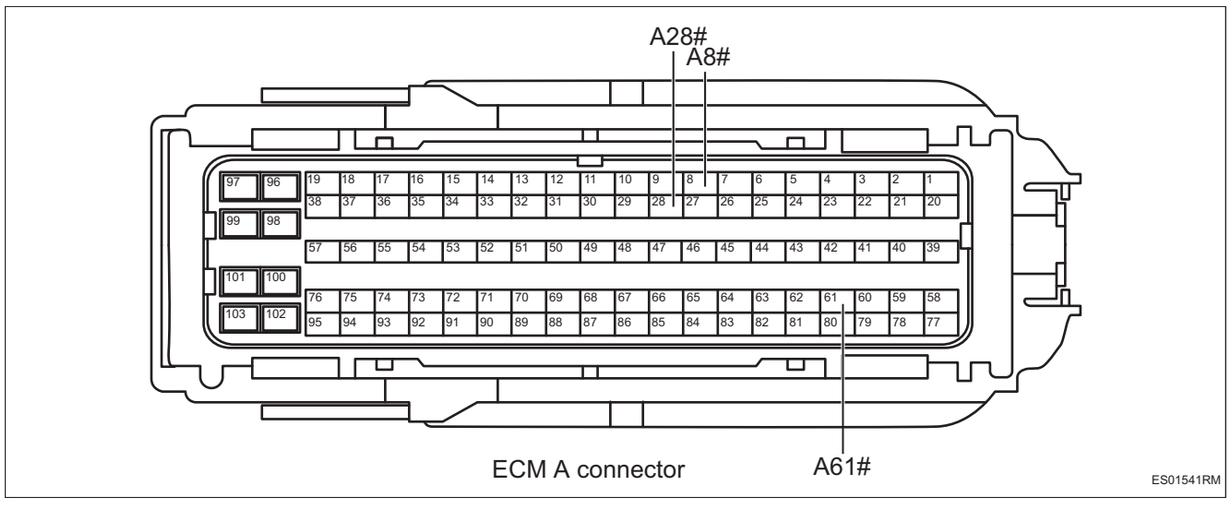
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A8# - downstream oxygen sensor connector 1#	Always connected	Less than 1Ω
ECM connector A28# - downstream oxygen sensor connector 2#	Always connected	Less than 1Ω
ECM connector A61# - downstream oxygen sensor connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check downstream oxygen sensor harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

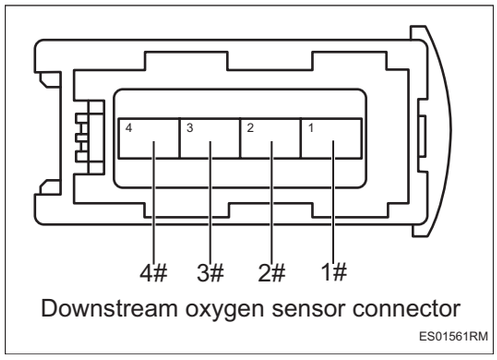
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A8# - body GND	Always connected	10 KΩ or greater
ECM connector A28# - body GND	Always connected	10 KΩ or greater
ECM connector A61# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

3	Check downstream oxygen sensor harness and connector for circuit shorted to each other



(a) Measure the resistance according to the values in the table below.

Standard value

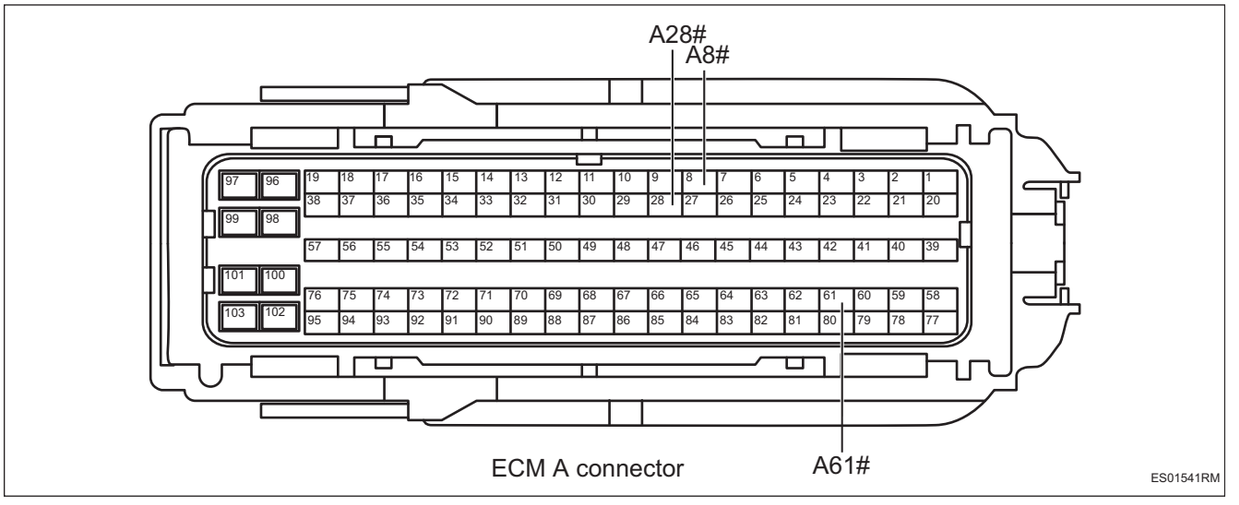
Detector connection	Detection conditions	Specified state
Downstream oxygen sensor connector 1# - downstream oxygen sensor connector 2#	Always connected	10 KΩ or greater
Downstream oxygen sensor connector 1# - downstream oxygen sensor connector 3#	Always connected	10 KΩ or greater
Downstream oxygen sensor connector 1# - downstream oxygen sensor connector 4#	Always connected	10 KΩ or greater
Downstream oxygen sensor connector 2# - downstream oxygen sensor connector 3#	Always connected	10 KΩ or greater

Detector connection	Detection conditions	Specified state
Downstream oxygen sensor connector 2# - downstream oxygen sensor connector 4#	Always connected	10 KΩ or greater
Downstream oxygen sensor connector 3# - downstream oxygen sensor connector 4#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check downstream oxygen sensor harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

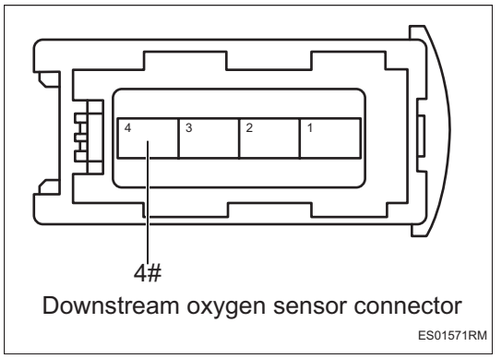
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A8# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A28# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A61# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Check the downstream oxygen sensor power supply



Downstream oxygen sensor connector
ES01571RM

(a) Set the ignition switch to "OFF".
(b) Disconnect the battery negative terminal.
(c) Connect ECM connector.
(d) Connect the battery negative terminal.
(e) Set the ignition switch to "ON".
(f) Measure the voltage according to the values in the table below.

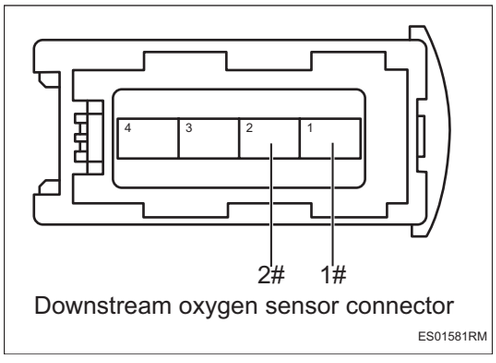
Standard value

Detector connection	Detection conditions	Specified state
Downstream oxygen sensor connector 4# — body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector, fuse and relay**

OK

6	Check the downstream oxygen sensor



Downstream oxygen sensor connector
ES01581RM

(a) Set the ignition switch to "OFF".
(b) Connect downstream oxygen sensor connector.
(c) Set the ignition switch to "ON".
(d) Measure the voltage according to the values in the table below.

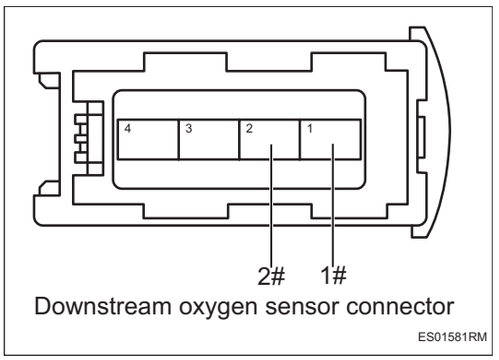
Standard value

Detector connection	Detection conditions	Specified state
Downstream oxygen sensor connector 1# - downstream oxygen sensor connector 2#	Always connected	About 0.45 V

NG → **Replace oxygen sensor**

OK

7	Check the downstream oxygen sensor



Downstream oxygen sensor connector

ES01581RM

(a) Start the vehicle (idle).

(b) Run the vehicle until the coolant temperature is normal.

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Downstream oxygen sensor connector 1# - downstream oxygen sensor connector 2#	Always connected	Jump between 0~1 V

NG → **Replace the oxygen sensor (See page ES-455)**

OK

8	**Replace the ECM (See page ES-450)**

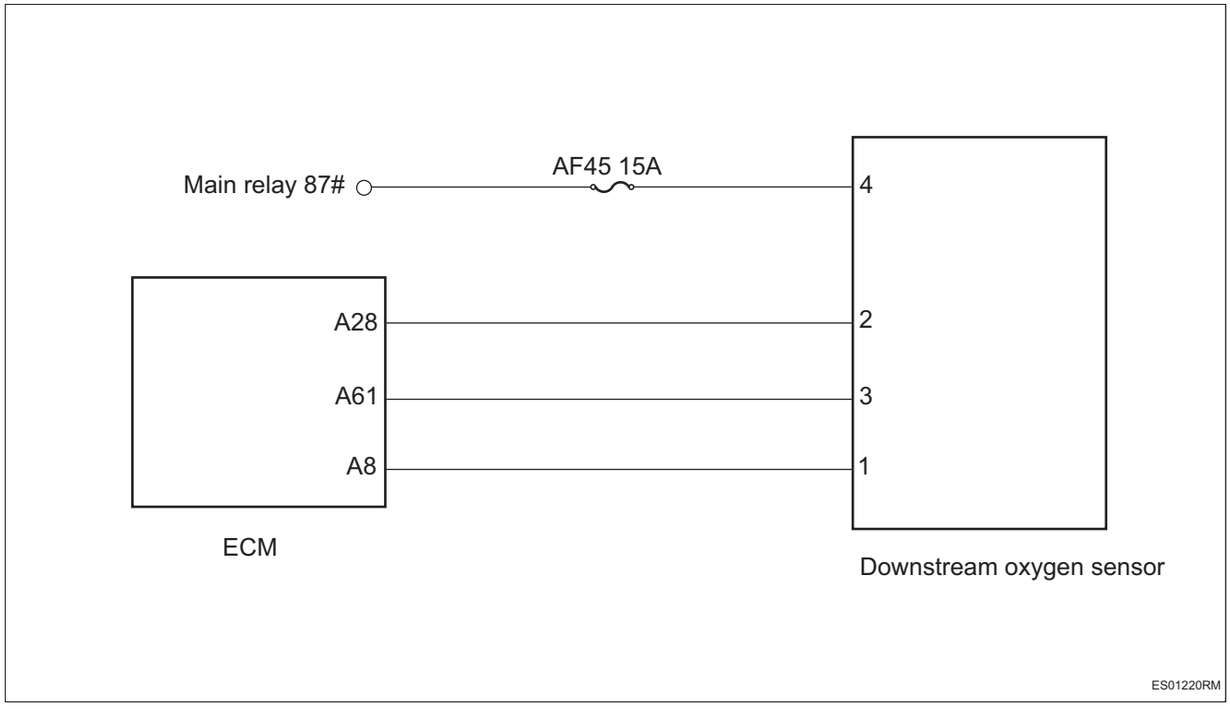
DTC	P227000	Downstream oxygen sensor aging - signal biased lean continuously
DTC	P227100	Downstream oxygen sensor aging - signal biased rick continuously

Description

In case of continuous lean or rich signal of oxygen sensor, the ECM will record the DTC.

DTC	DTC detection conditions	Faulty location
P227000	(a) Continuously high downstream oxygen sensor voltage.	• Oxygen sensor • Exhaust system
P227100	(a) Continuously low downstream oxygen sensor voltage.	• Oxygen sensor • Exhaust system

Circuit diagram



Inspection procedure

1	Check whether there is other DTC output

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Read the DTC.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

NG → **Repair according to the DTC**

OK

ES

2	Check the exhaust system

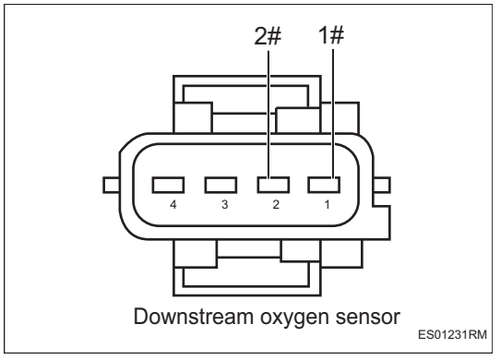
(a) Check whether the exhaust system pipeline is properly connected.

(b) Check the exhaust system for leakage damage.

NG → **Repair or replace the exhaust system components**

OK

3	Check the downstream oxygen sensor



(a) Set the ignition switch to "ON".

(b) Measure the voltage according to the values in the table below.

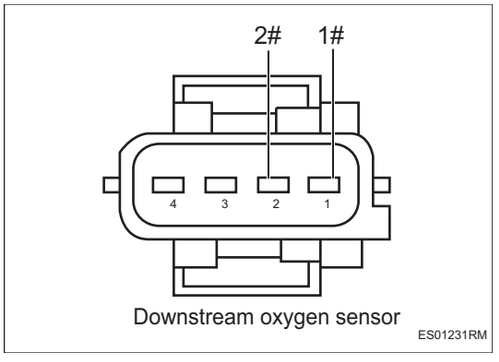
Standard value

Detector connection	Detection conditions	Specified state
Downstream oxygen sensor 1# -downstream oxygen sensor 2#	Set the ignition switch to "ON"	0.44 ~ 0.46V

NG → **Replace the downstream oxygen sensor**

OK

4	Check the downstream oxygen sensor



(a) Start the vehicle (idle).

(b) Run the vehicle until the coolant temperature is normal.

(c) Measure the voltage according to the values in the table below.

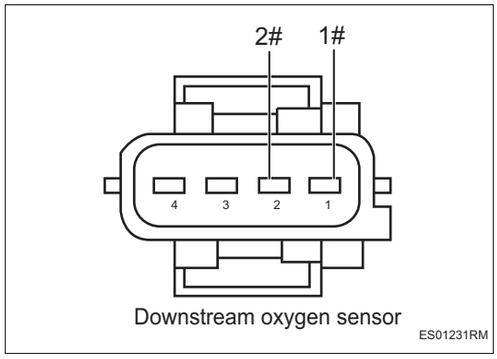
Standard value

Detector connection	Detection conditions	Specified state
Downstream oxygen sensor 1# -downstream oxygen sensor 2#	Set the ignition switch to "ON"	Jump between 0~1 V

NG → **Replace the downstream oxygen sensor**

OK

5	Check the downstream oxygen sensor



(a) Start the vehicle (idle).

(b) Run the vehicle until the coolant temperature is normal.

(c) Frequently release and step on the accelerator pedal alternately for 90 s.

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Downstream oxygen sensor 1# -downstream oxygen sensor 2#	Set the ignition switch to "ON"	Ride through "0.55 V ~ 0.65 V"

Hint:

"Ride through 0.55 V~0.65 V" means that the detected voltage was once higher than 0.55 V~0.65 V and also was lower than 0.55 V~0.65 V.

NG → **Replace the downstream oxygen sensor (See page ES-457)**

OK

6	End

DTC	P227900	Excessive inflation model deviation

ES

Description

When the air leakage self-learning value exceeds the reasonable range, the ECM will record the DTC.

DTC	DTC detection conditions	Faulty location
P227900	(a) Air leakage self-learning value above a reasonable threshold.	• ECM

Inspection procedure

1	Check intake system pipeline

(a) Check whether the intake system pipeline is properly connected.

(b) Check the intake system pipeline for air leakage.

NG → **Chick the intake system pipeline**

OK

2	Replace the ECM (See page ES-450)

DTC	P240C00	EVAP system leakage diagnosis DMTL heating unit circuit overvoltage
DTC	P240B00	EVAP system leakage diagnosis DMTL heating unit circuit undervoltage
DTC	P240A00	EVAP system leakage diagnosis DMTL heating unit circuit open
DTC	P24BF00	EVAP system DMTL solenoid valve control circuit overvoltage
DTC	P24BE00	EVAP system DMTL solenoid valve control circuit undervoltage
DTC	P24BD00	EVAP system DMTL solenoid valve control circuit open
DTC	P240200	EVAP system DMTL pump control circuit overvoltage
DTC	P240100	EVAP system DMTL pump control circuit undervoltage
DTC	P240000	EVAP system DMTL pump control circuit open

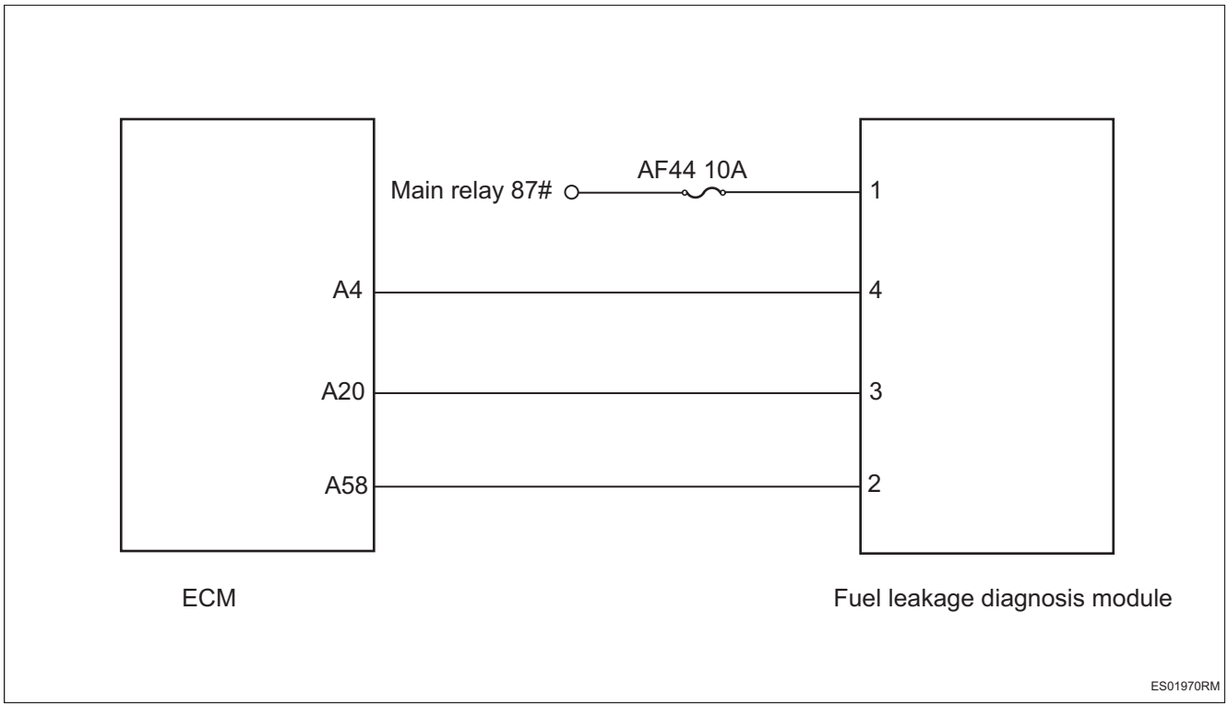
Description

When a short circuit or open circuit is detected in the fuel leakage diagnosis module control circuit, the ECM will record the DTC.

DTC	DTC detection conditions	Faulty location
P240C00	(a) DMTL heating unit circuit overvoltage.	• ECM • Harness and connector • Fuel leakage diagnosis module
P240B00	(a) DMTL heating unit circuit undervoltage.	• ECM • Harness and connector • Fuel leakage diagnosis module
P240A00	(a) DMTL heating unit is open-circuited.	• ECM • Harness and connector • Fuel leakage diagnosis module
P24BF00	(a) DMTL solenoid valve control circuit overvoltage.	• ECM • Harness and connector • Fuel leakage diagnosis module
P24BE00	(a) DMTL solenoid valve control circuit undervoltage.	• ECM • Harness and connector • Fuel leakage diagnosis module

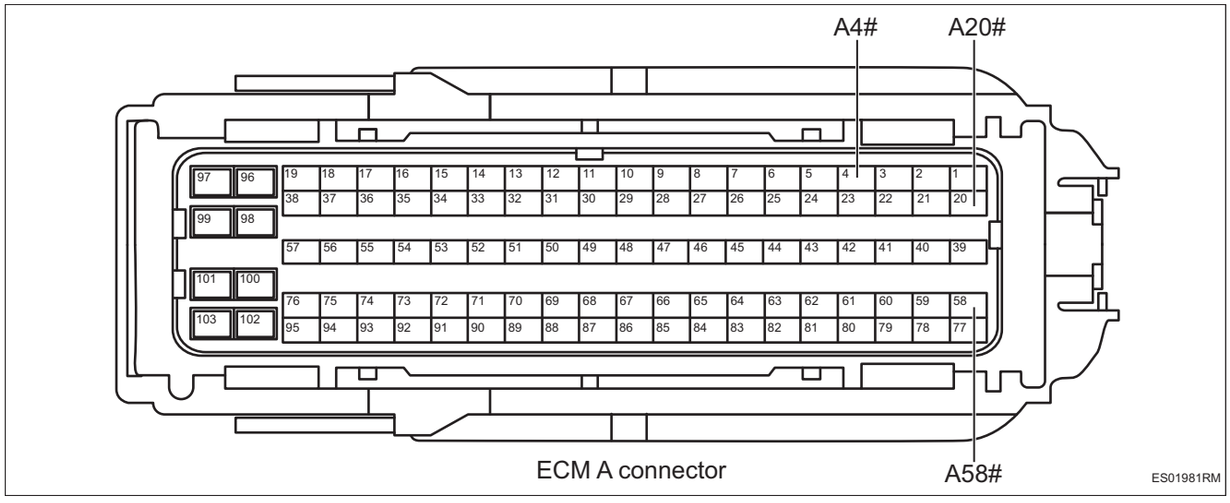
DTC	DTC detection conditions	Faulty location
P24BD00	(a) DMTL solenoid valve control circuit open.	• ECM • Harness and connector • Fuel leakage diagnosis module
P240200	(a) DMTL pump control circuit overvoltage.	• ECM • Harness and connector • Fuel leakage diagnosis module
P240100	(a) DMTL pump control circuit undervoltage.	• ECM • Harness and connector • Fuel leakage diagnosis module
P240000	(a) DMTL pump control circuit open.	• ECM • Harness and connector • Fuel leakage diagnosis module

Circuit diagram

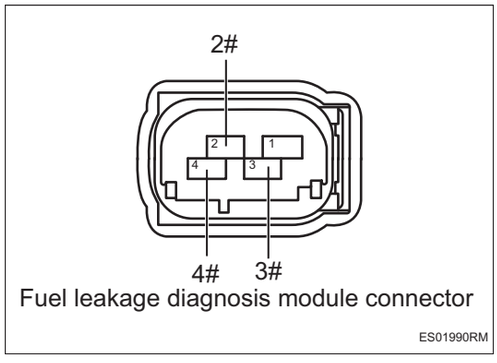


Inspection procedure

1	**Check fuel leakage diagnosis module harness and connector for open circuit**



ECM A connector



Fuel leakage diagnosis module connector

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the fuel leakage diagnosis module connector.

(e) Measure the resistance according to the values in the table below.

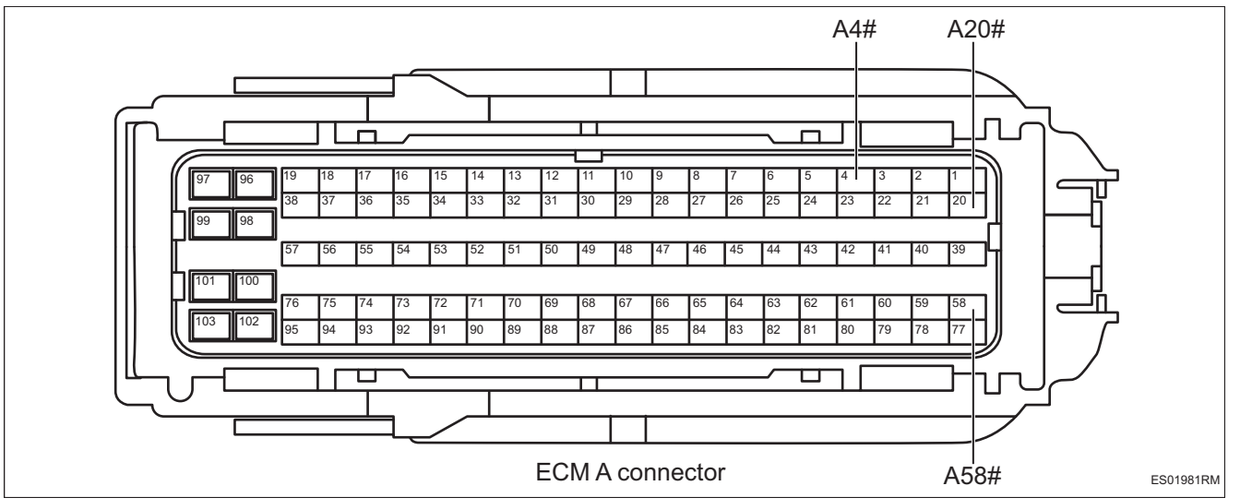
Standard value

Detector connection	Detection conditions	Specified state
Fuel leakage diagnosis module connector 2# - ECM connector A58#	Always connected	Less than 1Ω
Fuel leakage diagnosis module connector 3# - ECM connector A20#	Always connected	Less than 1Ω
Fuel leakage diagnosis module connector 4# - ECM connector A4#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check fuel leakage diagnosis module harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

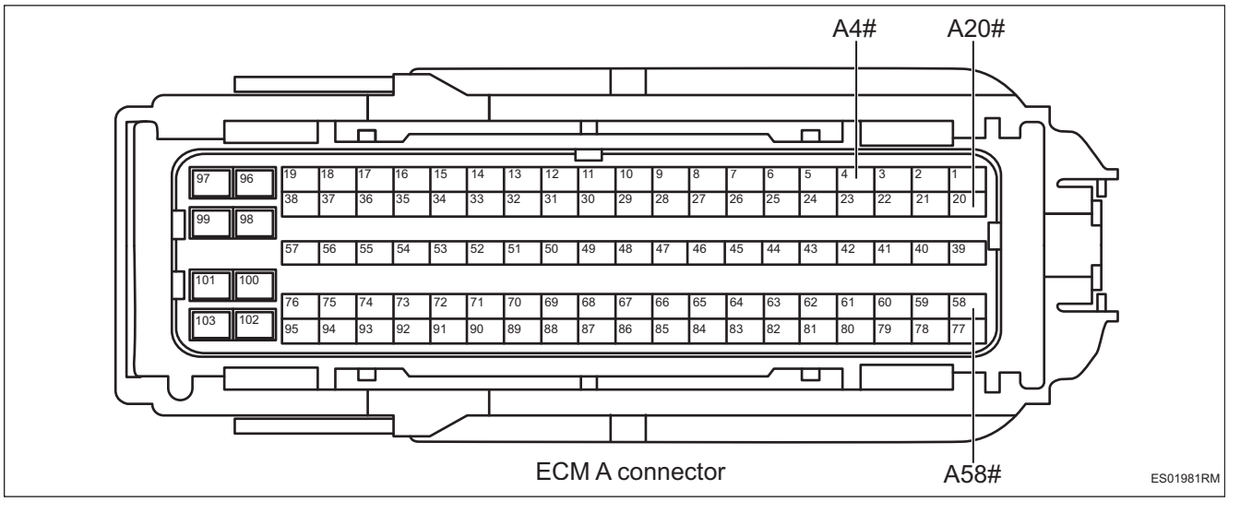
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A4# - body GND	Always connected	10 KΩ or greater
ECM connector A20# - body GND	Always connected	10 KΩ or greater
ECM connector A58# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check fuel leakage diagnosis module harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

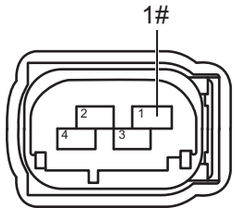
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A4# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A20# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A58# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	Check the fuel leakage diagnosis module power supply



Fuel leakage diagnosis module connector

ES02001RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Connect ECM connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Fuel leakage diagnosis module connector 1# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	Replace the fuel leakage diagnosis module (See page EC-9)

(a) Replace the fuel leakage diagnosis module.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

6	**End**

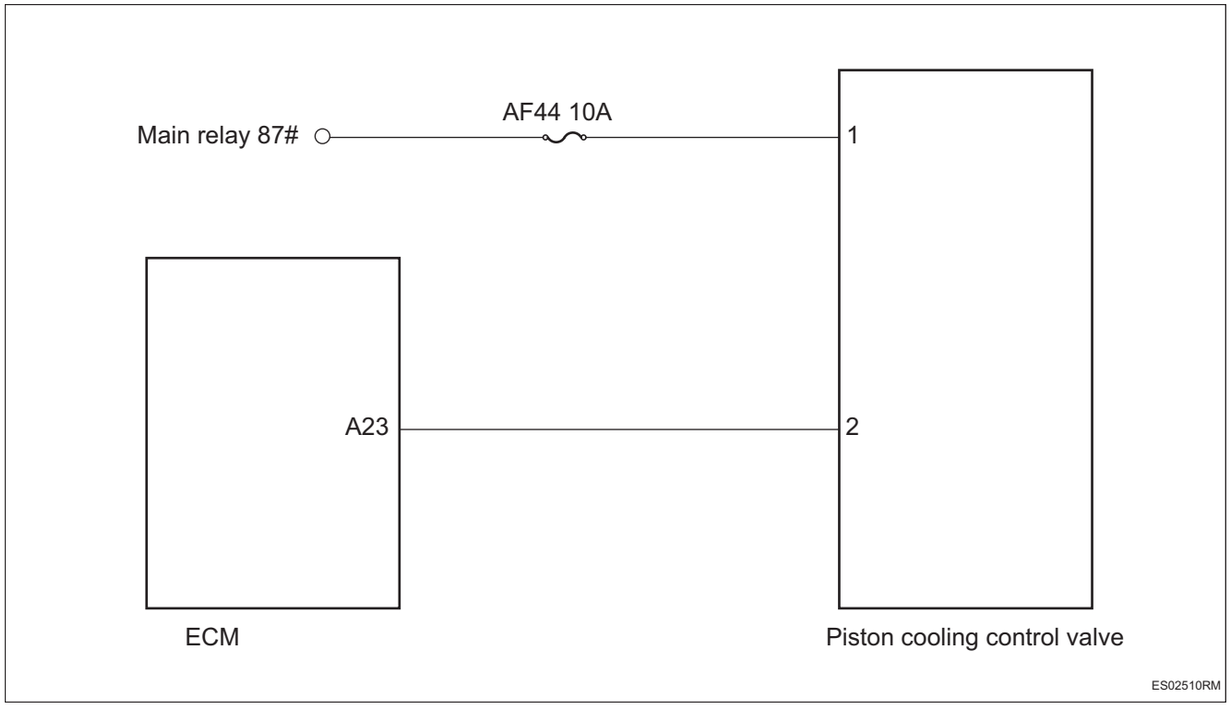
DTC	P25AB00	Piston cooling nozzle control valve control circuit overvoltage
DTC	P25AA00	Piston cooling nozzle control valve control circuit undervoltage
DTC	P25A900	Piston cooling nozzle control valve control circuit open

Description

When an abnormal piston cooling control valve circuit voltage is detected, the ECM will record the DTC.

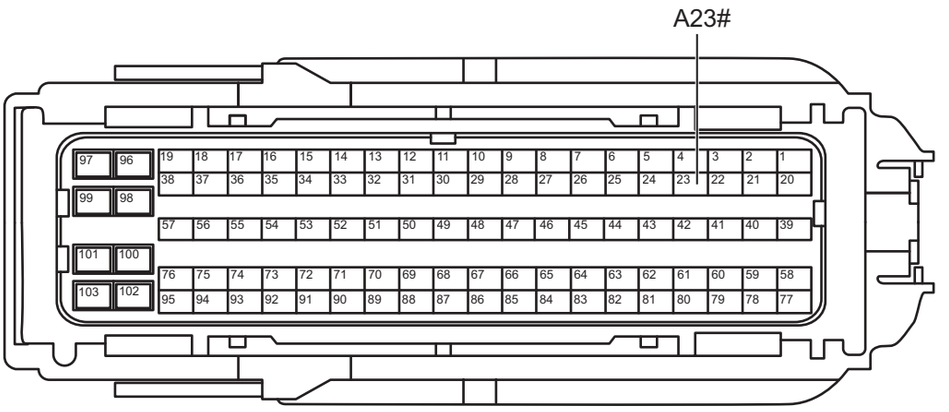
DTC	DTC detection conditions	Faulty location
P25AB00	(a) Piston cooling control valve control circuit overvoltage.	• ECM • Harness and connector • Piston cooling control valve
P25AA00	(a) Piston cooling control valve control circuit undervoltage.	• ECM • Harness and connector • Piston cooling control valve
P25A900	(a) Piston cooling control valve control circuit open.	• ECM • Harness and connector • Piston cooling control valve

Circuit diagram



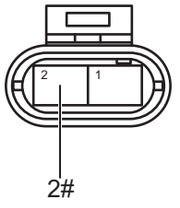
Inspection procedure

1	Check piston cooling control valve harness and connector for open circuit



ECM A connector

ES02521RM



Piston cooling control valve connector

ES02530RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the piston cooling control valve connector.

(e) Measure the resistance according to the values in the table below.

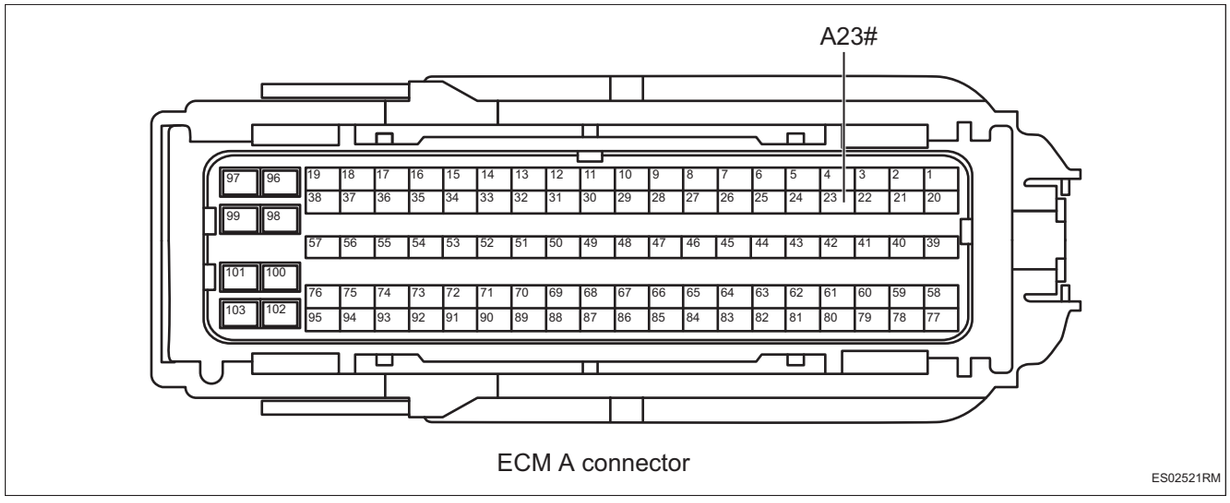
Standard value

Detector connection	Detection conditions	Specified state
Piston cooling control valve connector 2# - ECM connector A23#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check piston cooling control valve harness and connector for circuit shorted to ground**



ECM A connector

ES02521RM

(a) Measure the resistance according to the values in the table below.

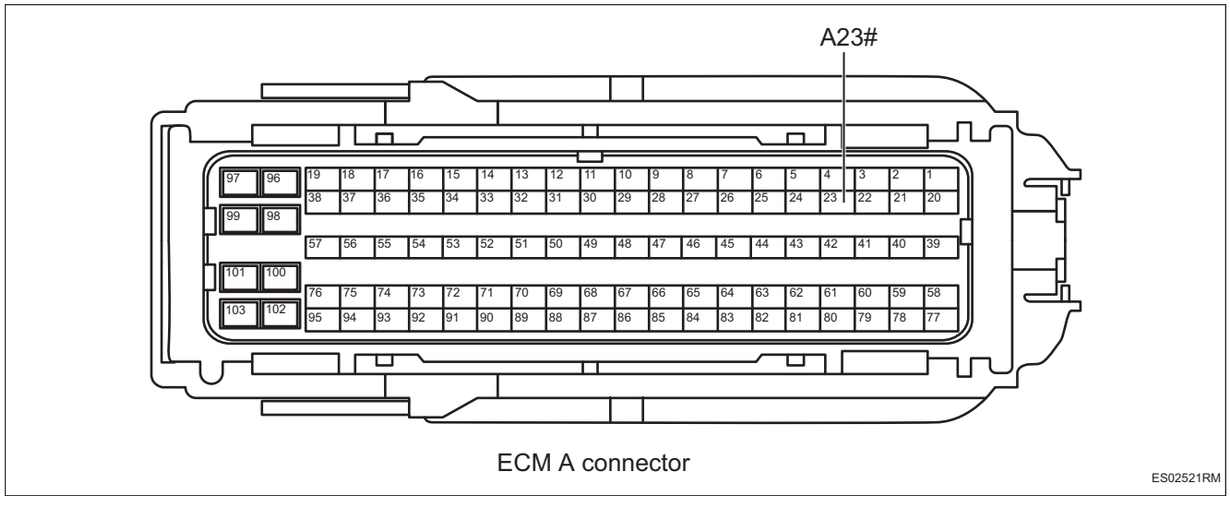
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A23# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

3	**Check piston cooling control valve harness and connector for circuit shorted to power supply**



ECM A connector

ES02521RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

ES

(c) Measure the voltage according to the values in the table below.

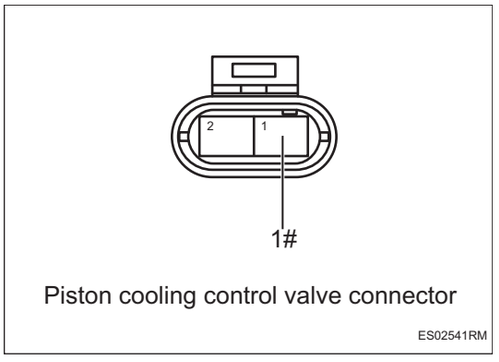
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A23# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	Check piston cooling control valve power supply



Piston cooling control valve connector

ES02541RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Connect ECM connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Piston cooling control valve connector 1# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector, fuse and relay**

OK

5	Replace piston cooling control valve (See page EM-12)

(a) Replace the piston cooling control valve.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG	Replace the ECM (See page ES-450)

OK

6	End

ES

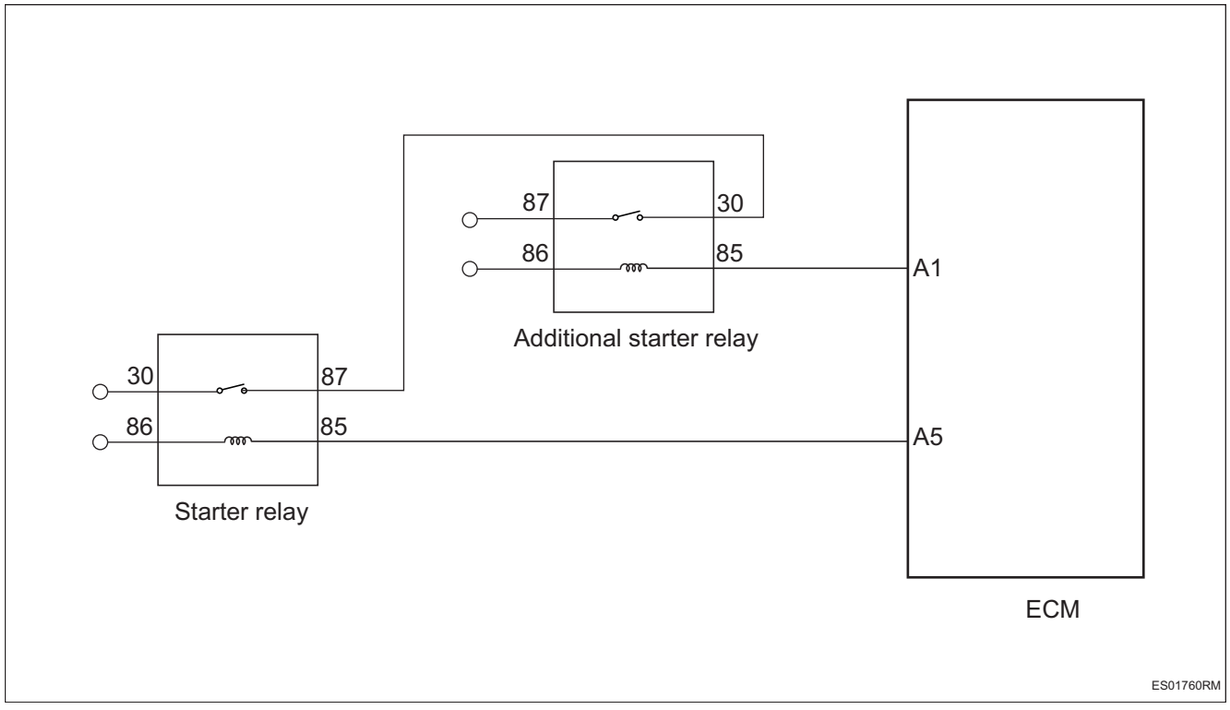
DTC	P26E600	Starter relay control circuit overvoltage
DTC	P26E500	Starter relay control circuit undervoltage
DTC	P061500	Starter relay control circuit fault-control terminal A
DTC	P061700	Starter relay control circuit overvoltage
DTC	P061600	Starter relay control circuit undervoltage
DTC	P26E400	Starter relay control circuit fault-control terminal B
DTC	P063441	Starter drive chip 1 overheating
DTC	P063444	Starter drive chip 2 overheating

Description

When the starter relay curcuit is shorted or open or the starter chip is overheated, the ECM records the DTC.

DTC	DTC detection conditions	Faulty location
P26E600	(a) Starter relay control circuit overvoltage.	• ECM • Harness and connector • Starter relay/additional starter relay
P26E500	(a) Starter relay control circuit undervoltage.	• ECM • Harness and connector • Starter relay/additional starter relay
P061500	(a) Starter relay control circuit fault.	• ECM • Harness and connector • Starter relay/additional starter relay
P061700	(a) Starter relay control circuit overvoltage.	• ECM • Harness and connector • Starter relay/additional starter relay
P061600	(a) Starter relay control circuit undervoltage.	• ECM • Harness and connector • Starter relay/additional starter relay
P26E400	(a) Starter relay control circuit fault.	• ECM • Harness and connector • Starter relay/additional starter relay
P063441	(a) Starter drive chip 1 overheating.	• ECM • Harness and connector • Starter relay/additional starter relay
P063444	(a) Starter drive chip 2 overheating.	• ECM • Harness and connector • Starter relay/additional starter relay • Starter

Circuit diagram



Inspection procedure

1	Check starter

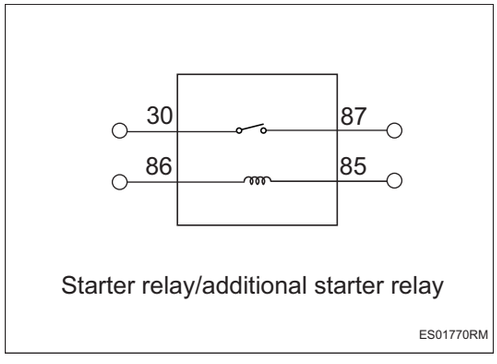
(a) Check whether the starter ground and power supply wire are connected securely.

(b) Check whether the starter is damaged.

NG → **Repair according to the fault**

OK

2	Check starter relay/additional starter relay



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the starter relay/additional starter relay.

(d) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Starter relay 30# -starter relay 87#	Apply battery voltage between 86# and 85#	Less than 1Ω

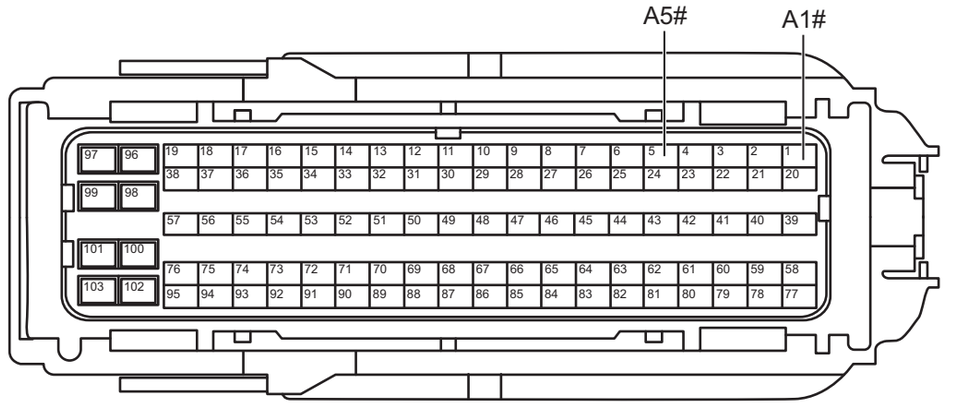
ES

Detector connection	Detection conditions	Specified state
Starter relay 30# -starter relay 87#	No battery voltage is applied between 86# and 85#	10 KΩ or greater
Additional starter relay 30# -additional starter relay 87#	Apply battery voltage between 86# and 85#	Less than 1Ω
Additional starter relay 30# -additional starter relay 87#	No battery voltage is applied between 86# and 85#	10 KΩ or greater

NG **Replace the starter relay/additional starter relay**

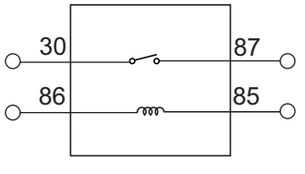
OK

3	Check starter relay/additional starter relay harness and connector for open circuit



ECM A connector

ES01781RM



Starter relay/additional starter relay

ES01791RM

(a) Disconnect the ECM connector.

(b) Measure the resistance according to the values in the table below.

Standard value

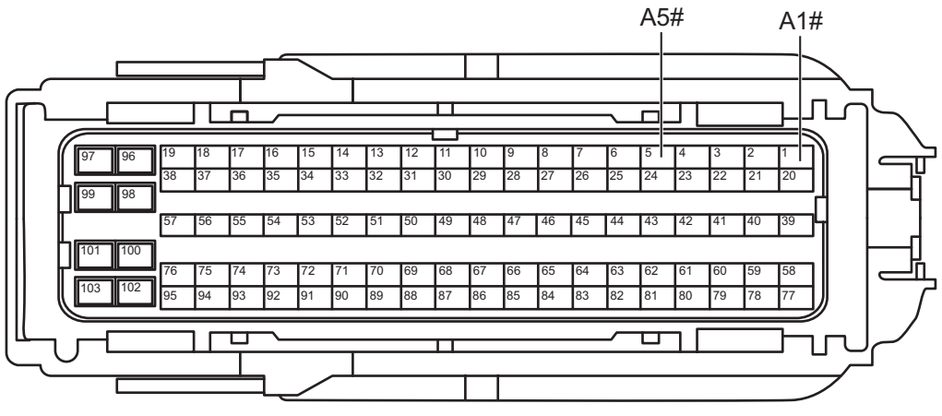
Detector connection	Detection conditions	Specified state
Starter relay connector 85# -ECM connector A5#	Always connected	Less than 1Ω
Additional starter relay connector 85# -ECM connector A1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

ES

4	**Check starter relay/additional additional starter relay harness and connector for circuit shorted to ground**



ECM A connector

ES01781RM

(a) Measure the resistance according to the values in the table below.

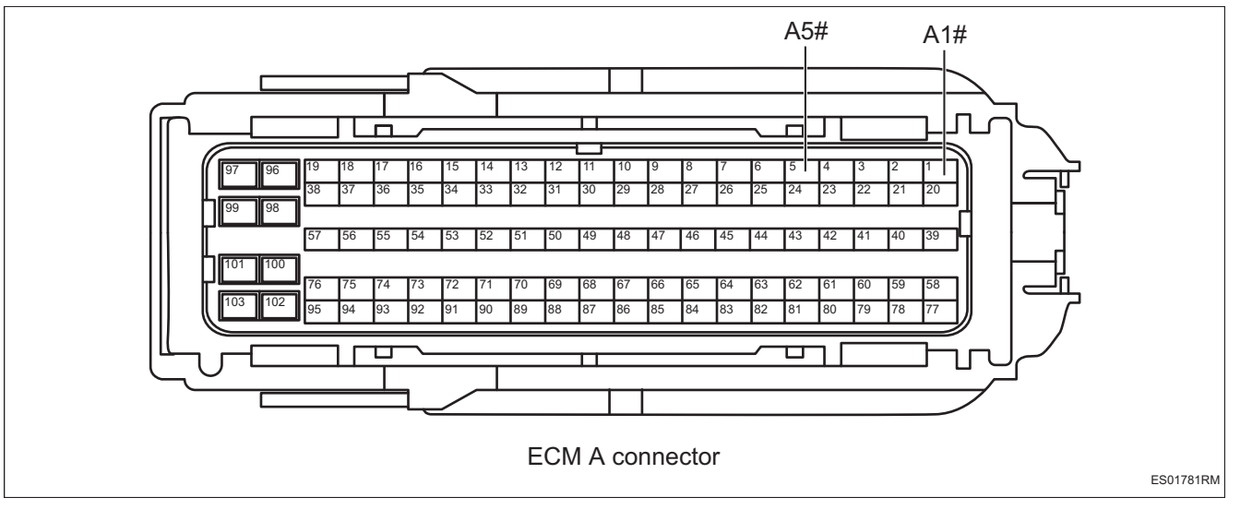
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A1# - body GND	Always connected	10 KΩ or greater
ECM connector A5# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	**Check starter relay/additional starter relay harness and connector for circuit shorted to power supply**



ECM A connector

ES01781RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector A1# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A5# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Replace the ECM (See page ES-450)**

DTC	P150000	Collision and fuel cutoff signal received by vehicle
DTC	P150100	Airbag communication information implausible
DTC	P150200	Collision and fuel cutoff signal received by vehicle
DTC	P150300	Airbag signal implausible

Description

The ECM records a DTC when the impact signal is abnormal.

DTC	DTC detection conditions	Faulty location
P150000	(a) Vehicle received collision fuel cutoff signal.	• ECM • Harness and connector • ACU • Impact sensor • GW
P150100	(a) Airbag communication information implausible.	• ECM • Harness and connector • ACU • Impact sensor • GW
P150200	(a) Vehicle received collision fuel cutoff signal.	• ECM • Harness and connector • ACU • Impact sensor • GW
P150300	(a) Airbag signal implausible.	• ECM • Harness and connector • ACU • Impact sensor • GW

Inspection procedure

1	**Check the impact sensor**

(a) Check whether the impact sensor is installed correctly.

(b) Check whether the impact sensor is damaged.

(c) Check whether the impact sensor model is correct.

NG	**Repair according to the fault**

OK

2	**Check impact sensor harness and connector**

ES

(a) Check whether the impact sensor harness and connector are properly connected.

(b) Check the impact sensor harness and connector for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

3	**Check powertrain CAN bus (ECM-ACU)**

(a) Check the CAN line for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

4	**Check the ACU harness and connector**

(a) Check whether the ACU harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

5	**Check GW terminal resistor**

(a) Check whether the GW terminal resistor is normal.

NG → **Replace GW**

OK

6	**Replace ACU (See page RS-218)**

(a) Replace the ACU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

7	**End**

DTC	P138824	Ambient temperature sensor cold start check implausible (positive deviation)
DTC	P138823	Ambient temperature sensor cold start check implausible (negative deviation)
DTC	P007300	Ambient temperature sensor circuit over-voltage
DTC	P007200	Ambient temperature sensor circuit under-voltage
DTC	P007000	Lost communication with ambient temperature sensor CAN

Description

When the ambient temperature signal is abnormal, the ECM will record the DTC.

DTC	DTC detection conditions	Faulty location
P138824	(a) Ambient temperature sensor cold start check implausible.	• ECM • Harness and connector • A/C control unit • Outside temperature sensor • GW
P138823	(a) Ambient temperature sensor cold start check implausible.	• ECM • Harness and connector • A/C control unit • Outside temperature sensor • GW
P007300	(a) Ambient temperature sensor circuit over-voltage.	• ECM • Harness and connector • A/C control unit • Outside temperature sensor • GW
P007200	(a) Ambient temperature sensor circuit undervoltage.	• ECM • Harness and connector • A/C control unit • Outside temperature sensor • GW
P007000	(a) Lost communication with ambient temperature sensor.	• ECM • Harness and connector • A/C control unit • Outside temperature sensor • GW

Inspection procedure

1	Check the outside temperature sensor

(a) Check whether the outside temperature sensor is damaged.

NG → **Repair according to the fault**

ES

OK

2	Check outside temperature sensor harness and connector

(a) Check whether the outside temperature sensor harness and connector are properly connected.

(b) Check the outside temperature sensor harness and connector for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

3	Check powertrain CAN bus (GW-ECM)

(a) Check the CAN line for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

4	Check comfort CAN bus (GW-A/C control unit)

(a) Check the CAN line for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

5	Check A/C control unit harness and connector

(a) Check the A/C control unit harness and connector for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

6	**Check GW terminal resistor**

(a) Check whether the GW terminal resistor is normal.

NG → **Replace GW**

OK

7	**Replace A/C control unit (See page AC-101)**

(a) Replace A/C control unit.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

8	**End**

DTC	P003300	Turbocharger relief valve control circuit open
DTC	P003400	Turbocharger relief valve control circuit undervoltage
DTC	P003500	Turbocharger relief valve control circuit overvoltage
DTC	P226100	Turbocharger relief valve mechanical fault

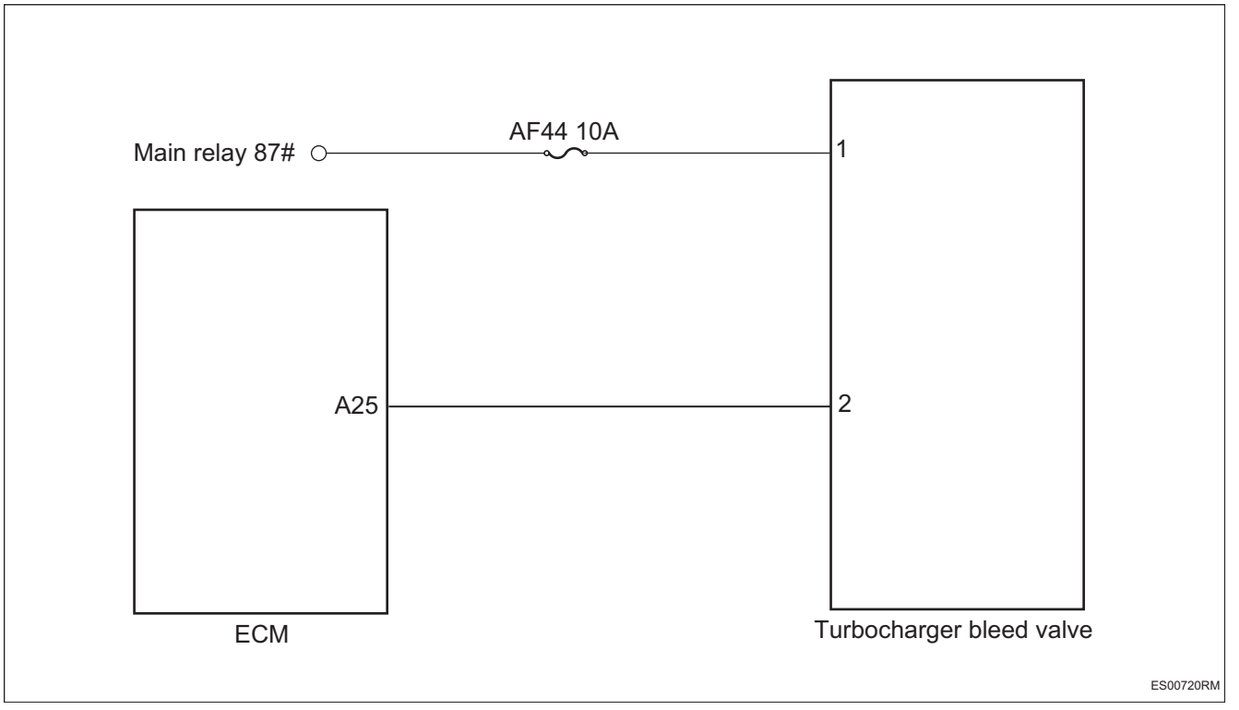
Description

When the turbocharger bleed valve control circuit is shorted or open or mechanical failure occurs, the ECM records the DTC.

DTC	DTC detection conditions	Faulty location
P003300	(a) Drive channel self-diagnosing fault.	• ECM • Harness and connector • Turbocharger bleed valve
P003400	(a) Drive channel self-diagnosing fault.	• ECM • Harness and connector • Turbocharger bleed valve
P003500	(a) Drive channel self-diagnosing fault.	• ECM • Harness and connector • Turbocharger bleed valve
P226100	(a) Number of throttle upstream pressure fluctuations above certain threshold.	• ECM • Harness and connector • Turbocharger bleed valve

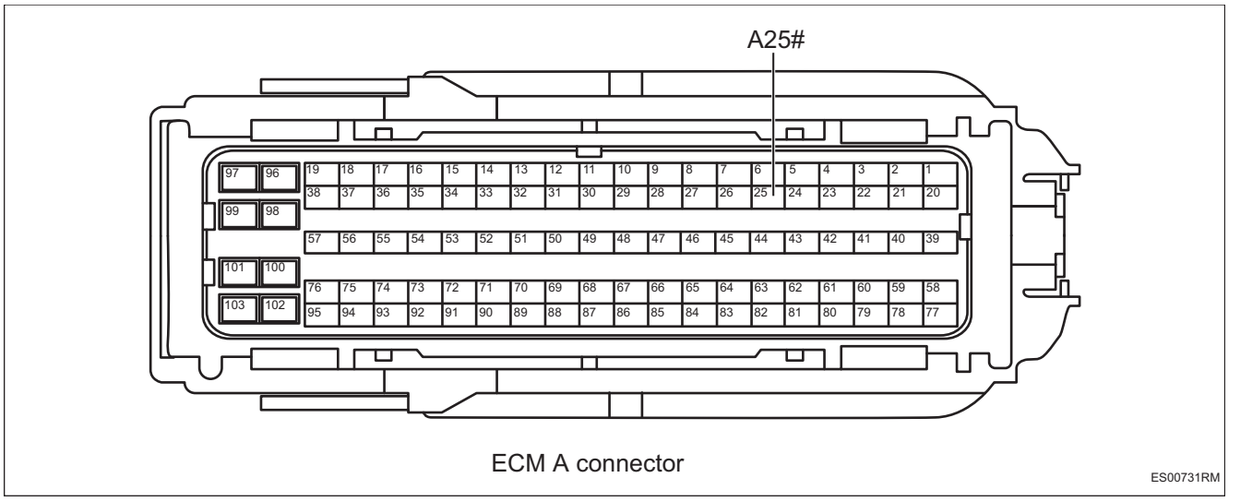
ES

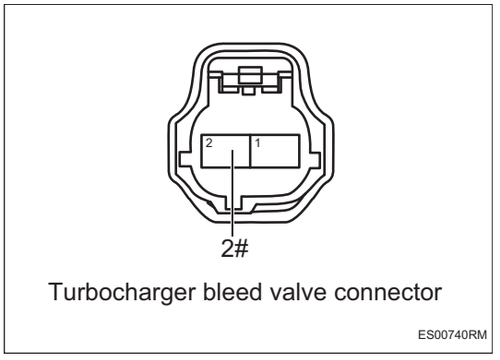
Circuit diagram



Inspection procedure

1	Check turbocharger bleed valve harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the turbocharger bleed valve connector.

(e) Measure the resistance according to the values in the table below.

Standard value

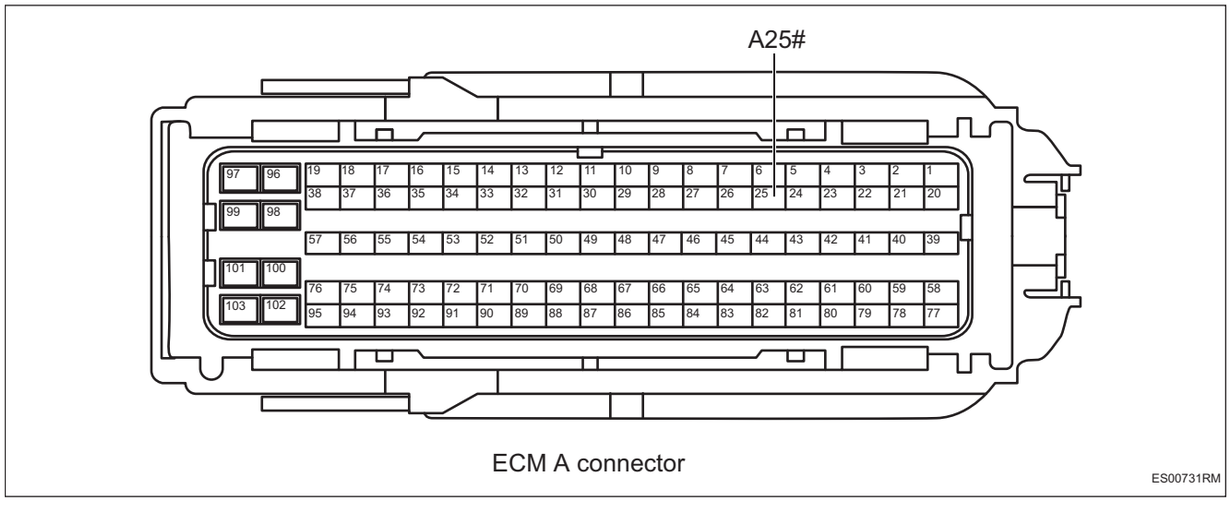
Detector connection	Detection conditions	Specified state
Turbocharger bleed valve connector 2# -ECM connector A25#	Always connected	Less than 1Ω

ES

NG → **Repair or replace the harness and connector**

OK

2	Check turbocharger bleed valve harness and connector for circuit shorted to ground



ECM A connector

ES00731RM

(a) Measure the resistance according to the values in the table below.

Standard value

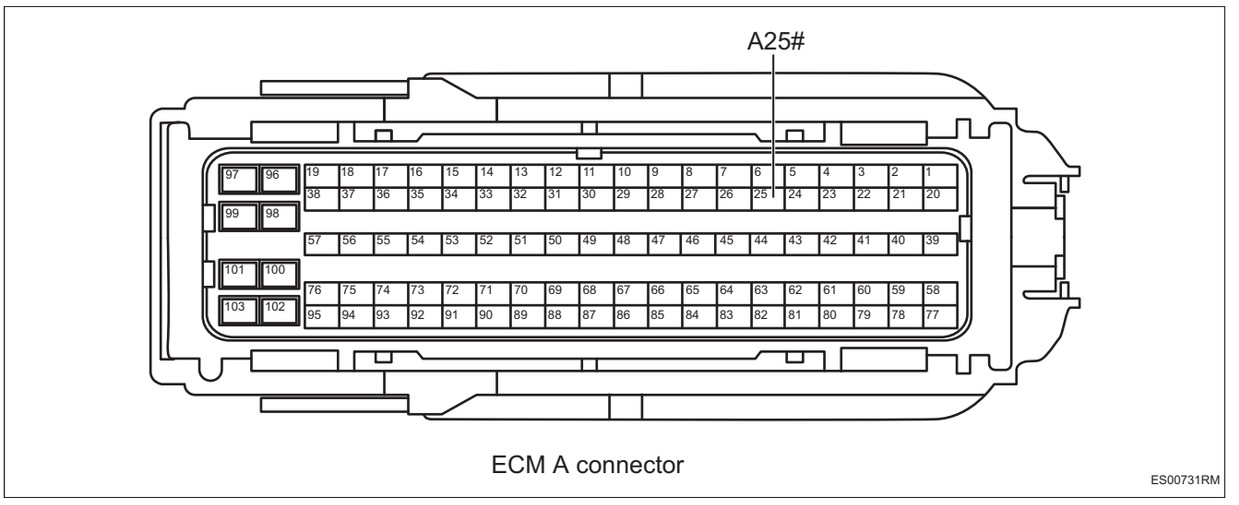
Detector connection	Detection conditions	Specified state
ECM connector A25# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	Check turbocharger bleed valve harness and connector for circuit shorted to power supply

ES



ECM A connector

ES00731RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

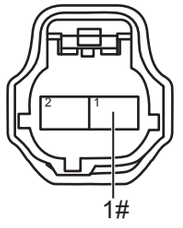
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A25# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG **Repair or replace the harness and connector**

OK

4	Check turbocharger bleed valve power supply



Turbocharger bleed valve connector

ES00751RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Connect ECM connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Turbocharger bleed valve connector 1# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector, fuse and relay**

OK

5	**Replace turbocharger bleed valve (See page IT-16)**

(a) Replace the turbocharger bleed valve.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

6	**End**

DTC	P12C400	Crankcase ventilation pipe 2 diagnostic circuit voltage high
DTC	P12C500	Crankcase ventilation pipe 2 diagnostic circuit voltage low

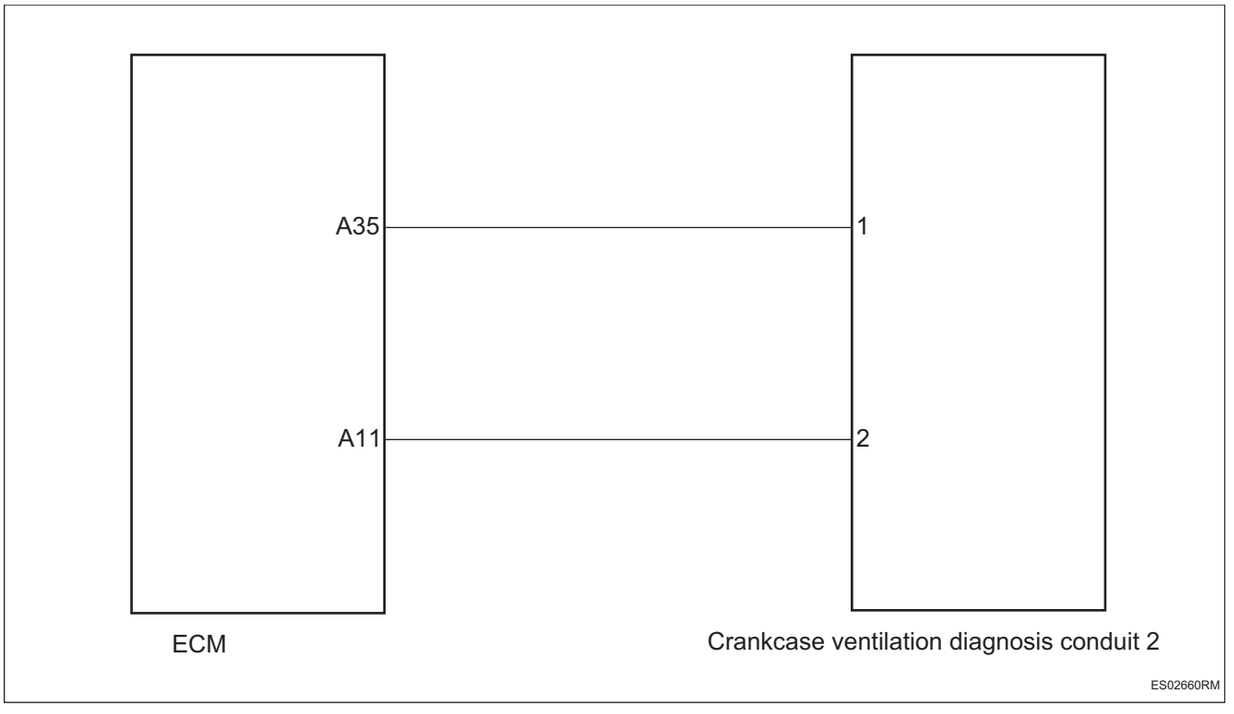
ES

Description

When the crankcase ventilation diagnosis conduit 2 circuit voltage is out of the normal range, the ECM records the DTC.

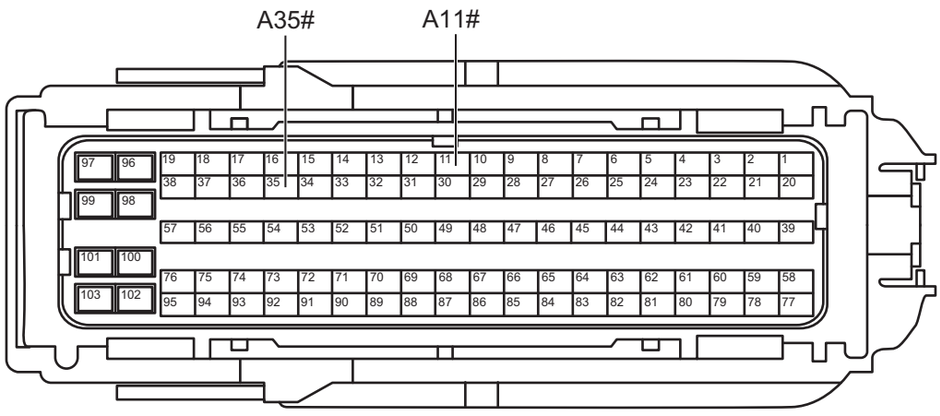
DTC	DTC detection conditions	Faulty location
P12C400	(a) Ventilation pipe diagnostic circuit voltage high.	• ECM • Harness and connector • Crankcase ventilation diagnosis conduit 2
P12C500	(a) Ventilation pipe diagnostic circuit voltage low.	• ECM • Harness and connector • Crankcase ventilation diagnosis conduit 2

Circuit diagram



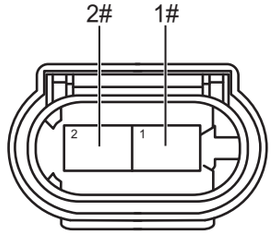
Inspection procedure

1	Check crankcase ventilation diagnosis conduit 2 harness and connector for open circuit



ECM A connector

ES02681RM



Crankcase ventilation diagnosis conduit 2 connector

ES02671RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the crankcase ventilation diagnosis conduit 2 connector.

(e) Measure the resistance according to the values in the table below.

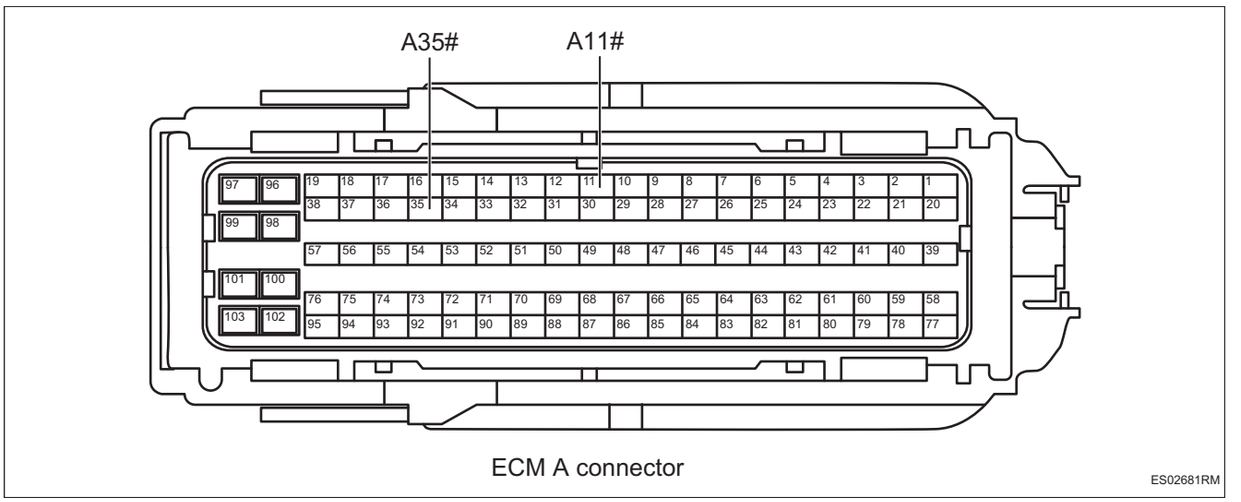
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A35# - crankcase ventilation diagnosis conduit 2 connector 1#	Always connected	Less than 1Ω
ECM connector A11# - crankcase ventilation diagnosis conduit 2 connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check crankcase ventilation diagnosis conduit 2 harness and connector for circuit shorted to ground**



ECM A connector

ES02681RM

(a) Measure the resistance according to the values in the table below.

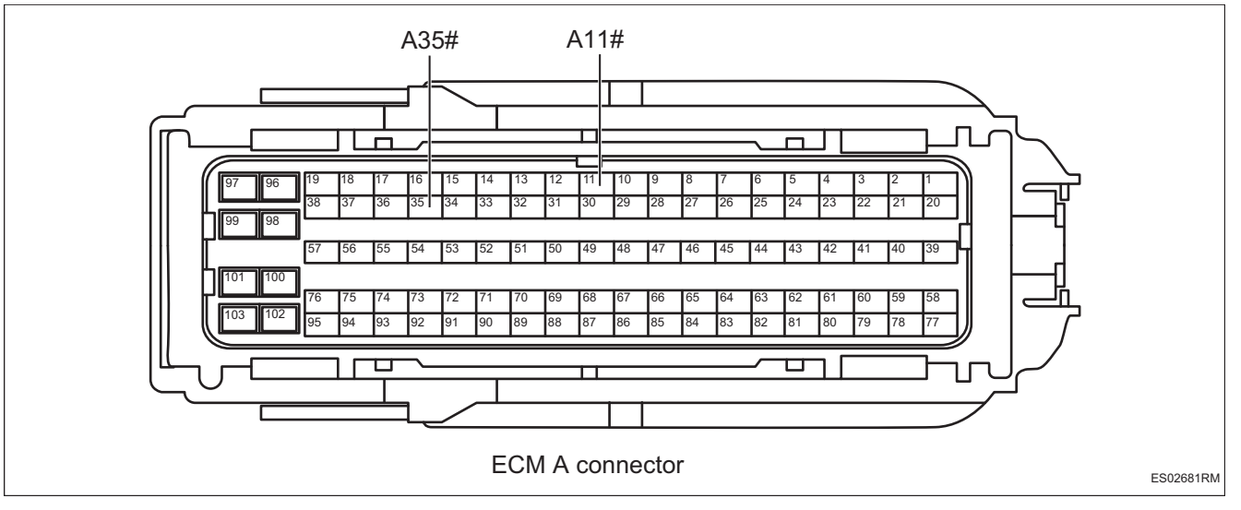
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A35# - body GND	Always connected	10 KΩ or greater
ECM connector A11# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check crankcase ventilation diagnosis conduit 2 harness and connector for circuit shorted to power supply**



ECM A connector

ES02681RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector A35# - body GND	Set the ignition switch to "ON"	Less than 1 V
ECM connector A11# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the crankcase ventilation diagnosis conduit 2 (See page EC-5)**

(a) Replace the crankcase ventilation diagnosis conduit 2.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM (See page ES-450)**

OK

5	**End**

ES

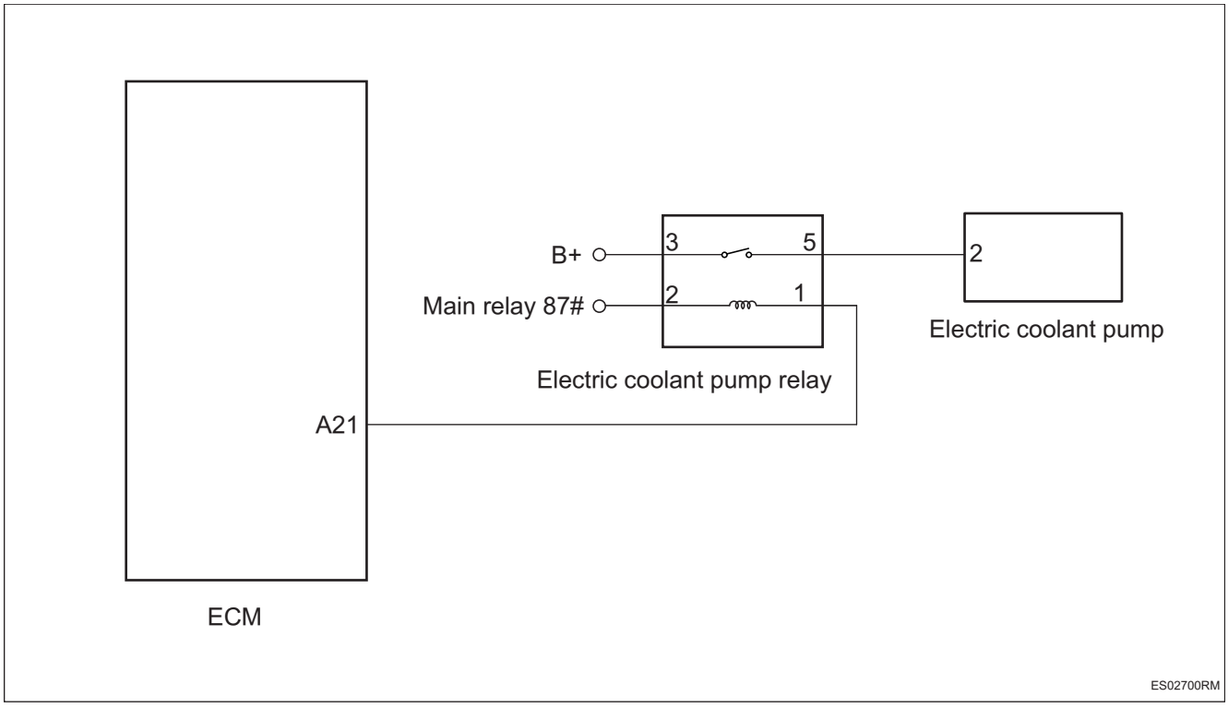
DTC	P261D00	Turbocharger electronic coolant pump control circuit overvoltage
DTC	P261C00	Turbocharger electronic coolant pump control circuit undervoltage/implausibility
DTC	P261A00	Turbocharger electronic coolant pump control circuit open

Description

When the electric coolant pump control circuit is shorted or open, the ECM records the DTC.

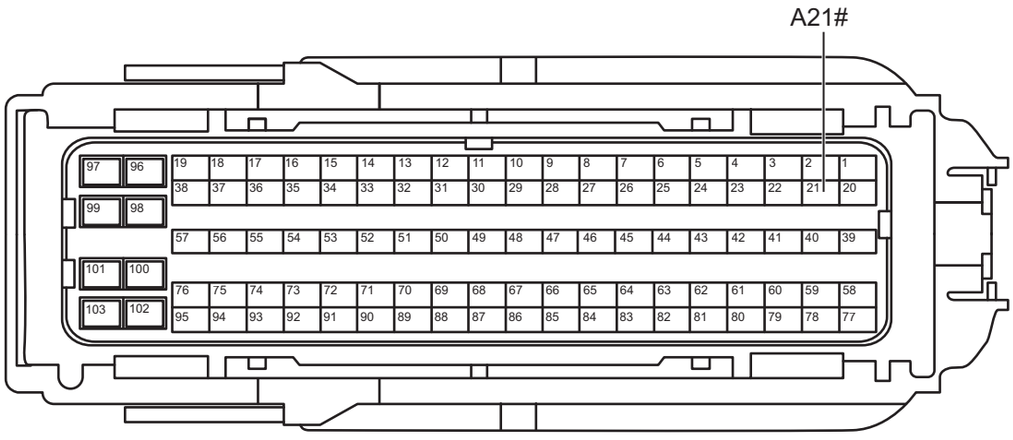
DTC	DTC detection conditions	Faulty location
P261D00	(a) Turbocharger electric coolant pump control circuit overvoltage.	• ECM • Harness and connector • Electric coolant pump relay
P261C00	(a) Turbocharger electric coolant pump control circuit undervoltage.	• ECM • Harness and connector • Electric coolant pump relay
P261A00	(a) Turbocharger electric coolant pump control circuit is open.	• ECM • Harness and connector • Electric coolant pump relay

Circuit diagram



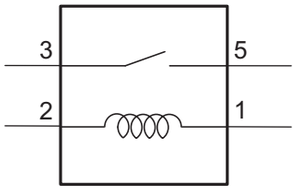
Inspection procedure

1	Check electric coolant pump relay harness and connector for open circuit

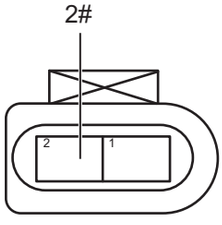


ECM A connector

ES02711RM



Electric coolant pump relay connector



Electric coolant pump connector

ES02720RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the electric coolant pump connector.

(e) Remove the electric coolant pump relay.

(f) Measure the resistance according to the values in the table below.

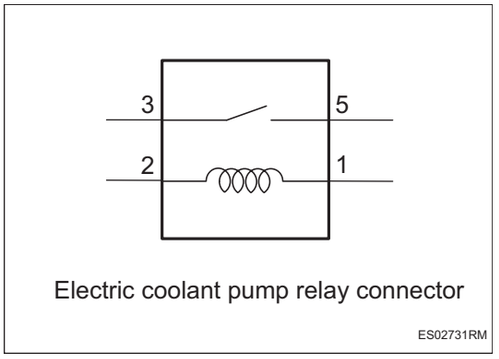
Standard value

Detector connection	Detection conditions	Specified state
Electric coolant pump relay connector 1# - ECM connector A21#	Always connected	Less than 1Ω
Electric coolant pump relay connector 5# - electric coolant pump connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check electric coolant pump relay harness and connector for circuit shorted to ground**



Electric coolant pump relay connector

ES02731RM

(a) Measure the resistance according to the values in the table below.

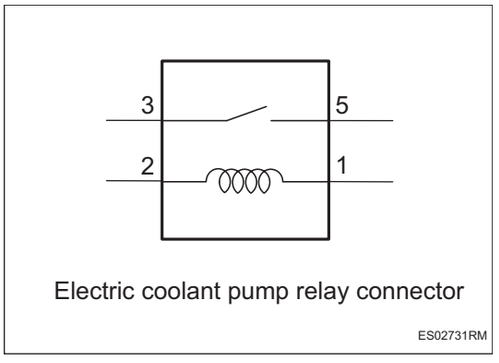
Standard value

Detector connection	Detection conditions	Specified state
Electric coolant pump relay connector 5# - body GND	Always connected	10 KΩ or greater
Electric coolant pump relay connector 1# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check electric coolant pump relay harness and connector for circuit shorted to power supply**



Electric coolant pump relay connector

ES02731RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

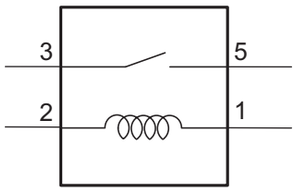
Standard value

Detector connection	Detection conditions	Specified state
Electric coolant pump relay connector 5# - body GND	Set the ignition switch to "ON"	Less than 1 V
Electric coolant pump relay connector 1# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Check the electric coolant pump relay**



Electric coolant pump connector

ES02741RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Electric coolant pump relay 3# -electric coolant pump relay 5#	Apply battery voltage between 1# and 2#	Less than 1Ω
Electric coolant pump relay 3# -electric coolant pump relay 5#	No battery voltage is applied between 1# and 2#	10 KΩ or greater

ES

NG → **Replace electric coolant pump relay**

OK

5	**Replace the ECM (See page ES-450)**

DTC	U012100	Lost communication with ABS module
DTC	U041500	ABS module communication Check Sum/ Rolling Counter fault
DTC	U015100	Lost communication with ACU module
DTC	U010F00	Lost communication with A/C module
DTC	U007300	CAN bus 1 OFF
DTC	U025900	Lost communication with multiple DMS
DTC	U01B000	Lost communication with EBS module
DTC	U041600	ESP module communication Check Sum/ Rolling Counter fault
DTC	U014600	Lost communication with GW module
DTC	U015500	Lost communication with ICM or abnormal signal
DTC	U012600	Lost communication with SAS module
DTC	U042800	SAS module communication Check Sum/ Rolling Counter fault
DTC	U010100	Lost communication with TCM module
DTC	U040200	TCM communication Check Sum/Rolling Counter fault

Description

When the communication between the ECM and other control units is abnormal or interrupted, the ECM records the DTC.

DTC	DTC detection conditions	Faulty location
U012100	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U041500	(a) Abnormal or interrupted communication.	
U015100	(a) Abnormal or interrupted communication.	
U010F00	(a) Abnormal or interrupted communication.	
U007300	(a) Abnormal or interrupted communication.	
U025900	(a) Abnormal or interrupted communication.	
U01B000	(a) Abnormal or interrupted communication.	
U041600	(a) Abnormal or interrupted communication.	
U014600	(a) Abnormal or interrupted communication.	
U015500	(a) Abnormal or interrupted communication.	
U012600	(a) Abnormal or interrupted communication.	
U042800	(a) Abnormal or interrupted communication.	
U010100	(a) Abnormal or interrupted communication.	
U040200	(a) Abnormal or interrupted communication.	

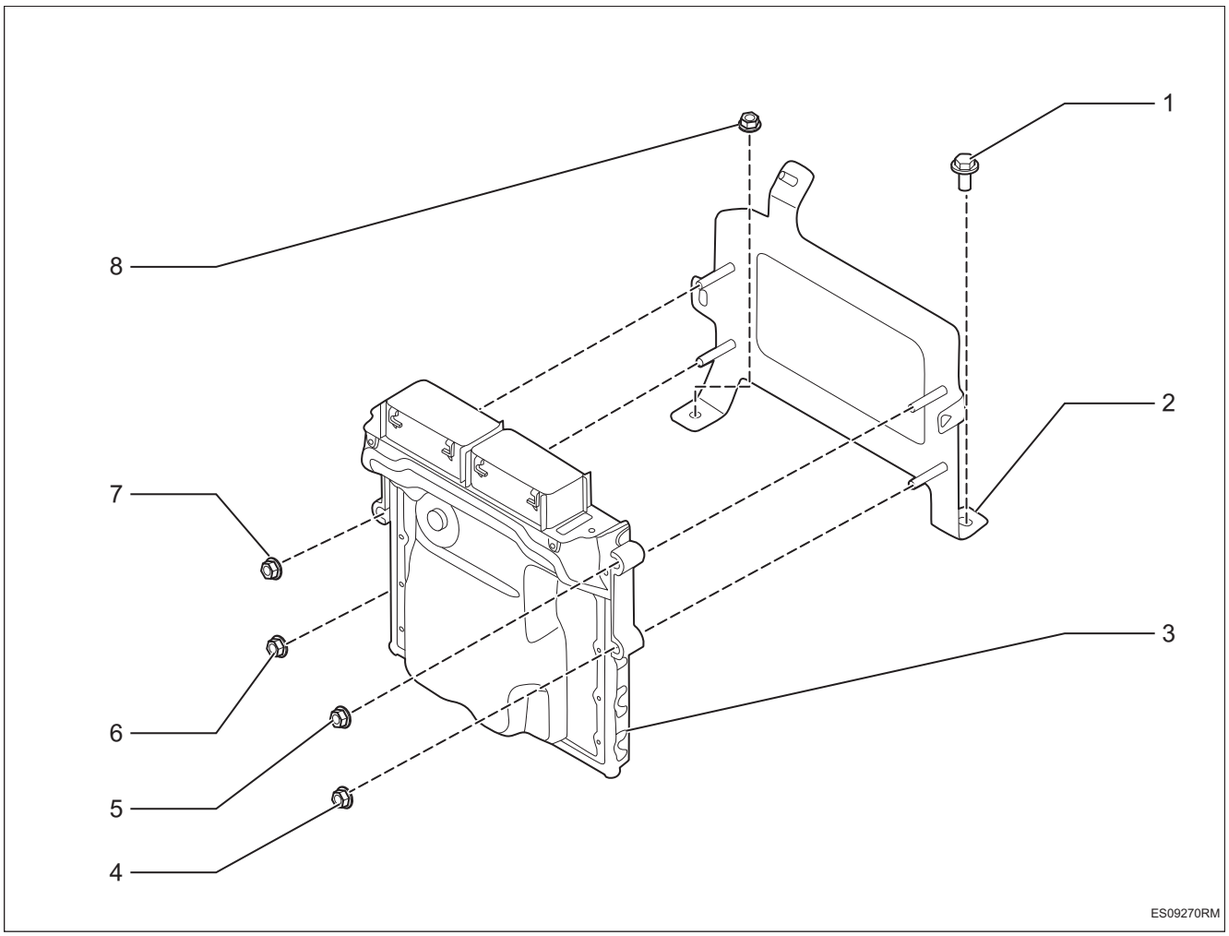
Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

ECM assembly

Parts

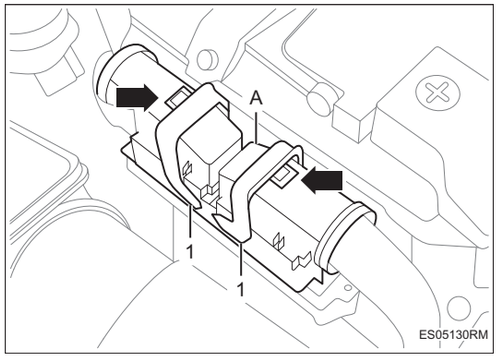
ES



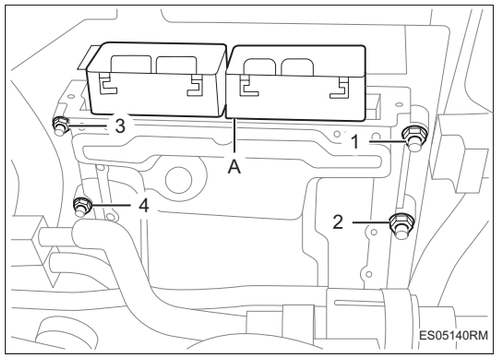
1. **Hexagon flange bolt**
   - Torque: 8~12 N · m
2. **ECM bracket assembly**
3. **ECM assembly**
4. **Hexagon flange nut**
   - Torque: 8~12 N · m
5. **Hexagon flange nut**
   - Torque: 8~12 N · m
6. **Hexagon flange nut**
   - Torque: 8~12 N · m
7. **Hexagon flange nut**
   - Torque: 8~12 N · m
8. **Hexagon flange nut**
   - Torque: 8~12 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-17)**
2. **Remove the upper right guard plate of the engine compartment (See page ET-17)**
3. **Remove ECM assembly**

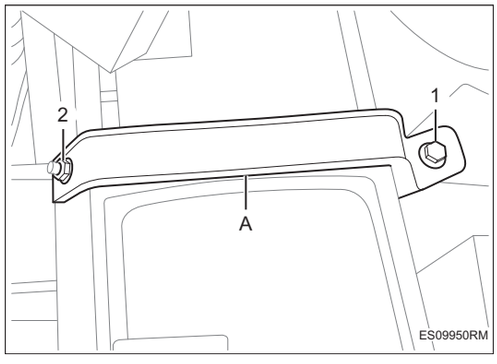


(a) Press down -arrow- to pull up the connector locking device -1-, and remove the harness connector -A-B-.



(b) Remove the nut -1-4-, and remove the ECM assembly-A-.

4. **Remove ECM bracket**



(a) Remove bolt -1- and nut -2-, and remove ECM fixing bracket I -A-.

Installation

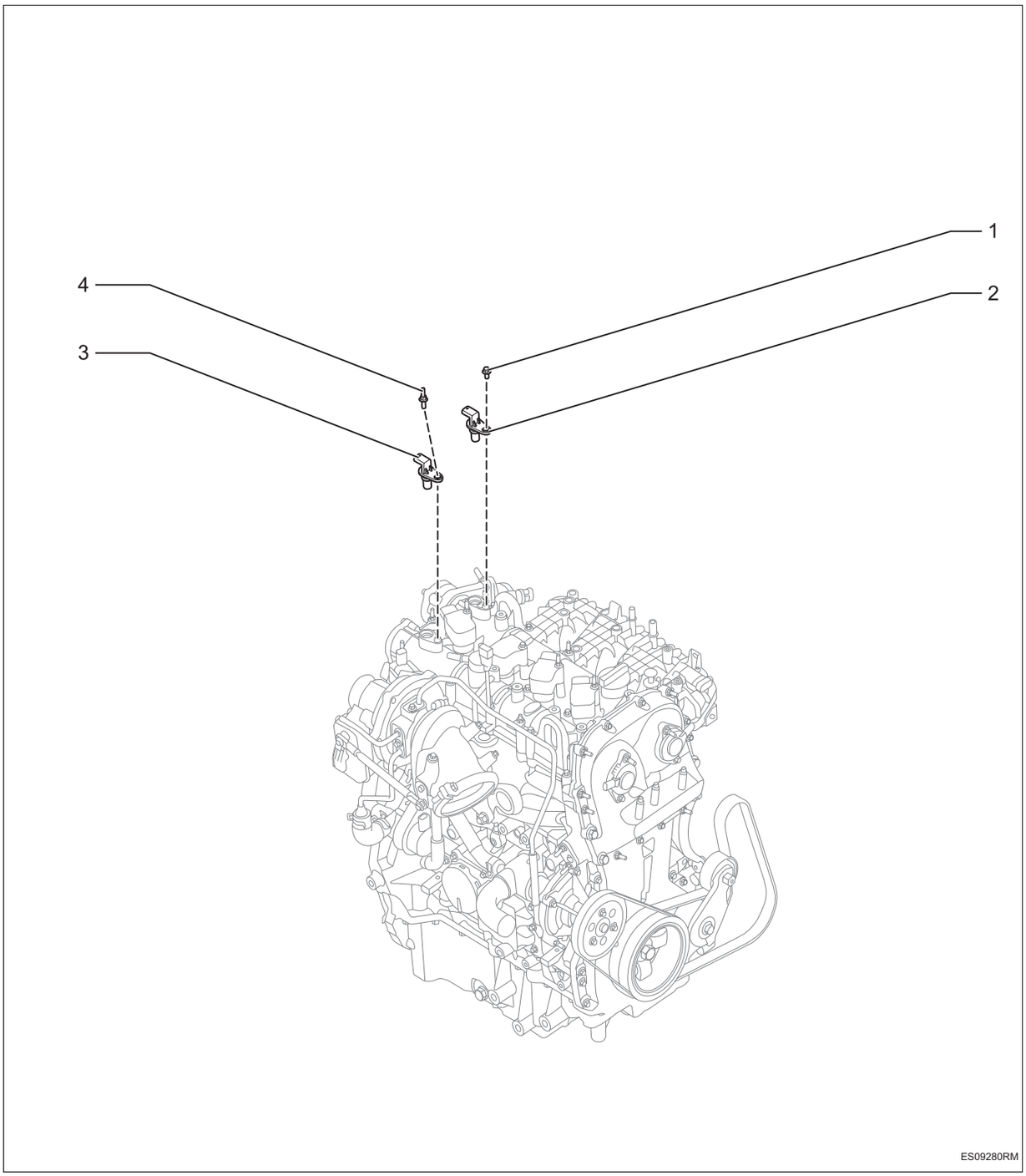
1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

(a) The connector should be pushed all the way to the limit position and locked until the click sound is heard.

Camshaft position sensor

Parts

ES

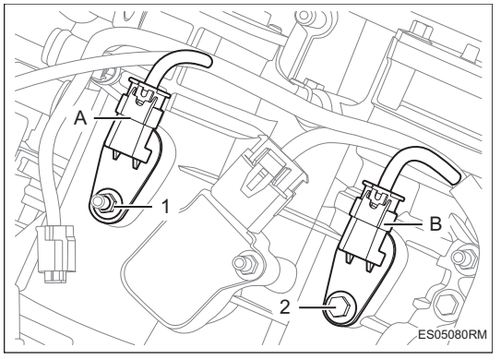


1. **Hexagon flange bolt**
   - Torque: 8~12 N · m
2. **Intake camshaft position sensor**
3. **Exhaust camshaft position sensor**
4. **Stud**

- Torque: 8~12 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-17)**
2. **Remove the intake and exhaust camshaft position sensors**



(a) Disconnect the harness connector-A-B-.

(b) Remove the bolt -1 - 2 - and remove the intake and exhaust camshaft position sensors.

Installation

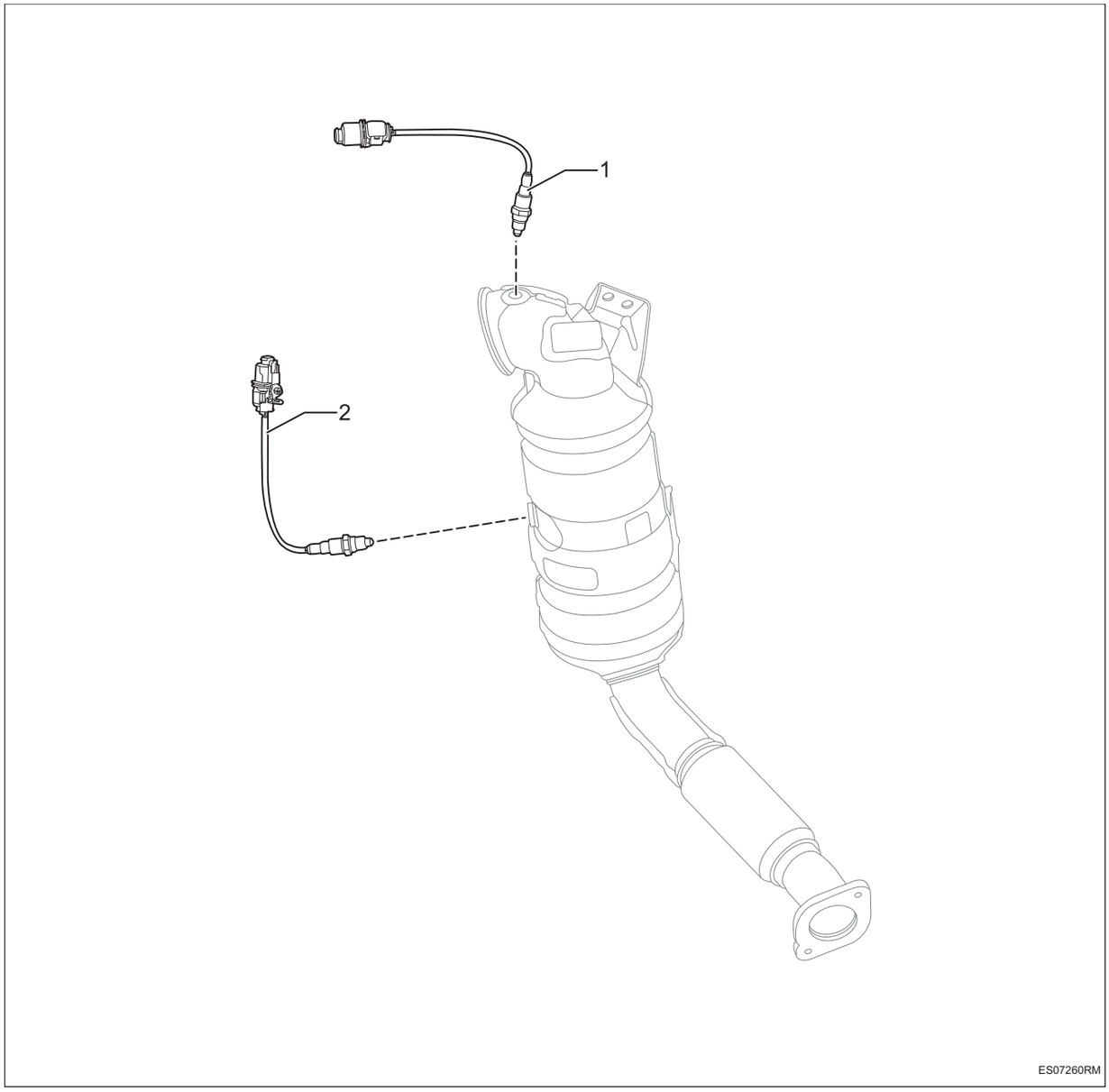
1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

Caution:

Do not damage the seal rings of intake and exhaust camshaft position sensors during installation.

Upstream oxygen sensor assembly

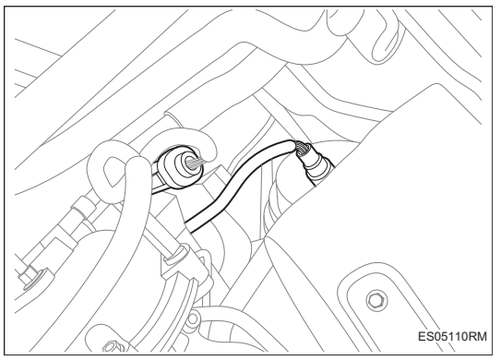
Parts



1. **Upstream oxygen sensor**
   - Torque: 40~60 N · m
2. **Downstream oxygen sensor**
   - Torque: 40~60 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-17)**
2. **Remove upstream oxygen sensor**
   (a) Disconnect the harness connector-A-.



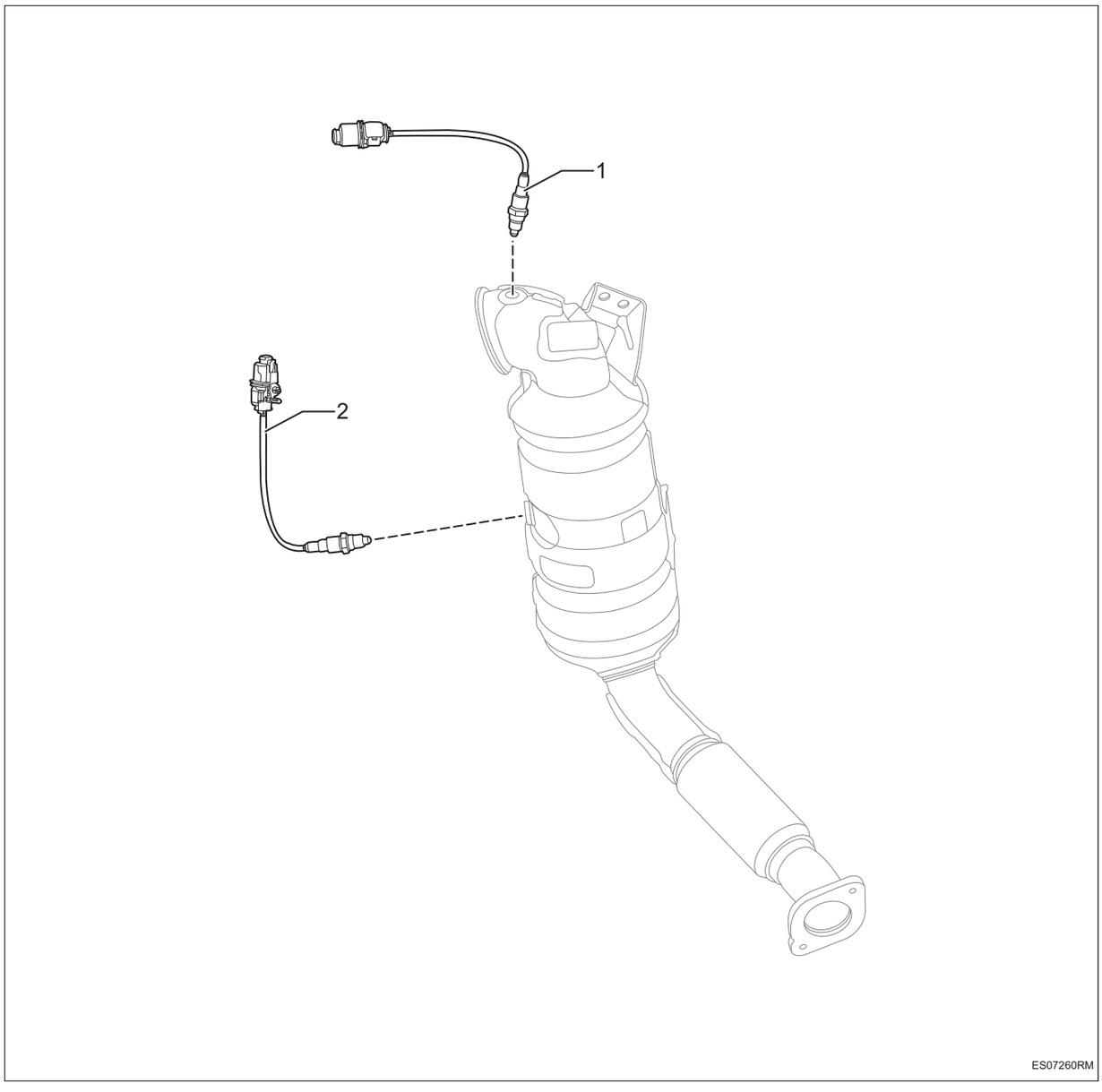
   (b) Rotate and remove the upstream oxygen sensor-B-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Downstream oxygen sensor

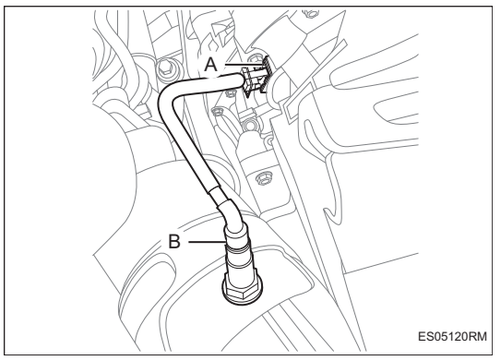
Parts



1. **Upstream oxygen sensor**
   - Torque: 40~60 N · m
2. **Downstream oxygen sensor**
   - Torque: 40~60 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-17)**
2. **Remove downstream oxygen sensor**
   (a) Disconnect the harness connector-A-.



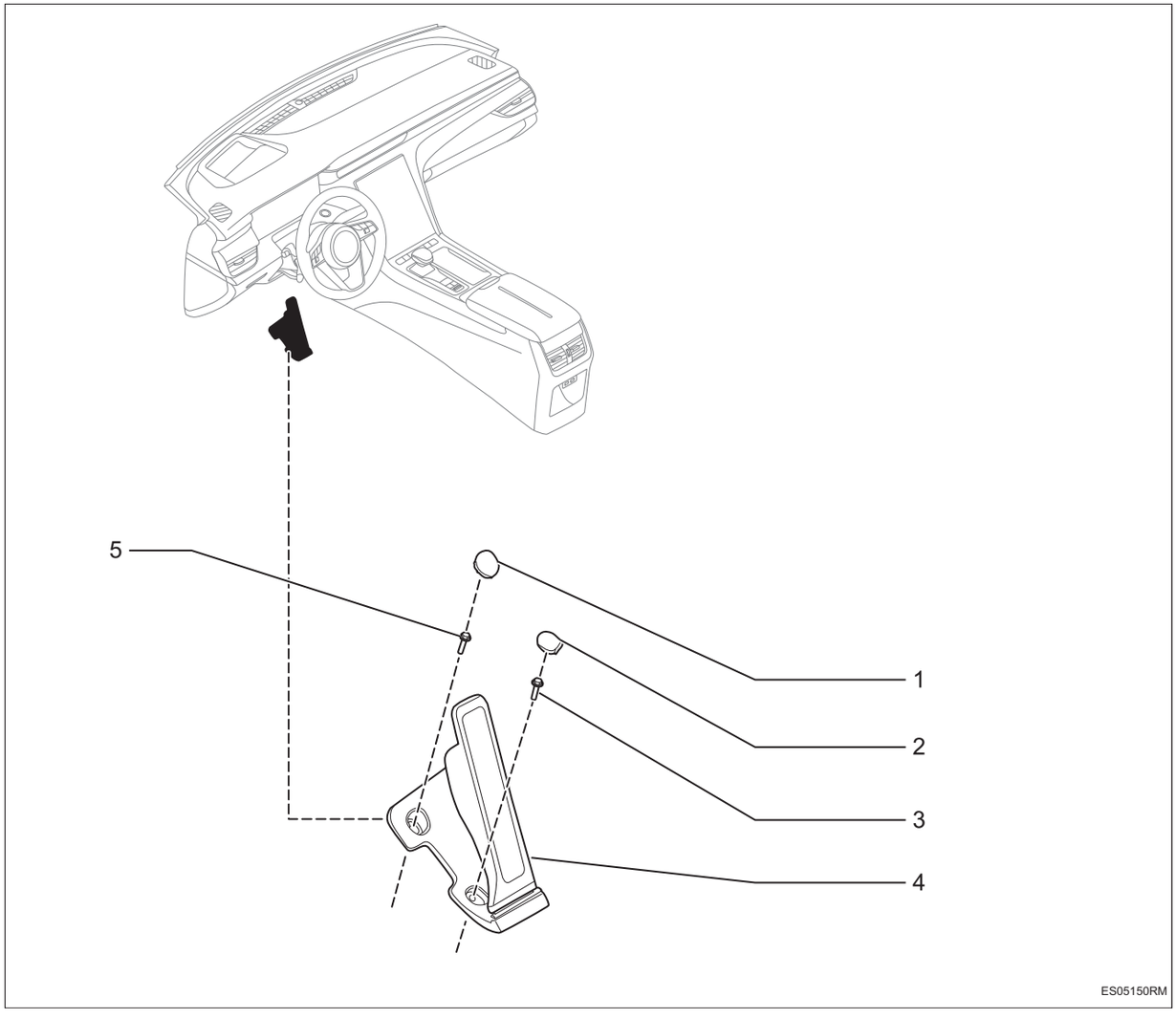
   (b) Rotate to remove the downstream oxygen sensor-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Electric accelerator pedal

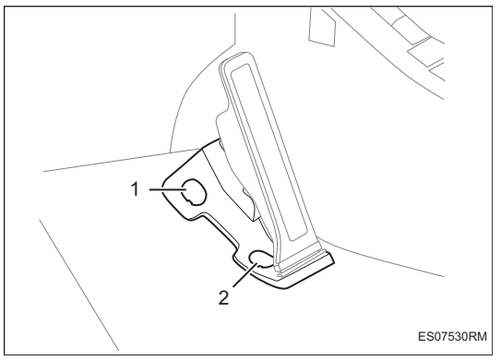
Parts



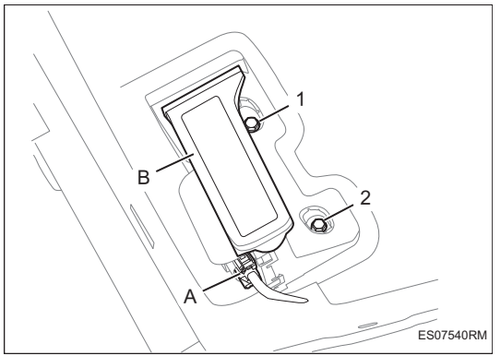
1. **Baffle plate**
2. **Baffle plate**
3. **Hexagon flange bolt**
   - Torque: 8~12 N · m
4. **Electronic accelerator pedal assembly**
5. **Hexagon flange bolt**
   - Torque: 8~12 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-17)**
2. **Remove electronic accelerator pedal**



(a) Remove the baffle plate -1-2-.



(b) Disconnect the harness connector-A-.

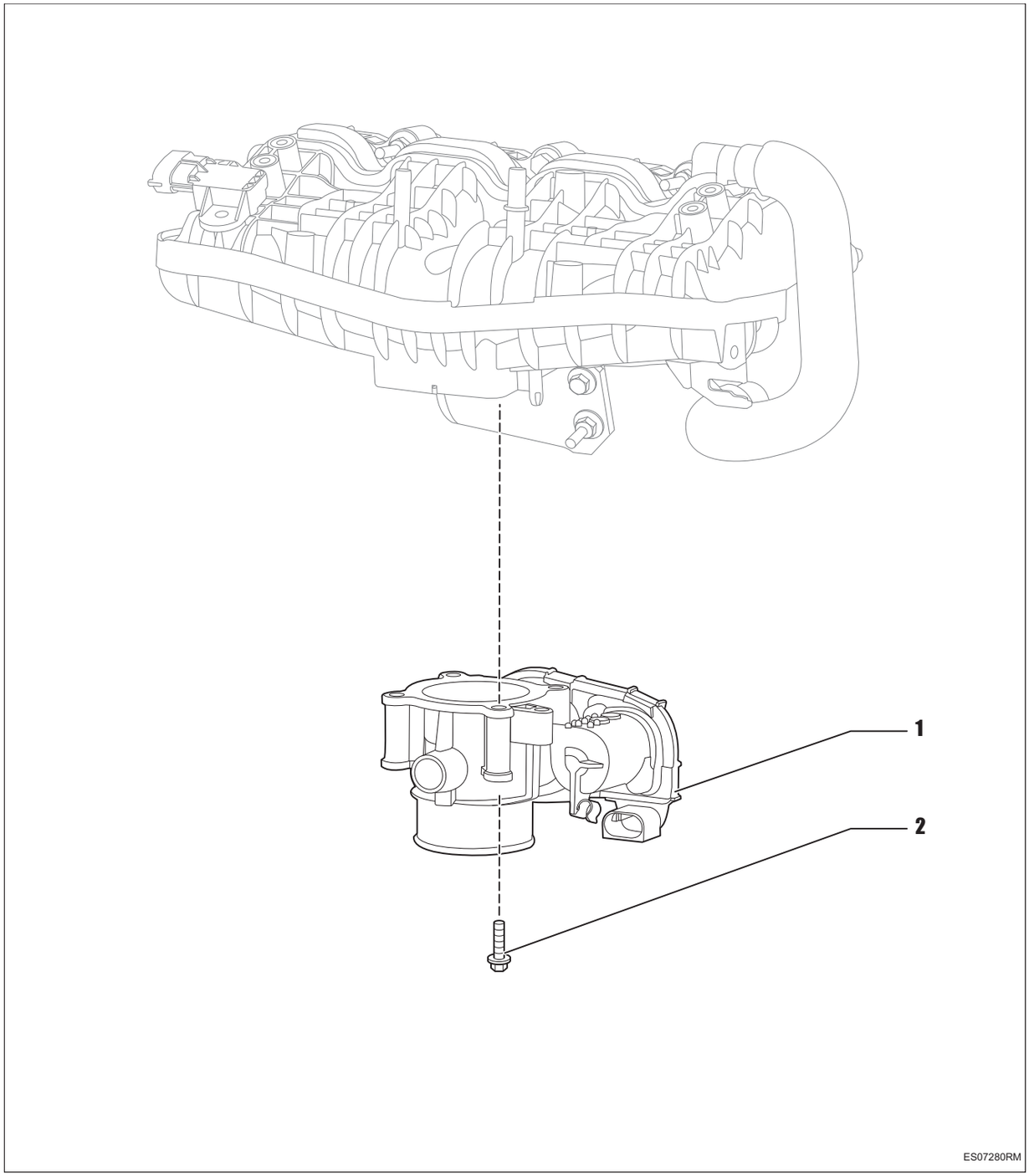
(c) Remove bolts -1-2- and remove electronic accelerator pedal -B-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Electronic throttle body assembly

Parts



1. **Electronic throttle body assembly**
2. **Hexagon flange bolt**
   - X4

- Torque: 8~12 N · m

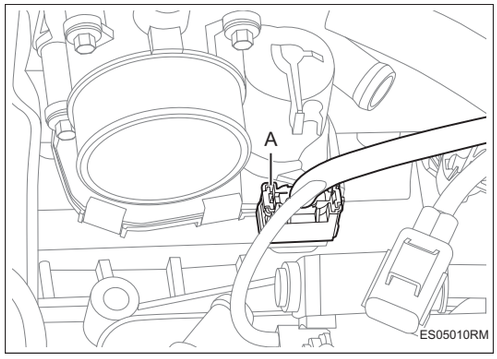
Removal

1. **Disconnect the battery negative terminal (See page CH-17)**
2. **Remove the electronic throttle body assembly**

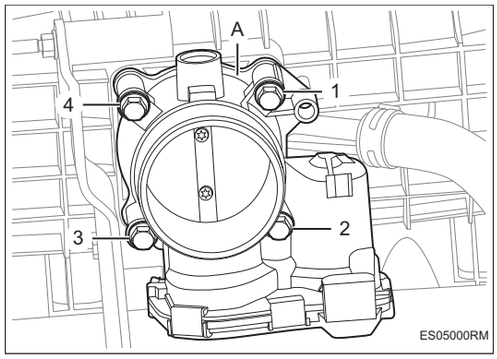
   Caution:

   Do not damage the electronic throttle body assembly seal ring during removal.

   (a) Disconnect the harness connector-A-.



   (b) Remove bolts -1-4- and remove electronic throttle body assembly -A-.



Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

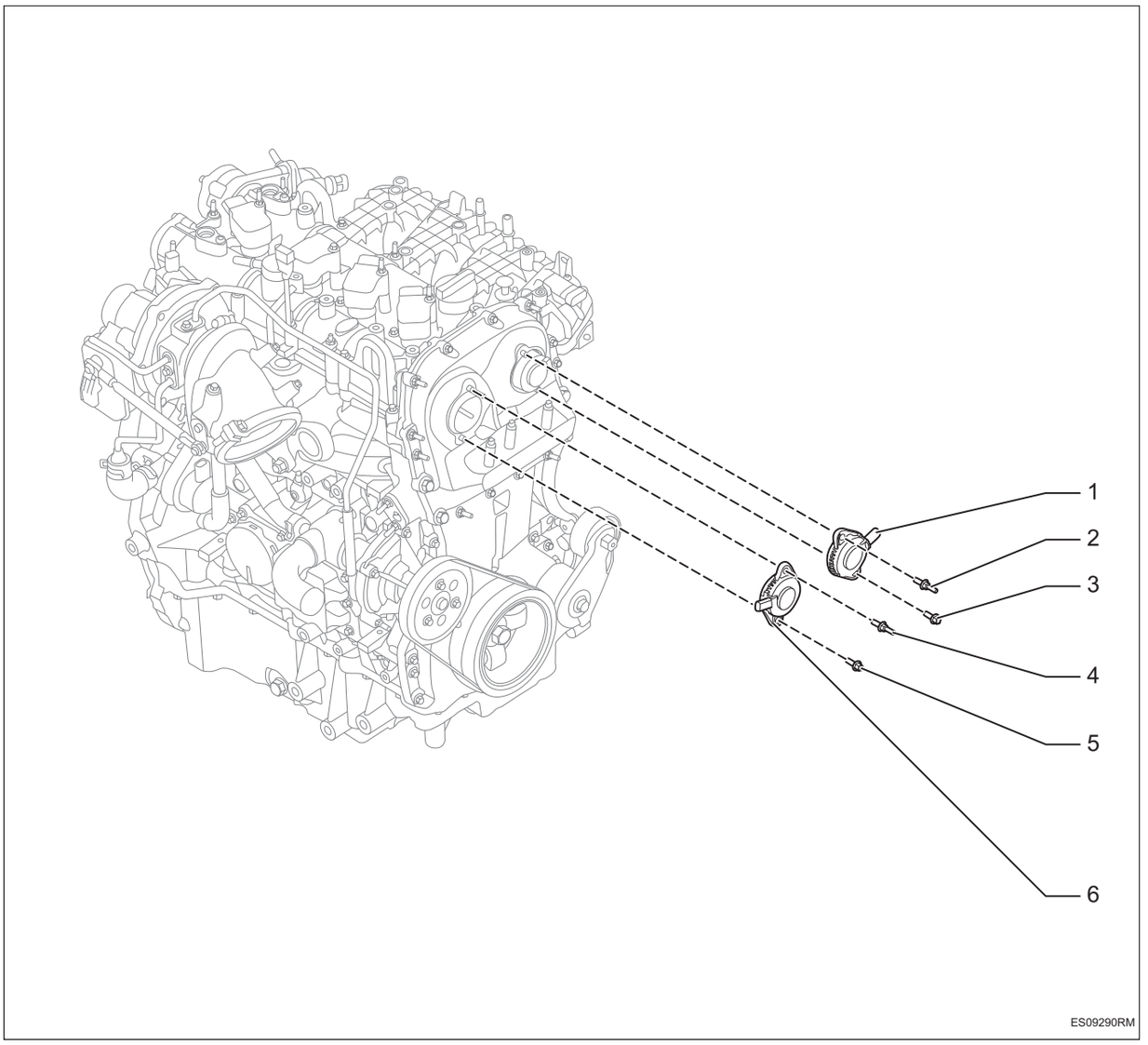
   Caution:

   Place the connecting pipe seal ring into the groove of electronic throttle body assembly seal ring.

Solenoid valve assembly

Parts

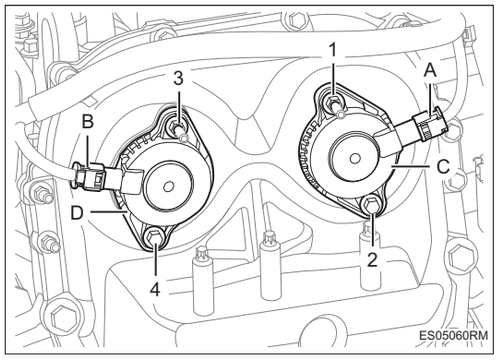
ES



1. **Solenoid valve**
2. **Stud**
   - Torque: 8~12 N · m
3. **Hexagon flange nut**
   - Torque: 8~12 N · m
4. **Stud**
   - Torque: 8~12 N · m
5. **Hexagon flange nut**
   - Torque: 8~12 N · m
6. **Solenoid valve**

Removal

1. **Disconnect the battery negative terminal (See page CH-17)**
2. **Remove solenoid valve assembly**



(a) Disconnect the harness connector-A-B-.

(b) Remove the bolt -1-4-.

(c) Remove the intake and exhaust solenoid valve assembly-C-D-

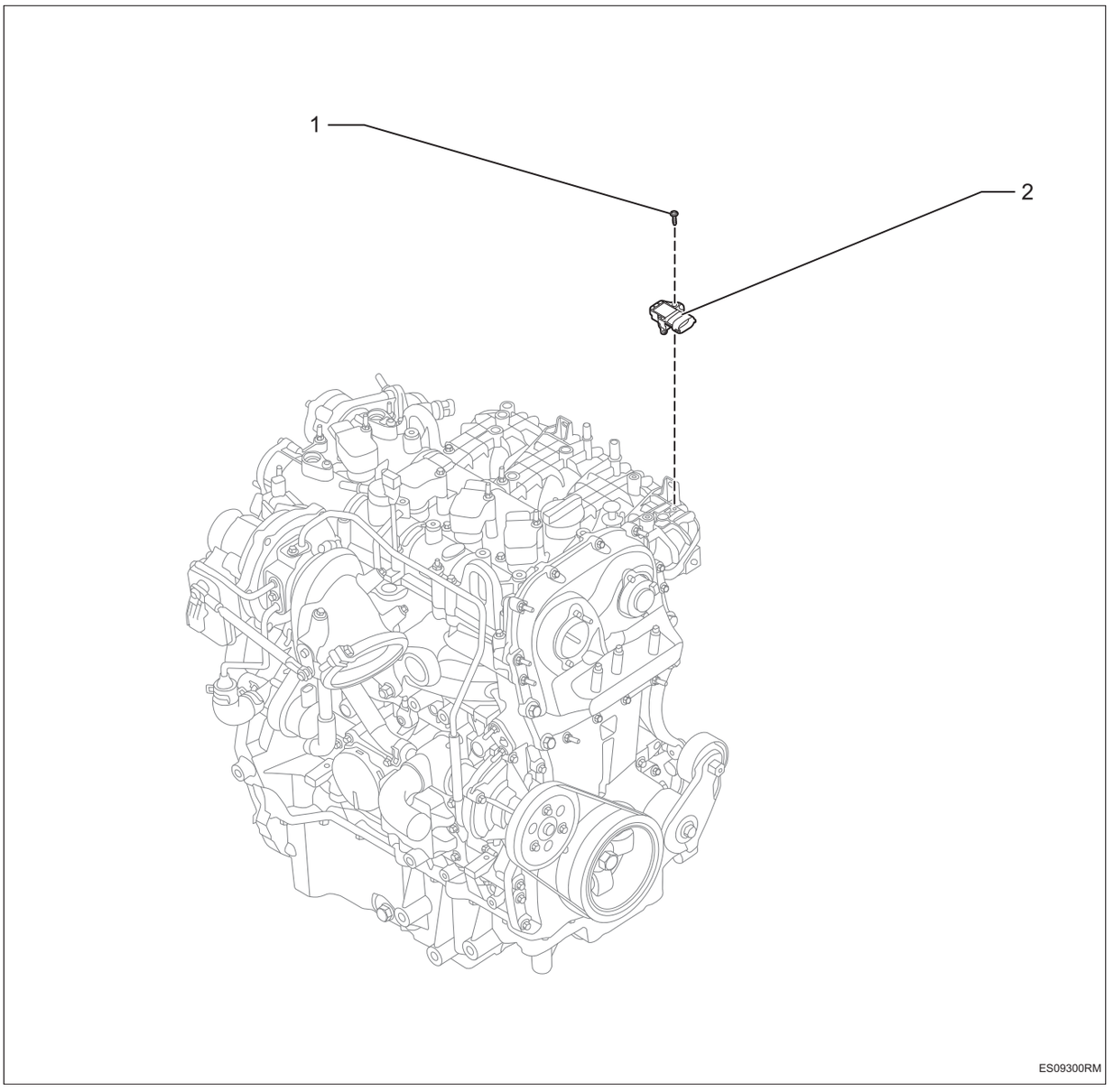
Installation

1. **The installation procedure is the reverse of removal procedure.**

MAP/IAT sensor assembly

Parts

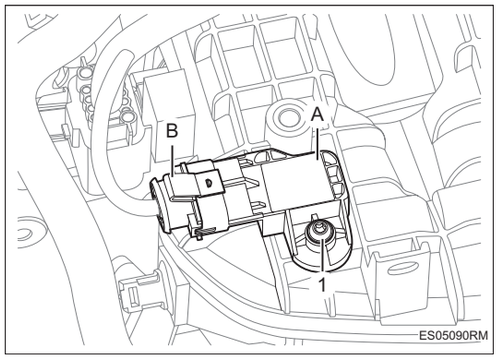
ES



1. **Hexagon flange bolt**
   - Torque: 2.7~3.7 N · m
2. **MAP/IAT sensor assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-17)**
2. **Remove front MAP/IAT sensor assembly**



(a) Disconnect the harness connector-B-.

(b) Remove the screw -1-, and the MAP/IAT sensor assembly-A-.

Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

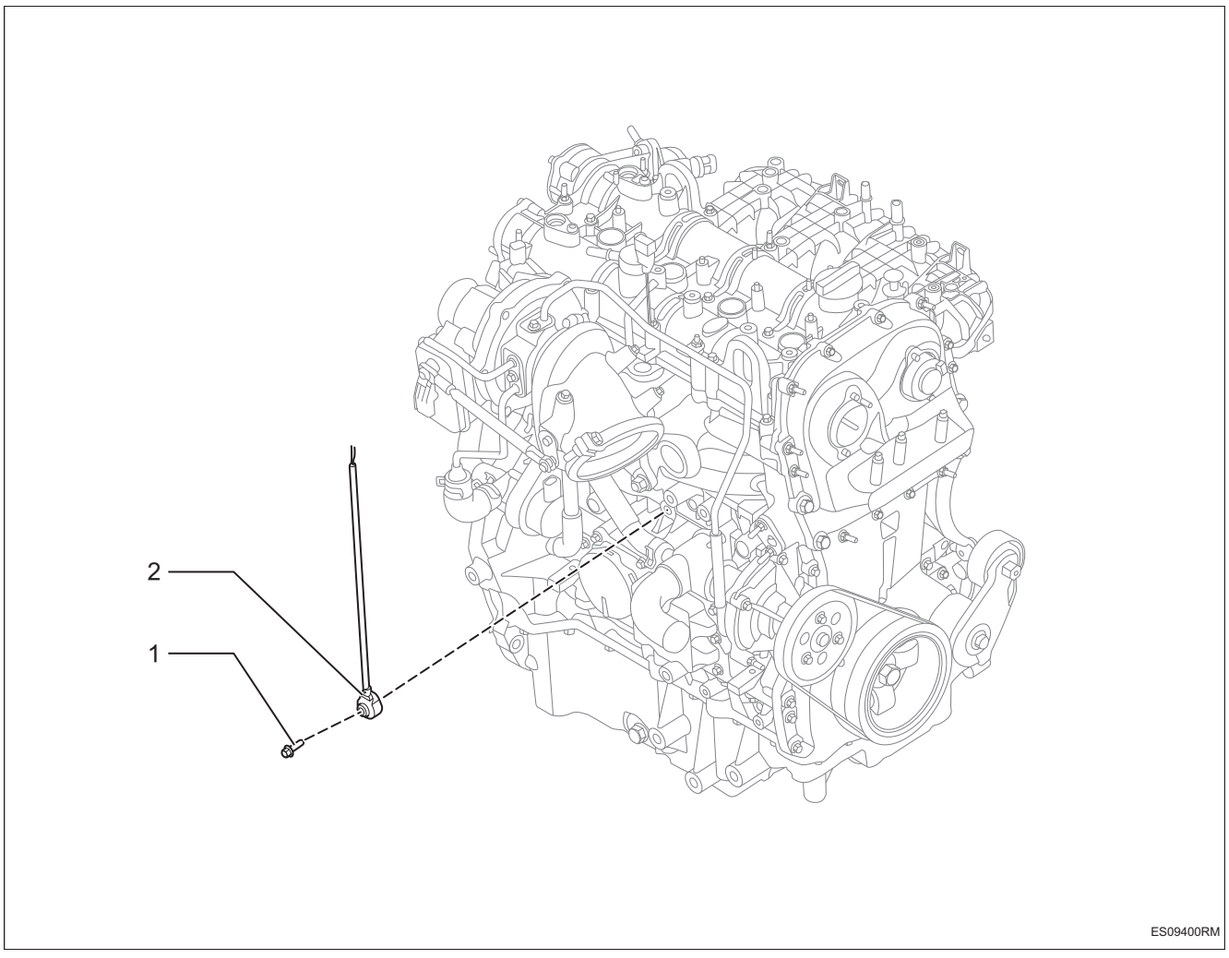
Caution:

Do not damage the seal ring of MAP/IAT sensor assembly during installation.

Knock sensor

Parts

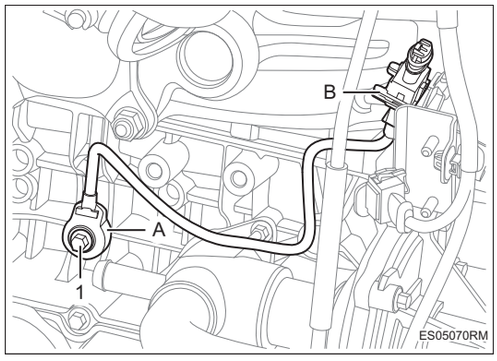
ES



1. **Hexagon flange bolt**
   - Torque: 18~22 N · m
2. **Knock sensor**

Removal

1. **Disconnect the battery negative terminal (See page CH-17)**
2. **Remove the knock sensor**
   (a) Disconnect knock sensor harness connector-B-.
   (b) Remove screw -1- and remove knock sensor -A-.



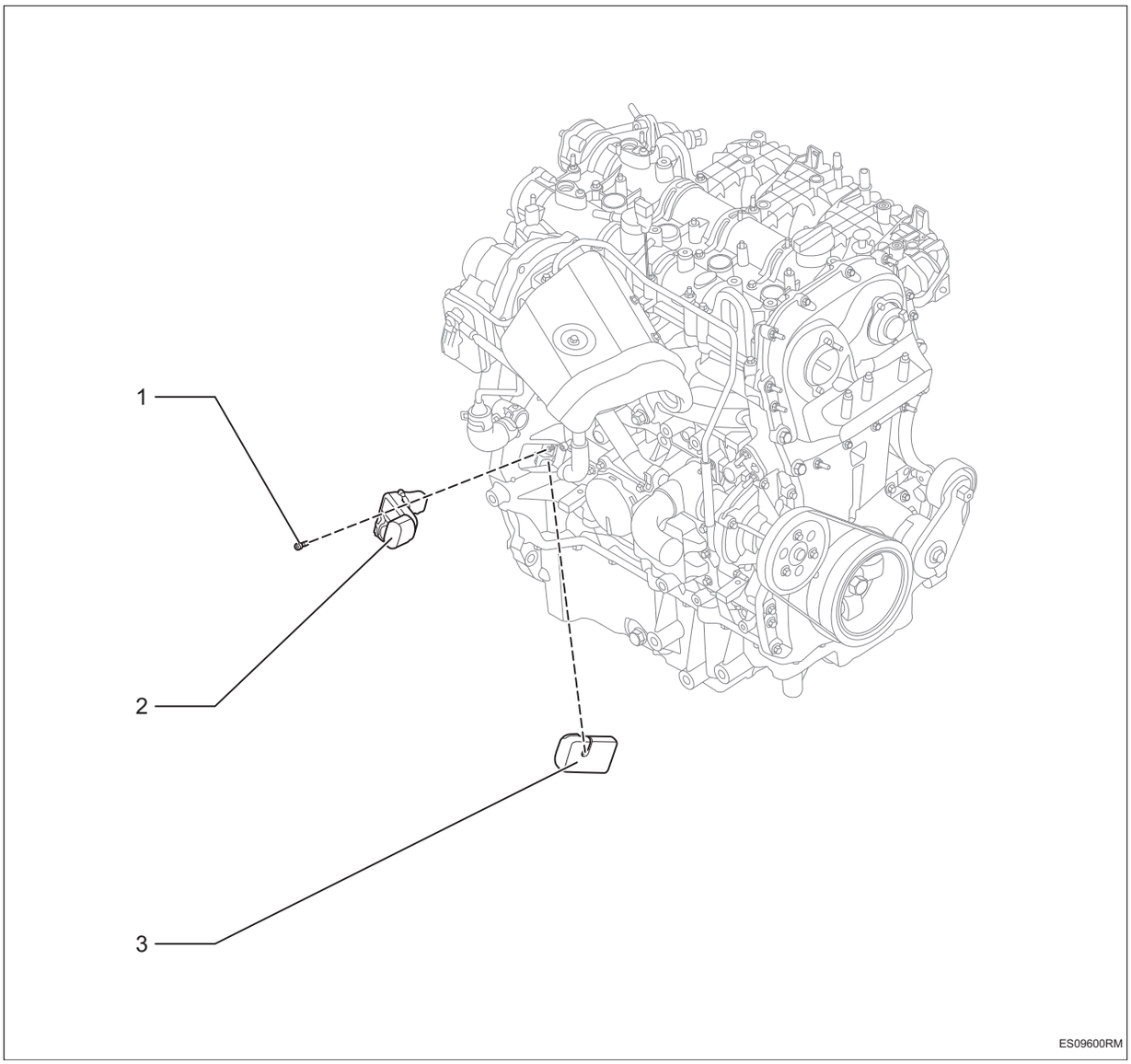
Installation

1. **The installation procedure is the reverse of removal procedure.**

Crankshaft position sensor

Parts

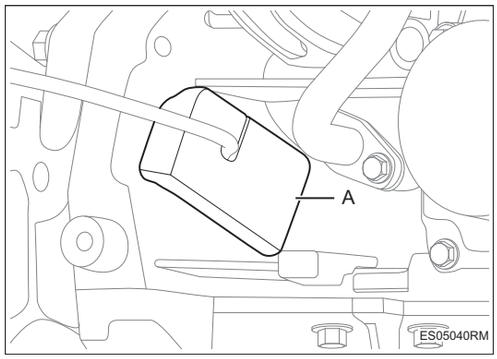
ES



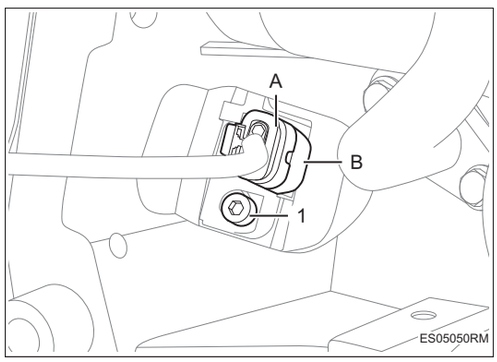
1. **Hexagon socket head cap bolt**
   - Torque: 3.5~5.5 N · m
2. **Crankshaft position sensor**
3. **Dust-proof plug cover**

Removal

1. **Disconnect the battery negative terminal (See page CH-17)**
2. **Remove engine bottom guard plate assembly (See page ET-31)**
3. **Remove crankshaft position sensor**



(a) Detach crankshaft position sensor dust cover-A-.



(b) Disconnect the harness connector-A-.

(c) Remove bolts -1- and remove crankshaft position sensor -B-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Engine mechanical system 2.0T and 1.8T

On-board inspection EM-1

V-ribbed belt EM-3

Parts EM-3

On-board inspection EM-4

Removal EM-4

Installation EM-5

Engine assembly EM-6

Parts EM-6

Removal EM-8

Installation EM-11

ECM EM-12

Parts EM-12

Removal EM-13

Installation EM-24

On-board inspection

1. **Check engine oil**
2. **Check engine coolant**
3. **Check the drive belt**
4. **Check air cleaner**
   (a) Do visual inspection on the air cleaner to check for excessive damage or oil and replace the air cleaner if necessary.
5. **Check ignition timing**
   (a) Warm up the engine.

   Hint:

   The engine coolant temperature is higher than 90 ℃ , and the engine speed is stable.

   (b) Connect the HQ-VDS and read whether the engine data recorder is in the normal range.

   Hint:

   Check ignition timing, and check that the transmission is in neutral position.
6. **Check engine idle speed**
   (a) Warm up the engine.

   Hint:

   The engine coolant temperature is higher than 90 ℃ , and the engine speed is stable.

   (b) Connect the HQ-VDS and read the engine data recorder.

   (c) Idle speed: 700±50 r/min

   Hint:

   Start and idle the engine so that the transmission should be in neutral position.

   Turn off all accessories and A/C before connecting the HQ-VDS.
7. **Check cylinder compression pressure**
   (a) Warm up and stop the engine.

   Hint:

   The engine coolant temperature is higher than 90 ℃ , and the engine speed is stable.

   (b) Remove 4 ignition coils.

   (c) Remove 4 spark plugs.

   (d) Pull off the fuel pump fuse.

(e) Install a suitable tool to the spark plug hole of cylinder 1 and start the engine to measure cylinder compression pressure.

Hint:

Compression pressure: 15 - 18 bar

Be sure to use a fully charged battery to obtain an engine speed of at least 240 rpm.

(f) Check the compression pressure of cylinders 1, 2, 3 and 4.

Hint:

The inspection procedures of cylinders 2, 3, 4 and 1 are the same.

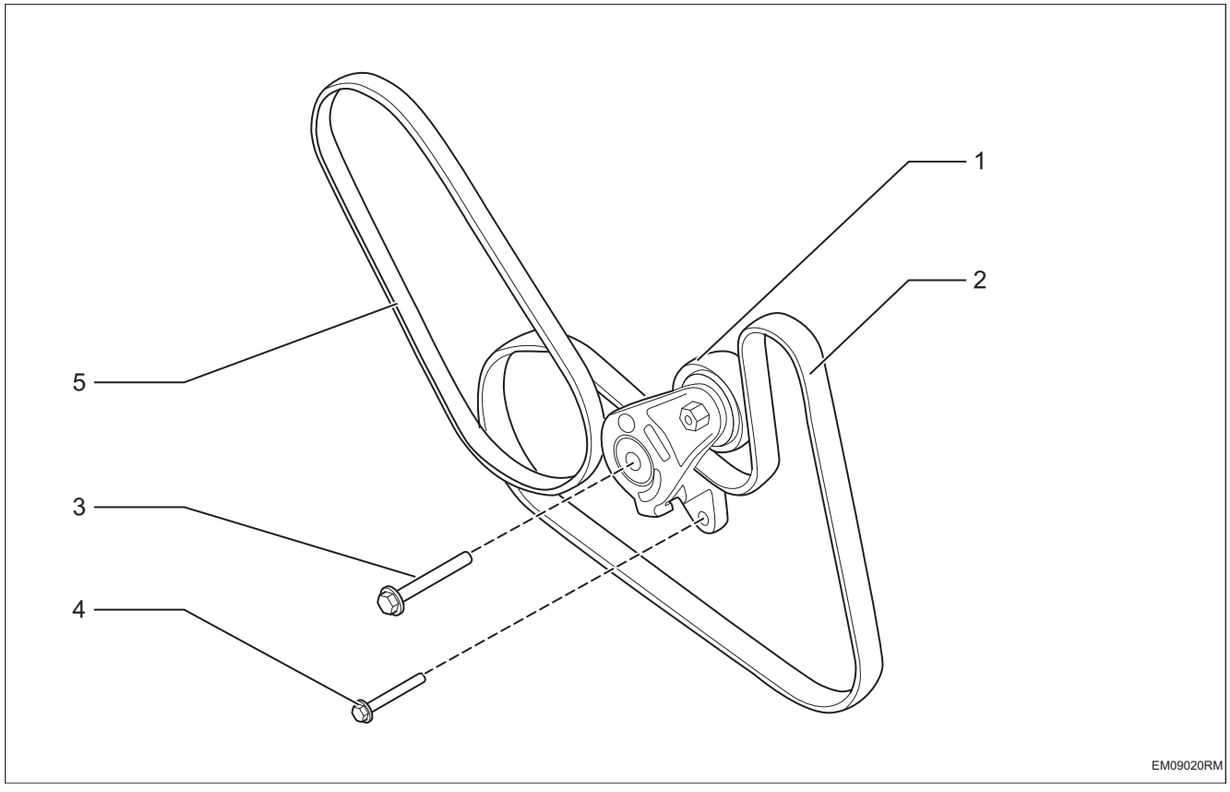
(g) Install 4 spark plugs.

(h) Install 4 ignition coils.

(i) Install the fuel pump fuse.

V-ribbed belt

Parts



1. **Automatic tensioner**
2. **V-ribbed belt**
3. **Hexagon flange bolt**
   - Torque: 48~52 N · m
4. **Hexagon flange bolt**
   - Torque: 18~22 N · m
5. **Elastic V-ribbed belt**

On-board inspection

1. Check V-ribbed belt and elastic V-ribbed belt

(a) Visually inspect the V-ribbed belt for excessive wear, missing wires, reinforcement damage, etc.

Hint:

If the above conditions occur, replace the V-ribbed belt.

(b) Visually inspect the V-ribbed belt for cracks.

Hint:

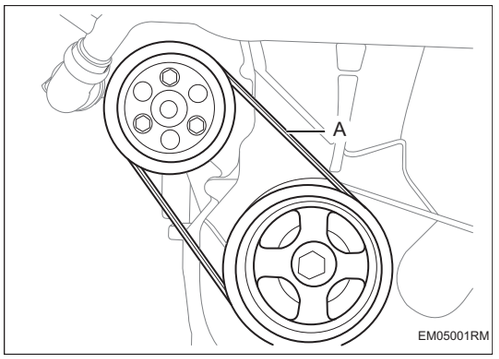
If the above conditions occur, replace the V-ribbed belt.

(c) After the drive V-ribbed belt is installed, check that the belt is completely installed in the pulley groove to prevent the drive V-ribbed belt from slipping out of the pulley groove.

Removal

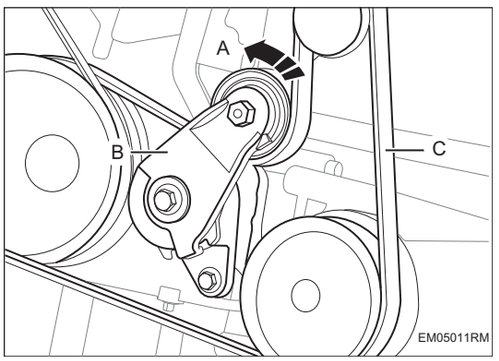
1. Remove elastic V-ribbed belt

(a) Remove elastic V-ribbed belt -A- with a suitable tool.

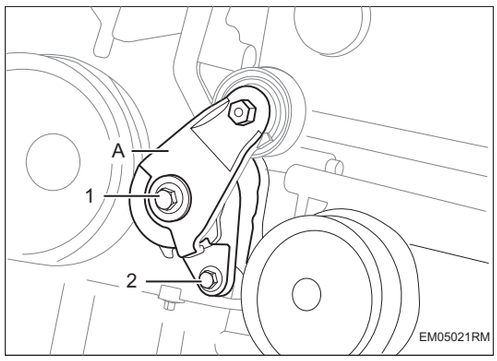


2. Remove V-ribbed belt

(a) Use a suitable tool to rotate the tensioner -B- in the direction of -arrow A-, and remove the V-ribbed belt -C-.



3. Remove automatic tensioner



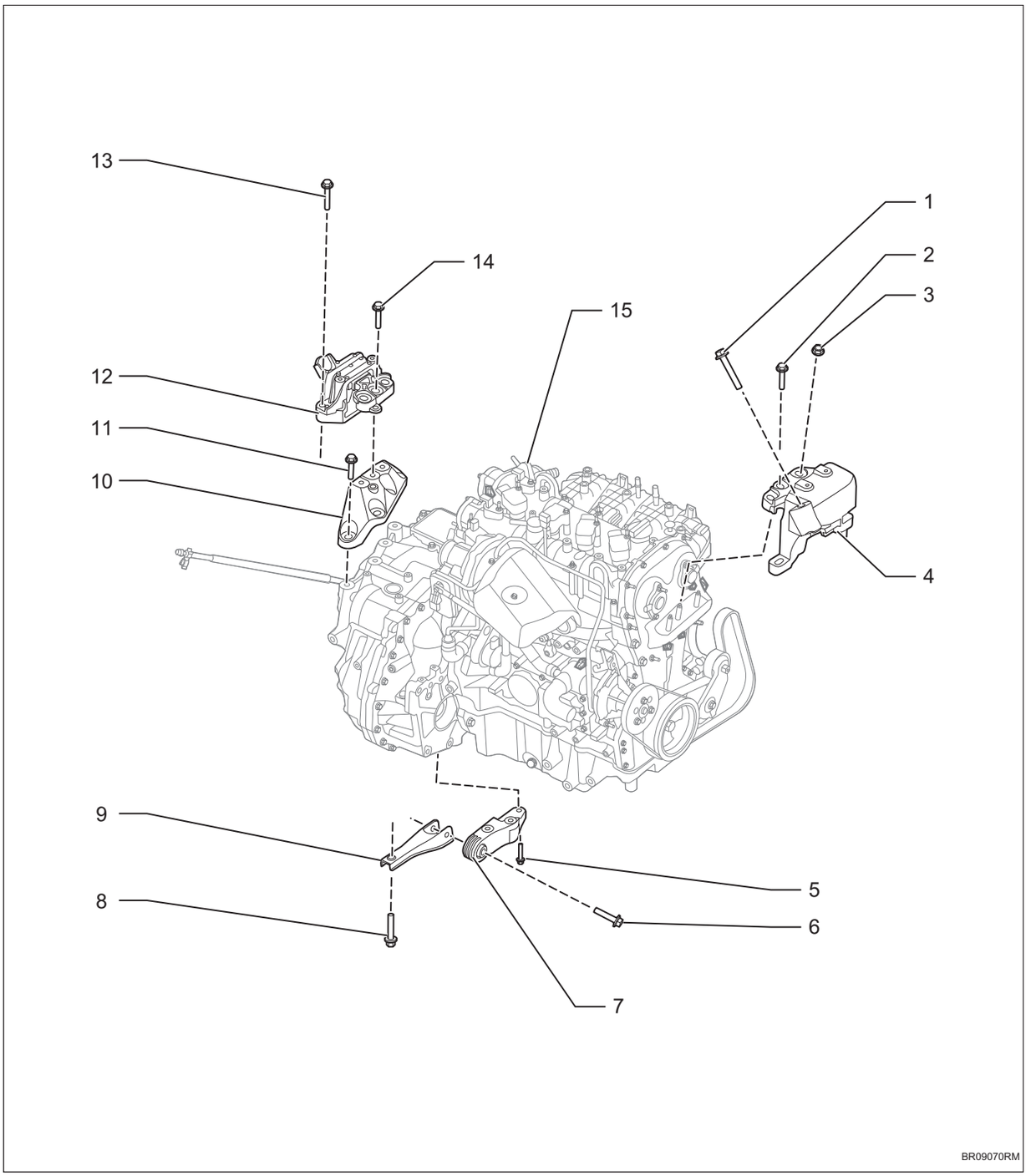
(a) Remove bolts -1-2-, and remove automatic tensioner -A-.

Installation

1. The installation procedure is the reverse of removal procedure.

Engine assembly

Parts



1. **Hexagon flange bolt**
   - Torque: 90~110 N · m
2. **Hexagon flange bolt**
   - X2
   - Torque: 90~110 N · m

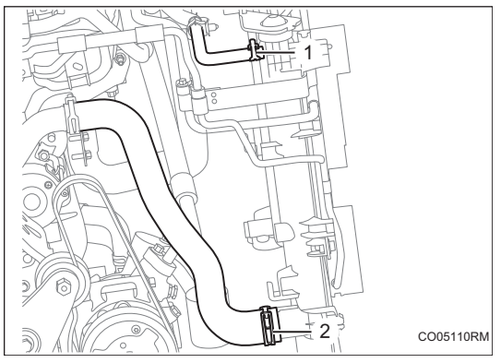
3. **Hexagon flange nut**
   - X3
   - Torque: 90~110 N · m
4. **Powertrain right mounting assembly**
5. **Hexagon flange bolt**
   - X2
   - Torque: 171~209 N · m
6. **Hexagon flange bolt**
   - Torque: 171~209 N · m
7. **Powertrain rear bracket assembly**
8. **Hexagon flange bolt**
   - Torque: 57~63 N · m +85.5~94.5 °
9. **Powertrain rear mounting tie rod**
10. **Powertrain left bracket**
11. **Hexagon flange bolt**
    - X4
    - Torque: 90~110 N · m
12. **Powertrain left mounting assembly**
13. **Hexagon flange bolt**
    - X3
    - Torque: 90~110 N · m
14. **Hexagon flange bolt**
    - X3
    - Torque: 90~110 N · m
15. **Powertrain**

Removal

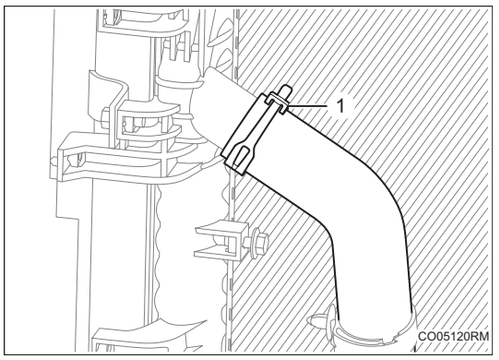
1. **Remove air cleaner assembly (See page IT-7)**
2. **Remove turbocharger to intercooler pipeline assembly (See page IT-11)**
3. **Remove intercooler to throttle valve pipeline assembly (See page IT-11)**
4. **Remove catalytic converter weldment (See page EX-4)**
5. **Remove the expansion tank (See page CO-29)**
6. **Drain coolant (See page CO-1)**
7. **Recover refrigerant (See page AC-98)**
8. **Remove the compressor (See page AC-124)**
9. **Remove ECM assembly (See page ES-451)**
10. **Remove the battery mount (See page CH-20)**
11. **Remove engine assembly**

    Hint:

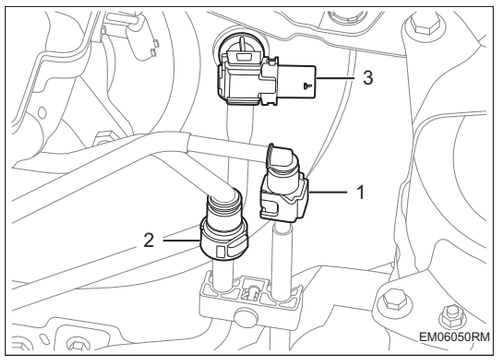
    Removal of the powertrain requires two people.



(a) Disconnect the radiator air return pipe -1- and the radiator lower coolant pipe -2-.

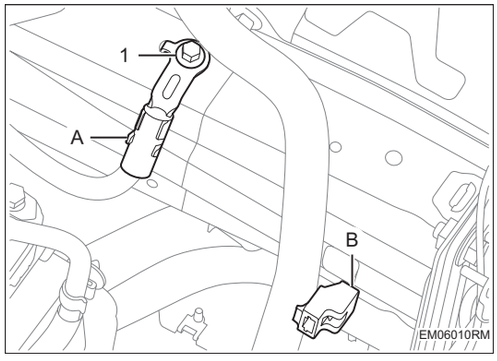


(b) Disconnect the radiator upper coolant pipe -1-.



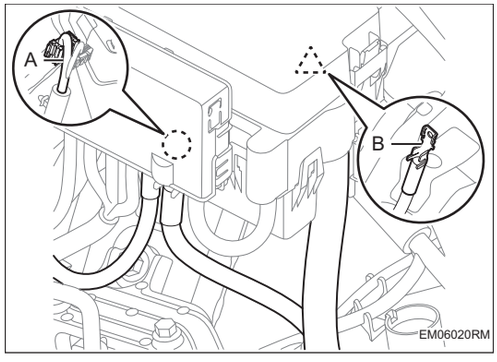
(c) Detach desorption pipe assembly -2- and fuel pipe -1-.

(d) Disconnect vacuum pipe assembly -3-.

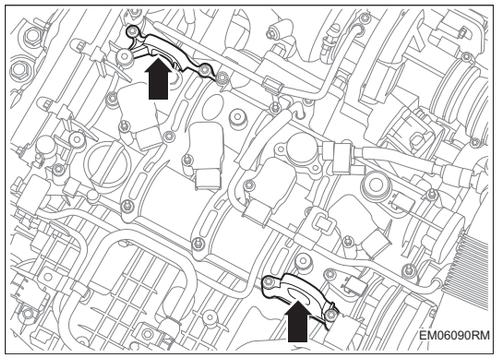


(e) Remove the bolt -1-and disconnect the ground wire -A-.

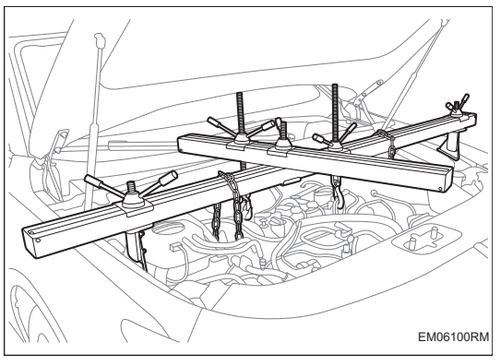
(f) Detach the harness fixture -B-.



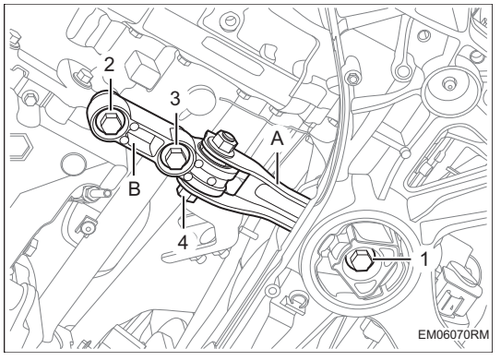
(g) Disconnect the harness connector -A- in the fuse box and connect the terminal -B-.



(h) Use the support bracket to install it to the power-train hanger as arrowed.



(i) After installation, adjust the support SST (9503025 HF01) to a stressed state.

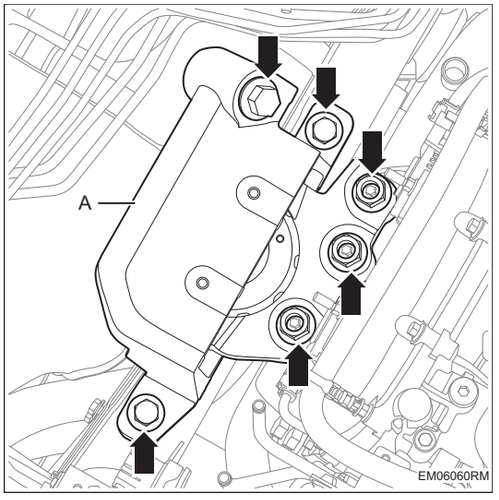


(j) Remove bolts -2-4- and remove powertrain rear bracket assembly -B-.

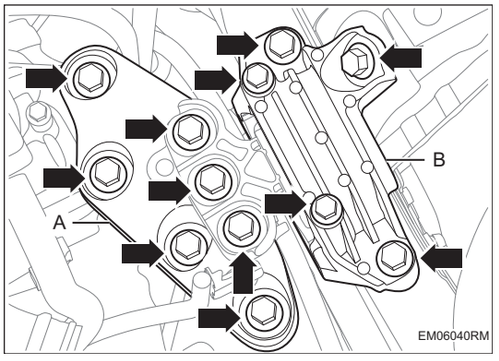
(k) Remove bolt -1-, and remove powertrain rear mounting tie rod -A-.

(l) Remove the driving axle (See page DS-6)

(m) Remove the subframe (See page SP-10)



(n) Remove the fixing bolts and nuts as arrowed of the powertrain right mounting assembly - A -.



(o) Remove the fixing bolts as arrowed of the powertrain left mounting assembly - B - and bracket - A -.

(p) Slowly lift the powertrain using the pallet jack and remove the support frame SST (9503025HF01).

Caution:

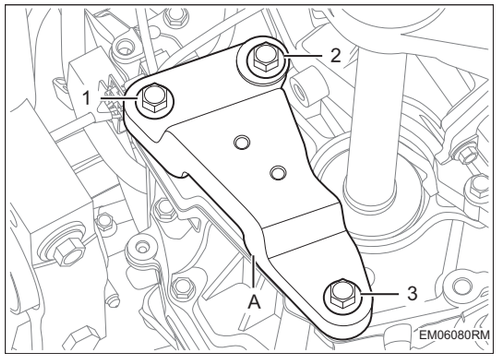
Make sure there are no wiring and hose connections on the powertrain.

When lowering the powertrain, do not touch the vehicle body and other components.

12. Remove transmission assembly (See page AX-153)

13. Remove the bracket

(a) Remove bolts -1-3- and remove bracket -A-.

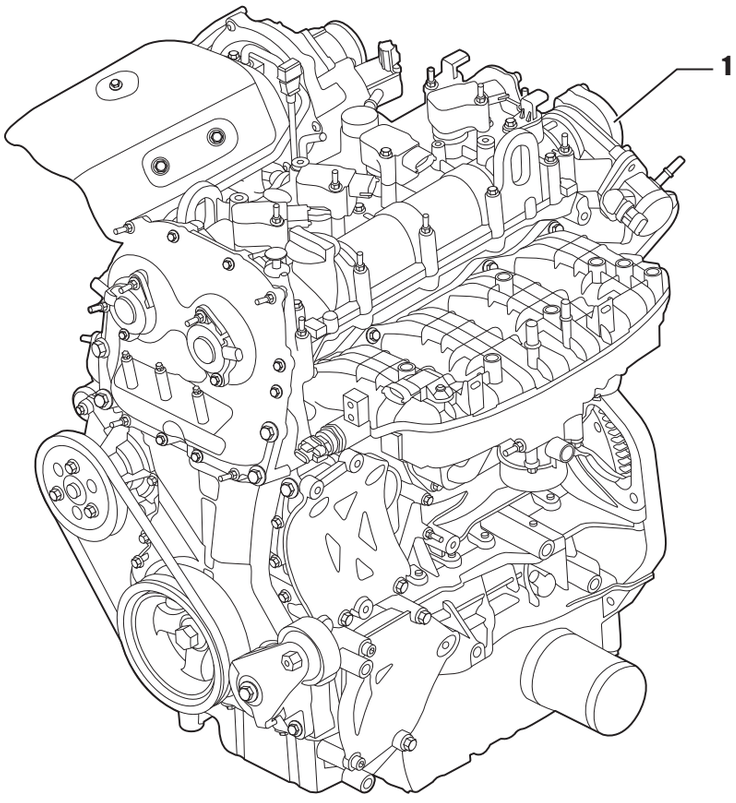


Installation

1. The installation procedure is the reverse of removal procedure.

ECM

Parts

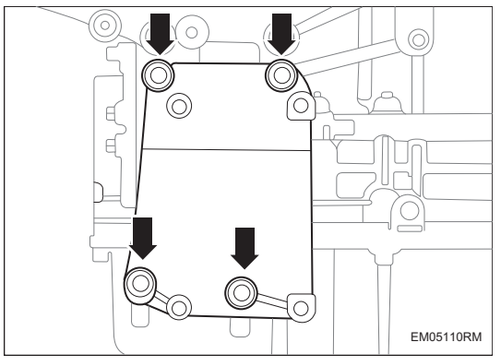


EM09040RM

1. ECM

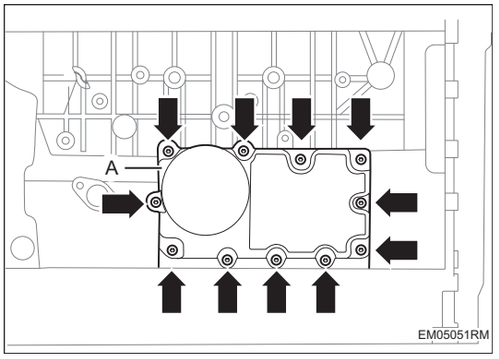
Removal

1. Remove V-ribbed belt (See page EM-4)
2. Remove tensioner assembly (See page EM-4)
3. Remove the compressor assembly (See page AC-124)
4. Remove the alternator (See page CH-8)
5. Remove alternator bracket (See page CH-8)
6. Remove the ignition coil assembly (See page IG-3)
7. Remove camshaft position sensor assembly (See page ES-454)
8. Remove electronic throttle (See page ES-463)
9. Remove intake manifold assembly (See page IT-4)
10. Additional coolant pump assembly (See page CO-31)
11. Remove the coolant pump assembly (See page CO-22)
12. Remove turbocharger assembly (See page IT-18)
13. Remove exhaust manifold assembly (See page EX-8)
14. Remove crankshaft position sensor assembly (See page ES-471)
15. Remove oil cooler assembly (See page CO-24)
16. Remove oil filter assembly (See page LU-3)
17. Remove oil cooler water outlet pipe assembly (See page CO-24)
18. Remove thermal management module assembly and oil pressure and temperature sensor assembly (See page CO-26)
19. Remove additional coolant pump inlet pipe seat (See page CO-31)
20. Remove engine water inlet pipe (See page CO-13)
21. Remove variable displacement oil pump solenoid valve assembly (See page LU-14)
22. Remove the A/C compressor bracket



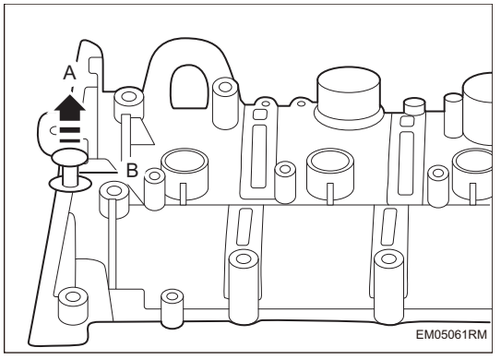
(a) Remove the bolt -arrow- and remove the A/C compressor bracket.

23. Remove oil-mist separator



(a) Remove the bolt as arrowed, and remove the oil-mist separator -A-.

24. Remove oil dipstick



(a) Remove oil dipstick-B- in the direction of arrow A-.

25. Remove knock sensor assembly (See page ES-469)

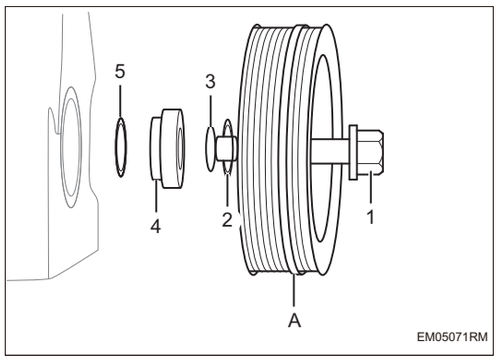
26. Remove the high-pressure fuel pipe (See page FU-5)

27. Remove high-pressure fuel rail assembly (See page FU-5)

28. Remove the high-pressure fuel pump (See page FU-2)

29. Remove the oil sump assembly (See page LU-12)

30. Remove the crankshaft pulley and shock absorber assembly



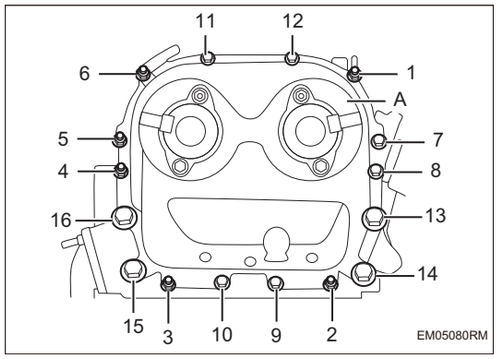
(a) Remove the bolt -1-, and remove the crankshaft pulley and shock absorber assembly-A-.

(b) Remove the crankshaft lock washer -5-.

(c) Remove the pulley transition sleeve -4- and O-ring -3-, and remove the crankshaft lock washer -2-.

31. Remove solenoid valve assembly (See page ES-465)

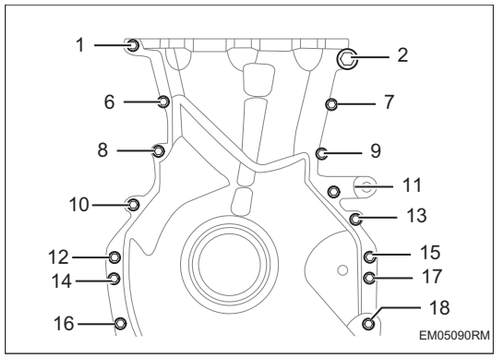
32. Remove the chain upper chamber cover assembly



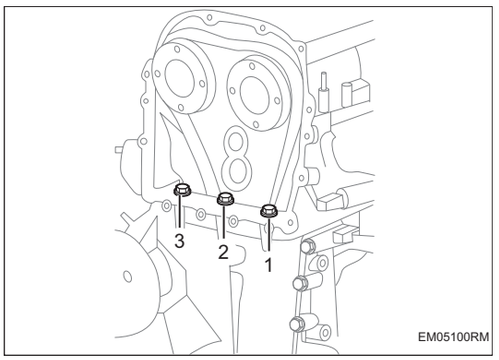
(a) Remove composite bolt -1-6-and hexagon flange bolt -6-12-.

(b) Remove the bolts -13-16-, and remove chain chamber upper cover assembly -A-.

33. Remove chain chamber lower cover

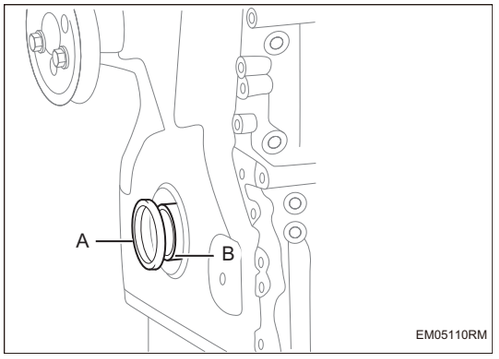


(a) Remove the bolt -1-17-.



(b) Remove bolts -1-3- and remove chain chamber lower cover -A-.

34. Remove crankshaft front oil seal



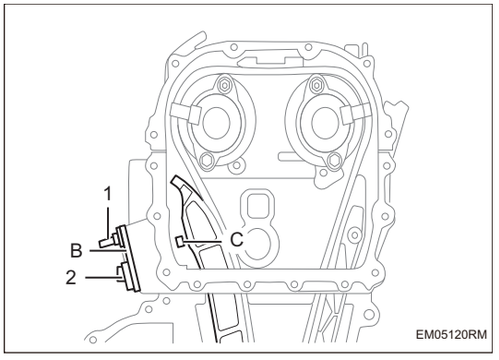
(a) Use a screwdriver to lever off the crankshaft front oil seal -A- from the chain chamber lower cover -B-.

Caution:

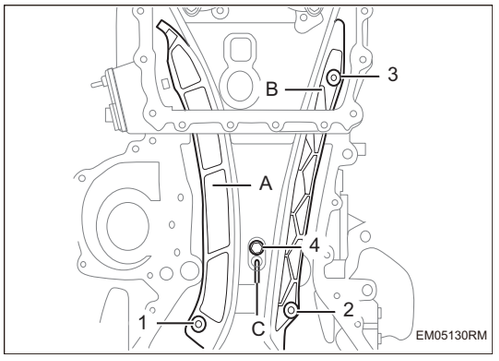
Stick adhesive tape on the tip of the screwdriver before use.

Take care not to damage the oil seal and contact surfaces.

35. Remove camshaft timing chain system



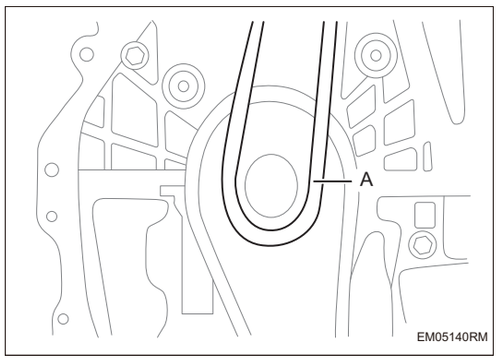
(a) Remove the bolt -1-2-, the camshaft chain tensioner-C- and the tensioner shim-B-.



(b) Remove bolt -4- and remove chain lubrication nozzle assembly -C-.

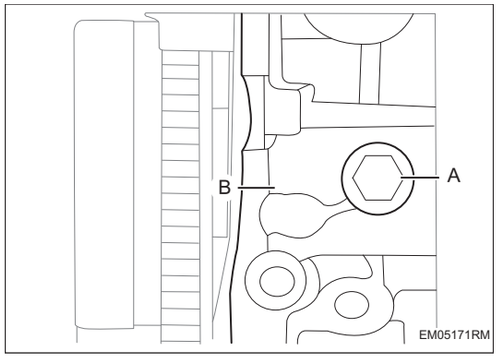
(c) Remove bolt -1- and remove camshaft drive chain tensioner arm -A-.

(d) Remove bolts -2-3- and remove camshaft drive chain guide assembly -B-.



(e) Remove the timing chain assembly-A-.

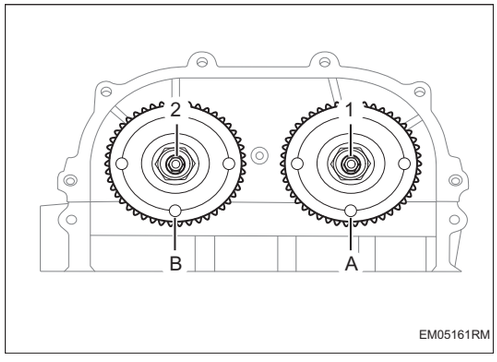
36. Remove OCV, intake and exhaust VCT cam sprocket assembly



(a) Install SST (39 GC110085 C) -A- on cylinder head cover -B- and fix the intake camshaft.

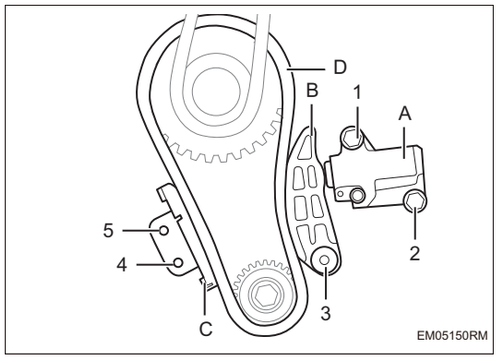
Hint:

The exhaust camshaft SST (39 GC110085 C) -A- shall be installed in the same way as the intake camshaft.



(b) Remove the OCV -1-2-, and remove the intake and exhaust VCT cam sprockets -A-B-.

37. Remove balance shaft chain and tensioner arm assembly



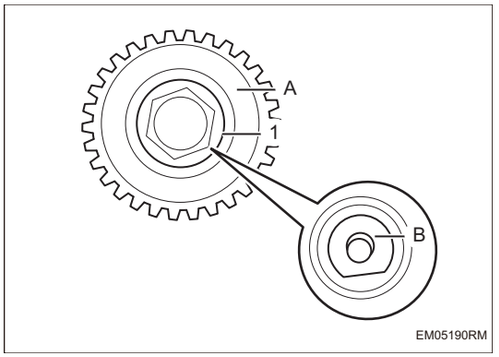
(a) Remove the bolt -1-2-, and remove the balance shaft drive chain tensioner assembly-A-.

(b) Remove the bolt -3- and remove the balance shaft drive chain tensioner arm assembly -B-.

(c) Remove the screw -4-5- and remove the balance shaft drive chain guide assembly-C-.

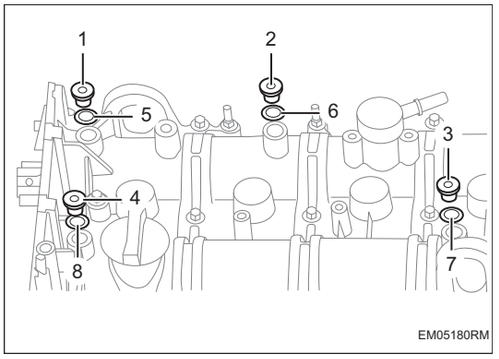
(d) Remove the balance shaft chain-D-.

(e) Remove bolt -1-, balance shaft brake lining-B and drive sprocket-A-.

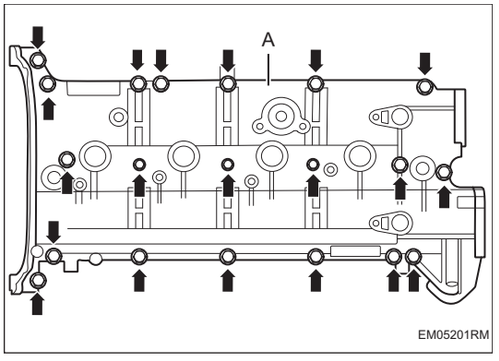


38. Remove valve chamber cover

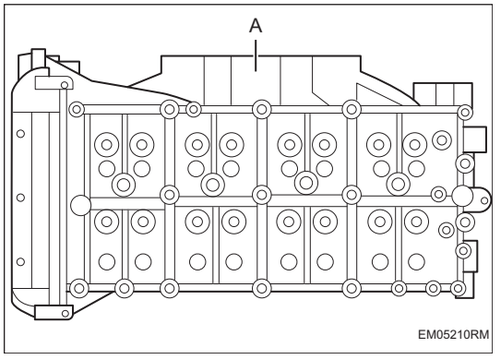
(a) Remove the timing plugs -1-4- and washers -5-8- of intake and exhaust camshafts.



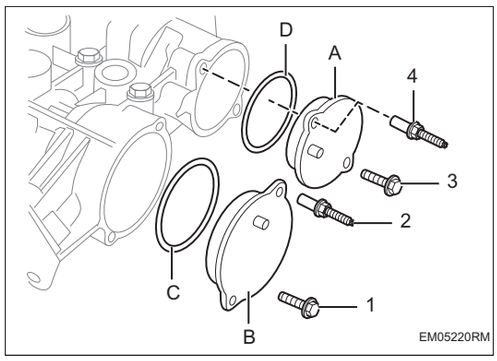
(b) Remove the fixing bolt -arrow- of valve chamber cover -A-.



(c) Remove valve chamber cover gasket-A-.

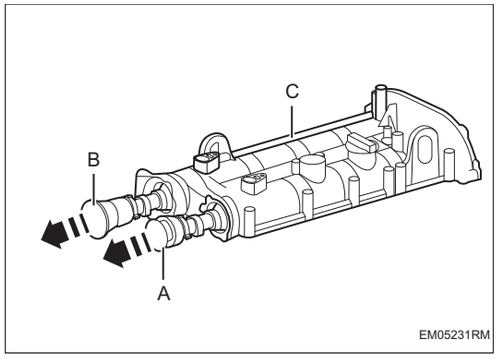


39. Remove intake and exhaust camshafts



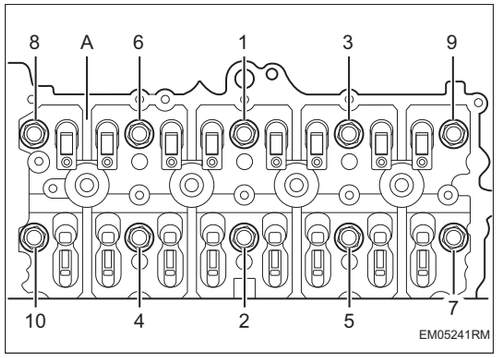
(a) Remove bolt -1-2-, intake side rear cover-B- and seal ring-C-.

(b) Remove the bolts -3-4-, the exhaust side rear cover-A- and seal ring-D-.



(c) Remove the intake and exhaust camshafts-A-B- as arrowed from the valve chamber cover-C.

40. Remove cylinder head assembly

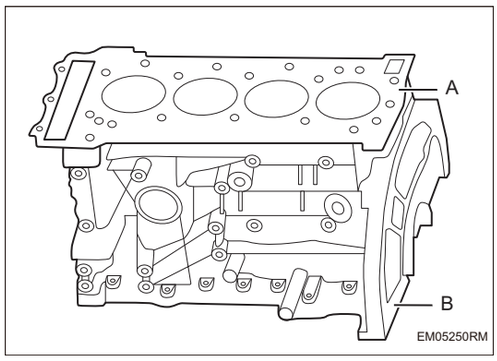


(a) Remove bolts -1-10- and remove cylinder head assembly -A-.

Hint:

The removal sequence is shown in the figure.

41. Remove cylinder head gasket assembly



(a) Remove the cylinder head gasket assembly-A- from cylinder block-B.

Hint:

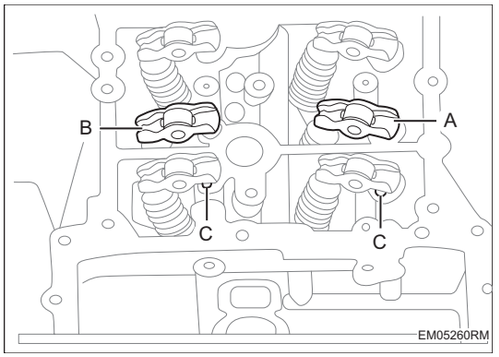
Make the cylinder head gasket side with pressure wave line face upwards.

Reuse is not allowed.

42. Remove rocker arm and hydraulic lash adjuster

Hint:

The removal sequence on the right side is the same as that on the left side.

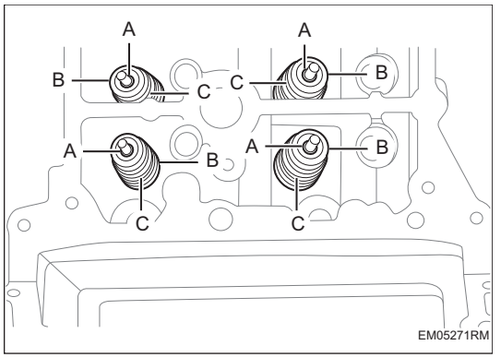


(a) Remove the intake rocker arm-A-, exhaust rocker arm-B-, and hydraulic lash adjuster-C-.

43. Remove intake and exhaust valves

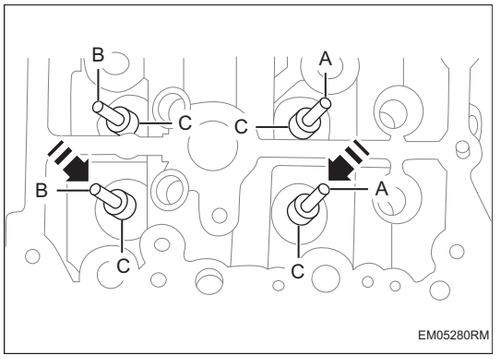
Hint:

There are 2 valve lock blocks on each valve, and the removal sequence of all valve lock blocks are same.



(a) Remove the valve lock block -A- and the valve spring gasket -B-.

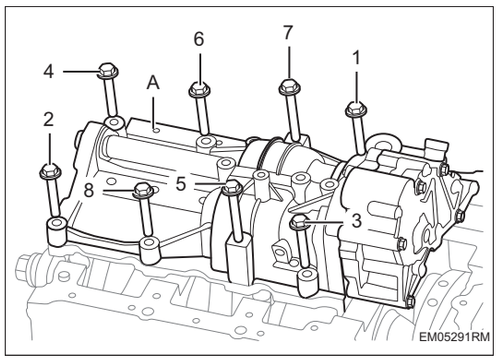
(b) Remove the valve spring -C-.



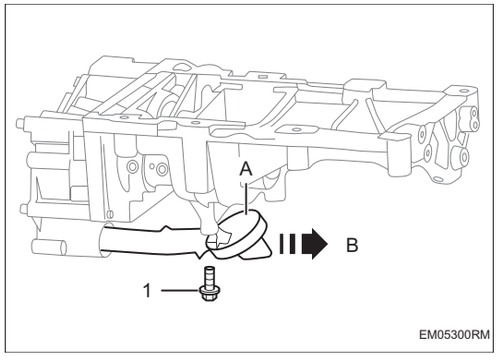
(c) Press the intake valve-A- and exhaust valve-B- downwards as arrowed and take them out.

(d) Remove valve oil seal-C- of intake valve and exhaust valve.

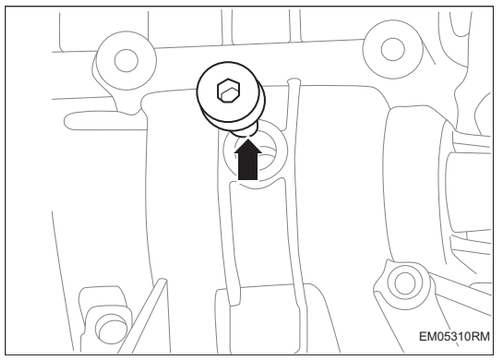
44. Remove balance shaft assembly and oil pump assembly



(a) Remove the bolt -1-8-, and remove the balance shaft assembly and oil pump assembly-A-.

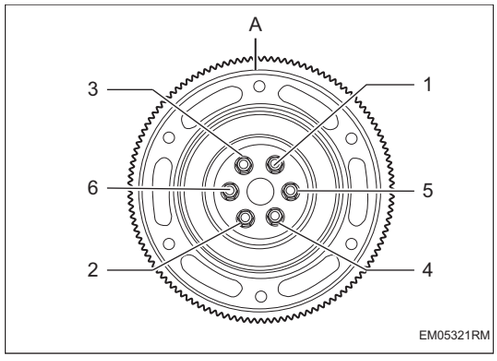


(b) Remove the bolt -1-, and pull to remove the oil collector assembly -A- in the direction of -arrow B- .

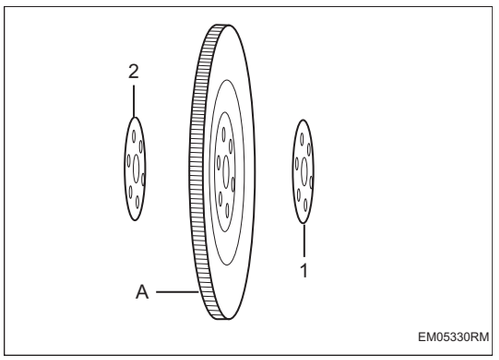


(c) Remove the balance shaft timing plug -1-.

45. Remove flywheel and ring gear assembly

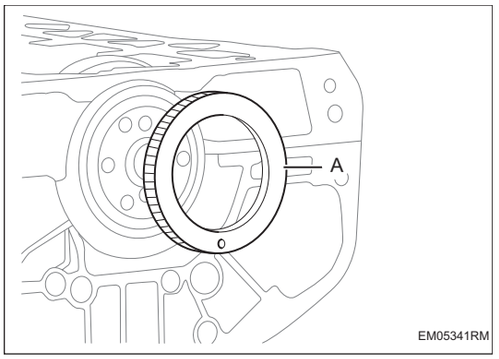


(a) Remove the bolts -1-6-, and remove the flywheel and ring gear assembly -A-.

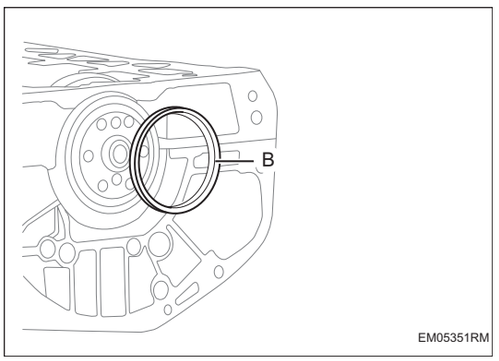


(b) Remove the shims -1-2- of flywheel and ring gear assembly-A-.

46. Remove rear oil seal assembly and crankshaft speed target wheel



(a) Remove the crankshaft speed target wheel-A-.

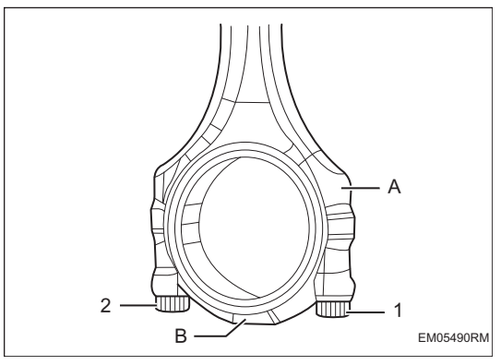


(b) Remove the rear oil seal -B-.

47. Remove piston and connecting rod assembly

Hint:

All pistons and connecting rod assembly are removed in the same order.

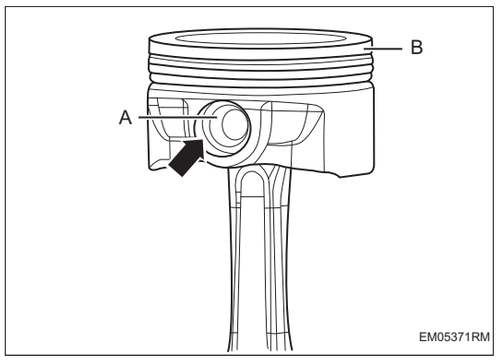


(a) Remove the bolt -1-2-, remove the connecting rod bearing shell and connecting rod bearing shell cover-B-, and take out the piston and connecting rod assembly-A- from the cylinder block.

Hint:

The connecting rod bearing shells shall be placed in order.

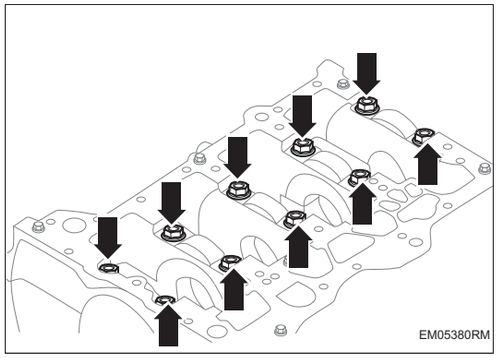
48. Remove piston assembly



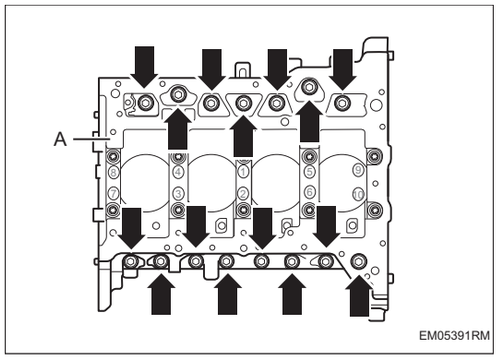
(a) Remove the wire retaining ring as arrowed, and remove the piston pin-A-.

(b) Remove the piston and piston ring assembly-B-.

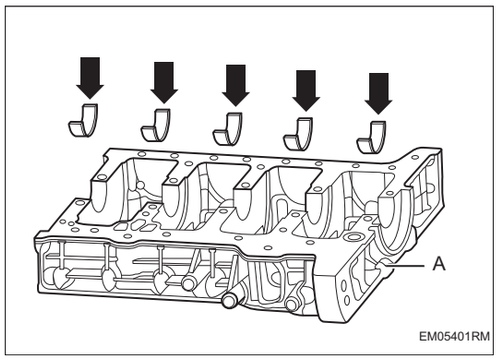
49. Remove main bearing shell and crankshaft



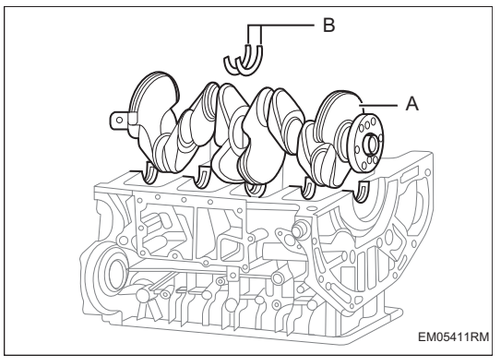
(a) Remove the main bearing bolt -arrow-.



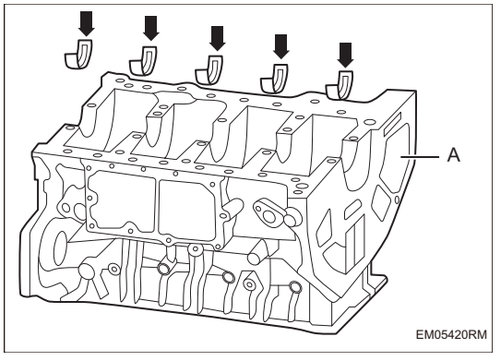
(b) Remove the fixing bolt-arrow- of trapezoid frame-A-.



(c) Remove the lower main bearing shell as arrowed from the trapezoid frame-A-.

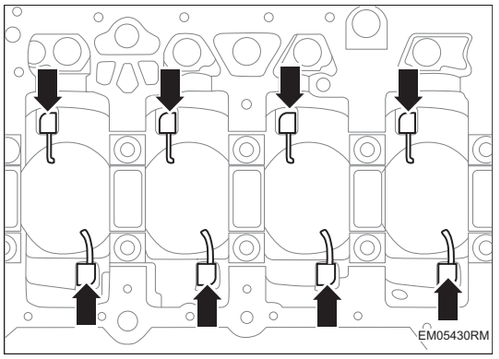


(d) Remove the crankshaft -A- and thrust plate -B-.



(e) Remove the upper main bearing shell as arrowed from the cylinder block-A-.

50. Remove piston cooling nozzle

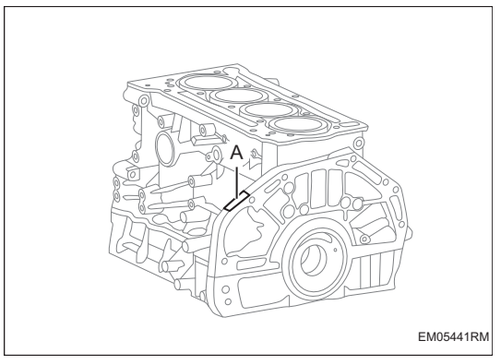


(a) Remove the piston cooling nozzle -arrow-. Installation

Installation

1. The installation procedure is the reverse of removal procedure, and the following points apply:

2. Group mark printing part -A-



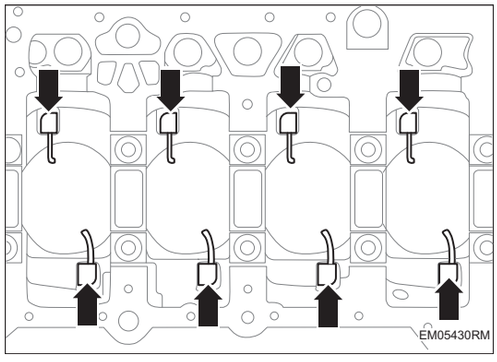
3. Main bearing hole grouping table:

Group No.	Group size of main bearing hole
1	>Φ52.037 ⩽ Φ53.043
2	>Φ53.031 ⩽ Φ53.037
3	>Φ53.025 ⩽ Φ53.031

4. Cylinder bore grouping table:

Group No.	Cylinder bore group size
A	>Φ82.5 ⩽ Φ82.51
B	>Φ82.51 ⩽ Φ82.52

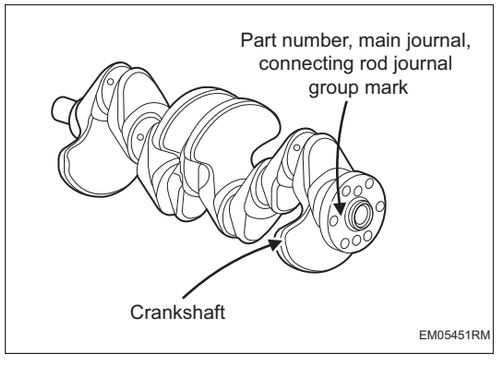
5. Install the piston cooling nozzle



(a) Clean the mounting surface of the piston cooling nozzle, fit the piston cooling nozzle -arrow- positioning block with the mounting surface and install it into the corresponding thread hole of the cylinder block.

Torque: 19 ~ 25 N·m

6. Grouping table of crankshaft main bearing journal and connecting rod journal



(a) The group marks of main journal and connecting rod journal are printed on the end face of crankshaft flywheel flange.

Main journal grouping	
Group number	**φ48(0/-0.018**)
1	＞47.994-48.000
2	＞47.988-47.994
3	47.982-47.988

(b) Grouping table of connecting rod journal:

Grouping of connecting rod journal	
Group number	**φ48(0/-0.018)**
A	＞49.994-50.000
B	＞49.988-49.994
C	49.982-49.988

7. Grouping table of main bearing shell wall thickness:

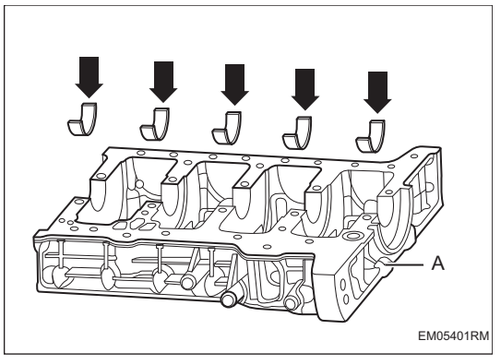
(a) The grouping is marked on the shell back, and the upper main bearing shell has oil hole.

Division number	L (alloy thickness)	T (total thickness)
1 (red)	0.3 ± 0.1	2.5(+0.006/0)
2 (blue)	0.3 ± 0.1	2.5(+0.012/+0.006)
3 (yellow)	0.3 ± 0.1	2.5(+0.018/+0.012)

8. Assembly relations of seat hole, bearing shell and main journal: (Table A)

9. Install main bearing shell

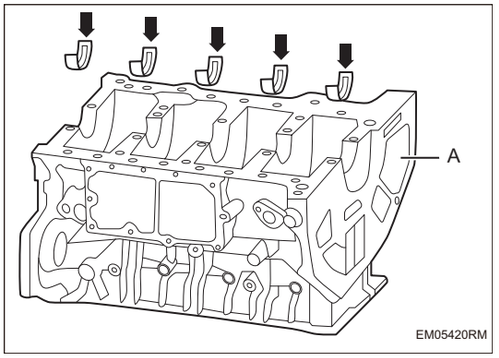
(a) Wipe the main bearing seat surface clean, and assemble the lower main bearing shell -arrow- to the trapezoid frame -A- according to the bearing shell matching scheme.



(b) Wipe the main bearing seat surface clean, and assemble the upper main bearing shell -arrow- to the cylinder block main bearing seat -A- according to the bearing shell matching scheme.

Caution:

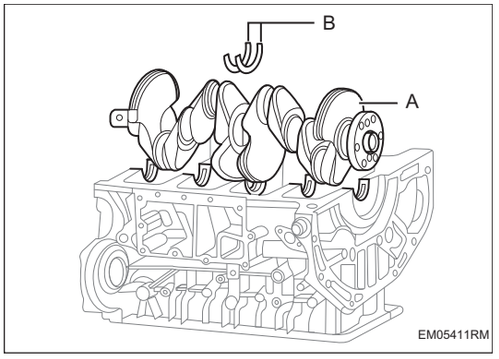
Fill the installed upper main bearing shell with engine oil gun to ensure that the bearing surface of the shell is oiled. Lift the crankshaft and check lubricating oil passage hole, and check whether there is foreign matter on each journal.



(c) Drop lubricating oil on the installed main bearing shell to install crankshaft assembly -A-.

Hint:

Turn it slightly to evenly distribute the lubricating oil on the surface of the crankshaft journal.

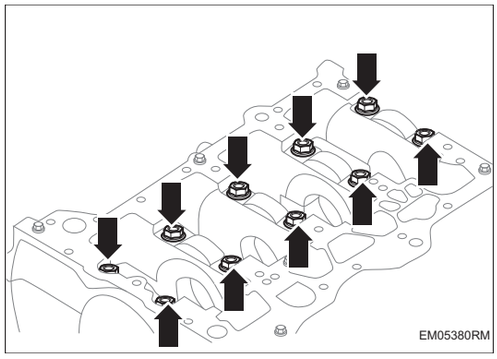


(d) Push the crankshaft assembly forward and backward, and push the upper thrust plate-B- coated with lubricating oil into both sides of the third bearing seat respectively.

Hint:

The oil groove faces outward on the crankshaft side.

(e) Apply plane sealant (THREEBOND 1217G) to the joint surface of the trapezoid frame and cylinder block, and install the seal ring into the blue rubber groove.

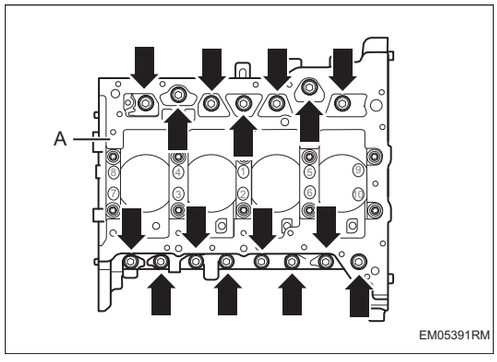


(f) Assemble the cylinder block and trapezoid frame as dowel pin, and install the bolt -arrow- of the main bearing shown in the figure.

Torque: 38 ~ 42 N·m + plus angle 88 ° ~ 92 ° 30 ′

Hint:

The tightening sequence is from the middle to both sides or at the same time.



(g) Install the outside bolt -arrow- of trapezoid frame -A-.

Torque: 24 ~ 30 N · m /18 ~ 22 N · m

Hint:

The tightening sequence is from the middle to both sides or at the same time.

10. Crankshaft axial play and crankshaft rotation torque measurement

(a) Crankshaft axial play: (0.2~0.42) mm, using dial indicator.

(b) Place the engine horizontally. When rotating the crankshaft with the torque wrench, the rotation shall be smooth without hysteresis, and the rotation torque value shall be less than (0.2-3.5) N·m.

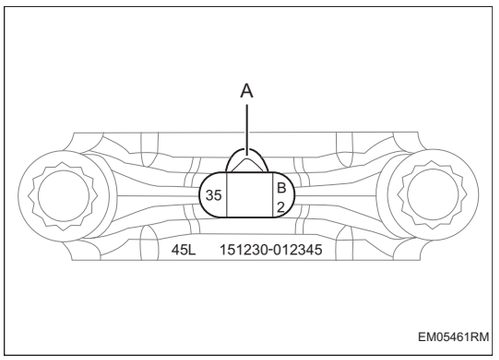
Hint:

The stuck dead spots are not allowed in the rotation process.

11. Install piston and connecting rod assembly

(a) Select the piston according to the cylinder bore size, and the cylinder gap is: (0.039 mm ~ 0.061 mm)

Piston skirt size grouping table		
Group mark	**Outer diameter of piston**	**Cylinder bore size**
A	82.455±0.006	82.505±0.005
B	82.465±0.006	82.515±0.005



(b) Select 4 connecting rods of the same mass group.

Mass unit: g

(c) Take 35 B 2 for example, 35 represents grouping of mass, B represents grouping of connecting rod big end hole, and 2 represents grouping of connecting rod small end hole.

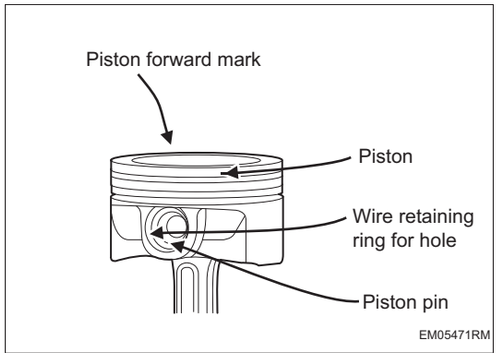
Grouping of connecting rod mass							
Mass of big head Mass of small head	364-367	367-370	370-373	373-376	376-379	379-382	382-385
143-147	23	33	43	53	63	73	83
147-151	24	34	44	54	64	74	84
151-155	25	35	45	55	65	75	85

(d) Grouping of connecting rod big end hole

Group mark	**Group size range**
A	53.018-53.022
B	＞53.022-53.026
C	＞53.026-53.030

(e) Grouping of connecting rod small end hole

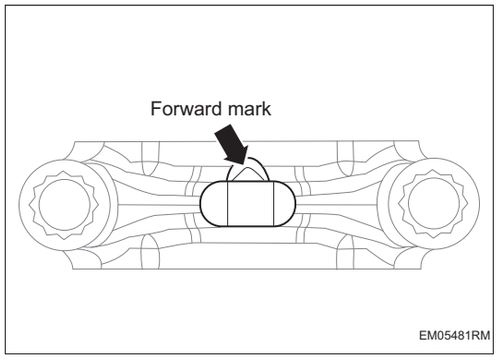
Group mark	**Group size range**
1	22.005-22.008
2	＞22.008-22.011



(f) Select the piston pin according to the group marks of connecting rod small end hole, 1 □ (red) piston pin for group 1 connecting rod small end hole, and 2 □ □ (blue) piston pin for group 2 connecting rod small end hole.

Hint:

Option 1: Apply oil to the piston pin surface, gently rotate it into the piston pin seat and connecting rod small end hole, and install the wire retaining ring for hole with special tools on both sides.



12. Install piston ring

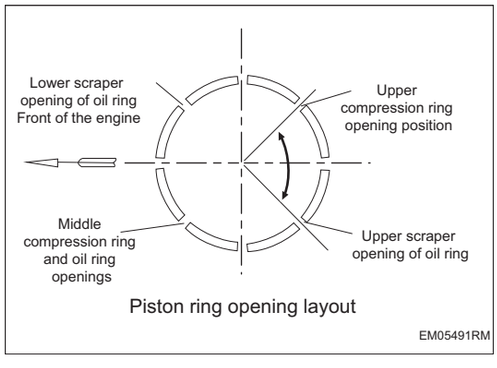
(a) Wipe the piston ring groove clean, ensure no foreign body is in the ring groove, and install the rings in sequence.

Caution:

The side clearance between the upper compression ring and the groove is (0.03~0.07) mm.

The side clearance between the middle compression ring and the groove is (0.02~0.06) mm.

The side clearance between oil ring and groove is (0.04~0.16) mm.



(b) Adjust the opening position of each ring as shown in the figure.

Caution:

Adjust the opening position of each ring to ensure that the gap between the upper compression ring opening and the middle compression ring opening is 180 °, the gap between the two scraper openings of the oil ring is more than 60 °, and the gap with the bushing ring opening is more than 30 °.

The face of the upward mark of the piston ring must be upward, and the piston ring should be able to rotate flexibly after being installed in the groove.

EM

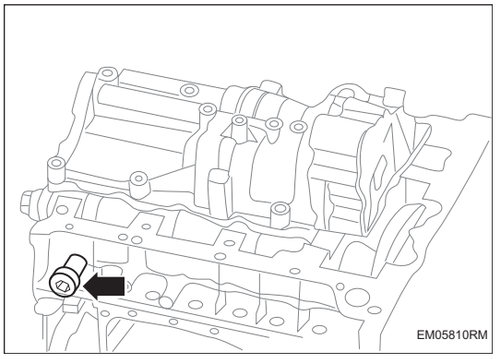
13. Grouping of connecting rod bearing shell

(a) The connecting rod bearing shells are divided into 3 groups according to the wall thickness, and the group numbers are printed on the back of the bearing shells.

Grouping of connecting rod bearing shell		
Division number	**L (alloy thickness)**	**T (total thickness)**
1 (red)	0.3 ± 0.1	1.5(-0.002/-0.008)
2 (blue)	0.3 ± 0.1	1.5(+0.004/-0.002)
3 (yellow)	0.3 ± 0.1	1.5(+0.010/+0.004)

14. Assembly relations of connecting rod big end hole, bearing shell and connecting rod journal: (table B)

15. Install the piston and connecting rod assembly



(a) Turn the crankshaft clockwise to make the first and fourth connecting rod journals in the TDC position, and install the crankshaft timing pin on the exhaust side of the front end of the cylinder block.

(b) According to the connecting rod journal group mark and connecting rod big end hole group mark on the crankshaft, select the connecting rod bearing shell according to the assembly relationship table.

(c) Install the connecting rod upper bearing shell into the connecting rod bearing shell seat hole.

Hint:

During manual installation, it is necessary to align the bearing shell positioning lip with the groove, and make the shell back against the seat surface of the connecting rod big end hole.

No oil or other foreign matters are allowed between the back of the connecting rod bearing shell and the seat hole.

(d) Wipe the cylinder bore and spray oil mist around the cylinder bore wall with sprayer.

Hint:

Ensure that an appropriate amount of lubricating oil is applied to the whole circumference of the cylinder within 10 mm from the top surface.

Apply oil to the surface of the piston ring, piston skirt, and connecting rod bearing shell of the piston and connecting rod assembly.

(e) Check whether the split ring position is correct.

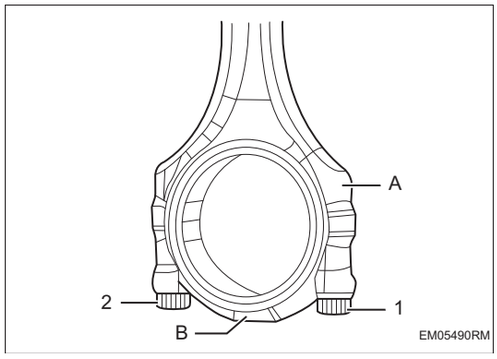
Hint:

Ensure that the piston ring opening are staggered with each other, and follow the location distribution diagram of piston ring opening.

(f) Push the piston and connecting rod assembly into the cylinder with a suitable tool.

Hint:

Ensure that the connecting rod and the piston cooling nozzle are not scratched during the pushing process.

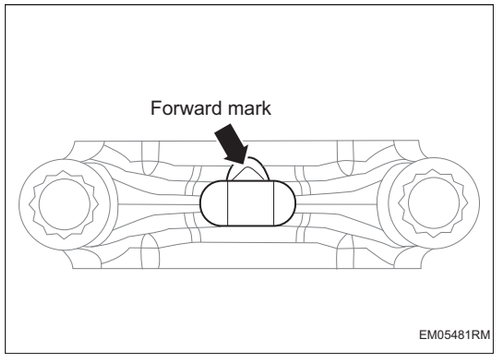


(g) After manually setting the connecting rod bolt, remove the crankshaft timing pin, install the connecting rod big end cap-B- with the connecting rod lower bearing shell into the connecting rod-A-, and tighten the bolt -1-2-.

Torque: 17 ~ 23N·m Turning angle 85 ° ~ 95 °

Caution:

The forward mark on the connecting rod cover shall be on the same side as the mark on the connecting rod body.



(h) Turn the crankshaft so that each connecting rod journal is in the position of TDC and repeat the above steps,

Hint:

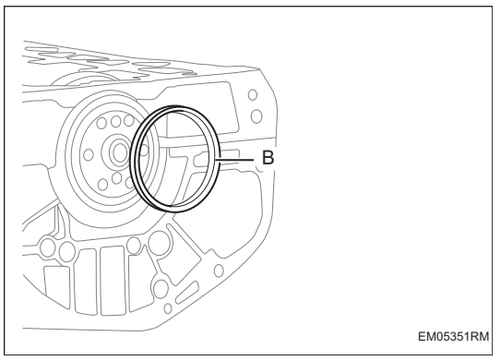
Place the engine horizontally with all pistons and connecting rods installed.

When rotating the crankshaft at a constant speed, the allowable range of rotation torque is: not more than 5 ~ 15 N·m.

The seizure phenomenon is not allowed in the rotation process.

Measure the gap between the crankshaft connecting rod journal and the connecting rod big end side, with a range of (0.15 to 0.35) mm.

16. Install the rear oil seal assembly and crankshaft speed target wheel

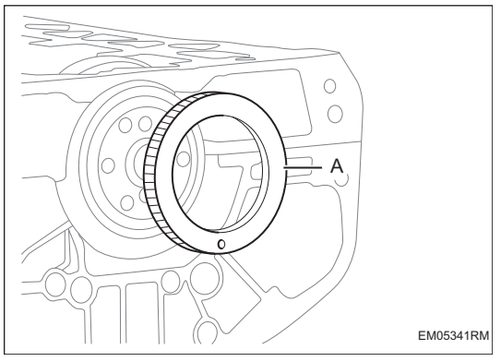


(a) Apply engine oil to the crankshaft rear oil seal journal, insert the rear oil seal assembly guide tool into the crankshaft rear end hole and push it against it, put the rear oil seal-B- on the guide tool, slowly push it against the rear end surface of the cylinder block, and remove the rear oil seal guide tool.

Caution:

The oil seal shall not protrude from the cylinder block.

The oil seal lip shall be free of abrasions.

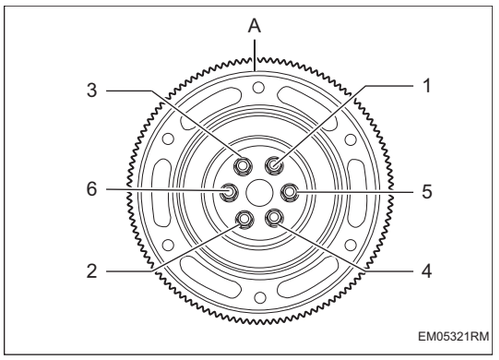


(b) Install the crankshaft speed target wheel-A-.

Caution:

The target wheel is 0.2-0.4 mm below the crankshaft flange.

17. Install flywheel and ring gear assembly



(a) Fix the crankshaft to prevent the flywheel from rotating clockwise. Align the flywheel pressure plate, flywheel assembly and flywheel pressure plate with the rear end of the crankshaft. The flywheel bolt washer is oriented as shown in the figure, and is fitted on the rear end stop of the crankshaft in the above order.

(b) The installation sequence of bolts is as shown in the figure, and the fixing bolts of the flywheel-A are cross-mounted.

Caution:

The chamfered side of flywheel assembly ring gear shall face toward engine front.

The flywheel bolt washer shall face towards the rear end of the engine.

Hint:

The bolt is disposable part and cannot be reused.

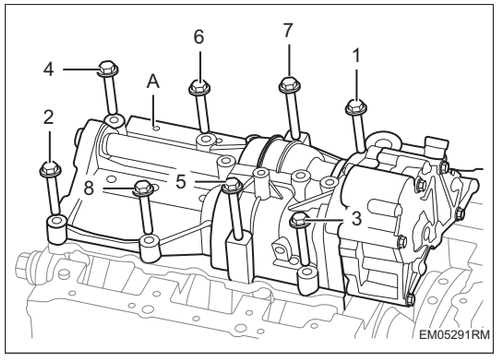
18. Install balance shaft assembly and oil pump assembly

Caution:

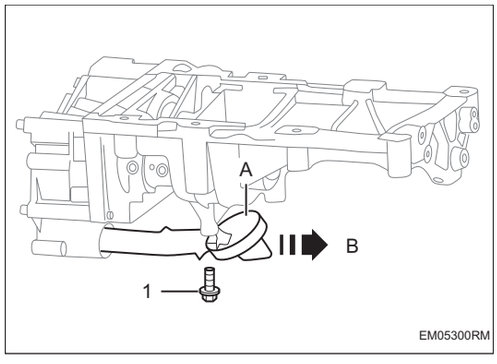
Check whether the seal ring at the lower end of the oil pump assembly is in good condition before installation.

Please fully apply the lubricating oil on the oil pump assembly during installation.

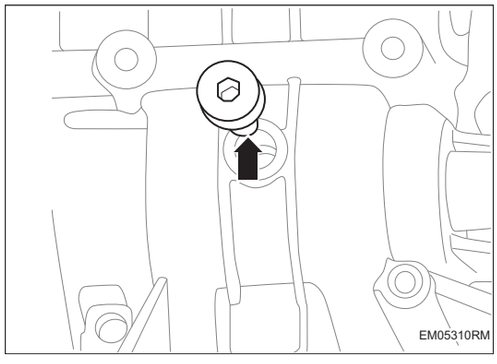
After installation, turn the crankshaft to confirm that the oil pump is not stuck.



(a) Install the balance shaft assembly, oil pump assembly-A- and fixing bolt -1-8-.**Torque: 25 N · m**

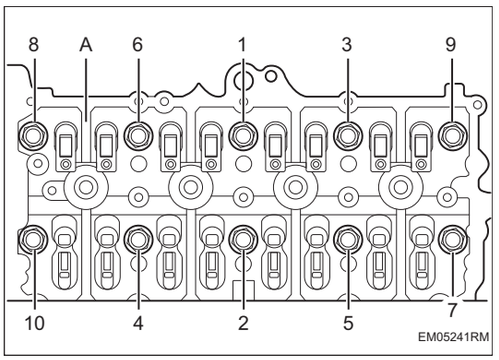


(b) Insert the oil collector assembly -A- in the opposite direction of -arrow B-, and install the bolt -1-.**Torque: 8 ~ 10 N · m**



(c) Install the balance shaft timing plug -1-.

19. Install the cylinder head



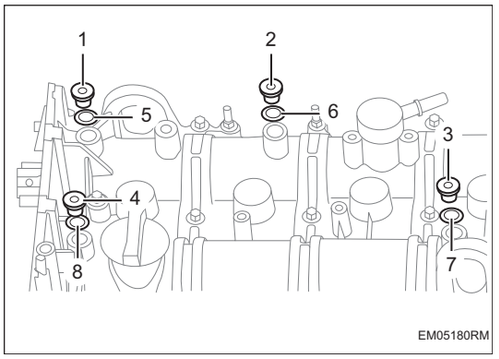
(a) Wipe the bottom surface and front end surface of the cylinder head assembly -A-, and carefully place it onto the cylinder head gasket with the dowel pin hole aligned with the dowel pin on the cylinder block.

(b) Insert the 10 cylinder head bolts into the cylinder head bolt holes. The tightening sequence is shown in the figure.
Torque: 40 N · m +180 °

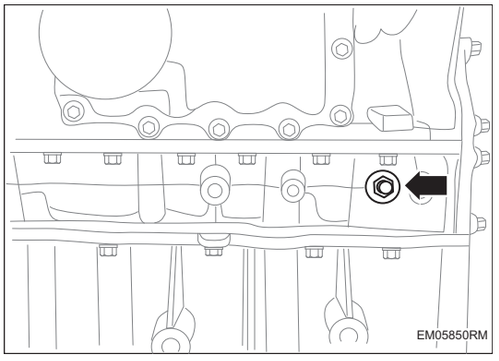
20. Install the camshaft

(a) Measure camshaft axial play: 0.09~0.31 mm.

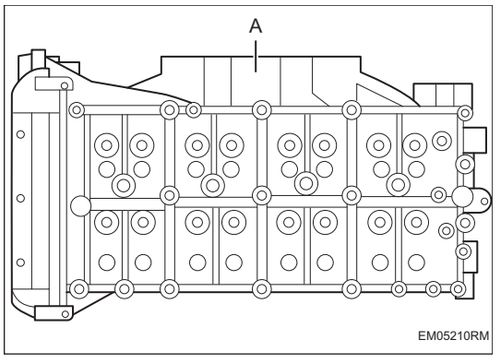
21. Install the valve chamber cover



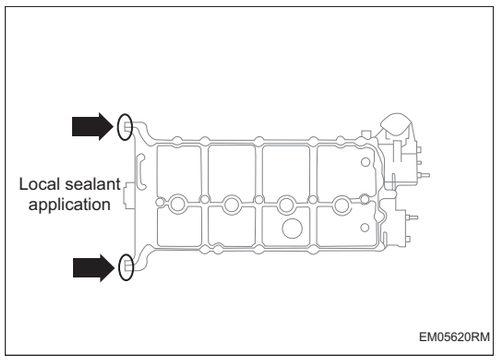
(a) Install the intake and exhaust camshaft timing plugs -1-4- and washers -5-8-.



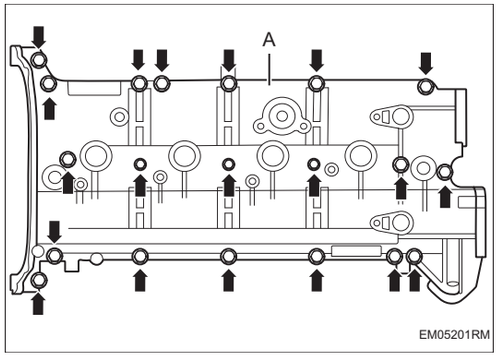
(b) Remove the crankshaft timing plug, rotate the crankshaft to a proper angle, screw SST (39GC110110C) into the timing hole of the cylinder block, and tighten it to lock the crankshaft to ensure that the crankshaft is at the TDC of 1# cylinder.



(c) Install valve chamber cover gasket -A-.

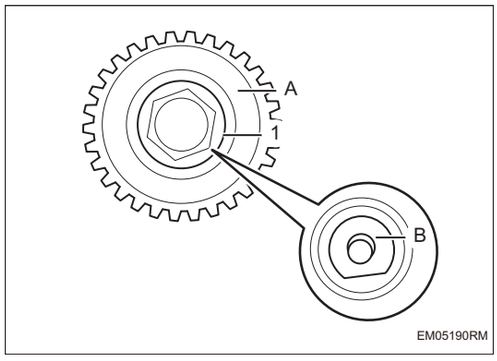


(d) Finally, align the valve chamber cover with the dowel pin hole to install it on the cylinder head, and apply sealant onto the valve chamber cover and its local part.



(e) Install the fixing bolt -arrow- of valve chamber cover -A-.
Torque: 15 ~ 19 N · m

22. Install balance shaft chain and tensioner arm assembly

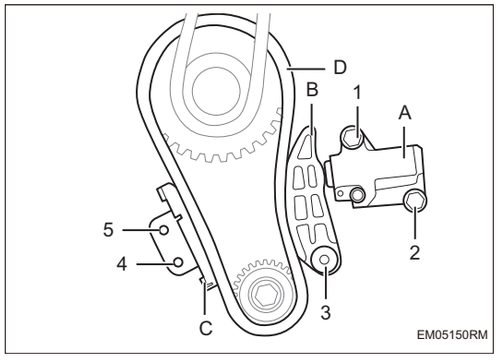


(a) Use the bolt -1- to install the drive sprocket-A- and balance shaft brake lining-B-. Do not tighten the bolt -1- temporarily.
Final torque: 28 ~ 32 N · m

Caution:

When installing the balance shaft sprocket, match the plane of the balance shaft on the balance shaft sprocket.

Place the friction shim in the balance shaft sprocket, and align the hole in the middle of the shim with the hole on the sprocket.



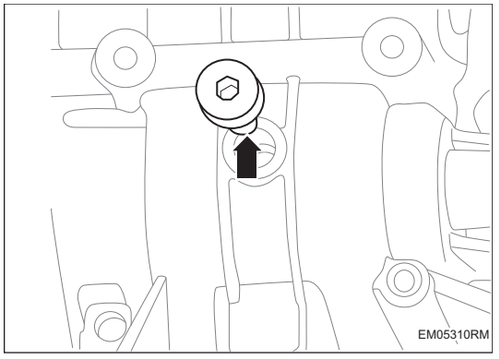
(b) Hang balance shaft drive chain assembly -D-. When hanging the chain, note that the colored chain links on the chain correspond to the marked points on the crankshaft sprocket (single point) and balance shaft sprocket (double points) respectively.

(c) Use screw -4-5- to install balance shaft drive chain guide assembly-C-.
Torque: 7 ~ 11 N·m

(d) Install balance shaft drive chain tensioner arm assembly -B- with bolt -3-.
Torque: 9 ~ 11 N·m

(e) Use bolt -1-2- to install balance shaft drive chain tensioner assembly-A-.
Torque: 7 ~ 11 N·m

(f) Remove the balance shaft timing plug -1-.

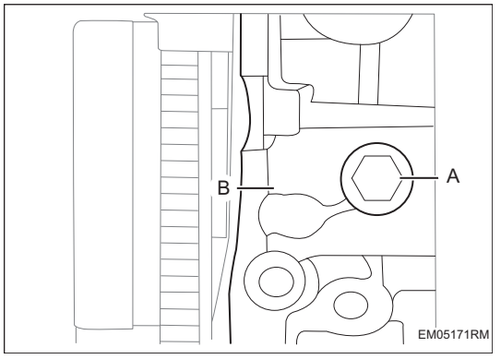


23. Install OCV control valve, intake/exhaust VCT cam sprocket assembly

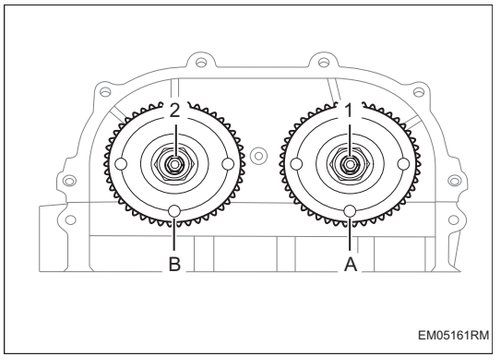
(a) Install SST (39 GC110085 C) -A- on cylinder head cover -B- and fix the intake camshaft.

Hint:

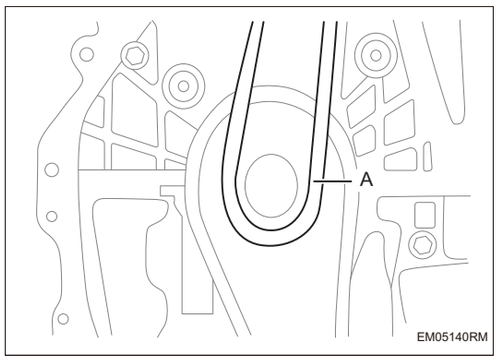
The exhaust camshaft SST (39 GC110085 C) -A- shall be installed in the same way as the intake camshaft.



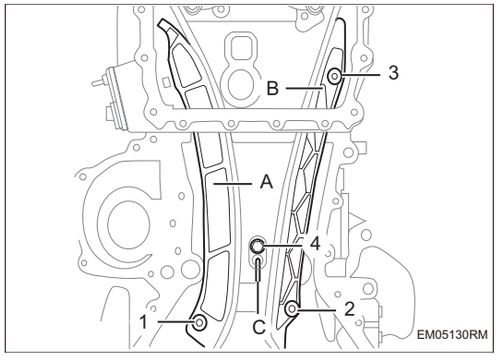
(b) Use the OCV -1-2- to install the intake and exhaust VCT cam sprockets -A-B- without tightening them temporarily.
Final torque: 50 N·m+30°



24. Install camshaft timing chain system



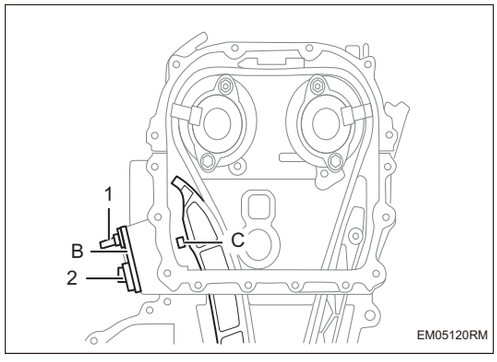
(a) Install the timing chain assembly -A-.



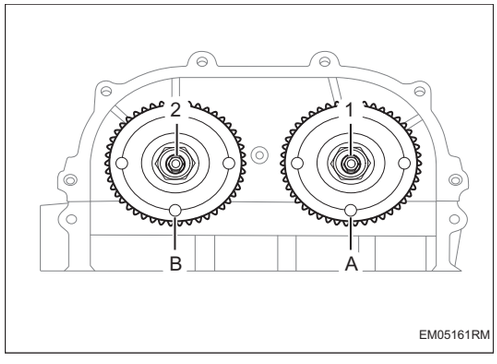
(b) Use bolt -4- to install chain lubrication nozzle assembly -C-.
Torque: 8 ~ 12 N · m

(c) Use bolt -2-3- to install camshaft drive chain guide assembly -2-3-.
Torque: 18 ~ 22 N·m

(d) Use bolt -1- to install camshaft drive chain tensioner arm-A-.
Torque: 18 ~ 22 N·m



(e) Use bolt -1-2- to install camshaft chain tensioner shim-B- and tensioner-C-.
Torque: 8 ~ 12 N · m



(f) Tighten the OCV -1-2- and the exhaust VCT cam sprocket -A-B-.
Torque: 50 N · m +30 °

(g) Remove the crankshaft timing tool SST (39GC110110C) and the camshaft timing tool SST (39GC110085C), and install the bolt. **Crankshaft timing adjustment bolt. Torque: 18~22 N · m camshaft oil passage blockage bolt. Torque: 18~22 N · m**

25. (Table A) seat hole, bearing shell, main journal assembly relations:

Grouping of main bearing holes in cylinder block	Grouping of upper main bearing shell	Crankshaft main bearing journal grouping	Grouping of lower main bearing shell	Minimum gap (mm)	Maximum gap (mm)
1	2	1	2	0.013	0.037
1	3	2	2	0.013	0.037
1	3	3	3	0.013	0.037
2	2	1	1	0.013	0.037
2	2	2	2	0.013	0.037
2	2	3	3	0.013	0.037
3	1	1	1	0.013	0.037
3	1	2	2	0.013	0.037
3	2	3	3	0.013	0.037
Note: The amount of expansion is not taken into account in the gap					
Minimum hole + maximum journal = using thinnest shell					
Maximum hole + minimum journal = using thickest shell					

26. (Table B) Connecting rod big end hole, bearing shell, connecting rod journal assembly relations:

Grouping of connecting rod big end hole	Grouping of connecting rod upper bearing shell	Crankshaft connecting rod journal grouping	Grouping of connecting rod lower bearing shell	Minimum gap (mm)	Maximum gap (mm)
A	1 (Red)	A	1 (Red)	0.022	0.044
A	1 (Red)	B	2 (blue)	0.022	0.044
A	2 (blue)	C	2 (blue)	0.022	0.044
B	2 (blue)	A	1 (Red)	0.020	0.042
B	2 (blue)	B	2 (blue)	0.020	0.042
B	2 (blue)	C	3 (yellow)	0.020	0.042
C	2 (blue)	A	2 (blue)	0.018	0.040
C	3 (yellow)	B	2 (blue)	0.018	0.040
C	3 (yellow)	C	3 (yellow)	0.018	0.040

Note: gap does not consider expansion A = 1 B = 2 C = 3 Minimum hole + maximum journal = using thinnest shell Maximum hole + minimum journal = using thickest shell

27. Tighten torque table of engine main parts:

Note: gap does not consider expansion A = 1 B = 2 C = 3 Minimum hole + maximum journal = using thinnest shell Maximum hole + minimum journal = using thickest shell

S/N	Name	Quantity	Specification	Tightening torque (N.m)	Torque monitoring range
1	Suspension bolt	3	M12	10±2 (pre-tightening)	8 ~ 12
2	Master Bearing bolt	10	M10X1.5	(40±2) N·m+(90°± 2°30′)	60 ~ 110
3	Frame and cylinder block outboard connecting bolt	15	M8	20±2	18 ~ 22
4	Chain chamber upper cover	6+6	M6	10±2	8 ~ 12
		4	M10	50±3	47 ~ 53
5	Chain chamber lower cover	13	M6	10±2	8 ~ 12
		1	M10	50±3	47 ~ 53
		4	M8	20±2	18 ~ 22
6	Cylinder head bolt	10	M10	(40±2)N•m+ (180°±4°)	75 ~ 110
7	Valve chamber cover bolt	20	M6	(8±1)N•m+ (90°±5°)	14 ~ 26
8	Connecting rod bolt	8	M8×1	(20±3)N•m+ (90°±5°)	36 ~ 55
9	Piston cooling nozzle	8	M10	22±3	19 ~ 25
10	Flywheel bolt	6	M12×1	(60±4) N·m+(60°±3°)	145 ~ 220
11	Crankshaft pulley bolt	1	M14×1.5	(150±4) N•m+(90°±3°)	201 ~ 365
12	Intake manifold bracket	4	M6	10±2	8 ~ 12
13	Intake manifold and cylinder head connecting bolt	7	M8	20±2	18 ~ 22
14	Intake side rear cover	2	M6	0±2	8 ~ 12
15	Rear cover plate on exhaust side	2	M6	10±2	8 ~ 12
16	Oil sump bolt	13	M8	20±2	18 ~ 22
		4	M6	20±2	18 ~ 22
		4	M6	10±2	8 ~ 12

17	Drain plug assembly	1	M14×1.5	35±5	30 ~ 40
18	Oil collector	1	M6	10±2	8 ~ 12
19	Oil pump assembly	5	M8	20±2	18 ~ 22
20	Piston cooling nozzle solenoid valve	1	M6	10±2	8 ~ 12
21	Oil filter connector	1	3/4-VNF	35±5	30 ~ 40
22	Oil filter assembly	1	3/4-VNF	15 ~ 18	15 ~ 18
23	Oil cooler fixing bolt	5	M6	10±2	8 ~ 12
24	Oil-mist separator assembly	11	M6	10±2	8 ~ 12
25	Variable displacement oil pump solenoid valve assembly	1	M6	10±2	8 ~ 12
26	Balance shaft long bolt	2	M8	25±2	23 ~ 27
27	Balance shaft short bolt	6	M8	25±2	23 ~ 27
28	Automatic tensioner assembly	1	M10	50±2	48 ~ 52
29	VCT and intake and exhaust camshaft sprocket assembly	2	M22×1	(50±4)N•m +(30°±2°)	140 ~ 200
30	Balance shaft front end bolt	1	M8	30±2	28 ~ 32
31	Balance shaft drive chain guide	2	M6	9±2	7 ~ 11
32	Balance shaft chain tensioner assembly	2	M6	9±2	7 ~ 11
33	Balance shaft drive chain tensioner arm assembly	1	M6	10±1	9 ~ 11
34	Camshaft drive chain tensioner arm assembly	1	M8	20±2	18 ~ 22
35	Camshaft drive chain guide assembly	2	M8	20±2	20 ~ 30
36	Chain tensioner assembly	2	M6	10±2	8 ~ 12
37	Chain lubrication nozzle assembly	1	M6	10±2	8 ~ 12

38	Solenoid valve assembly	2	M6	10±2	8 ~ 12
39	Turbocharger assembly stud	4	M10	17±2	15 ~ 19
40	Turbocharger assembly nut	4	M10	45±5	40 ~ 50
41	Turbocharger water inlet/ return pipe assembly	1	M6	10±2	8 ~ 12
42	Turbocharger oil inlet pipe bolt	2	M6	10±2	8 ~ 12
43	Turbocharger oil return pipe assembly nut	3	M6	10±2	8 ~ 12
44	Turbocharger heat shield	3	M6	10±2	8 ~ 12
45	Turbocharger oil inlet pipe assembly	1	M6	10±2	8 ~ 12
46	Turbocharger check valve assembly	1	M6	10±2	8 ~ 12
47	Fuel injection pump assembly	2	M8	20±2	18 ~ 22
48	High-pressure fuel rail assembly	4	M8	25±2	23 ~ 27
49	High-pressure fuel pipe assembly	2	M14	30±3	27 ~ 33
50	Additional coolant pump inlet pipe seat	2	M6	10±2	8 ~ 12
51	Engine water inlet pipe	2	M6	10±2	8 ~ 12
52	Oil cooler water outlet pipe assembly	2	M6	10±2	8 ~ 12
53	Exhaust manifold bleeder joint assembly	1	M6	10±2	8 ~ 12
54	Thermal management module	5	M6	10±2	8 ~ 12
55	Coolant pump assembly	5	M6	10±2	8 ~ 12
56	Coolant pump pulley	3	M8	20±2	18 ~ 22
57	Additional coolant pump	2	M6	10±2	8 ~ 12
58	Additional coolant pump bracket assembly	2	M6	10±2	8 ~ 12

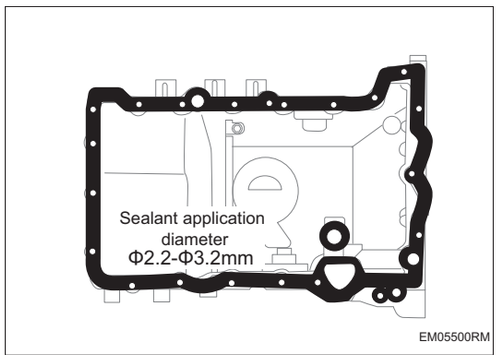
59	Coolant temperature sensor assembly	1	M12×1.5	18±2	16 ~ 20
60	MAP/IAT sensor	1	M5	3.5±0.5	3 ~ 4
61	Crankshaft position sensor assembly	1	M5	4.5±0.5	4 ~ 5
62	Crankshaft position sensor bracket	3	M6	10±2	8 ~ 12
63	Camshaft position sensor assembly	1	M6	10±2	8 ~ 12
64	Knock sensor assembly	1	M8	20±2	18 ~ 22
65	Rail pressure sensor assembly	1	M10×1	32.5±2.5	30 ~ 35
66	Electronic throttle body assembly	4	M6	10±2	8 ~ 12
67	Ignition coil assembly	4	M6	10±2	8 ~ 12
68	Spark plug assembly	4	M12×1.25	23±2	21 ~ 25
69	Oil pressure and temperature sensor assembly	1	M14×1.5	11±2	9 ~ 13
70	Alternator assembly	4	M10	45±5	40 ~ 55
71	Cold air compressor assembly	4	M8	20±2	18 ~ 26

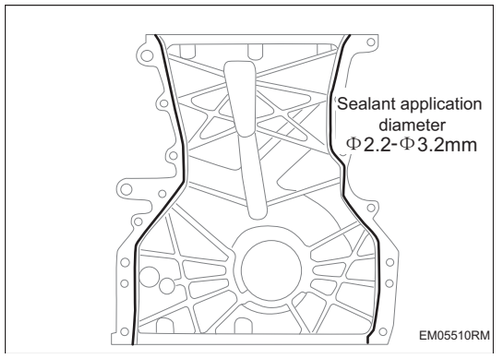
28. Engine sealant application parts and sealant models:

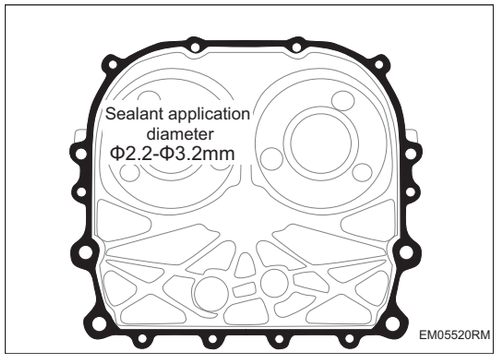
S/N	Name of application part	Medium	Model	Assembly requirements
1	Sealant around the oil sump (sealant around the inside of the thread hole)	ThreeBond silicone sealant	1217G	Assemble within 10 minutes after sealant application and tighten within 5 minutes thereafter

2	Piston cooling nozzle thread (4), chain nozzle thread (1), flywheel bolt (6 pcs, which may not be coated when precoated during supply)	ThreeBond anaerobic adhesive		Assemble within 10 minutes after sealant application and tighten within 5 minutes thereafter
3	Excircle of bowl plug mating surface and outer circumference of outlet pipe mating surface of bypass water pipe	Loctite anaerobic adhesive	Loctite 11747	Assemble within 10 minutes after sealant application and tighten within 5 minutes thereafter
4	Front end of cylinder head gasket	ThreeBond silicone sealant	1217G	Assemble within 10 minutes after sealant application and tighten within 5 minutes thereafter
5	Front cover sealant	ThreeBond silicone sealant	1217G	Assemble within 10 minutes after sealant application and tighten within 5 minutes thereafter
6	Two points at the joint between the cylinder head and the front cover	ThreeBond silicone sealant	1217G	Assemble within 10 minutes after sealant application and tighten within 5 minutes thereafter
7	Camshaft	Hypoid gear oil	5W-30	Oil application is required during assembly
8	Coolant pump O-ring	Additive		Lubrication is required during assembly
9	Hose assembly-small circulation/hose-PCV valve to intake pipe	Additive		Lubrication is required during assembly

10	Vacuum pipe	Additive		Lubrication is required during assembly
11	Cylinder bore, crankshaft journal, inner surface of crankshaft upper bearing shell, inner surface of connecting rod bearing shell, valve (up to 40-65 mm from the rod tail), periphery and top of cylinder head valve shim, sealing surface of crankshaft pulley assembly, camshaft position sensor (O-ring), fuel injection nozzle (O-ring), absolute air (O-ring), oil filter assembly (O-ring), piston ring and skirt, crankshaft connecting rod journal, crankshaft rear oil seal journal, main bearing shell cover bolt and shell cover mating face.	Special oil for turbocharged gasoline engine	5W-30	Oil application is required during assembly
12	For cleaning the oil sump sealant application surface, upper cover sealant application surface, cylinder block bottom plane, camshaft journal and other parts	Detergent	ThreeBond 6602T	Glued surface degreasing







29. List of engine parts with limitation on number of use times:

S/N	Part name	Requirements for use	Remarks
1	Connecting rod bolt	It is allowed to be used twice for machining, and twice for assembly.	
2	Front oil seal assembly	Reuse is not allowed	The sealing lip is easy to be damaged after removal, affecting the tightness
3	Rear oil seal assembly	Reuse is not allowed	The sealing lip is easy to be damaged after removal, affecting the tightness

4	Crankshaft pulley bolt	Allowed to be used twice	
5	Flywheel bolt	Reuse is not allowed	The bolt is coated with sealant, and the sealant fails after one use.
6	Target wheel	Reuse is not allowed	
7	High-pressure fuel pipe assembly	Reuse is not allowed	The ball joints at both ends of the high-pressure fuel pipe and the conical surface of the butt joint, form a sealing strip through extrusion deformation after tightening, and fail after removal.
8	Turbocharger gasket	Reuse is not allowed	Shim protrudes from the sealing rib, and the sealing rib fails after removal
9	Cylinder head gasket assembly	Reuse is not allowed	Cylinder head gasket assembly have varying pressure wave height after assembly, and repeated use has an impact on the pressure wave sealing ability.
10	Cylinder head bolt	Allowed to be used twice	It should be tightened according to the tightening process specified in the installation and adjustment manual, and it is allowed to be used twice.
11	Intake valve guide oil seal assembly	Reuse is not allowed	The sealing lip is easy to be damaged after removal, affecting the tightness
12	Exhaust valve guide oil seal assembly	Reuse is not allowed	The sealing lip is easy to be damaged after removal, affecting the tightness

13	OCV assembly	Allowed to be installed three times	
14	Intake camshaft assembly	Allowed to be installed three times	The camshaft phase fixing slot will be deformed after assembly, which will affect the cam phase deviation after assembly
15	Exhaust camshaft assembly	Allowed to be installed three times	The camshaft phase fixing slot will be deformed after assembly, which will affect the cam phase deviation after assembly
16	Main bearing cap bolt	Allowed to be used twice	
17	Coolant pump assembly	Only allowed to be used twice	The sealing strip is easy to be damaged after removal, affecting the tightness
18	Gasket	Only allowed to be used twice	After removal, the bulge is easy to be flattened, affecting the tightness
Note 1: Once the expansion plug, bowl plug, locating ring and cylindrical pin are disassembled, they cannot be used again. 2: Special tools are required for piston ring removal. Otherwise piston rings cannot be reused after removal.			

EMS (1.5T)

ECM ES-1
ECU terminal ES-1
DTC chart ES-4
P053A00 ..... ES-21
P053B00 ..... ES-21
P053C00 ..... ES-21
P258A00 ..... ES-25
P258D00 ..... ES-25
P258C00 ..... ES-25
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P261C00 ..... ES-53
P261A00 ..... ES-53

ECM assembly ES-54

Parts ES-54
Removal ES-56

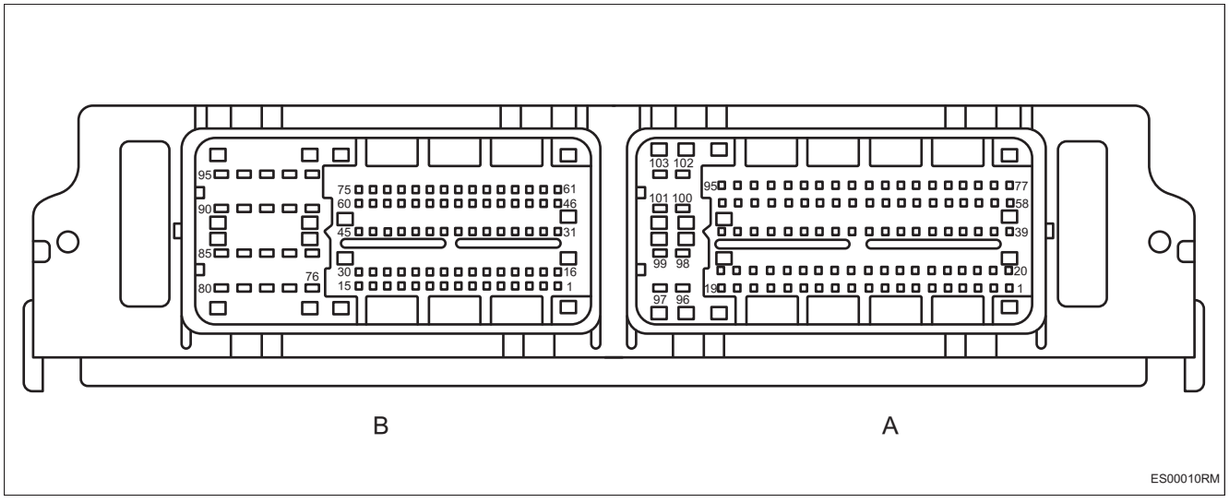
Camshaft position sensor ES-57

Parts ES-57

Removal ES-59
Upstream oxygen sensor assembly ES-60
Parts ES-60
Removal ES-62
Downstream oxygen sensor ES-63
Parts ES-63
Removal ES-64
Electric accelerator pedal ES-65
Parts ES-65
Removal ES-66
Electronic throttle body assembly ES-67
Parts ES-67
Removal ES-69
Solenoid valve assembly ES-70
Parts ES-70
Removal ES-71
MAP/IAT sensor assembly ES-72
Parts ES-72
Removal ES-73
Knock sensor ES-74
Parts ES-74
Removal ES-75
Installation ES-75
Crankshaft position sensor ES-76
Parts ES-76
Removal ES-77
Installation ES-77

ECM

ECU terminal



ECM A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Starter control LSD	53	—
2	Electronic vacuum pump	54	—
3	—	55	Brake lamp switch
4	Electronic canister pump	56	Brake switch
5	Starter control HSD	57	Starter status feedback signal
6	Main relay coil	58	Electronic canister purge valve heater
7	—	59	Variable displacement oil pump
8	Downstream oxygen sensor	60	—
9	Analog sensor ground	61	Downstream oxygen sensor heating
10	Analog sensor ground 6	62	Upstream oxygen sensor heating
11	G.R. SENANA7 (crankcase ventilation diagnosis conduit)	63	B+
12	—	64	Powertrain CAN_L
13	Accelerator pedal position sensor 1 power supply	65	Powertrain CAN_H
14	Sensor 5V power supply	66	Upstream oxygen sensor
15	Accelerator pedal position sensor 2	67	Upstream oxygen sensor VN
16	Accelerator pedal position sensor 2 power supply	68	—
17	—	69	—
18	—	70	—
19	—	71	—
20	Electronic canister purge valve	72	—
21	Turbocharged electronic coolant pump relay	73	—

ECM A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
22	PCV heater	74	—
23	Piston cooling nozzle control valve	75	—
24	—	76	—
25	Relief control valve	77	—
26	Low-pressure fuel pump relay	78	—
27	Brake vacuum sensor	79	—
28	Downstream oxygen sensor ground	80	—
29	Accelerator pedal position sensor 2 ground	81	—
30	—	82	—
31	Accelerator pedal position sensor 1	83	—
32	—	84	—
33	—	85	—
34	—	86	—
35	I.A.PCV1 (crankcase ventilation diagnosis conduit)	87	—
36	—	88	—
37	—	89	—
38	—	90	—
39	PWM fan	91	—
40	VVT valve (exhaust)	92	—
41	VVT valve (intake)	93	—
42	Canister control valve	94	—
43	—	95	—
44	—	96	ECU ground 4
45	—	97	ECU ground 2
46	IG1	98	ECU ground 3
47	—	99	ECU ground 1
48	Upstream oxygen sensor IP	100	Main relay power supply 1
49	Upstream oxygen sensor VM	101	Main relay power supply 2
50	—	102	Main relay power supply 3
51	Accelerator pedal position sensor 1 ground	103	Main relay power supply 4
52	Radiator coolant temperature sensor	—	—

ECM B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Sensor power supply (5 V)	49	—
2	Sensor power supply (5 V)	50	—
3	Sensor power supply	51	—

ECM B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
4	Digital sensor ground	52	—
5	—	53	—
6	Analog sensor ground	54	Electric actuator position signal
7	Analog sensor ground	55	—
8	Analog sensor ground	56	Airbag impact
9	Analog sensor ground	57	Engine speed sensor signal
10	Exhaust CMP sensor ground	58	—
11	Intake CMP sensor ground	59	—
12	2# cylinder ignition	60	—
13	4# cylinder ignition	61	—
14	1# cylinder ignition	62	—
15	3# cylinder ignition	63	—
16	Sensor power supply (5 V)	64	—
17	Sensor power supply (5 V)	65	—
18	Speed sensor power supply	66	—
19	—	67	—
20	Speed sensor ground	68	—
21	—	69	—
22	Engine coolant temperature sensor signal	70	—
23	Oil pressure sensor	71	—
24	—	72	—
25	—	73	—
26	High-load desorption pressure sensor	74	—
27	Charge air pressure sensor signal	75	—
28	MAP sensor signal	76	4# cylinder fuel injector+
29	Charge air temperature sensor signal	77	4# cylinder fuel injector-
30	Intake CMP sensor signal	78	1# cylinder fuel injector-
31	—	79	3# cylinder fuel injector+
32	Oil temperature sensor	80	2# cylinder fuel injector+
33	—	81	Electric actuator control-
34	Electronic throttle feedback signal 2	82	Electric actuator control +
35	—	83	1# cylinder fuel injector+
36	Rail pressure sensor signal	84	3# cylinder fuel injector-
37	EYM position feedback signal	85	2# cylinder fuel injector-
38	IAT sensor signal	86	Electronic throttle control-
39	—	87	EYM actuator +
40	Electronic throttle feedback signal 1	88	—

ECM B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
41	—	89	—
42	—	90	Fuel pressure control valve -
43	—	91	Electronic throttle control +
44	—	92	EYM actuator-
45	Exhaust CMP sensor signal	93	—
46	Knock sensor +	94	—
47	Knock sensor -	95	Fuel pressure control valve +
48	—	—	—

DTC chart

DTC	Description	Reference page
P000A00	Intake VVT operation fault (retarded)	(See page ES-53)
P003C00	Intake VVT operation fault (stuck)	(See page ES-53)
P001000	Intake VVT control circuit open	(See page ES-53)
P001676	Crankshaft-Intake camshaft initial installation position implausible (Bank1)	(See page ES-53)
P001678	Excessive relative position deviation between crankshaft and intake camshaft (Bank1)	(See page ES-53)
P208800	Intake VVT control circuit undervoltage	(See page ES-53)
P208900	Intake VVT control circuit overvoltage	(See page ES-53)
P001100	Intake camshaft locking position operation implausible	(See page ES-53)
P000B00	Exhaust VVT operation fault (retarded)	(See page ES-53)
P005A00	Exhaust VVT operation fault (stuck)	(See page ES-53)
P001300	Exhaust VVT control circuit open	(See page ES-53)
P001776	Crankshaft-exhaust camshaft initial installation position implausible (Bank1)	(See page ES-53)
P001778	Excessive relative position deviation between crankshaft and exhaust camshaft (Bank1)	(See page ES-53)
P209000	Exhaust VVT control circuit undervoltage	(See page ES-53)
P209100	Exhaust VVT control circuit overvoltage	(See page ES-53)
P001400	Exhaust camshaft locking position operation implausible	(See page ES-53)
P003000	Upstream oxygen sensor heater control circuit open	(See page ES-53)
P003100	Upstream oxygen sensor heater control circuit undervoltage	(See page ES-53)
P003200	Upstream oxygen sensor heater control circuit overvoltage	(See page ES-53)
P003600	Downstream oxygen sensor heater control circuit open	(See page ES-53)

DTC	Description	Reference page
P003700	Downstream oxygen sensor heater control circuit undervoltage	(See page ES-53)
P003800	Downstream oxygen sensor heater control circuit overvoltage	(See page ES-53)
P003A22	Turbocharger electronic wastegate initial zero self-learning above upper limit	(See page ES-53)
P003A21	Turbocharger electronic wastegate initial zero self-learning below lower limit	(See page ES-53)
P003A72	Turbocharger electronic wastegate zero self-learning above upper limit	(See page ES-53)
P003A73	Turbocharger electronic wastegate zero self-learning below lower limit	(See page ES-53)
P024477	Deviation between turbocharger electronic wastegate target position and actual position out of limit	(See page ES-53)
P024437	Turbocharger electronic wastegate duty cycle out of limit	(See page ES-53)
P256400	Turbocharger electronic wastegate position sensor undervoltage	(See page ES-53)
P256500	Turbocharger electronic wastegate position sensor overvoltage	(See page ES-53)
P170300	Turbocharger wastegate control circuit communication failure	(See page ES-53)
P024300	Turbocharger wastegate control circuit open	(See page ES-53)
P024600	Turbocharger wastegate control circuit overvoltage or undervoltage	(See page ES-53)
P005300	Upstream oxygen sensor heater circuit fault	(See page ES-53)
P005400	Downstream oxygen sensor heater internal resistance implausible	(See page ES-53)
P008700	High-pressure fuel rail pressure low	(See page ES-53)
P008800	High-pressure fuel rail pressure high	(See page ES-53)
P008985	Too large PID control deviation of high-pressure fuel supply pressure	(See page ES-53)
P008984	Too small PID control deviation of high-pressure fuel supply pressure	(See page ES-53)
P009000	Flow control valve high side control circuit high side and low side circuits shorted to each other	(See page ES-53)
P025100	Flow control valve high or low side control circuit open	(See page ES-53)
P025400	Flow control valve high side control circuit overvoltage or undervoltage	(See page ES-53)
P025900	Flow control valve low side control circuit overvoltage or undervoltage	(See page ES-53)
P00C600	High-voltage start failure	(See page ES-53)
P01062A	Abnormal signal value without fluctuation of MAP sensor	(See page ES-53)
P010622	MAP sensor pressure implausibly higher than model pressure	(See page ES-53)

DTC	Description	Reference page
P010621	MAP sensor pressure implausibly lower than model pressure	(See page ES-53)
P120000	MAP sensor pressure above upper limit	(See page ES-53)
P120100	MAP sensor pressure below lower limit	(See page ES-53)
P00C721	MAP sensor signal pressure value too low during start	(See page ES-53)
P00C722	MAP sensor signal pressure value too high during start	(See page ES-53)
P010700	MAP sensor circuit shorted to ground	(See page ES-53)
P010800	MAP sensor circuit shorted to power supply fault	(See page ES-53)
P011126	IAT sensor 1 signal implausible (sticky)	(See page ES-53)
P011200	IAT sensor 1 circuit undervoltage	(See page ES-53)
P011300	IAT sensor 1 circuit overvoltage	(See page ES-53)
P011400	IAT sensor 1 circuit voltage implausible	(See page ES-53)
P00CE24	Air temperature sensor 1 cold start check implausible (positive deviation)	(See page ES-53)
P00CE23	IAT sensor 1 cold start check implausible (negative deviation)	(See page ES-53)
P012300	Electronic throttle position sensor 1 signal circuit overvoltage	(See page ES-53)
P012200	Electronic throttle position sensor 1 signal circuit undervoltage	(See page ES-53)
P012100	Electronic throttle position sensor 1 signal implausible	(See page ES-53)
P022300	Electronic throttle position sensor 2 signal circuit overvoltage	(See page ES-53)
P022200	Electronic throttle position sensor 2 signal circuit undervoltage	(See page ES-53)
P022100	Electronic throttle position sensor 2 signal implausible	(See page ES-53)
P012800	Thermostat performance implausible (water temperature failing to reach nominal opening temperature of thermostat)	(See page ES-53)
P013300	Upstream oxygen sensor aging	(See page ES-53)
P013A00	Downstream oxygen sensor rich-lean response slow	(See page ES-53)
P219500	LSU oxygen sensor characteristic deviation (biased lean)	(See page ES-53)
P219600	LSU oxygen sensor characteristic deviation (biased rich)	(See page ES-53)
P209700	Closed-loop correction value based on downstream oxygen sensor above upper limit - biased rich	(See page ES-53)
P209600	Closed-loop correction value based on downstream oxygen sensor below lower limit -biased lean	(See page ES-53)
P013800	Downstream oxygen sensor signal line shorted to power supply	(See page ES-53)

DTC	Description	Reference page
P013700	Downstream oxygen sensor signal line shorted to ground	(See page ES-53)
P013600	Downstream oxygen sensor signal circuit open	(See page ES-53)
P017F00	DMTL air cleaner flow resistance high	(See page ES-53)
P128000	DMTL pump current frequency high	(See page ES-53)
P128100	DMTL pump current frequency low	(See page ES-53)
P043E00	EVAP system leakage diagnosis DMTL reference pump current high	(See page ES-53)
P043F00	EVAP system leakage diagnosis DMTL reference pump current relatively low	(See page ES-53)
P24C100	DMTL pump idle current high	(See page ES-53)
P240700	DMTL pump current fluctuation out of plausible range (caused by humidity)	(See page ES-53)
P044200	EVAP system 1.0mm leakage	(See page ES-53)
P019800	Oil temperature sensor circuit overvoltage	(See page ES-53)
P019700	Oil temperature sensor circuit undervoltage	(See page ES-53)
P019664	Oil temperature sensor signal implausible (high side)	(See page ES-53)
P019629	Oil temperature sensor signal implausible (low side)	(See page ES-53)
P121800	Oil temperature sensor signal above upper limit	(See page ES-53)
P052300	High oil pressure sensor circuit voltage/duty cycle	(See page ES-53)
P052200	Low oil pressure sensor circuit voltage/duty cycle	(See page ES-53)
P021900	High engine speed	(See page ES-53)
P023400	Turbocharger charge air pressure display high	(See page ES-53)
P029900	Turbocharger charge air pressure display low	(See page ES-53)
P023700	Charge air pressure sensor circuit shorted to ground	(See page ES-53)
P023800	Charge air pressure sensor circuit shorted to power supply	(See page ES-53)
P138024	IAT sensor 2 cold start check implausible (positive deviation)	(See page ES-53)
P138023	IAT sensor 2 cold start check implausible (negative deviation)	(See page ES-53)
P009800	IAT sensor 2 circuit overvoltage	(See page ES-53)
P009700	IAT sensor 2 circuit undervoltage	(See page ES-53)
P009900	IAT sensor 2 circuit voltage implausible	(See page ES-53)
P009626	IAT sensor 2 signal implausible (sticky)	(See page ES-53)
P020100	1# cylinder fuel injector control circuit open	(See page ES-53)
P026200	1# cylinder fuel injector low side control circuit overvoltage or undervoltage	(See page ES-53)

DTC	Description	Reference page
P02EE00	1# cylinder fuel injector high side and low side control circuits shorted to each other	(See page ES-53)
P02CD00	1# cylinder CVO self-learning adjustment up to upper limit	(See page ES-53)
P02CC00	1# cylinder CVO self-learning adjustment up to lower limit	(See page ES-53)
P126100	1# cylinder CVO circuit signal implausible	(See page ES-53)
P020200	2# cylinder fuel injector control circuit open	(See page ES-53)
P026500	2# cylinder fuel injector low side control circuit overvoltage or undervoltage	(See page ES-53)
P02EF00	2# cylinder fuel injector high side and low side control circuits shorted to each other	(See page ES-53)
P02CF00	#2 Cylinder CVO self-learning adjustment at upper limit	(See page ES-53)
P02CE00	2# cylinder CVO self-learning adjustment at lower limit	(See page ES-53)
P126200	2# cylinder CVO circuit signal implausible	(See page ES-53)
P020300	3# cylinder fuel injector control circuit open	(See page ES-53)
P026800	3# cylinder fuel injector low side control circuit overvoltage or undervoltage	(See page ES-53)
P02F000	3# cylinder fuel injector high side and low side control circuits shorted to each other	(See page ES-53)
P02D100	3# cylinder CVO self-learning adjustment at upper limit	(See page ES-53)
P02D000	4# cylinder CVO self-learning adjustment at lower limit	(See page ES-53)
P126300	3# cylinder CVO circuit signal implausible	(See page ES-53)
P020400	4# cylinder fuel injector control circuit open	(See page ES-53)
P027100	4# cylinder fuel injector low side control circuit overvoltage or undervoltage	(See page ES-53)
P02F100	4# cylinder fuel injector high side and low side control circuits shorted to each other	(See page ES-53)
P02D300	4# cylinder CVO self-learning adjustment at upper limit	(See page ES-53)
P02D200	4# cylinder CVO self-learning adjustment at lower limit	(See page ES-53)
P126400	4# cylinder CVO circuit signal implausible	(See page ES-53)
P030000	Engine random or multi-cylinder misfire	(See page ES-53)
P030100	1# Cylinder misfire detected	(See page ES-53)
P030200	2# Cylinder misfire detected	(See page ES-53)
P030300	3# Cylinder misfire detected	(See page ES-53)
P030400	4# cylinder misfire detected	(See page ES-53)
P036300	Engine misfire triggering fuel cutoff	(See page ES-53)
P032700	Knock sensor A end shorted to ground	(See page ES-53)
P032714	Knock sensor B end shorted to ground	(See page ES-53)

DTC	Description	Reference page
P032800	Knock sensor A end shorted to power supply	(See page ES-53)
P032815	Knock sensor B end shorted to power supply	(See page ES-53)
P032500	Knock sensor signal circuit undervoltage	(See page ES-53)
P151000	Knock sensor signal evaluation and diagnosis	(See page ES-53)
P032600	Knock sensor signal circuit overvoltage	(See page ES-53)
P033900	Speed sensor signal Implausible	(See page ES-53)
P261700	Speed sensor signal lost	(See page ES-53)
P033664	Crankshaft sensor pulse width signal implausible	(See page ES-53)
P034A00	Crankshaft position sensor –crankshaft starting position incorrect (stop position implausible)	(See page ES-53)
P034B00	Crankshaft position sensor -crankshaft rotation direction incorrect (reverse signal implausible)	(See page ES-53)
P034100	Intake camshaft sensor signal Implausible (Bank1)	(See page ES-53)
P034200	Intake camshaft sensor signal circuit shorted to ground (Bank1)	(See page ES-53)
P034300	Intake camshaft sensor signal circuit shorted to power supply (Bank1)	(See page ES-53)
P035100	1# cylinder ignition coil control circuit open	(See page ES-53)
P230000	1# cylinder ignition coil control circuit undervoltage	(See page ES-53)
P230100	1# cylinder ignition coil control circuit overvoltage	(See page ES-53)
P035200	2# cylinder ignition coil control circuit open	(See page ES-53)
P230300	2# cylinder ignition coil control circuit undervoltage	(See page ES-53)
P230400	2# cylinder ignition coil control circuit overvoltage	(See page ES-53)
P035300	3# cylinder ignition coil control circuit open	(See page ES-53)
P230600	3# cylinder ignition coil control circuit undervoltage	(See page ES-53)
P230700	3# cylinder ignition coil control circuit overvoltage	(See page ES-53)
P035400	4# cylinder ignition coil control circuit open	(See page ES-53)
P230900	4# cylinder ignition coil control circuit undervoltage	(See page ES-53)
P231000	4# cylinder ignition coil control circuit overvoltage	(See page ES-53)
P036600	Exhaust camshaft sensor signal implausible (Bank1)	(See page ES-53)
P036800	Exhaust camshaft sensor signal circuit shorted to power supply (Bank1)	(See page ES-53)

DTC	Description	Reference page
P036700	Exhaust camshaft sensor signal circuit shorted to ground (Bank1)	(See page ES-53)
P042000	TWC OSC aging	(See page ES-53)
P044400	Canister control valve control circuit open	(See page ES-53)
P045800	Canister control valve circuit undervoltage	(See page ES-53)
P045900	Canister control valve circuit overvoltage	(See page ES-53)
P049700	Canister solenoid valve stuck closed	(See page ES-53)
P046000	Fuel level sensor original signal out of range	(See page ES-53)
P25B000	Fuel level sensor signal stuck	(See page ES-53)
P128400	Fuel level signal out of range	(See page ES-53)
P046129	Fuel level signal implausible	(See page ES-53)
P046300	Fuel level sensor circuit overvoltage	(See page ES-53)
P046200	Fuel level sensor circuit undervoltage	(See page ES-53)
U067681	Fuel level sensor signal loss/failure/check error	(See page ES-53)
P046700	High-load desorption pipeline pressure sensor circuit undervoltage	(See page ES-53)
P046800	High-load desorption pipeline pressure sensor circuit overvoltage	(See page ES-53)
P128500	High-load desorption pipeline pressure sensor signal above upper threshold	(See page ES-53)
P128600	High-load desorption pipeline pressure sensor signal below lower threshold	(See page ES-53)
P048371	Cooling fan plausibility fault type 1	(See page ES-53)
P048372	Cooling fan plausibility fault type 2	(See page ES-53)
P048000	Cooling fan 1 control circuit open	(See page ES-53)
P069200	Cooling fan 1 control circuit overvoltage	(See page ES-53)
P069100	Cooling fan 1 control circuit undervoltage	(See page ES-53)
P063400	Cooling fan 1 driver chip overheating	(See page ES-53)
P04F000	High-load desorption pipeline fault - canister valve fault	(See page ES-53)
P050B00	Ignition angle efficiency monitoring during catalytic converter heating (idle speed)	(See page ES-53)
P050B20	Ignition angle efficiency monitoring during catalytic converter heating (partial load)	(See page ES-53)
P053F22	High-pressure fuel passage pressure high during catalytic converter heating	(See page ES-53)
P053F21	High-pressure fuel passage pressure low during catalytic converter heating	(See page ES-53)
P050A22	High engine idle speed during catalytic converter heating	(See page ES-53)
P050A21	Low engine idle speed during catalytic converter heating	(See page ES-53)
P050D00	Parking idle speed fluctuation out of range during catalytic converter heating and without fuel cutoff	(See page ES-53)

DTC	Description	Reference page
P05EC00	Multiple injection monitoring faults during catalytic converter heating	(See page ES-53)
P050700	Engine idle speed high	(See page ES-53)
P050600	Engine idle speed low	(See page ES-53)
P050500	Engine idle speed fluctuation out of range	(See page ES-53)
P050C24	Coolant temperature sensor 1 cold start check implausible (positive deviation)	(See page ES-53)
P050C23	Coolant temperature sensor 1 cold start check implausible (negative deviation)	(See page ES-53)
P011623	Coolant temperature sensor 1 signal implausible (low side)	(See page ES-53)
P011626	Coolant temperature sensor 1 signal implausible (stuck)	(See page ES-53)
P011800	Coolant temperature sensor 1 circuit overvoltage	(See page ES-53)
P011700	Coolant temperature sensor 1 circuit undervoltage	(See page ES-53)
P011900	Coolant temperature sensor 1 circuit voltage implausible	(See page ES-53)
P051300	Incorrect immobilizer authentication response and immobilizer authentication failure	(See page ES-53)
P063300	ECM no IMMO matching	(See page ES-53)
P163100	Immobilizer authentication communication error or no response from immobilizer	(See page ES-53)
P161100	PIN input error	(See page ES-53)
P055800	Brake chamber vacuum pressure sensor overvoltage	(See page ES-53)
P055700	Brake chamber vacuum pressure sensor undervoltage	(See page ES-53)
P145200	Unreasonable brake chamber pressure	(See page ES-53)
P056300	Battery overvoltage	(See page ES-53)
P056200	Battery undervoltage	(See page ES-53)
P057100	Asynchronous brake signal	(See page ES-53)
P050400	Brake signal correlation failure	(See page ES-53)
P061A00	Second layer torque monitoring fault (torque comparison fault)	(See page ES-53)
P060D00	Second accelerator pedal signal implausible	(See page ES-53)
P152000	Load forecast monitoring fault	(See page ES-53)
P152100	Pipe monitoring fault in fuel cutoff mode	(See page ES-53)
P152200	Pipe monitoring fault in fuel supply mode	(See page ES-53)
P153900	Synchronization process plausibility check (based on speed and sync count)	(See page ES-53)
P153700	Load comparison monitoring fault	(See page ES-53)
P153500	Mixture monitoring fault	(See page ES-53)
P153600	Operating mode monitoring fault	(See page ES-53)

DTC	Description	Reference page
P062900	Fuel pump relay control circuit overvoltage	(See page ES-53)
P062800	Fuel pump relay control circuit undervoltage	(See page ES-53)
P062700	Fuel pump relay control circuit open	(See page ES-53)
P062B9A	Similar working condition path of self-learning adjustment out of limit	(See page ES-53)
P062B64	Similar working condition path of circuit signal implausible	(See page ES-53)
P062B96	ECU fault (CVO failure in all cylinders)	(See page ES-53)
P063000	VIN not written or incompatible	(See page ES-53)
P064100	5V power supply module 1 fault	(See page ES-53)
P065100	Chip 5 V power supply voltage 2 fault	(See page ES-53)
P069700	5V power supply module 3 fault	(See page ES-53)
P064D00	LSU integrated chip register writing failure	(See page ES-53)
P223700	LSU type oxygen sensor APE circuit open (near ECU end)	(See page ES-53)
P225100	Upstream oxygen sensor IPE circuit open	(See page ES-53)
P224300	Upstream oxygen sensor RE circuit open	(See page ES-53)
P013200	Upstream oxygen sensor signal circuit overvoltage (APEIPERE line circuit shorted to power supply)	(See page ES-53)
P013100	Upstream oxygen sensor signal circuit undervoltage (APEIPERE line circuit shorted to ground)	(See page ES-53)
P241400	Upstream oxygen sensor output voltage implausible	(See page ES-53)
P064D13	LSU integrated chip SPI communication failure	(See page ES-53)
P262600	Upstream oxygen sensor MES circuit open	(See page ES-53)
P223713	LSU type oxygen sensor APE circuit open	(See page ES-53)
P013000	Upstream oxygen sensor compensation resistor circuit open	(See page ES-53)
P068500	Main relay open circuit	(See page ES-53)
P068700	Main relay circuit shorted to power supply	(See page ES-53)
P068600	Main relay circuit shorted to ground	(See page ES-53)
P06869E	ECM/PCM main relay stuck or circuit shorted to ground	(See page ES-53)
P06B842	Error in reading NVMBlock	(See page ES-53)
P06B843	Error in writing NVMBlock	(See page ES-53)
P06DC00	Two-stage oil pump control circuit overvoltage	(See page ES-53)
P06DB00	Two-stage oil pump control circuit undervoltage	(See page ES-53)
P06DA00	Two-stage oil pump control circuit open	(See page ES-53)
P070000	Transmission control fault request to illuminate MIL	(See page ES-53)

DTC	Description	Reference page
P120400	Charge air pressure above upper limit	(See page ES-53)
P120500	Charge air pressure below lower limit	(See page ES-53)
P023622	Charge air pressure implausibly high	(See page ES-53)
P023621	Charge air pressure implausible, low	(See page ES-53)
P121200	Vehicle speed sensor performance failure (vehicle speed above upper limit)	(See page ES-53)
P050000	Vehicle speed sensor input signal failure	(See page ES-53)
P050165	Vehicle speed sensor performance failure (vehicle speed low during coasting with fuel off)	(See page ES-53)
P050166	Vehicle speed implausible - Low vehicle speed during high engine load	(See page ES-53)
P019000	High-pressure fuel rail pressure sensor voltage signal implausible	(See page ES-53)
P019128	Negative deviation of characteristic curve of high-pressure fuel rail pressure sensor	(See page ES-53)
P019129	Positive deviation of characteristic curve of high-pressure fuel rail pressure sensor	(See page ES-53)
P019200	High-pressure fuel rail pressure sensor circuit undervoltage	(See page ES-53)
P019300	High-pressure fuel rail pressure sensor circuit overvoltage	(See page ES-53)
P019400	High-pressure fuel rail pressure sensor signal stuck	(See page ES-53)
P127000	Rail pressure signal of high-pressure fuel rail pressure sensor above upper limit	(See page ES-53)
P139D00	TMM position sensor signal value out of range (SENT input)	(See page ES-53)
P139C00	TMM position sensor signal fault (SENT signal wire shorted to power supply)	(See page ES-53)
P139B00	TMM position sensor signal fault (SENT signal line shorted to ground)	(See page ES-53)
P139A00	TMM position sensor signal fault (communication protocol not satisfied)	(See page ES-53)
P139E00	TMM position sensor closed position self-learning out of limit	(See page ES-53)
P26CD00	TMM control circuit overvoltage or undervoltage	(See page ES-53)
P170100	TMM control circuit overcurrent	(See page ES-53)
P170200	TMM control circuit communication failure	(See page ES-53)
P26CA00	TMM control circuit open	(See page ES-53)
P138E00	TMM valve body stuck	(See page ES-53)
P142000	CAN hardware register response timeout	(See page ES-53)
P142100	LIN hardware register response timeout	(See page ES-53)
P14AE00	Starter feedback voltage signal line (KL50r) circuit shorted to power supply or R1 relay stuck	(See page ES-53)

DTC	Description	Reference page
P14AF00	Starter feedback voltage signal line (KL50r) circuit shorted to ground	(See page ES-53)
P26F200	Drive chain status relay R2 (PT State Relay) stuck closed	(See page ES-53)
P26F100	Crank relay R1 or PT state relay R2 stuck open	(See page ES-53)
P14AC00	Starter damage or starter power supply circuit interrupted	(See page ES-53)
P14AD00	Engine stalling or starter failure to mesh with flywheel	(See page ES-53)
P153800	Ignition angle signal, harness or ECU fault	(See page ES-53)
P152700	First layer safety fuel cutoff monitoring fault	(See page ES-53)
P152800	Second layer safety fuel cutoff monitoring fault	(See page ES-53)
P061C00	Second layer engine speed monitoring fault	(See page ES-53)
P152900	Starter control monitoring fault	(See page ES-53)
P153000	AD converter zero test monitoring fault	(See page ES-53)
P153100	AD converter set voltage test monitoring fault	(See page ES-53)
P157100	Drive stage check fault or communication failure in the shutdown path check	(See page ES-53)
P157200	ABE activated at normal voltage	(See page ES-53)
P157300	Monitoring error response fault	(See page ES-53)
P157400	Errorpin activated with normal monitoring communication	(See page ES-53)
P261000	Engine off timer implausible	(See page ES-53)
P157500	DVE drive cutoff due to overvoltage	(See page ES-53)
P155000	Electronic throttle self-learning condition not met	(See page ES-53)
P155100	Electronic throttle lower limit position initialization self-learning fault	(See page ES-53)
P155600	Throttle mechanical BDC re-self-learning maximum error	(See page ES-53)
P155700	Throttle mechanical BDC re-self-learning ninimum value error	(See page ES-53)
P155800	Deviation of throttle limp home position from initial self-learning value out of limit	(See page ES-53)
P155900	Throttle limp position above upper limit	(See page ES-53)
P155A00	Deviation of throttle limp home position from last self-learning value out of limit	(See page ES-53)
P155B00	Throttle limp position below lower limit	(See page ES-53)
P155400	Return spring stuck in maximum position	(See page ES-53)
P155500	Return spring stuck in minimum position	(See page ES-53)
P156100	DVE position control deviation	(See page ES-53)
P156000	Throttle body PID adjustment out of limit	(See page ES-53)
P15A000	CPU0: MPU fault (register, DSPR, PSPR)	(See page ES-53)

DTC	Description	Reference page
P15A100	CPU0: DCACHE/DSPRECC uncorrectable	(See page ES-53)
P15A200	CPU0: DCACHE/DSPR address failure	(See page ES-53)
P15A300	CPU0: DCACHE TAG SRAM ECC uncorrectable	(See page ES-53)
P15A400	CPU0: DCACHE TAG SRAM address failure	(See page ES-53)
P15A500	CPU0: PCACHE TAGRAM ECC uncorrectable	(See page ES-53)
P15A600	CPU0: PCACHE TAGRAM address failure	(See page ES-53)
P15A700	CPU0: PCACHE/PSPR ECC uncorrectable	(See page ES-53)
P15A800	CPU0: PCACHE/PSPR address failure	(See page ES-53)
P15A900	CPU1: Lockstep comparator fault	(See page ES-53)
P15AA00	CPU1: MPU fault (register, DSPR, PSPR)	(See page ES-53)
P15AB00	CPU1: DCACHE/DSPR ECC uncorrectable	(See page ES-53)
P15AC00	CPU1: DCACHE/DSPR address failure	(See page ES-53)
P15AD00	CPU1: DCACHE TAGRAM ECC uncorrectable	(See page ES-53)
P15AE00	CPU1: DCACHE TAGRAM address failure	(See page ES-53)
P15AF00	CPU1: PCACHE TAGRAM ECC uncorrectable	(See page ES-53)
P15B000	CPU1: PCACHE TAGRAM address failure	(See page ES-53)
P15B100	CPU1: PCACHE/PSPR ECC uncorrectable	(See page ES-53)
P15B200	CPU1:PCACHE/PSPR address failure	(See page ES-53)
P15B300	LMU: SRAM ECC monitoring fault	(See page ES-53)
P15B400	LMU: SRAM ECC uncorrectable	(See page ES-53)
P15B500	LMU: SRAM address failure	(See page ES-53)
P15B600	SMU: Timer0 recovery timeout	(See page ES-53)
P15B700	SMU: Timer1 recovery timeout	(See page ES-53)
P15B800	PMU: PFLASH ECC uncorrectable multiple bit faults	(See page ES-53)
P15B900	PMU: PFLASH address failure	(See page ES-53)
P15BA00	PMU: PFLASH ECC monitoring fault (covering all ECC modules)	(See page ES-53)
P15BB00	PMU: PFLASH EDC comparator failure (covering all PFLASH instances)	(See page ES-53)
P15BC00	SCU/CGU: system PLL OSC_WDT: input clock out of limit	(See page ES-53)
P15BD00	SCU/CGU: system PLL VCO clock event loss	(See page ES-53)
P15BE00	SCU/EVR: EVR 1.3 V digital undervoltage	(See page ES-53)
P15BF00	SCU/EVR: EVR 3.3 V overvoltage	(See page ES-53)
P15C000	SCU/EVR: external power supply overvoltage	(See page ES-53)
P15C100	SCU/WDTS: safety watchdog timeout	(See page ES-53)

DTC	Description	Reference page
P15C200	SCU/WDTCPU0: watchdog CPU0 timeout	(See page ES-53)
P15C300	SCU/WDTCPU1: watchdog CPU1 timeout	(See page ES-53)
P15C400	SCU/CGU: PLL_ERAY VCO clock event loss	(See page ES-53)
P15C500	SCU/WDTCPU2: watchdog CPU2 timeout	(See page ES-53)
P15C600	SCU/ DTS: temperature sensor overflow	(See page ES-53)
P15C700	Registers: fault detected by register monitoring	(See page ES-53)
P15C800	SCU/LSCU: SCU configuration failure: monitoring dual-rail property (reversesignal) from lockstep comparator (LSCU) alarm	(See page ES-53)
P15C900	SCU/CGU: clock monitoring: STM out of frequency range	(See page ES-53)
P15CA00	SCU/CGU: clock monitoring: PLL_ERAY out of frequency range	(See page ES-53)
P15CB00	SCU/CGU: clock monitoring: PLL out of frequency range	(See page ES-53)
P15CC00	SCU/CGU: clock monitoring: SRI out of frequency range	(See page ES-53)
P15CD00	SCU/CGU: clock monitoring: SPB out of frequency range	(See page ES-53)
P15CE00	SCU/CGU: clock monitoring: GTM out of frequency range	(See page ES-53)
P15CF00	SCU/CGU: clock monitoring: ADC out of frequency range	(See page ES-53)
P15D000	GTM: SRAMs uncorrectable	(See page ES-53)
P15D100	FLEXRAY: SRAM address failure	(See page ES-53)
P15D200	Misc SRAMs: SRAM ECC uncorrectable	(See page ES-53)
P15D300	Misc SRAMs: SRAM address failure	(See page ES-53)
P15D400	GTM: SRAMs address failure	(See page ES-53)
P15D500	CAN: SRAM uncorrectable	(See page ES-53)
P15D600	CAN: SRAM address failure	(See page ES-53)
P15D700	FLEXRAY: SRAM ECC uncorrectable	(See page ES-53)
P15D800	CPU2: MPU fault (register, DSPR, PSPR)	(See page ES-53)
P15D900	CPU2: DCACHE/DSPR ECC uncorrectable	(See page ES-53)
P15DA00	CPU2: DCACHE/DSPR address failure	(See page ES-53)
P15DB00	CPU2: DCACHE TAG SRAM ECC uncorrectable	(See page ES-53)
P15DD00	CPU2: 121 PCACHE TAGRAM ECC uncorrectable	(See page ES-53)
P15DE00	CPU2: PCACHE TAGRAM address failure	(See page ES-53)
P15DF00	CPU2: PCACHE/PSPR ECC uncorrectable	(See page ES-53)
P15E000	CPU2 PCACHE/PSPR address failure	(See page ES-53)
P210300	Electronic throttle drive stage fault (short circuit)	(See page ES-53)

DTC	Description	Reference page
P211800	Electronic throttle drive stage fault (overheat or overcurrent)	(See page ES-53)
P210600	Electronic throttle drive stage fault (implausible)	(See page ES-53)
P210000	Electronic throttle drive stage fault (open circuit)	(See page ES-53)
P213800	Electronic accelerator pedal position sensor signal implausible	(See page ES-53)
P212300	Electronic accelerator pedal position sensor 1 signal overvoltage	(See page ES-53)
P212800	Electronic accelerator pedal position sensor 2 signal overvoltage	(See page ES-53)
P212200	Electronic accelerator pedal position sensor 1 signal undervoltage	(See page ES-53)
P212700	Electronic accelerator pedal position sensor 2 signal undervoltage	(See page ES-53)
P214800	1# and 4# cylinder fuel injector high side control circuit overvoltage/undervoltage or 4# cylinder fuel injector low side control circuit overvoltage/undervoltage	(See page ES-53)
P215100	2# and 3# cylinder fuel injector high side control circuit overvoltage/undervoltage or #2 cylinder fuel injector low side control circuit overvoltage/undervoltage	(See page ES-53)
P217700	Air-fuel ratio closed-loop control self-learning value above upper limit (medium load zone)	(See page ES-53)
P217800	Air-fuel ratio closed-loop control self-learning value below lower limit (medium load zone)	(See page ES-53)
P218700	Air-fuel ratio closed-loop control self-learning value above upper limit (idle speed)	(See page ES-53)
P218800	Air-fuel ratio closed-loop control self-learning value below lower limit (idle speed)	(See page ES-53)
P218500	Coolant temperature sensor 2 circuit overvoltage	(See page ES-53)
P218400	Coolant temperature sensor 2 circuit undervoltage	(See page ES-53)
P218324	Coolant temperature sensor 2 cold start check implausible (positive deviation)	(See page ES-53)
P218323	Coolant temperature sensor 2 cold start check implausible (negative deviation)	(See page ES-53)
P222900	Ambient pressure sensor circuit shorted to power supply	(See page ES-53)
P222800	Ambient pressure sensor circuit shorted to ground	(See page ES-53)
P222729	Ambient pressure sensor signal fault	(See page ES-53)
P222722	Ambient pressure sensor pressure implausibly high	(See page ES-53)
P222721	Ambient pressure sensor pressure implausibly low	(See page ES-53)

ES

DTC	Description	Reference page
P222785	Ambient pressure sensor signal pressure value high during starting	(See page ES-53)
P222784	Ambient pressure sensor signal pressure value low during starting	(See page ES-53)
P120200	Ambient pressure sensor pressure above upper limit	(See page ES-53)
P120300	Ambient pressure sensor pressure below lower limit	(See page ES-53)
P223200	Coupling of downstream oxygen sensor signal line to heater wire	(See page ES-53)
P227000	Downstream oxygen sensor aging - signal biased lean continuously	(See page ES-53)
P227100	Downstream oxygen sensor aging - signal biased rick continuously	(See page ES-53)
P227900	Excessive inflation model deviation	(See page ES-53)
P240C00	EVAP system leakage diagnosis DMTL heating unit circuit overvoltage	(See page ES-53)
P240B00	EVAP system leakage diagnosis DMTL heating unit circuit undervoltage	(See page ES-53)
P240A00	EVAP system leakage diagnosis DMTL heating unit circuit open	(See page ES-53)
P24BF00	EVAP system DMTL solenoid valve control circuit overvoltage	(See page ES-53)
P24BE00	EVAP system DMTL solenoid valve control circuit undervoltage	(See page ES-53)
P24BD00	EVAP system DMTL solenoid valve control circuit open	(See page ES-53)
P240200	EVAP system DMTL pump control circuit overvoltage	(See page ES-53)
P240100	EVAP system DMTL pump control circuit undervoltage	(See page ES-53)
P240000	EVAP system DMTL pump control circuit open	(See page ES-53)
P25AB00	Piston cooling nozzle control valve control circuit overvoltage	(See page ES-53)
P25AA00	Piston cooling nozzle control valve control circuit undervoltage	(See page ES-53)
P25A900	Piston cooling nozzle control valve control circuit open	(See page ES-53)
P26E600	Starter relay control circuit overvoltage	(See page ES-53)
P26E500	Starter relay control circuit undervoltage	(See page ES-53)
P061500	Starter relay control circuit fault-control terminal A	(See page ES-53)
P061700	Starter relay control circuit overvoltage	(See page ES-53)
P061600	Starter relay control circuit undervoltage	(See page ES-53)
P26E400	Starter relay control circuit fault-control terminal B	(See page ES-53)
P063441	Starter drive chip 1 overheating	(See page ES-53)

DTC	Description	Reference page
P150000	Collision and fuel cutoff signal received by vehicle	(See page ES-53)
P150100	Airbag communication information implausible	(See page ES-53)
P150200	Collision and fuel cutoff signal received by vehicle	(See page ES-53)
P150300	Airbag signal implausible	(See page ES-53)
P138824	Ambient temperature sensor cold start check implausible (positive deviation)	(See page ES-53)
P138823	Ambient temperature sensor cold start check implausible (negative deviation)	(See page ES-53)
P007300	Ambient temperature sensor circuit overvoltage	(See page ES-53)
P007200	Ambient temperature sensor circuit undervoltage	(See page ES-53)
P007000	Lost communication with ambient temperature sensor CAN	(See page ES-53)
P003300	Turbocharger relief valve control circuit open	(See page ES-53)
P003400	Turbocharger relief valve control circuit undervoltage	(See page ES-53)
P003500	Turbocharger relief valve control circuit overvoltage	(See page ES-53)
P226100	Turbocharger relief valve mechanical fault	(See page ES-53)
P261D00	Turbocharger electronic coolant pump control circuit overvoltage	(See page ES-53)
P261C00	Turbocharger electronic coolant pump control circuit undervoltage/implausibility	(See page ES-53)
P261A00	Turbocharger electronic coolant pump control circuit open	(See page ES-53)
P258A00	Brake vacuum pump control circuit open	(See page ES-25)
P258D00	Brake vacuum pump control circuit overvoltage	(See page ES-25)
P258C00	Brake vacuum pump control circuit undervoltage	(See page ES-25)
P053A00	Crankcase heater pipeline circuit open	(See page ES-21)
P053C00	Crankcase heater pipeline circuit overvoltage	(See page ES-21)
P053B00	Crankcase heater pipeline circuit undervoltage	(See page ES-21)
U012100	Lost communication with ABS module	(See page ES-29)
U041500	ABS module communication Check Sum/ Rolling Counter fault	(See page ES-29)
U015100	Lost communication with ACU module	(See page ES-29)
U010F00	Lost communication with A/C module	(See page ES-29)
U007300	CAN bus 1 OFF	(See page ES-29)
U01B000	Lost communication with EBS module	(See page ES-29)

DTC	Description	Reference page
U041600	ESP module communication Check Sum/ Rolling Counter fault	(See page ES-29)
U015500	Lost communication with ICM or abnormal signal	(See page ES-29)
U012600	Lost communication with SAS module	(See page ES-29)
U042800	SAS module communication Check Sum/ Rolling Counter fault	(See page ES-29)
U010100	Lost communication with TCM module	(See page ES-29)
U040200	TCM communication Check Sum/Rolling Counter fault	(See page ES-29)

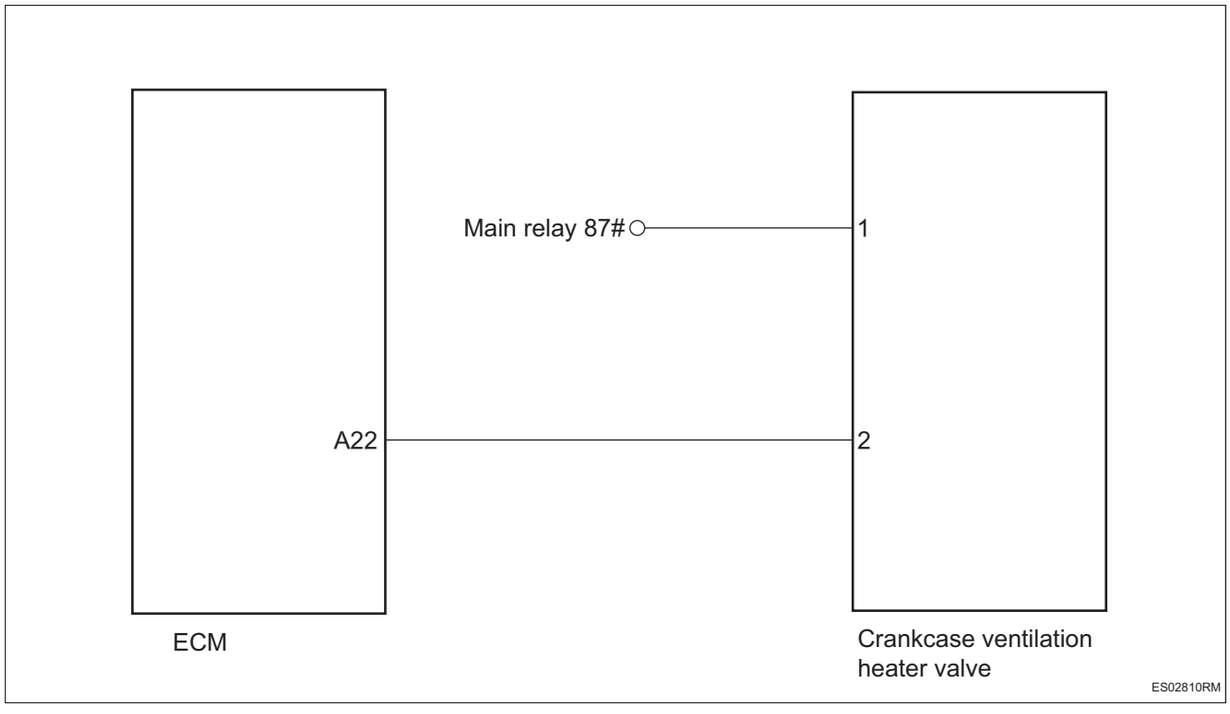
DTC	P053A00	Crankcase heater pipeline circuit open
DTC	P053B00	Crankcase ventilation pipe diagnosis circuit undervoltage
DTC	P053C00	Crankcase ventilation pipe diagnosis circuit overvoltage

Description

When the crankcase ventilation heater valve circuit voltage is out of the normal range, the ECM records the DTC.

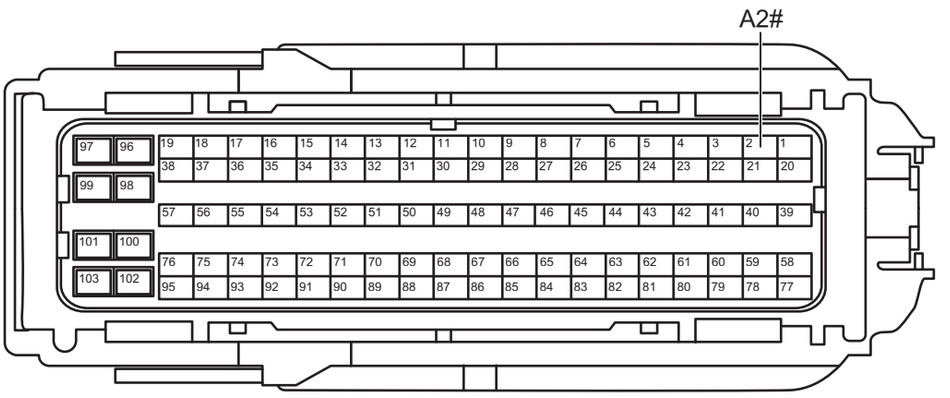
DTC	DTC detection conditions	Faulty location
P053A00	(a) Crankcase ventilation heater valve is open-circuited.	• ECM • Harness and connector • Crankcase ventilation heater valve
P053B00	(a) Crankcase ventilation heater valve circuit voltage low.	• ECM • Harness and connector • Crankcase ventilation heater valve
P053C00	(a) Crankcase ventilation heater valve circuit voltage low.	• ECM • Harness and connector • Crankcase ventilation heater valve

Circuit diagram



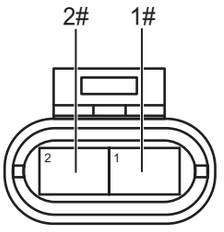
Inspection procedure

1	Check crankcase ventilation heater valve harness and connector for open circuit



ECM A connector

ES02821RM



Crankcase ventilation heater valve connector

ES02830RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Remove the main relay.

(e) Disconnect the crankcase ventilation heater valve connector.

(f) Measure the resistance according to the values in the table below.

Standard value

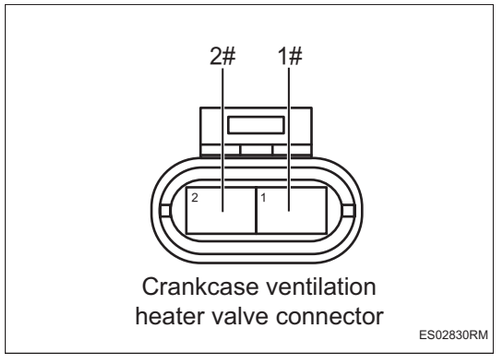
Detector connection	Detection conditions	Specified state
ECM connector A22# - crankcase ventilation heater valve connector 2#	Always connected	Less than 1Ω
Crankcase ventilation heater valve connector 1# - main relay connector 87#	Always connected	Less than 1Ω

NG

Repair or replace the harness and connector

OK

2	**Check crankcase ventilation heater valve harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

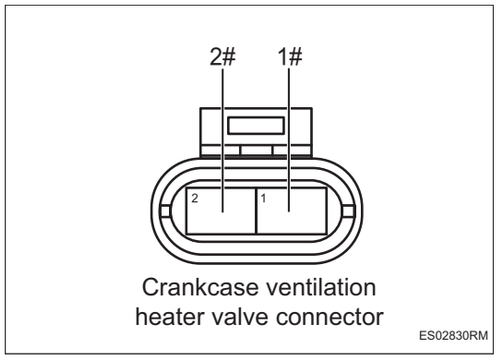
Detector connection	Detection conditions	Specified state
Crankcase ventilation heater valve connector 1#-body Ground	Always connected	10 KΩ or greater
Crankcase ventilation heater valve connector 2#- body GND	Always connected	10 KΩ or greater

ES

NG → **Repair or replace the harness and connector**

OK

3	**Check crankcase ventilation heater valve harness and connector for circuit shorted to power supply**



(a) Install the main relay.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Crankcase ventilation heater valve connector 1#- body GND	Set the ignition switch to "ON"	Less than 1 V
Crankcase ventilation heater valve connector 2#- body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the crankcase ventilation heater valve (See page EC-5)**

(a) Replace the crankcase ventilation heater valve.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace ECM (See page ES-54)**

OK

5	**End**

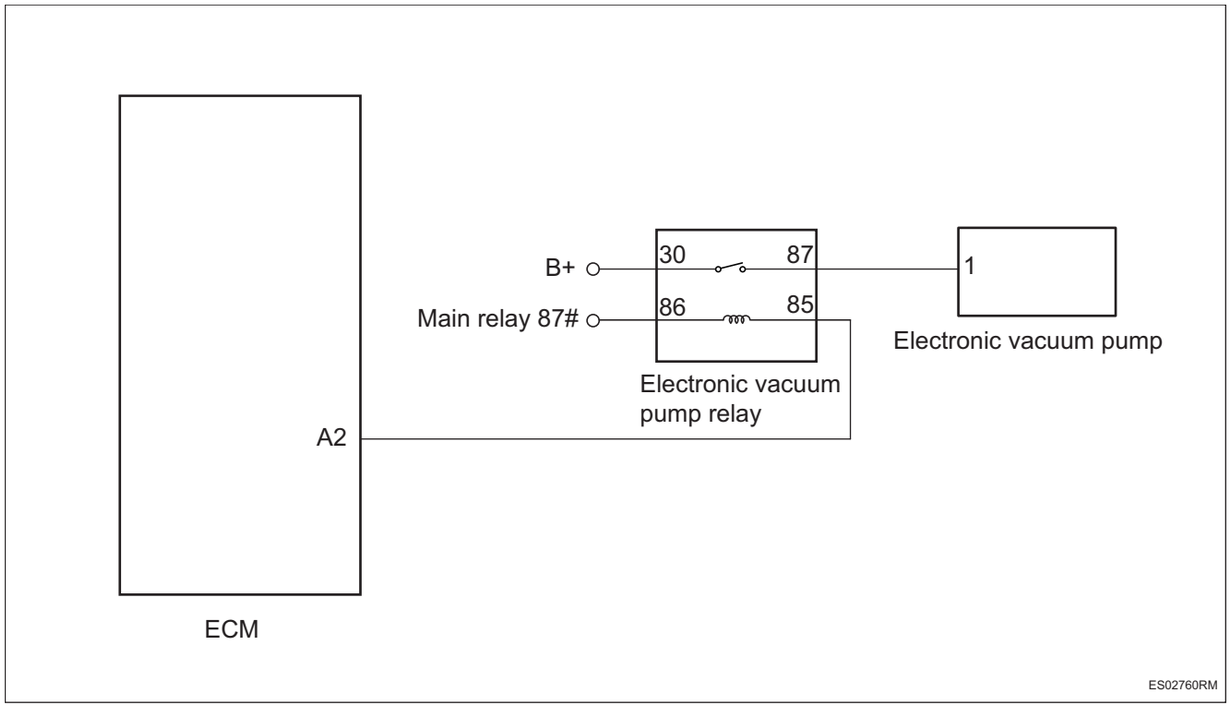
DTC	P258A00	Brake vacuum pump control circuit open
DTC	P258D00	Brake vacuum pump control circuit overvoltage
DTC	P258C00	Brake vacuum pump control circuit undervoltage

Description

When electronic vacuum pump control circuit is shorted or open, the ECM records the DTC.

DTC	DTC detection conditions	Faulty location
P258A00	(a) Electronic vacuum pump control circuit open.	• ECM • Harness and connector • Electronic vacuum pump relay
P258D00	(a) Electronic vacuum pump control circuit overvoltage.	• ECM • Harness and connector • Electronic vacuum pump relay
P258C00	(a) Electronic vacuum pump control circuit undervoltage.	• ECM • Harness and connector • Electronic vacuum pump relay

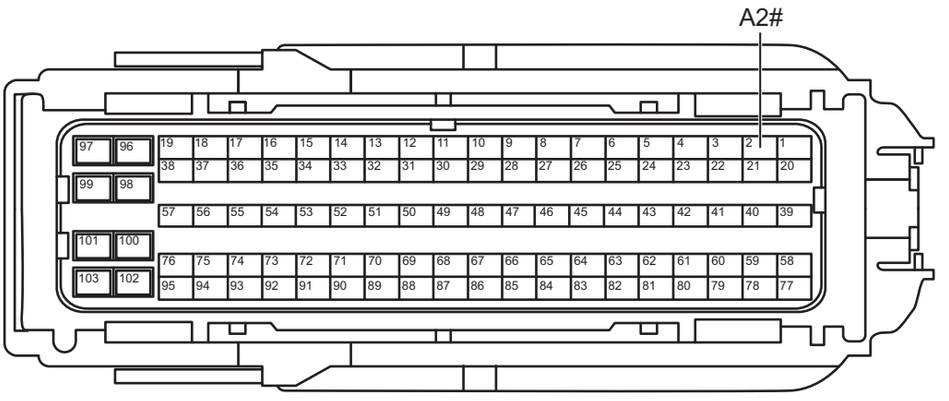
Circuit diagram



Inspection procedure

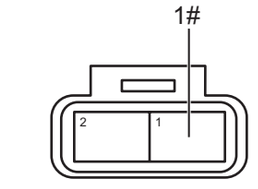
1	Check electronic vacuum pump relay harness and connector for open circuit

ES

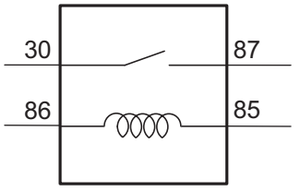


ECM A connector

ES02771RM



ECM A connector



Electronic vacuum pump connector

ES02780RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the electronic vacuum pump connector.

(e) Remove the electronic vacuum pump relay.

(f) Measure the resistance according to the values in the table below.

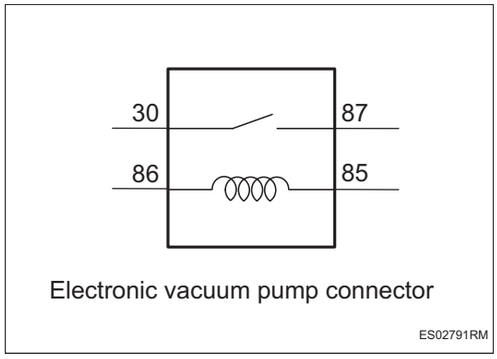
Standard value

Detector connection	Detection conditions	Specified state
Electronic vacuum pump relay connector 85# -ECM connector A2#	Always connected	Less than 1Ω
Electronic vacuum pump relay connector 87# -electronic vacuum pump connector 1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check electronic vacuum pump relay harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

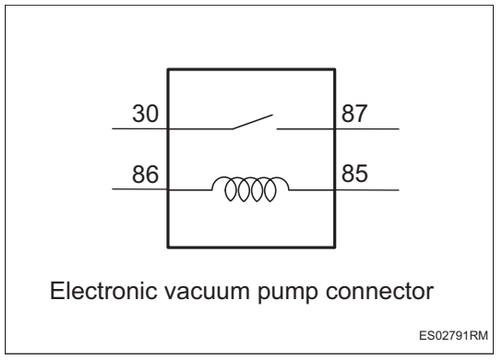
Detector connection	Detection conditions	Specified state
Electronic vacuum pump relay connector 87# -body GND	Always connected	10 KΩ or greater
Electronic vacuum pump relay connector 85# -body GND	Always connected	10 KΩ or greater

ES

NG → **Repair or replace the harness and connector**

OK

3	Check electronic vacuum pump relay harness and connector for circuit shorted to power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

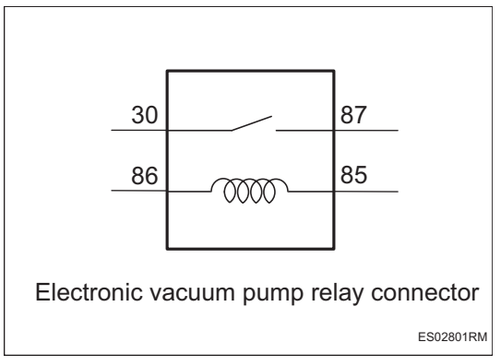
Standard value

Detector connection	Detection conditions	Specified state
Electronic vacuum pump relay connector 87# -body GND	Set the ignition switch to "ON"	Less than 1 V
Electronic vacuum pump relay connector 85# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	Check the electronic vacuum pump relay



Electronic vacuum pump relay connector

ES02801RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Electronic vacuum pump relay 30# -electronic vacuum pump relay 87#	Apply battery voltage between 85# and 86#	Less than 1Ω
Electronic vacuum pump relay 30# -electronic vacuum pump relay 87#	No battery voltage is applied between 85# and 86#	10 KΩ or greater

NG → **Replace the electronic vacuum pump relay**

OK

5	**Replace ECM (See page ES-54)**

DTC	U012100	Lost communication with ABS module
DTC	U041500	ABS module communication Check Sum/ Rolling Counter fault
DTC	U015100	Lost communication with ACU module
DTC	U010F00	Lost communication with A/C module
DTC	U007300	CAN bus 1 OFF
DTC	U01B000	Lost communication with EBS module
DTC	U041600	ESP module communication Check Sum/ Rolling Counter fault
DTC	U015500	Lost communication with ICM or abnormal signal
DTC	U012600	Lost communication with SAS module
DTC	U042800	SAS module communication Check Sum/ Rolling Counter fault
DTC	U010100	Lost communication with TCM module
DTC	U040200	TCM communication Check Sum/Rolling Counter fault

Description

When the communication between the ECM and other control units is abnormal or interrupted, the ECM records the DTC.

DTC	DTC detection conditions	Faulty location
U012100	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U041500	(a) Abnormal or interrupted communication.	
U015100	(a) Abnormal or interrupted communication.	
U010F00	(a) Abnormal or interrupted communication.	
U007300	(a) Abnormal or interrupted communication.	
U01B000	(a) Abnormal or interrupted communication.	
U041600	(a) Abnormal or interrupted communication.	
U015500	(a) Abnormal or interrupted communication.	
U012600	(a) Abnormal or interrupted communication.	
U042800	(a) Abnormal or interrupted communication.	
U010100	(a) Abnormal or interrupted communication.	
U040200	(a) Abnormal or interrupted communication.	

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

DTC	P000A00	Intake VVT operation fault (retarded)
DTC	P003C00	Intake VVT operation fault (stuck)
DTC	P001000	Intake VVT control circuit open
DTC	P001676	Crankshaft-Intake camshaft initial installation position implausible (Bank1)
DTC	P001678	Excessive relative position deviation between crankshaft and intake camshaft (Bank1)
DTC	P208800	Intake VVT control circuit undervoltage
DTC	P208900	Intake VVT control circuit overvoltage
DTC	P001100	Intake camshaft locking position operation implausible
DTC	P000B00	Exhaust VVT operation fault (retarded)
DTC	P005A00	Exhaust VVT operation fault (stuck)
DTC	P001300	Exhaust VVT control circuit open
DTC	P001776	Crankshaft-exhaust camshaft initial installation position implausible (Bank1)
DTC	P001778	Excessive relative position deviation between crankshaft and exhaust camshaft (Bank1)
DTC	P209000	Exhaust VVT control circuit undervoltage
DTC	P209100	Exhaust VVT control circuit overvoltage
DTC	P001400	Exhaust camshaft locking position operation implausible
DTC	P003000	Upstream oxygen sensor heater control circuit open
DTC	P003100	Upstream oxygen sensor heater control circuit undervoltage
DTC	P003200	Upstream oxygen sensor heater control circuit overvoltage
DTC	P003600	Downstream oxygen sensor heater control circuit open

ES

DTC	P003700	Downstream oxygen sensor heater control circuit undervoltage
DTC	P003800	Downstream oxygen sensor heater control circuit overvoltage
DTC	P003A22	Turbocharger electronic wastegate initial zero self-learning above upper limit
DTC	P003A21	Turbocharger electronic wastegate initial zero self-learning below lower limit
DTC	P003A72	Turbocharger electronic wastegate zero self-learning above upper limit
DTC	P003A73	Turbocharger electronic wastegate zero self-learning below lower limit
DTC	P024477	Deviation between turbocharger electronic wastegate target position and actual position out of limit
DTC	P024437	Turbocharger electronic wastegate duty cycle out of limit
DTC	P256400	Turbocharger electronic wastegate position sensor undervoltage
DTC	P256500	Turbocharger electronic wastegate position sensor overvoltage
DTC	P170300	Turbocharger wastegate control circuit communication failure
DTC	P024300	Turbocharger wastegate control circuit open
DTC	P024600	Turbocharger wastegate control circuit overvoltage or undervoltage
DTC	P005300	Upstream oxygen sensor heater circuit fault
DTC	P005400	Downstream oxygen sensor heater internal resistance implausible
DTC	P008700	High-pressure fuel rail pressure low
DTC	P008800	High-pressure fuel rail pressure high
DTC	P008985	Too large PID control deviation of high-pressure fuel supply pressure

DTC	P008984	Too small PID control deviation of high-pressure fuel supply pressure
DTC	P009000	Flow control valve high side control circuit high side and low side circuits shorted to each other
DTC	P025100	Flow control valve high or low side control circuit open
DTC	P025400	Flow control valve high side control circuit overvoltage or undervoltage
DTC	P025900	Flow control valve low side control circuit overvoltage or undervoltage
DTC	P00C600	High-voltage start failure
DTC	P01062A	Abnormal signal value without fluctuation of MAP sensor
DTC	P010622	MAP sensor pressure implausibly higher than model pressure
DTC	P010621	MAP sensor pressure implausibly lower than model pressure
DTC	P120000	MAP sensor pressure above upper limit
DTC	P120100	MAP sensor pressure below lower limit
DTC	P00C721	MAP sensor signal pressure value too low during start
DTC	P00C722	MAP sensor signal pressure value too high during start
DTC	P010700	MAP sensor circuit shorted to ground
DTC	P010800	MAP sensor circuit shorted to power supply fault
DTC	P011126	IAT sensor 1 signal implausible (sticky)
DTC	P011200	IAT sensor 1 circuit undervoltage
DTC	P011300	IAT sensor 1 circuit overvoltage
DTC	P011400	IAT sensor 1 circuit voltage implausible

DTC	P00CE24	Air temperature sensor 1 cold start check implausible (positive deviation)
DTC	P00CE23	IAT sensor 1 cold start check implausible (negative deviation)
DTC	P012300	Electronic throttle position sensor 1 signal circuit overvoltage
DTC	P012200	Electronic throttle position sensor 1 signal circuit undervoltage
DTC	P012100	Electronic throttle position sensor 1 signal implausible
DTC	P022300	Electronic throttle position sensor 2 signal circuit overvoltage
DTC	P022200	Electronic throttle position sensor 2 signal circuit undervoltage
DTC	P022100	Electronic throttle position sensor 2 signal implausible
DTC	P012800	Thermostat performance implausible (water temperature failing to reach nominal opening temperature of thermostat)
DTC	P013300	Upstream oxygen sensor aging
DTC	P013A00	Downstream oxygen sensor rich-lean response slow
DTC	P219500	LSU oxygen sensor characteristic deviation (biased lean)
DTC	P219600	LSU oxygen sensor characteristic deviation (biased rich)
DTC	P209700	Closed-loop correction value based on downstream oxygen sensor above upper limit - biased rich
DTC	P209600	Closed-loop correction value based on downstream oxygen sensor below lower limit -biased lean
DTC	P013800	Downstream oxygen sensor signal line shorted to power supply

DTC	P013700	Downstream oxygen sensor signal line shorted to ground
DTC	P013600	Downstream oxygen sensor signal circuit open
DTC	P017F00	DMTL air cleaner flow resistance high
DTC	P128000	DMTL pump current frequency high
DTC	P128100	DMTL pump current frequency low
DTC	P043E00	EVAP system leakage diagnosis DMTL reference pump current high
DTC	P043F00	EVAP system leakage diagnosis DMTL reference pump current relatively low
DTC	P24C100	DMTL pump idle current high
DTC	P240700	DMTL pump current fluctuation out of plausible range (caused by humidity)
DTC	P044200	EVAP system 1.0mm leakage
DTC	P019800	Oil temperature sensor circuit overvoltage
DTC	P019700	Oil temperature sensor circuit undervoltage
DTC	P019664	Oil temperature sensor signal implausible (high side)
DTC	P019629	Oil temperature sensor signal implausible (low side)
DTC	P121800	Oil temperature sensor signal above upper limit
DTC	P052300	High oil pressure sensor circuit voltage/duty cycle
DTC	P052200	Low oil pressure sensor circuit voltage/duty cycle
DTC	P021900	High engine speed
DTC	P023400	Turbocharger charge air pressure display high
DTC	P029900	Turbocharger charge air pressure display low

DTC	P023700	Charge air pressure sensor circuit shorted to ground
DTC	P023800	Charge air pressure sensor circuit shorted to power supply
DTC	P138024	IAT sensor 2 cold start check implausible (positive deviation)
DTC	P138023	IAT sensor 2 cold start check implausible (negative deviation)
DTC	P009800	IAT sensor 2 circuit overvoltage
DTC	P009700	IAT sensor 2 circuit undervoltage
DTC	P009900	IAT sensor 2 circuit voltage implausible
DTC	P009626	IAT sensor 2 signal implausible (sticky)
DTC	P020100	1# cylinder fuel injector control circuit open
DTC	P026200	1# cylinder fuel injector low side control circuit overvoltage or undervoltage
DTC	P02EE00	1# cylinder fuel injector high side and low side control circuits shorted to each other
DTC	P02CD00	1# cylinder CVO self-learning adjustment up to upper limit
DTC	P02CC00	1# cylinder CVO self-learning adjustment up to lower limit
DTC	P126100	1# cylinder CVO circuit signal implausible
DTC	P020200	2# cylinder fuel injector control circuit open
DTC	P026500	2# cylinder fuel injector low side control circuit overvoltage or undervoltage
DTC	P02EF00	2# cylinder fuel injector high side and low side control circuits shorted to each other
DTC	P02CF00	#2 Cylinder CVO self-learning adjustment at upper limit
DTC	P02CE00	2# cylinder CVO self-learning adjustment at lower limit
DTC	P126200	2# cylinder CVO circuit signal implausible

DTC	P020300	3# cylinder fuel injector control circuit open
DTC	P026800	3# cylinder fuel injector low side control circuit overvoltage or undervoltage
DTC	P02F000	3# cylinder fuel injector high side and low side control circuits shorted to each other
DTC	P02D100	3# cylinder CVO self-learning adjustment at upper limit
DTC	P02D000	4# cylinder CVO self-learning adjustment at lower limit
DTC	P126300	3# cylinder CVO circuit signal implausible
DTC	P020400	4# cylinder fuel injector control circuit open
DTC	P027100	4# cylinder fuel injector low side control circuit overvoltage or undervoltage
DTC	P02F100	4# cylinder fuel injector high side and low side control circuits shorted to each other
DTC	P02D300	4# cylinder CVO self-learning adjustment at upper limit
DTC	P02D200	4# cylinder CVO self-learning adjustment at lower limit
DTC	P126400	4# cylinder CVO circuit signal implausible
DTC	P030000	Engine random or multi-cylinder misfire
DTC	P030100	1# Cylinder misfire detected
DTC	P030200	2# Cylinder misfire detected
DTC	P030300	3# Cylinder misfire detected
DTC	P030400	4# cylinder misfire detected
DTC	P036300	Engine misfire triggering fuel cutoff
DTC	P032700	Knock sensor A end shorted to ground
DTC	P032714	Knock sensor B end shorted to ground
DTC	P032800	Diagnosis of short circuit to power supply of knock sensor end A

DTC	P032815	Diagnosis of short circuit to power supply of knock sensor end B
DTC	P032500	Knock sensor signal circuit undervoltage
DTC	P151000	Knock sensor signal evaluation and diagnosis
DTC	P032600	Knock sensor signal circuit overvoltage
DTC	P033900	Speed sensor signal Implausible
DTC	P261700	Speed sensor signal lost
DTC	P033664	Crankshaft sensor pulse width signal implausible
DTC	P034A00	Crankshaft position sensor –crankshaft starting position incorrect (stop position implausible)
DTC	P034B00	Crankshaft position sensor -crankshaft rotation direction incorrect (reverse signal implausible)
DTC	P034100	Intake camshaft sensor signal Implausible (Bank1)
DTC	P034200	Intake camshaft sensor signal circuit shorted to ground (Bank1)
DTC	P034300	Intake camshaft sensor signal circuit shorted to power supply (Bank1)
DTC	P035100	1# cylinder ignition coil control circuit open
DTC	P230000	1# cylinder ignition coil control circuit undervoltage
DTC	P230100	1# cylinder ignition coil control circuit overvoltage
DTC	P035200	2# cylinder ignition coil control circuit open
DTC	P230300	2# cylinder ignition coil control circuit undervoltage
DTC	P230400	2# cylinder ignition coil control circuit overvoltage
DTC	P035300	3# cylinder ignition coil control circuit open

DTC	P230600	3# cylinder ignition coil control circuit undervoltage
DTC	P230700	3# cylinder ignition coil control circuit over-voltage
DTC	P035400	4# cylinder ignition coil control circuit open
DTC	P230900	4# cylinder ignition coil control circuit undervoltage
DTC	P231000	4# cylinder ignition coil control circuit over-voltage
DTC	P036600	Exhaust camshaft sensor signal implausible (Bank1)
DTC	P036800	Exhaust camshaft sensor signal circuit shorted to power supply (Bank1)
DTC	P036700	Exhaust camshaft sensor signal circuit shorted to ground (Bank1)
DTC	P042000	TWC OSC aging
DTC	P044400	Canister control valve control circuit open
DTC	P045800	Canister control valve circuit undervoltage
DTC	P045900	Canister control valve circuit overvoltage
DTC	P049700	Canister solenoid valve stuck closed
DTC	P046000	Fuel level sensor original signal out of range
DTC	P25B000	Fuel level sensor signal stuck
DTC	P128400	Fuel level signal out of range
DTC	P046129	Fuel level signal implausible
DTC	P046300	Fuel level sensor circuit overvoltage
DTC	P046200	Fuel level sensor circuit undervoltage
DTC	U067681	Fuel level sensor signal loss/failure/check error
DTC	P046700	High-load desorption pipeline pressure sensor circuit undervoltage

ES

DTC	P046800	High-load desorption pipeline pressure sensor circuit overvoltage
DTC	P128500	High-load desorption pipeline pressure sensor signal above upper threshold
DTC	P128600	High-load desorption pipeline pressure sensor signal below lower threshold
DTC	P048371	Cooling fan plausibility fault type 1
DTC	P048372	Cooling fan plausibility fault type 2
DTC	P048000	Cooling fan 1 control circuit open
DTC	P069200	Cooling fan 1 control circuit overvoltage
DTC	P069100	Cooling fan 1 control circuit undervoltage
DTC	P063400	Cooling fan 1 driver chip overheating
DTC	P04F000	High-load desorption pipeline fault - canister valve fault
DTC	P050B00	Ignition angle efficiency monitoring during catalytic converter heating (idle speed)
DTC	P050B20	Ignition angle efficiency monitoring during catalytic converter heating (partial load)
DTC	P053F22	High-pressure fuel passage pressure high during catalytic converter heating
DTC	P053F21	High-pressure fuel passage pressure low during catalytic converter heating
DTC	P050A22	High engine idle speed during catalytic converter heating
DTC	P050A21	Low engine idle speed during catalytic converter heating
DTC	P050D00	Parking idle speed fluctuation out of range during catalytic converter heating and without fuel cutoff
DTC	P05EC00	Multiple injection monitoring faults during catalytic converter heating
DTC	P050700	Engine idle speed high

DTC	P050600	Engine idle speed low
DTC	P050500	Engine idle speed fluctuation out of range
DTC	P050C24	Coolant temperature sensor 1 cold start check implausible (positive deviation)
DTC	P050C23	Coolant temperature sensor 1 cold start check implausible (negative deviation)
DTC	P011623	Coolant temperature sensor 1 signal implausible (low side)
DTC	P011626	Coolant temperature sensor 1 signal implausible (stuck)
DTC	P011800	Coolant temperature sensor 1 circuit overvoltage
DTC	P011700	Coolant temperature sensor 1 circuit undervoltage
DTC	P011900	Coolant temperature sensor 1 circuit voltage implausible
DTC	P051300	Incorrect immobilizer authentication response and immobilizer authentication failure
DTC	P063300	ECM no IMMO matching
DTC	P163100	Immobilizer authentication communication error or no response from immobilizer
DTC	P161100	PIN input error
DTC	P055800	Brake chamber vacuum pressure sensor overvoltage
DTC	P055700	Brake chamber vacuum pressure sensor undervoltage
DTC	P145200	Unreasonable brake chamber pressure
DTC	P056300	Battery overvoltage
DTC	P056200	Battery undervoltage
DTC	P057100	Asynchronous brake signal
DTC	P050400	Brake signal correlation failure

DTC	P061A00	Second layer torque monitoring fault (torque comparison fault)
DTC	P060D00	Second accelerator pedal signal implausible
DTC	P152000	Load forecast monitoring fault
DTC	P152100	Pipe monitoring fault in fuel cutoff mode
DTC	P152200	Pipe monitoring fault in fuel supply mode
DTC	P153900	Synchronization process plausibility check (based on speed and sync count)
DTC	P153700	Load comparison monitoring fault
DTC	P153500	Mixture monitoring fault
DTC	P153600	Operating mode monitoring fault
DTC	P062900	Fuel pump relay control circuit overvoltage
DTC	P062800	Fuel pump relay control circuit undervoltage
DTC	P062700	Fuel pump relay control circuit open
DTC	P062B9A	Similar working condition path of self-learning adjustment out of limit
DTC	P062B64	Similar working condition path of circuit signal implausible
DTC	P062B96	ECU fault (CVO failure in all cylinders)
DTC	P063000	VIN not written or incompatible
DTC	P064100	5V power supply module 1 faulty
DTC	P065100	Chip 5 V power supply voltage 2 fault
DTC	P069700	5V power supply module 3 faulty
DTC	P064D00	LSU integrated chip register writing failure
DTC	P223700	LSU type oxygen sensor APE circuit open (near ECU end)
DTC	P225100	Upstream oxygen sensor IPE circuit open
DTC	P224300	Upstream oxygen sensor RE circuit open
DTC	P013200	Upstream oxygen sensor signal circuit overvoltage (APE / IPE / RE circuit shorted to power supply)

DTC	P013100	Upstream oxygen sensor signal circuit undervoltage (APE / IPE / RE circuit shorted to ground)
DTC	P241400	Upstream oxygen sensor output voltage implausible
DTC	P064D13	LSU integrated chip SPI communication failure
DTC	P262600	Upstream oxygen sensor MES circuit open
DTC	P223713	LSU type oxygen sensor APE circuit open
DTC	P013000	Upstream oxygen sensor compensation resistor circuit open
DTC	P068500	Main relay open circuit
DTC	P068700	Main relay circuit shorted to power supply
DTC	P068600	Main relay circuit shorted to ground
DTC	P06869E	ECM/PCM main relay stuck or circuit shorted to ground
DTC	P06B842	Error in reading NVM Block
DTC	P06B843	Error in writing NVM Block
DTC	P06DC00	Two-stage oil pump control circuit overvoltage
DTC	P06DB00	Two-stage oil pump control circuit undervoltage
DTC	P06DA00	Two-stage oil pump control circuit open
DTC	P070000	Transmission control fault request to illuminate MIL
DTC	P120400	Charge air pressure above upper limit
DTC	P120500	Charge air pressure below lower limit
DTC	P023622	Charge air pressure implausibly high
DTC	P023621	Charge air pressure implausible, low
DTC	P121200	Vehicle speed sensor performance failure (vehicle speed above upper limit)

DTC	P050000	Vehicle speed sensor input signal failure
DTC	P050165	Vehicle speed sensor performance failure (vehicle speed low during coasting with fuel off)
DTC	P050166	Vehicle speed implausible - Low vehicle speed during high engine load
DTC	P019000	High-pressure fuel rail pressure sensor voltage signal implausible
DTC	P019128	Negative deviation of characteristic curve of high-pressure fuel rail pressure sensor
DTC	P019129	Positive deviation of characteristic curve of high-pressure fuel rail pressure sensor
DTC	P019200	High-pressure fuel rail pressure sensor circuit undervoltage
DTC	P019300	High-pressure fuel rail pressure sensor circuit overvoltage
DTC	P019400	High-pressure fuel rail pressure sensor signal stuck
DTC	P127000	Rail pressure signal of high-pressure fuel rail pressure sensor above upper limit
DTC	P139D00	TMM position sensor signal value out of range (SENT input)
DTC	P139C00	TMM position sensor signal fault (SENT signal wire shorted to power supply)
DTC	P139B00	TMM position sensor signal fault (SENT signal line shorted to ground)
DTC	P139A00	TMM position sensor signal fault (communication protocol not satisfied)
DTC	P139E00	TMM position sensor closed position self-learning out of limit
DTC	P26CD00	TMM control circuit overvoltage or undervoltage
DTC	P170100	TMM control circuit overcurrent

DTC	P170200	TMM control circuit communication failure
DTC	P26CA00	TMM control circuit open
DTC	P138E00	TMM valve body stuck
DTC	P142000	CAN hardware register response timeout
DTC	P142100	LIN hardware register response timeout
DTC	P14AE00	Starter feedback voltage signal line (KL50r) circuit shorted to power supply or R1 relay stuck
DTC	P14AF00	Starter feedback voltage signal line (KL50r) circuit shorted to ground
DTC	P26F200	Drive chain status relay R2 (PT State Relay) stuck closed
DTC	P26F100	Crank relay R1 or PT state relay R2 stuck open
DTC	P14AC00	Starter damage or starter power supply circuit interrupted
DTC	P14AD00	Engine stalling or starter failure to mesh with flywheel
DTC	P153800	Ignition angle signal, harness or ECU fault
DTC	P152700	First layer safety fuel cutoff monitoring fault
DTC	P152800	Second layer safety fuel cutoff monitoring fault
DTC	P061C00	Second layer engine speed monitoring fault
DTC	P152900	Starter control monitoring fault
DTC	P153000	AD converter zero test monitoring fault
DTC	P153100	AD converter set voltage test monitoring fault
DTC	P157100	Drive stage check fault or communication failure in the shutdown path check
DTC	P157200	ABE activated at normal voltage
DTC	P157300	Monitoring error response fault

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DTC	P157400	Errorpin activated with normal monitoring communication
DTC	P261000	Engine off timer implausible
DTC	P157500	DVE drive cutoff due to overvoltage
DTC	P155000	Electronic throttle self-learning condition not met
DTC	P155100	Electronic throttle lower limit position initialization self-learning fault
DTC	P155600	Throttle mechanical BDC re-self-learning maximum error
DTC	P155700	Throttle mechanical BDC re-self-learning ninimum value error
DTC	P155800	Deviation of throttle limp home position from initial self-learning value out of limit
DTC	P155900	Throttle limp position above upper limit
DTC	P155A00	Deviation of throttle limp home position from last self-learning value out of limit
DTC	P155B00	Throttle limp position below lower limit
DTC	P155400	Return spring stuck in maximum position
DTC	P155500	Return spring stuck in minimum position
DTC	P156100	DVE position control deviation
DTC	P156000	Throttle body PID adjustment out of limit
DTC	P15A000	CPU0: MPU fault (register, DSPR, PSPR)
DTC	P15A100	CPU0: DCACHE/DSPRECC uncorrectable
DTC	P15A200	CPU0: DCACHE/DSPR address failure
DTC	P15A300	CPU0: DCACHE TAG SRAM ECC uncorrectable
DTC	P15A400	CPU0: DCACHE TAG SRAM address failure
DTC	P15A500	CPU0: PCACHE TAGRAM ECC uncorrectable
DTC	P15A600	CPU0: PCACHE TAGRAM address failure

DTC	P15A700	CPU0: PCACHE/PSPR ECC uncorrectable
DTC	P15A800	CPU0: PCACHE/PSPR address failure
DTC	P15A900	CPU1: Lockstep comparator fault
DTC	P15AA00	CPU1: MPU fault (register, DSPR, PSPR)
DTC	P15AB00	CPU1: DCACHE/DSPR ECC uncorrectable
DTC	P15AC00	CPU1: DCACHE/DSPR address failure
DTC	P15AD00	CPU1: DCACHE TAGRAM ECC uncorrectable
DTC	P15AE00	CPU1: DCACHE TAGRAM address failure
DTC	P15AF00	CPU1: PCACHE TAGRAM ECC uncorrectable
DTC	P15B000	CPU1: PCACHE TAGRAM address failure
DTC	P15B100	CPU1: PCACHE/PSPR ECC uncorrectable
DTC	P15B200	CPU1:PCACHE/PSPR address failure
DTC	P15B300	LMU: SRAM ECC monitoring fault
DTC	P15B400	LMU: SRAM ECC uncorrectable
DTC	P15B500	LMU: SRAM address failure
DTC	P15B600	SMU: Timer0 recovery timeout
DTC	P15B700	SMU: Timer1 recovery timeout
DTC	P15B800	PMU: PFLASH ECC uncorrectable multiple bit faults
DTC	P15B900	PMU: PFLASH address failure
DTC	P15BA00	PMU: PFLASH ECC monitoring fault (covering all ECC modules)
DTC	P15BB00	PMU: PFLASH EDC comparator failure (covering all PFLASH instances)
DTC	P15BC00	SCU/CGU: system PLL OSC_WDT: input clock out of limit
DTC	P15BD00	SCU/CGU: system PLL VCO clock event loss
DTC	P15BE00	SCU/EVR: EVR 1.3 V digital undervoltage

DTC	P15BF00	SCU/EVR: EVR 3.3 V overvoltage
DTC	P15C000	SCU/EVR: external power supply overvoltage
DTC	P15C100	SCU/WDTS: safety watchdog timeout
DTC	P15C200	SCU/WDTCPU0: watchdog CPU0 timeout
DTC	P15C300	SCU/WDTCPU1: watchdog CPU1 timeout
DTC	P15C400	SCU/CGU: PLL_ERAY VCO clock event loss
DTC	P15C500	SCU/WDTCPU2: watchdog CPU2 timeout
DTC	P15C600	SCU/ DTS: temperature sensor overflow
DTC	P15C700	Registers: fault detected by register monitoring
DTC	P15C800	SCU/LSCU: SCU configuration failure: monitoring dual-rail property (reverse signal) from lockstep comparator (LSCU) alarm
DTC	P15C900	SCU/CGU: clock monitoring: STM out of frequency range
DTC	P15CA00	SCU/CGU: clock monitoring: PLL_ERAY out of frequency range
DTC	P15CB00	SCU/CGU: clock monitoring: PLL out of frequency range
DTC	P15CC00	SCU/CGU: clock monitoring: SRI out of frequency range
DTC	P15CD00	SCU/CGU: clock monitoring: SPB out of frequency range
DTC	P15CE00	SCU/CGU: clock monitoring: GTM out of frequency range
DTC	P15CF00	SCU/CGU: clock monitoring: ADC out of frequency range
DTC	P15D000	GTM: SRAMs uncorrectable
DTC	P15D100	FLEXRAY: SRAM address failure
DTC	P15D200	Misc SRAMs: SRAM ECC uncorrectable
DTC	P15D300	Misc SRAMs: SRAM address failure

DTC	P15D400	GTM: SRAMs address failure
DTC	P15D500	CAN: SRAM uncorrectable
DTC	P15D600	CAN: SRAM address failure
DTC	P15D700	FLEXRAY: SRAM ECC uncorrectable
DTC	P15D800	CPU2: MPU fault (register, DSPR, PSPR)
DTC	P15D900	CPU2: DCACHE/DSPR ECC uncorrectable
DTC	P15DA00	CPU2: DCACHE/DSPR address failure
DTC	P15DB00	CPU2: DCACHE TAG SRAM ECC uncorrectable
DTC	P15DD00	CPU2: 121 PCACHE TAGRAM ECC uncorrectable
DTC	P15DE00	CPU2: PCACHE TAGRAM address failure
DTC	P15DF00	CPU2: PCACHE/PSPR ECC uncorrectable
DTC	P15E000	CPU2 PCACHE/PSPR address failure
DTC	P210300	Electronic throttle drive stage fault (short circuit)
DTC	P211800	Electronic throttle drive stage fault (overheat or overcurrent)
DTC	P210600	Electronic throttle drive stage fault (implausible)
DTC	P210000	Electronic throttle drive stage fault (open circuit)
DTC	P213800	Electronic accelerator pedal position sensor signal implausible
DTC	P212300	Electronic accelerator pedal position sensor 1 signal overvoltage
DTC	P212800	Electronic accelerator pedal position sensor 2 signal overvoltage
DTC	P212200	Electronic accelerator pedal position sensor 1 signal undervoltage
DTC	P212700	Electronic accelerator pedal position sensor 2 signal undervoltage

DTC	P214800	1# and 4# cylinder fuel injector high side control circuit overvoltage/undervoltage or 4# cylinder fuel injector low side control circuit overvoltage/undervoltage
DTC	P215100	2# and 3# cylinder fuel injector high side control circuit overvoltage/undervoltage or #2 cylinder fuel injector low side control circuit overvoltage/undervoltage
DTC	P217700	Air-fuel ratio closed-loop control self-learning value above upper limit (medium load zone)
DTC	P217800	Air-fuel ratio closed-loop control self-learning value below lower limit (medium load zone)
DTC	P218700	Air-fuel ratio closed-loop control self-learning value above upper limit (idle speed)
DTC	P218800	Air-fuel ratio closed-loop control self-learning value below lower limit (idle speed)
DTC	P218500	Coolant temperature sensor 2 circuit overvoltage
DTC	P218400	Coolant temperature sensor 2 circuit undervoltage
DTC	P218324	Coolant temperature sensor 2 cold start check implausible (positive deviation)
DTC	P218323	Coolant temperature sensor 2 cold start check implausible (negative deviation)
DTC	P222900	Ambient pressure sensor circuit shorted to power supply
DTC	P222800	Ambient pressure sensor circuit shorted to ground
DTC	P222729	Ambient pressure sensor signal fault
DTC	P222722	Ambient pressure sensor pressure implausibly high

DTC	P222721	Ambient pressure sensor pressure implausibly low
DTC	P222785	Ambient pressure sensor signal pressure value high during starting
DTC	P222784	Ambient pressure sensor signal pressure value low during starting
DTC	P120200	Ambient pressure sensor pressure above upper limit
DTC	P120300	Ambient pressure sensor pressure below lower limit
DTC	P223200	Coupling of downstream oxygen sensor signal line to heater wire
DTC	P227000	Downstream oxygen sensor aging - signal biased lean continuously
DTC	P227100	Downstream oxygen sensor aging - signal biased rick continuously
DTC	P227900	Excessive inflation model deviation
DTC	P240C00	EVAP system leakage diagnosis DMTL heating unit circuit overvoltage
DTC	P240B00	EVAP system leakage diagnosis DMTL heating unit circuit undervoltage
DTC	P240A00	EVAP system leakage diagnosis DMTL heating unit circuit open
DTC	P24BF00	EVAP system DMTL solenoid valve control circuit overvoltage
DTC	P24BE00	EVAP system DMTL solenoid valve control circuit undervoltage
DTC	P24BD00	EVAP system DMTL solenoid valve control circuit open
DTC	P240200	EVAP system DMTL pump control circuit overvoltage
DTC	P240100	EVAP system DMTL pump control circuit undervoltage

DTC	P240000	EVAP system DMTL pump control circuit open
DTC	P25AB00	Piston cooling nozzle control valve control circuit overvoltage
DTC	P25AA00	Piston cooling nozzle control valve control circuit undervoltage
DTC	P25A900	Piston cooling nozzle control valve control circuit open
DTC	P26E600	Starter relay control circuit overvoltage
DTC	P26E500	Starter relay control circuit undervoltage
DTC	P061500	Starter relay control circuit fault-control terminal A
DTC	P061700	Starter relay control circuit overvoltage
DTC	P061600	Starter relay control circuit undervoltage
DTC	P26E400	Starter relay control circuit fault-control terminal B
DTC	P063441	Starter drive chip 1 overheating
DTC	P150000	Collision and fuel cutoff signal received by vehicle
DTC	P150100	Airbag communication information implausible
DTC	P150200	Collision and fuel cutoff signal received by vehicle
DTC	P150300	Airbag signal implausible
DTC	P138824	Ambient temperature sensor cold start check implausible (positive deviation)
DTC	P138823	Ambient temperature sensor cold start check implausible (negative deviation)
DTC	P007300	Ambient temperature sensor circuit overvoltage
DTC	P007200	Ambient temperature sensor circuit undervoltage

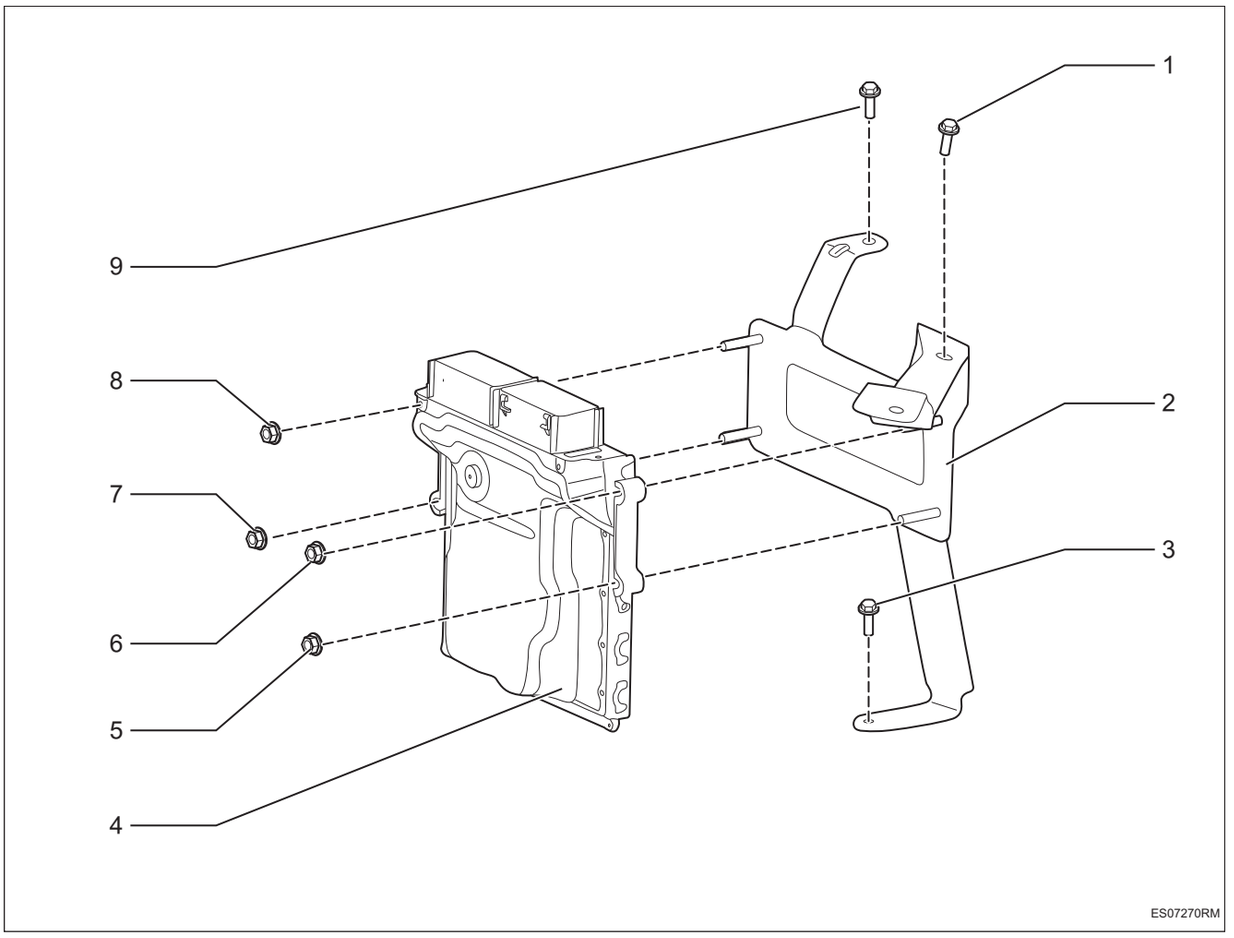
DTC	P007000	Lost communication with ambient temperature sensor CAN
DTC	P003300	Turbocharger relief valve control circuit open
DTC	P003400	Turbocharger relief valve control circuit undervoltage
DTC	P003500	Turbocharger relief valve control circuit overvoltage
DTC	P226100	Turbocharger relief valve mechanical fault
DTC	P261D00	Turbocharger electronic coolant pump control circuit overvoltage
DTC	P261C00	Turbocharger electronic coolant pump control circuit undervoltage/implausibility
DTC	P261A00	Turbocharger electronic coolant pump control circuit open

Inspection procedure

Note: For the DTCs in the above table, please refer to the relevant contents of EMS (2.0 T and 1.8 T) and the circuit diagram manual for specific analysis steps.

ECM assembly

Parts



1. **Hexagon flange bolt**
   - Torque: 8 ~ 12 N·m
2. **ECM bracket assembly**
3. **Hexagon flange bolt**
   - Torque: 8~12 N · m
4. **ECM assembly**
5. **Hexagon flange nut**
   - Torque: 8~12 N · m
6. **Hexagon flange nut**
   - Torque: 8 ~ 12 N·m
7. **Hexagon flange nut**
   - Torque: 8 ~ 12 N·m
8. **Hexagon flange nut**
   - Torque: 8 ~ 12 N·m

9. Hexagon flange bolt

- Torque: 8 ~ 12 N·m

ES

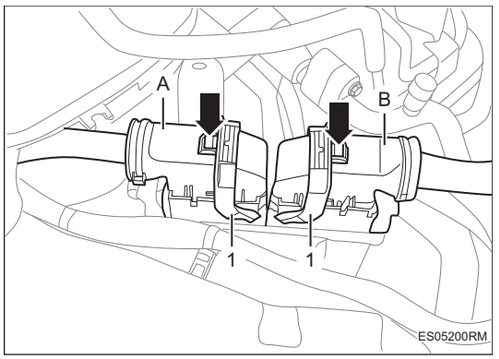
Removal

1. Remove 1.5 T ECM assembly

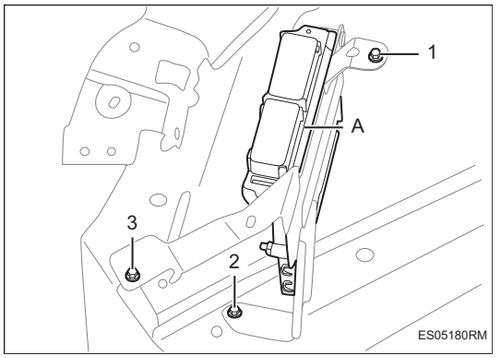
(a) Refer to ECM assembly (2.0T) for removal steps.

2. Remove ECM assembly (only for HEV models)

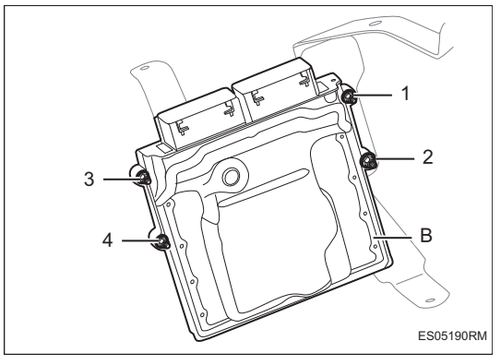
(a) Press down -arrow- to pull up the connector locking device -1-, and remove the harness connector -A-B-.



(b) Remove the bolts -1-3-, and remove the ECM and fixing bracket -A-.

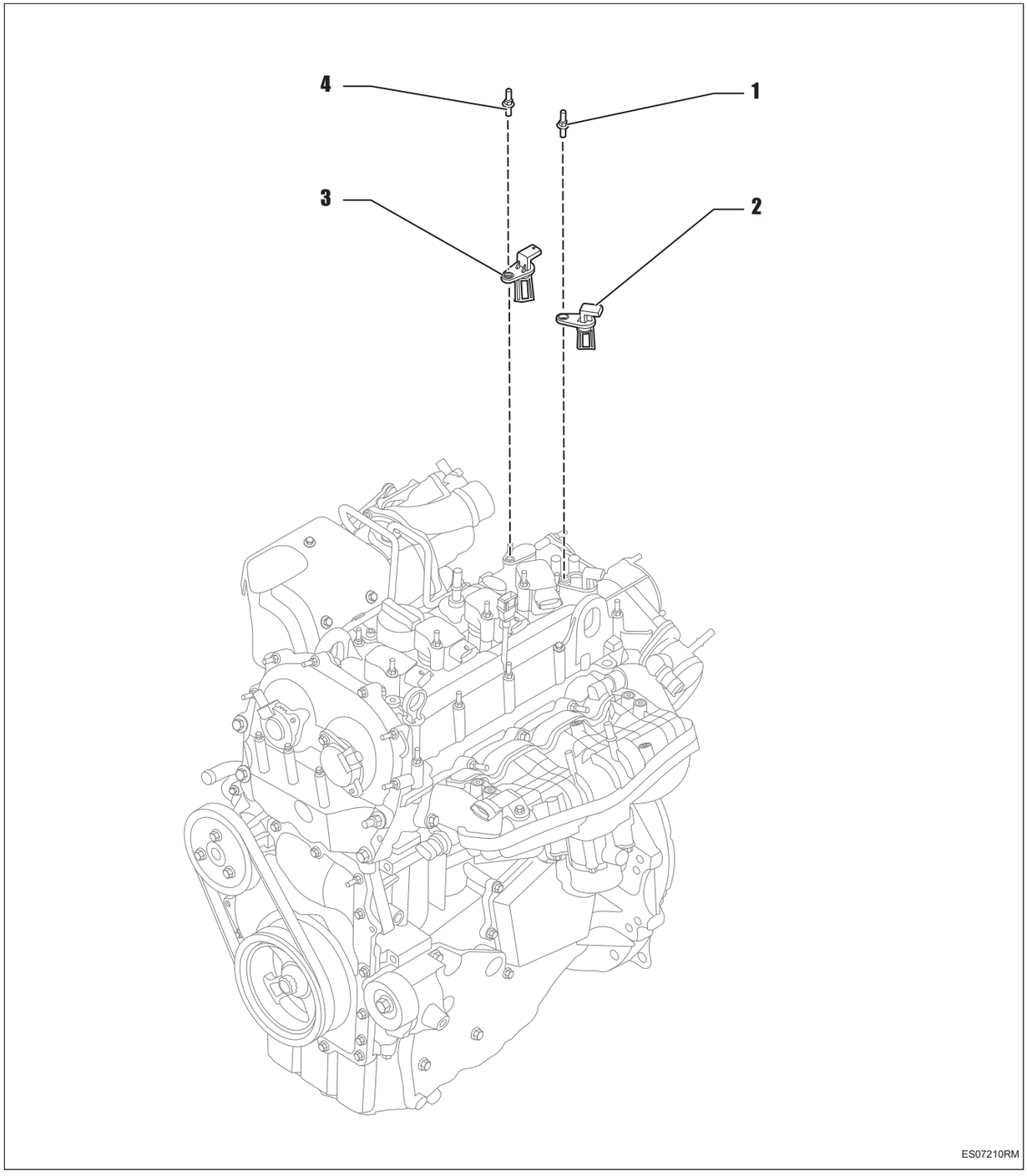


(c) Remove the nut -1-4- and remove the ECM assembly-B-.



Camshaft position sensor

Parts



1. **Stud**
   - Torque: 8~12 N · m
2. **Intake camshaft position sensor**
3. **Exhaust camshaft position sensor**

4. Stud

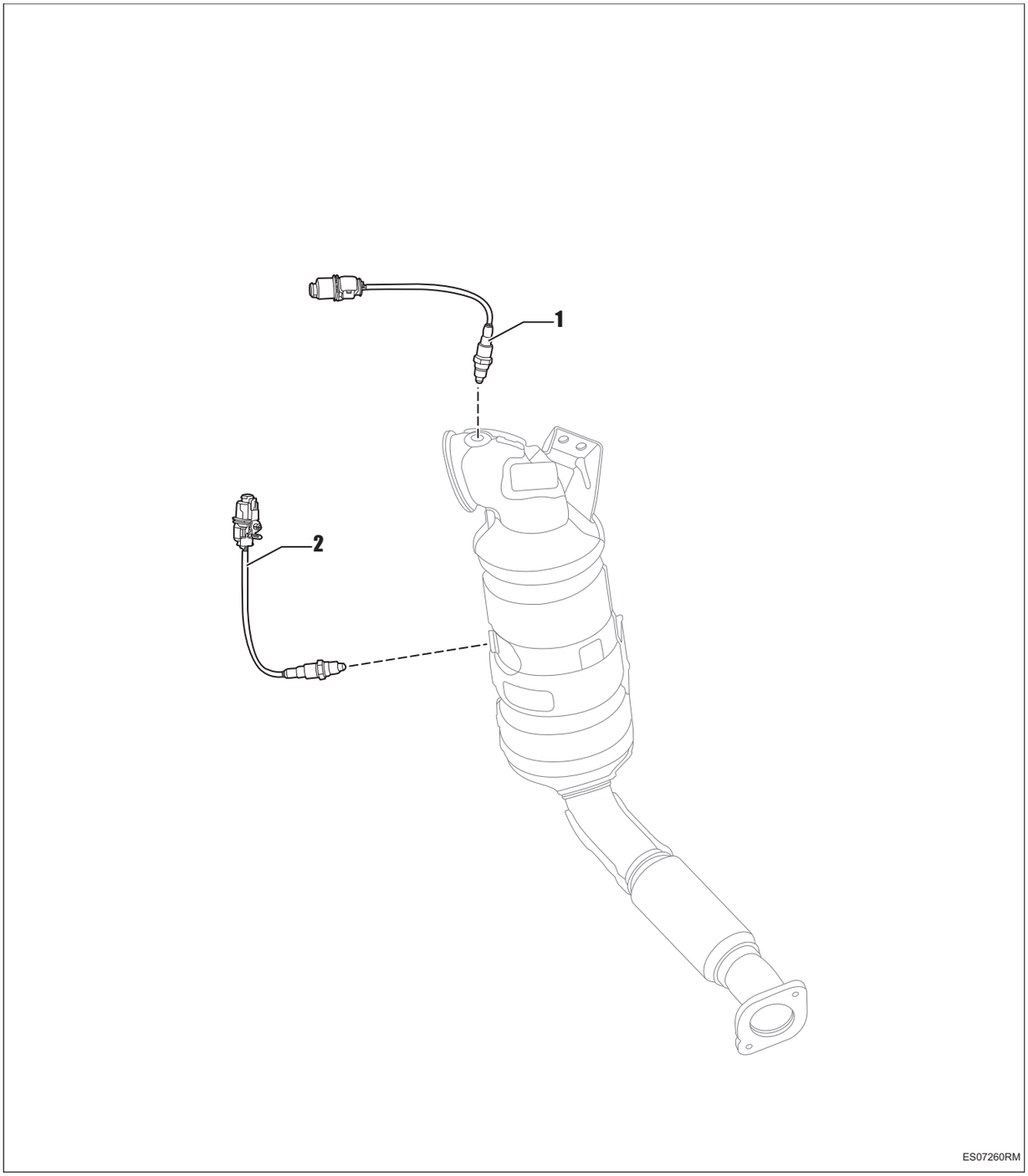
- Torque: 8~12 N · m

Removal

1. **Remove the intake and exhaust camshaft position sensors**
   (a) Refer to engine intake/exhaust camshaft position sensor (2.0T) for removal steps.

Upstream oxygen sensor assembly

Parts



1. **Upstream oxygen sensor**
   - Torque: 40~60 N · m

2. Downstream oxygen sensor

- Torque: 40~60 N · m

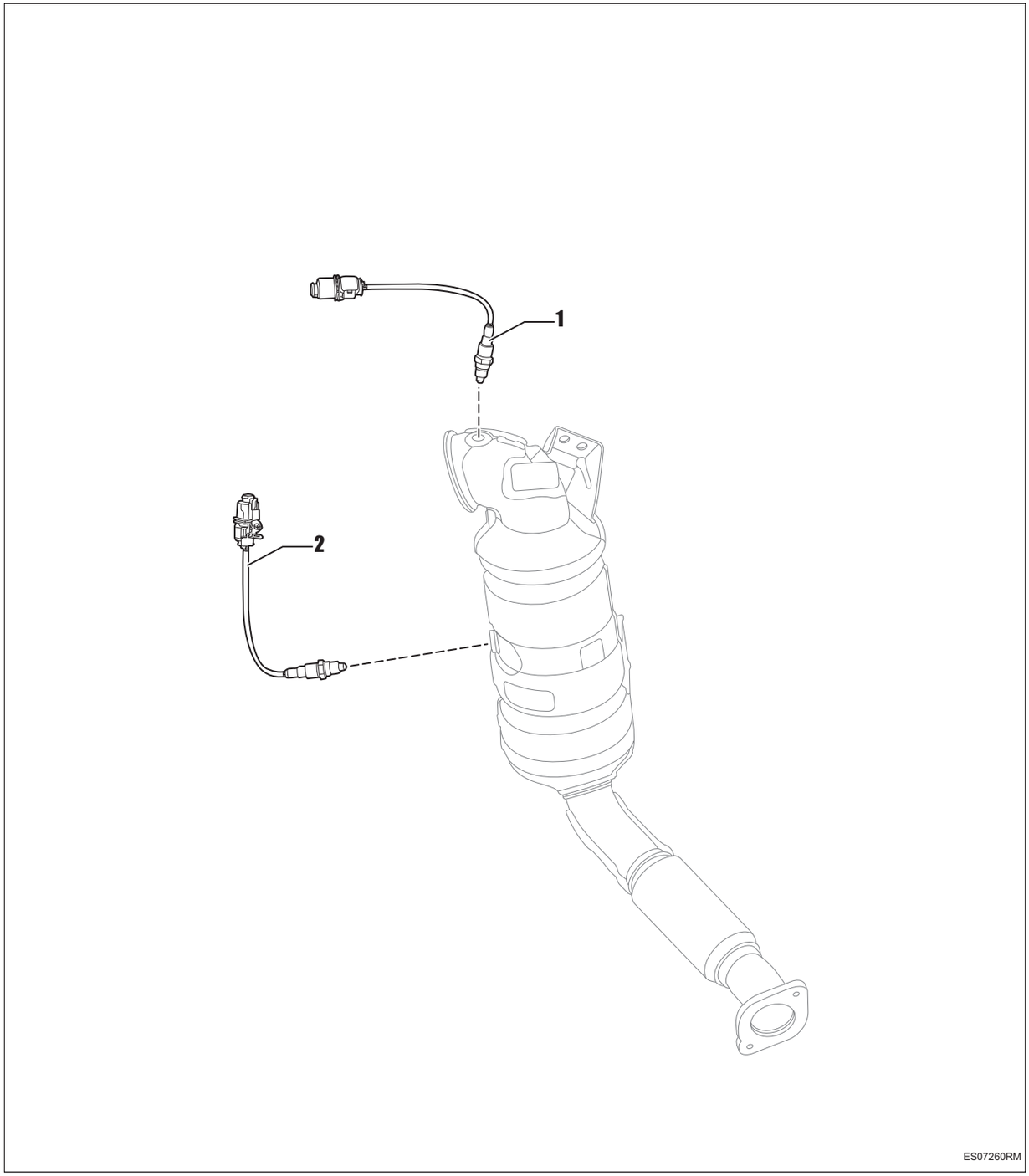
Removal

1. **Remove upstream oxygen sensor**

   (a) Refer to engine upstream oxygen sensor (2.0T) for removal steps.

Downstream oxygen sensor

Parts



1. **Upstream oxygen sensor**
   - Torque: 40~60 N · m
2. **Downstream oxygen sensor**
   - Torque: 40~60 N · m

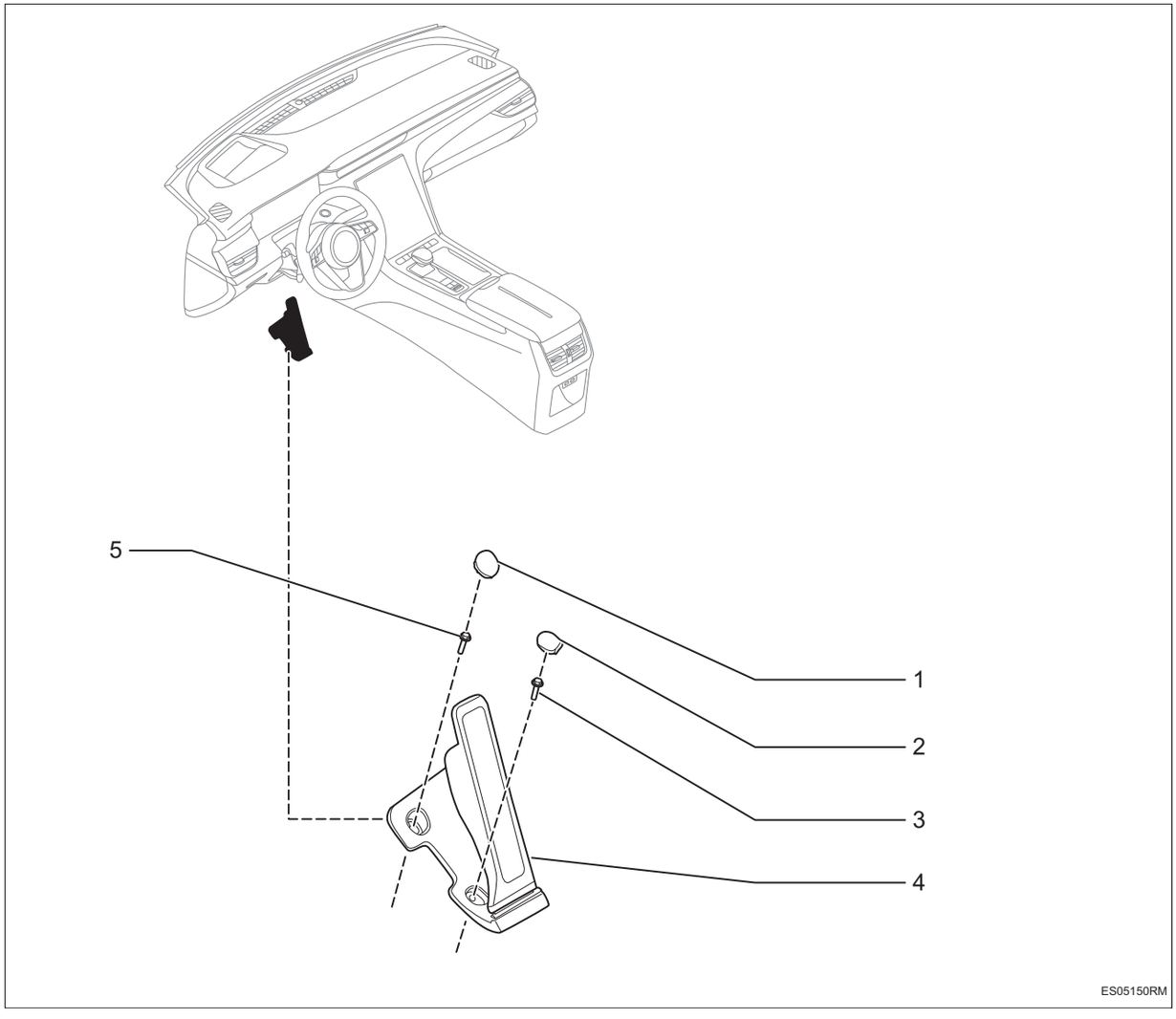
Removal

1. Remove downstream oxygen sensor

(a) Refer to engine downstream oxygen sensor (2.0T) for removal steps.

Electric accelerator pedal

Parts



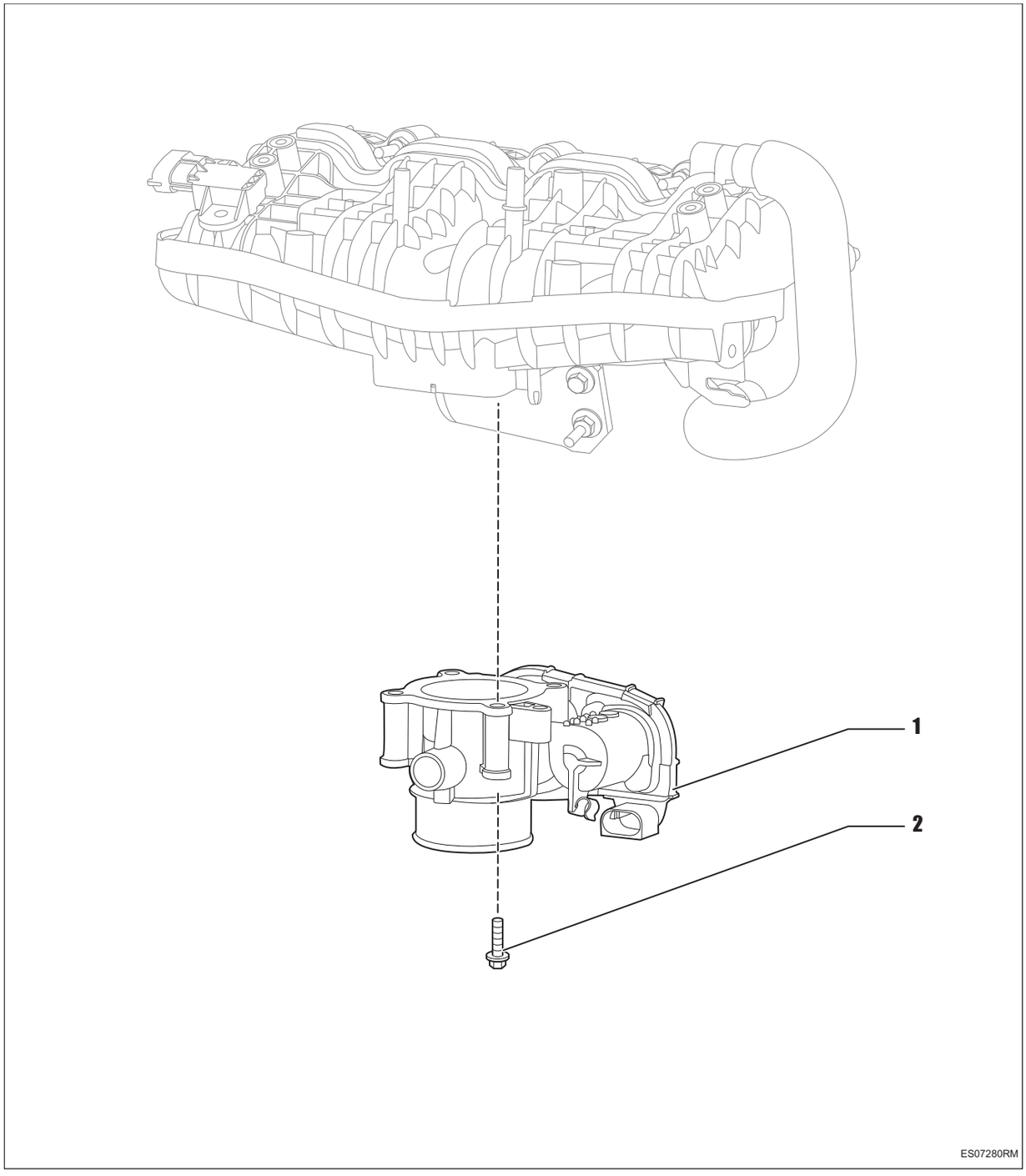
1. **Baffle plate**
2. **Baffle plate**
3. **Hexagon flange bolt**
   - Torque: 8~12 N · m
4. **Electronic accelerator pedal assembly**
5. **Hexagon flange bolt**
   - Torque: 8~12 N · m

Removal

1. **Remove electronic accelerator pedal**
   (a) Refer to engine electronic accelerator pedal (2.0T) for removal steps.

Electronic throttle body assembly

Parts



1. **Electronic throttle body assembly**

2. Hexagon flange bolt

- X4
- Torque: 8~12 N · m

Removal

1. **Remove electronic throttle body assembly**

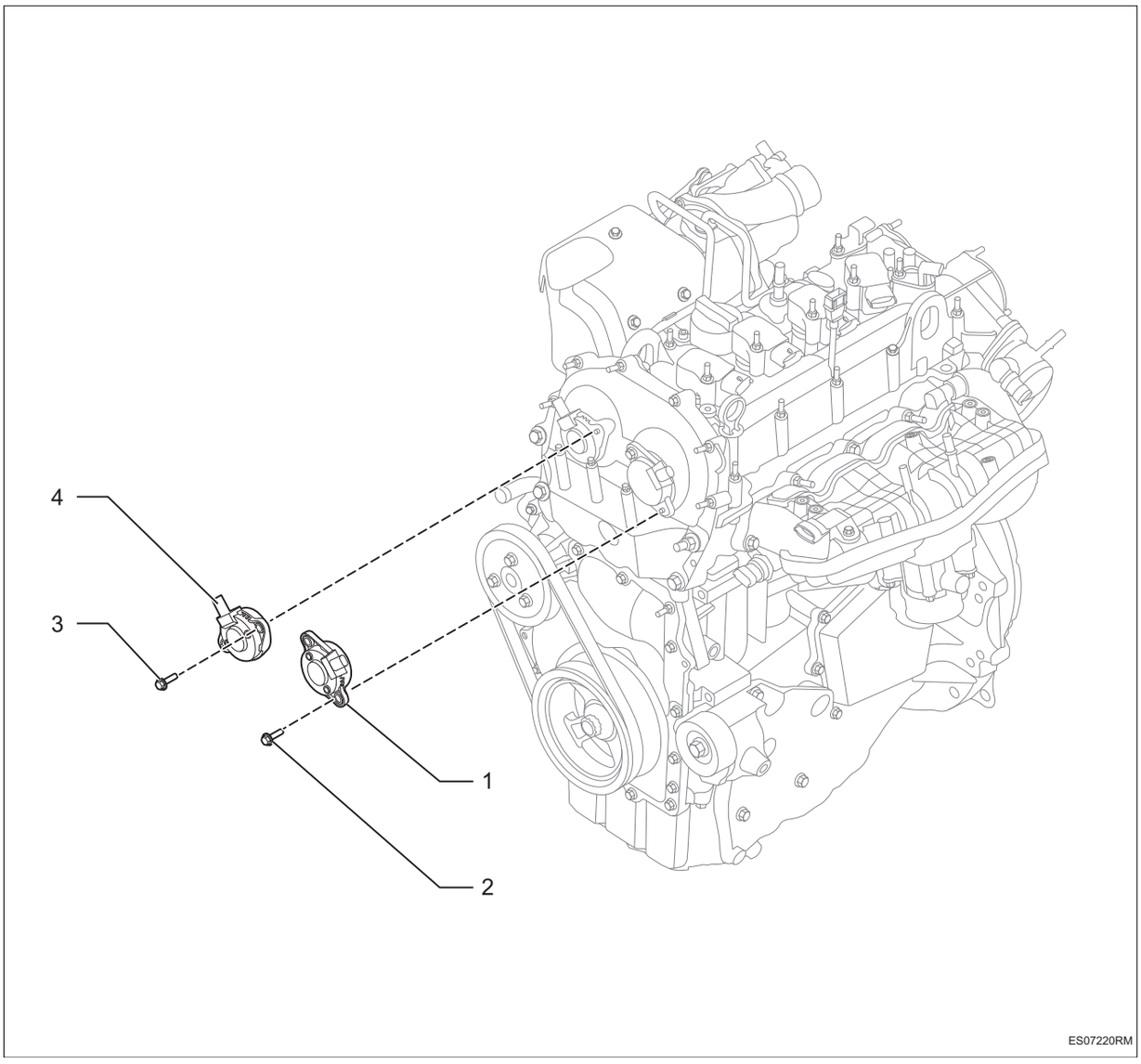
   Caution:

   Do not damage the electronic throttle body assembly seal ring during removal.

   (a) Refer to engine electronic throttle body assembly (2.0T) for removal steps.

Solenoid valve assembly

Parts



1. **Solenoid valve**
2. **Hexagon flange bolt**
   - X2
   - Torque: 8~12 N · m
3. **Hexagon flange bolt**
   - X2
   - Torque: 8~12 N · m
4. **Solenoid valve**

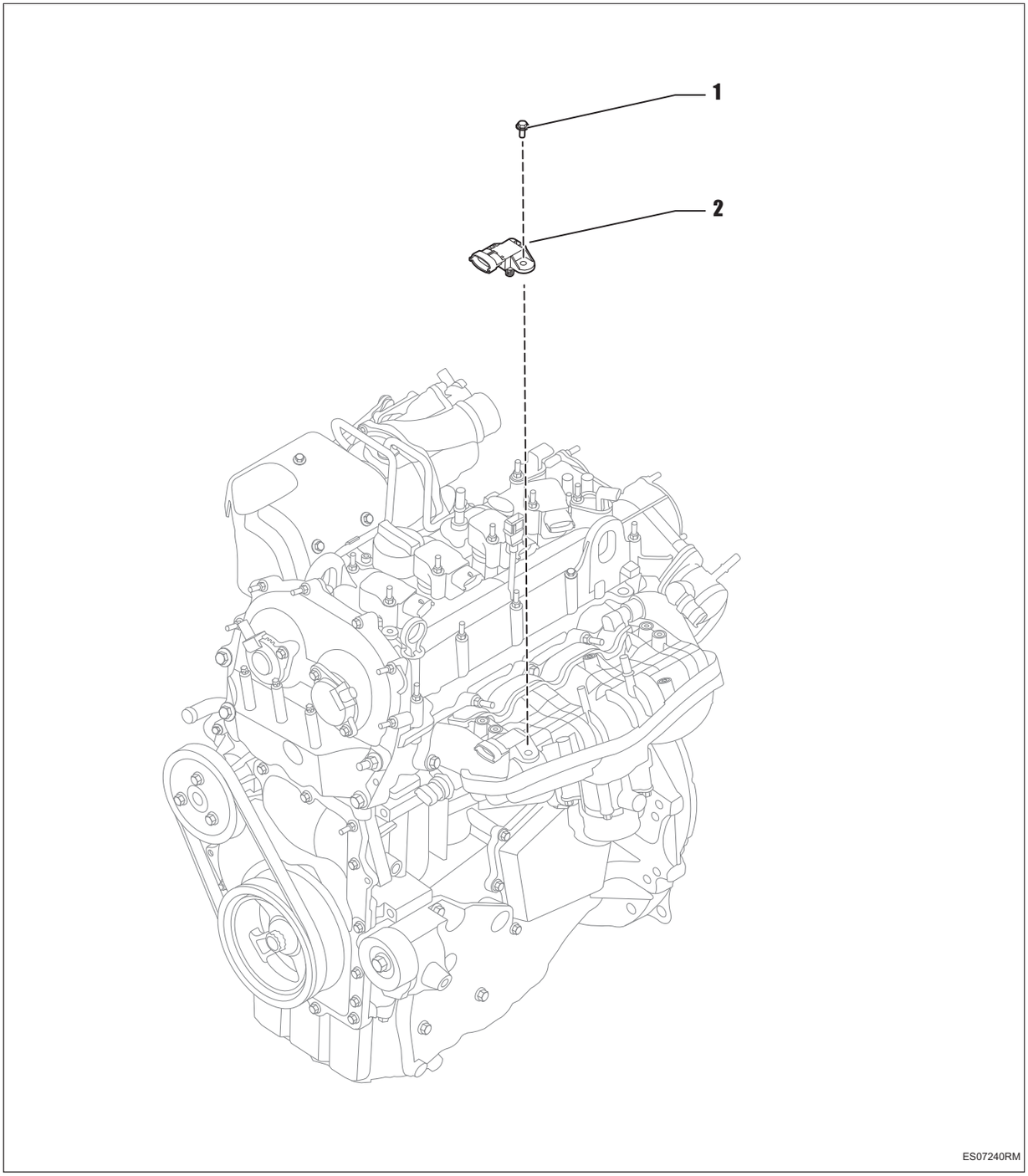
Removal

1. **Remove solenoid valve assembly**

   (a) Refer to engine solenoid valve assembly (2.0T) for removal steps.

MAP/IAT sensor assembly

Parts



1. **Hexagon flange bolt**
   - Torque: 2.7~3.7 N · m
2. **MAP/IAT sensor assembly**

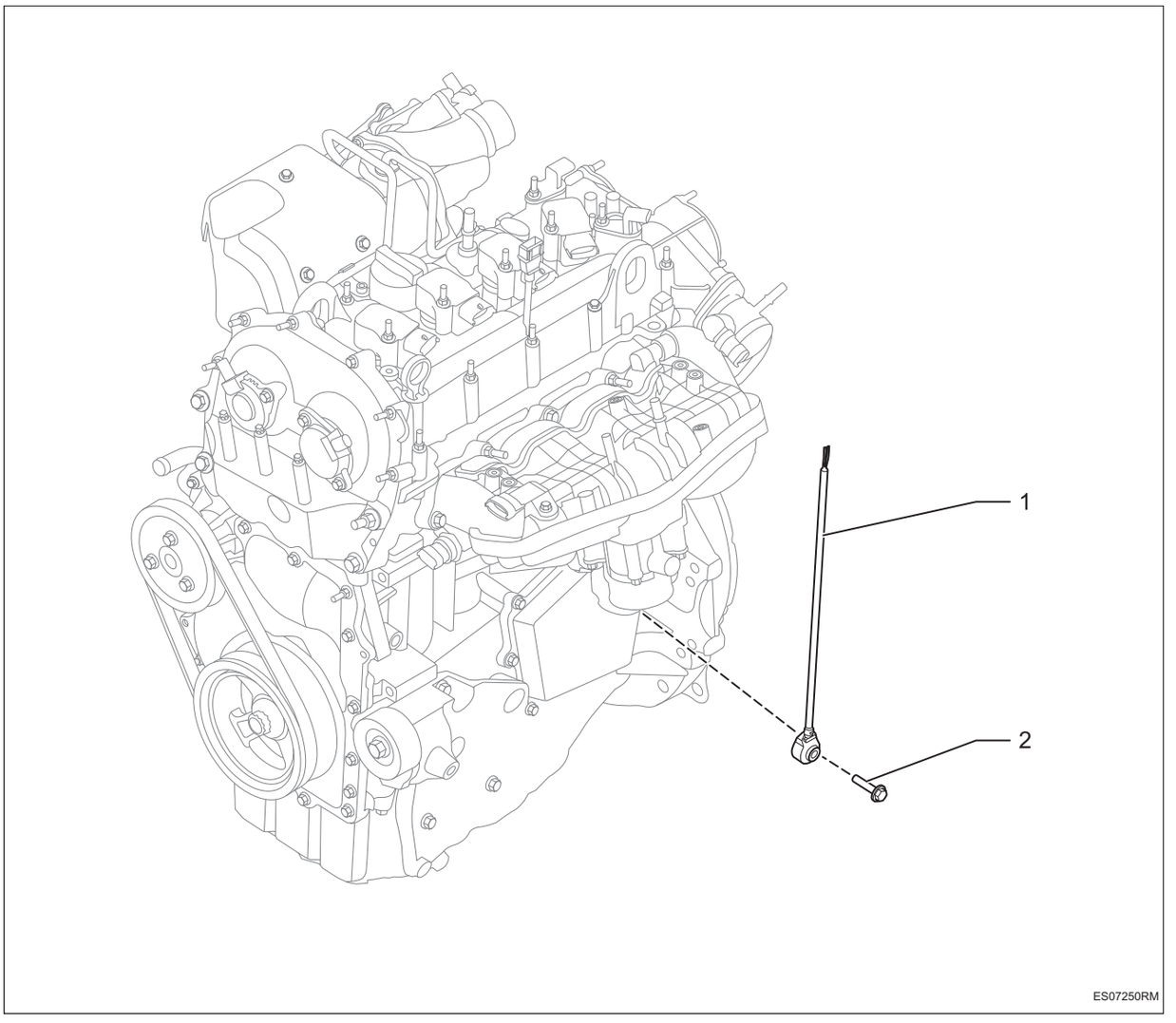
Removal

1. **Remove front MAP/IAT sensor assembly**

   (a) Refer to engine front MAP/IAT sensor assembly (2.0T) for removal steps.

Knock sensor

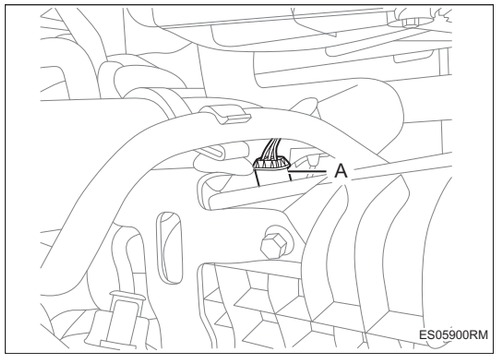
Parts



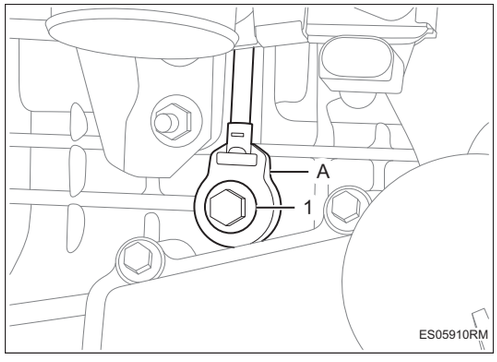
1. **Knock sensor**
2. **Hexagon flange bolt**
   - Torque: 18~22 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-17)**
2. **Remove turbocharger to intercooler pipeline assembly (See page IT-16)**
3. **Remove intercooler to throttle valve pipeline assembly (See page IT-16)**
4. **Remove the knock sensor**



(a) Disconnect knock sensor harness connector-A-.



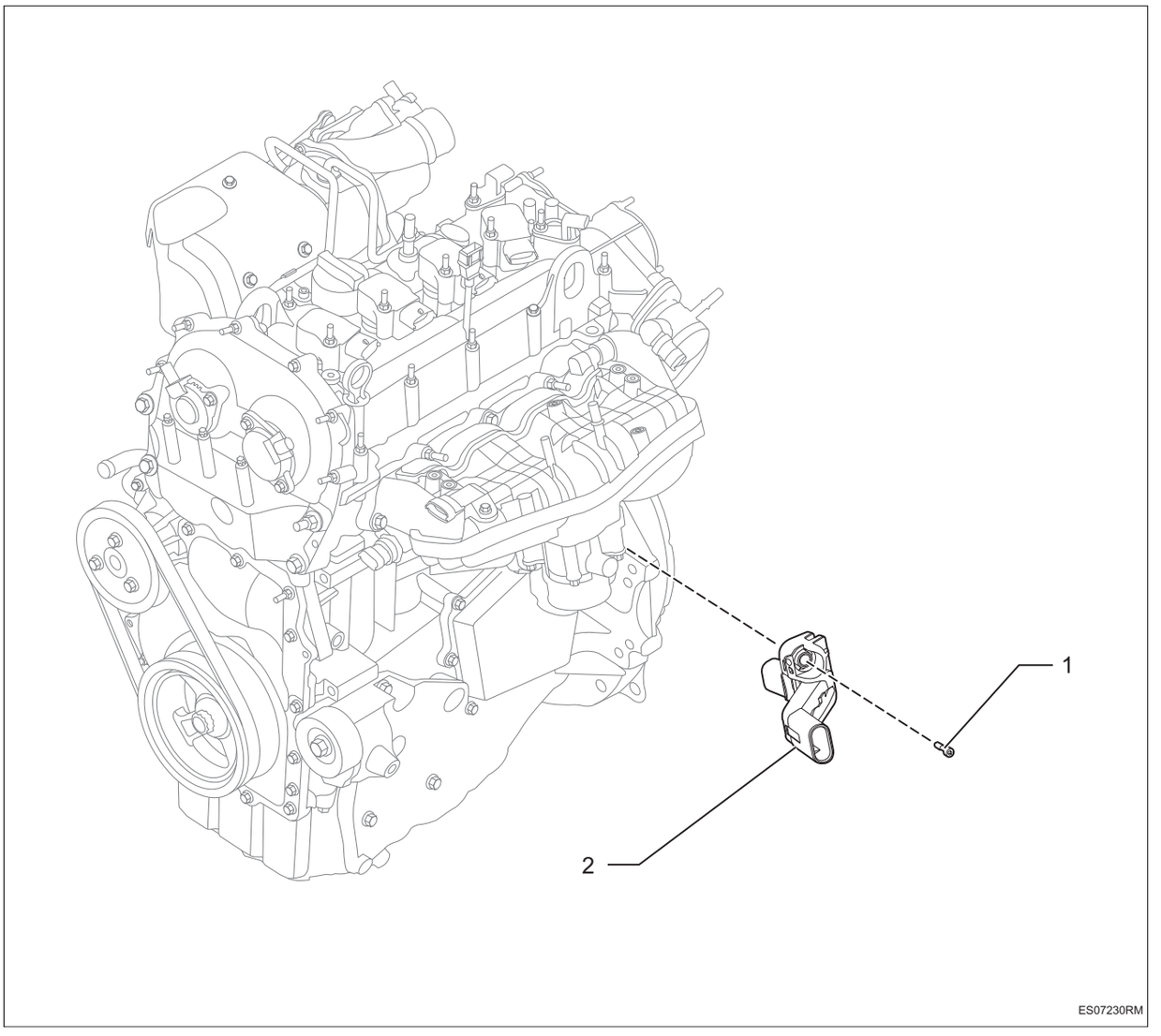
(b) Remove screw -1- and remove knock sensor -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Crankshaft position sensor

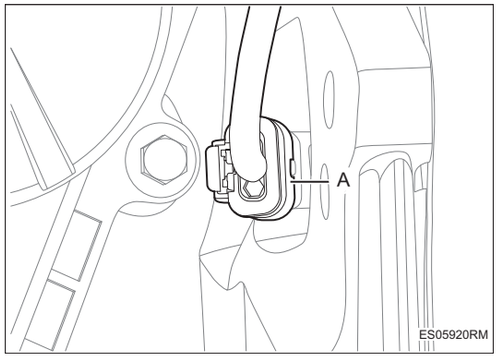
Parts



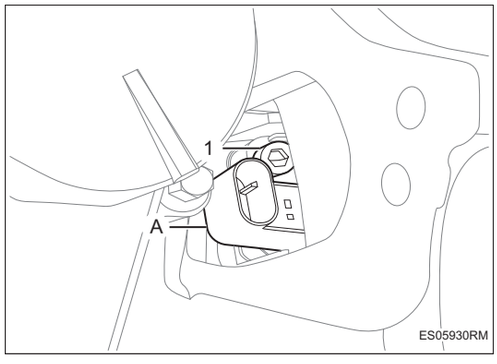
1. **Hexagon socket head cap bolt**
   - Torque: 3.5~5.5 N · m
2. **Crankshaft position sensor**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove engine bottom guard plate assembly (See page ET-34)**
3. **Remove crankshaft position sensor**



(a) Disconnect the harness connector-A-.



(b) Remove bolt -1- and remove crankshaft position sensor -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Engine mechanical system 1.5 T

On-board inspection EM-1

V-ribbed belt EM-3

Parts EM-3

On-board inspection EM-4

Removal EM-4

Installation EM-5

Engine assembly EM-6

Parts EM-6

Removal EM-8

Installation EM-8

ECM EM-9

Parts EM-9

Removal EM-10

Installation EM-20

On-board inspection

1. Check engine oil

2. Check engine coolant

3. Check the drive belt

4. Check air cleaner

(a) Do visual inspection on the air cleaner to check for excessive damage or oil and replace the air cleaner if necessary.

5. Check ignition timing

(a) Warm up the engine.

Hint:

The engine coolant temperature is higher than 90 ℃ , and the engine speed is stable.

(b) Connect the HQ-VDS and read whether the engine data recorder is in the normal range.

Hint:

Check ignition timing, and check that the transmission is in neutral position.

6. Check engine idle speed

(a) Warm up the engine.

Hint:

The engine coolant temperature is higher than 90 ℃ , and the engine speed is stable.

(b) Connect the HQ-VDS and read the engine data recorder.

(c) Idle speed: 700±50 r/min

Hint:

Start and idle the engine so that the transmission should be in neutral position.

Turn off all accessories and A/C before connecting the HQ-VDS.

7. Check cylinder compression pressure

(a) Warm up and stop the engine.

Hint:

The engine coolant temperature is higher than 90 ℃ , and the engine speed is stable.

(b) Remove 4 ignition coils.

(c) Remove 4 spark plugs.

(d) Pull off the fuel pump fuse.

(e) Install a suitable tool to the spark plug hole of cylinder 1 and start the engine to measure cylinder compression pressure.

Hint:

Compression pressure: 16 - 18 bar

Be sure to use a fully charged battery to obtain an engine speed of at least 240 rpm.

(f) Check the compression pressure of cylinders 1, 2, 3 and 4.

Hint:

The inspection procedures of cylinders 2, 3, 4 and 1 are the same.

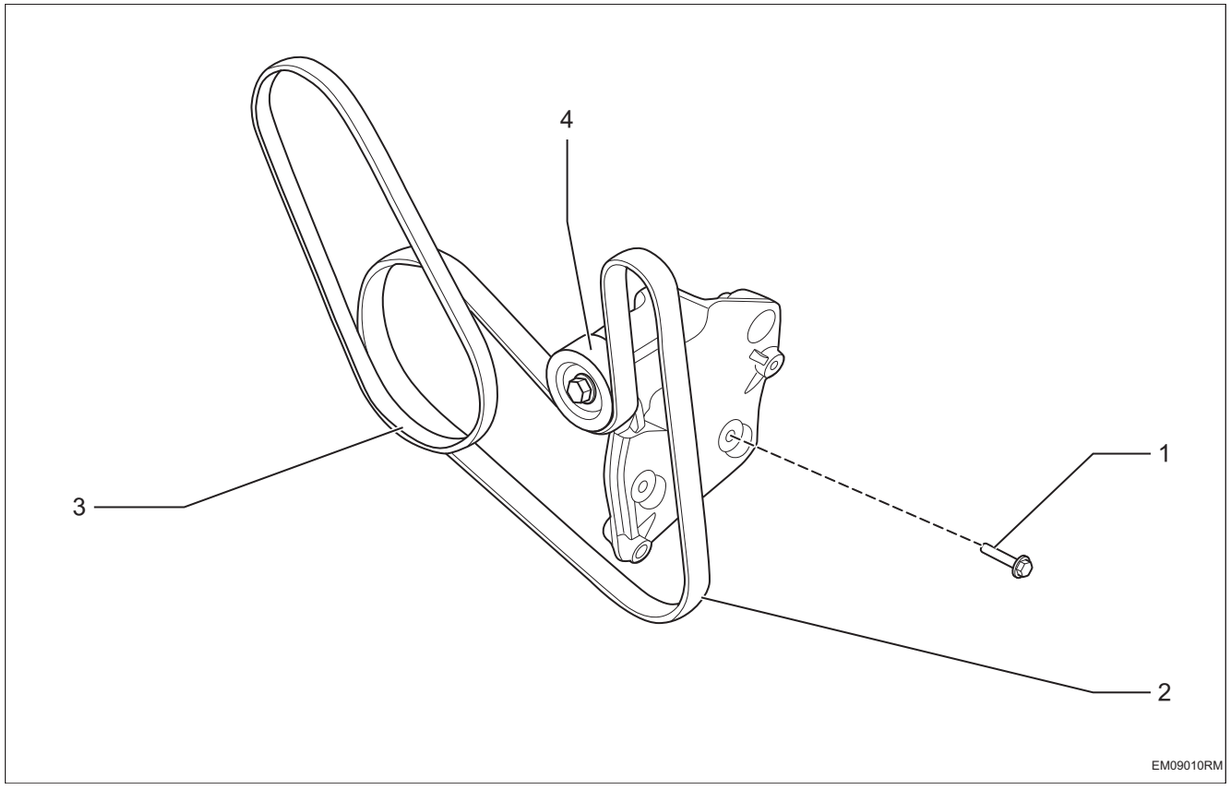
(g) Install 4 spark plugs.

(h) Install 4 ignition coils.

(i) Install the fuel pump fuse.

V-ribbed belt

Parts



1. **Hexagon flange bolt**
   - X5
   - Torque: 22~28 N · m
2. **V-ribbed belt**
3. **Elastic V-ribbed belt**
4. **Automatic tensioner**

On-board inspection

1. Check V-ribbed belt and elastic V-ribbed belt

(a) Visually inspect the V-ribbed belt for excessive wear, missing wires, reinforcement damage, etc.

Hint:

If the above conditions occur, replace the V-ribbed belt.

(b) Visually inspect the V-ribbed belt for cracks.

Hint:

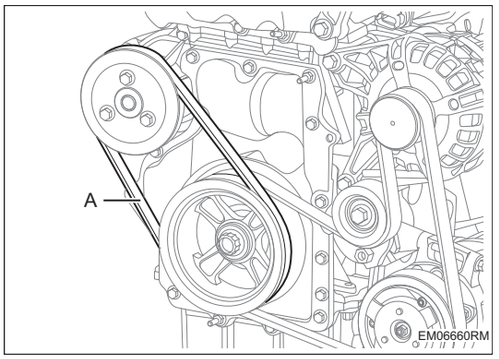
If the above conditions occur, replace the V-ribbed belt.

(c) After the drive V-ribbed belt is installed, check that the belt is completely installed in the pulley groove to prevent the drive V-ribbed belt from slipping out of the pulley groove.

Removal

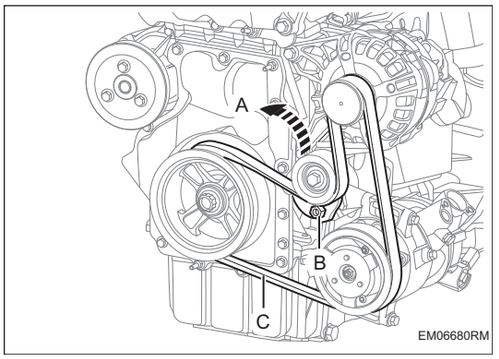
1. Remove elastic V-ribbed belt

(a) Remove elastic V-ribbed belt -A- with a suitable tool.



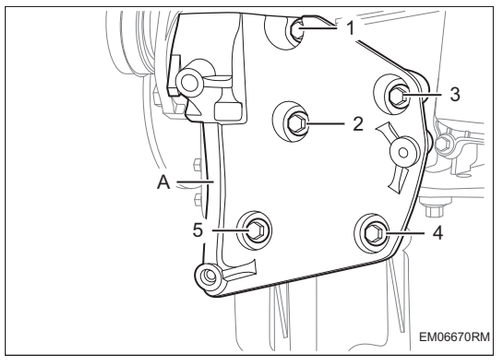
2. Remove V-ribbed belt (only for 1.5 T model)

(a) Use a suitable tool to rotate the tensioner -B- in the direction of -arrow A-, and remove the V-ribbed belt -C-.



3. Remove A/C compressor (See page AC-120)

4. Remove the automatic tensioner



(a) Remove bolts -1-5-, and remove automatic tensioner -A-.

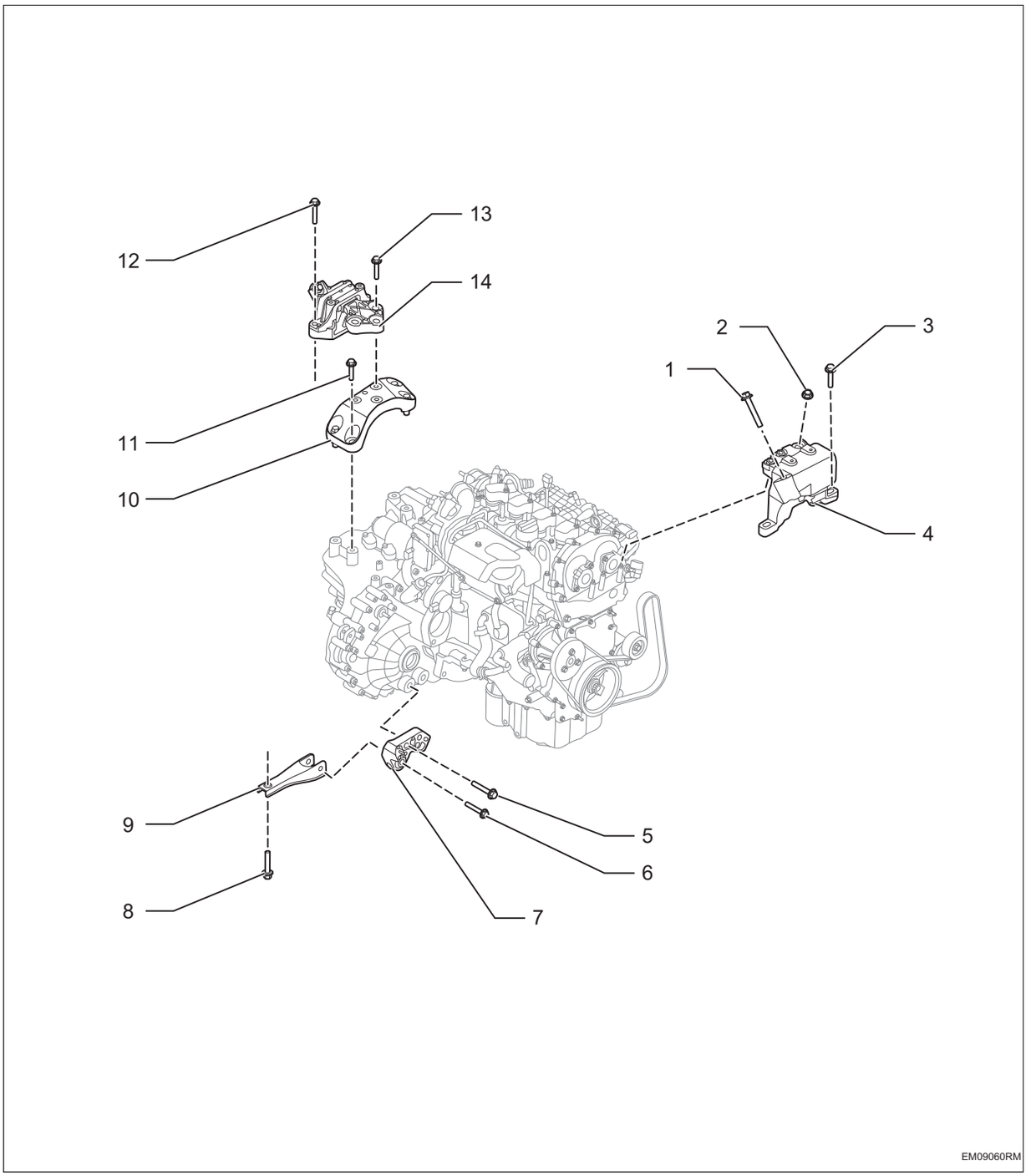
Installation

1. **The installation procedure is the reverse of removal procedure.**

Engine assembly

Parts

EM



1. **Hexagon flange bolt**
   - Torque: 90~110 N · m
2. **Hexagon flange nut**
   - X3
   - Torque: 90~110 N · m

3. **Hexagon flange bolt**
   - X2
   - Torque: 90~110 N · m
4. **Powertrain right mounting assembly**
5. **Hexagon flange bolt**
   - X2
   - Torque: 171~209 N · m
6. **Hexagon flange bolt**
   - Torque: 171~209 N · m
7. **Powertrain rear bracket assembly**
8. **Hexagon flange bolt**
   - Torque: 57~63 N · m +85.5~94.5 °
9. **Powertrain rear mounting tie rod**
10. **Powertrain left bracket**
11. **Hexagon flange bolt**
    - X4
    - Torque: 90~110 N · m
12. **Hexagon flange bolt**
    - X3
    - Torque: 90~110 N · m
13. **Hexagon flange bolt**
    - X3
    - Torque: 90~110 N · m
14. **Powertrain left suspension assembly**

Removal

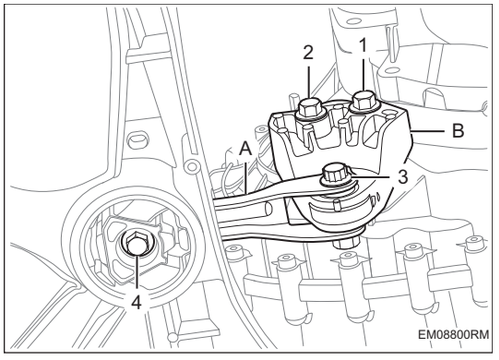
1. Remove engine assembly

Hint:

removal of the powertrain requires two people.

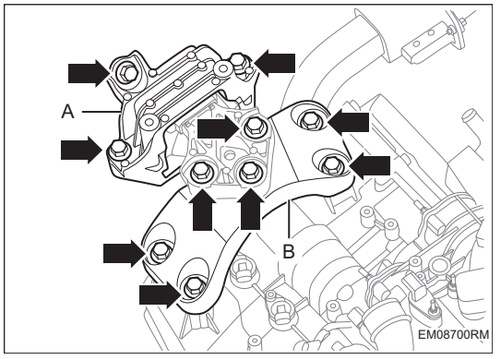
(a) Refer to engine assembly (2.0T) for removal steps.

(b) Remove bolts -1-3- and remove powertrain rear bracket assembly -B-.



(c) Remove bolt -4-, and remove powertrain rear mounting tie rod -A-.

(d) Remove the fixing bolts as arrowed of the power-train left mounting assembly - A - and bracket - B-.



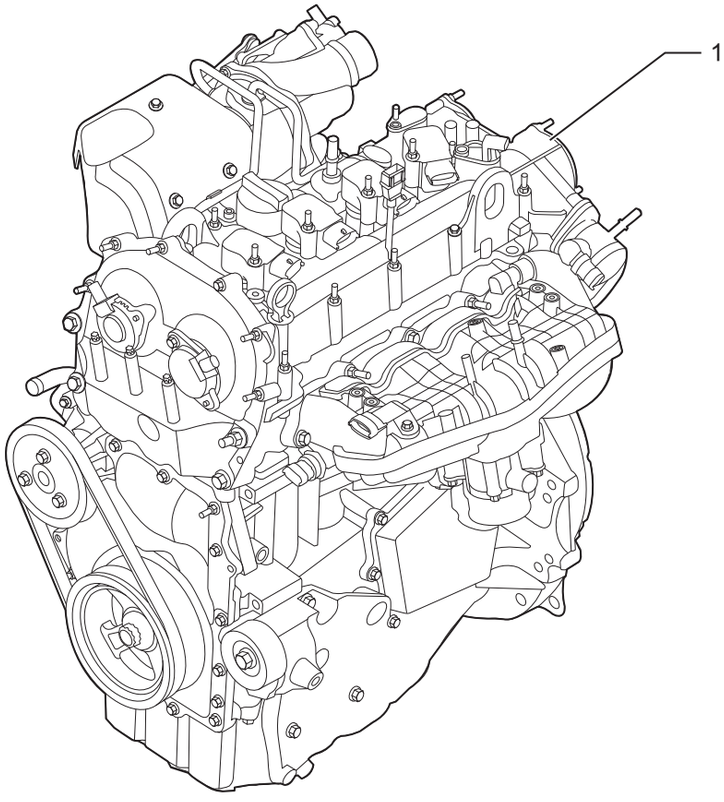
2. Remove transmission assembly (See page AX-230)

Installation

1. The installation procedure is the reverse of removal procedure.

ECM

Parts

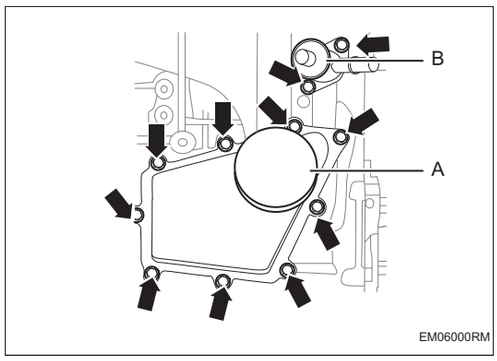


EM09030RM

1. ECM

Removal

1. Remove V-ribbed belt (See page EM-4)
2. Remove tensioner assembly (See page EM-4)
3. Remove the compressor assembly (See page AC-124)
4. Remove the A/C compressor bracket (See page AC-124)
5. Remove alternator (See page CH-8)
6. Remove the alternator bracket (See page CH-8)
7. Remove the ignition coil assembly (See page IG-3)
8. Remove camshaft position sensor assembly (See page ES-59)
9. Remove electronic throttle (See page ES-69)
10. Remove intake manifold assembly (See page IT-4)
11. Additional coolant pump assembly (See page CO-27)
12. Remove the coolant pump assembly (See page CO-22)
13. Remove turbocharger assembly (See page IT-21)
14. Remove exhaust manifold assembly (See page EX-9)
15. Remove crankshaft position sensor assembly (See page ES-77)
16. Remove oil cooler assembly (See page CO-20)
17. Remove oil filter assembly (See page LU-3)
18. Remove oil cooler water outlet pipe assembly (See page CO-20)
19. Remove thermal management module assembly and oil pressure and temperature sensor assembly (See page CO-24)
20. Remove additional coolant pump inlet pipe seat (See page CO-27)
21. Remove engine water inlet pipe (See page CO-7)
22. Remove variable displacement oil pump solenoid valve assembly (See page LU-7)
23. Pull out the oil dipstick
24. Remove the oil-mist separator



(a) Remove the bolt as arrowed, the oil-mist separator and check valve-A-B-.

25. Remove knock sensor assembly (See page ES-75)

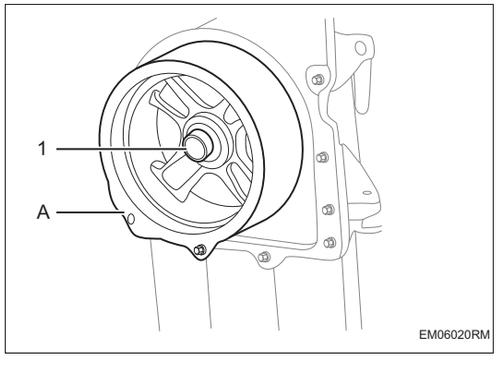
26. Remove the high-pressure fuel pipe (See page FU-5)

27. Remove high-pressure fuel rail assembly (See page FU-5)

28. Remove the high-pressure fuel pump (See page FU-2)

29. Remove the oil sump assembly (See page LU-12)

30. Remove the crankshaft pulley and shock absorber assembly



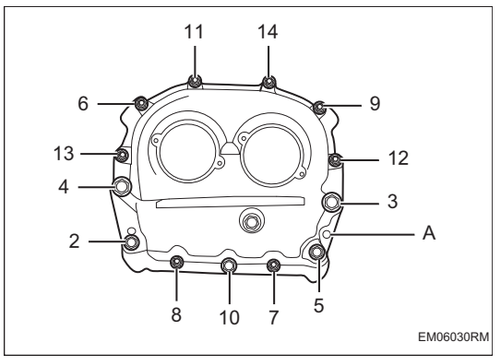
(a) Remove the bolt -1-, and remove the crankshaft pulley and shock absorber assembly-A-.

(b) Remove the crankshaft lock washer -4-.

(c) Remove the pulley transition sleeve -4- and O-ring -3-, and remove the crankshaft lock washer -2-.

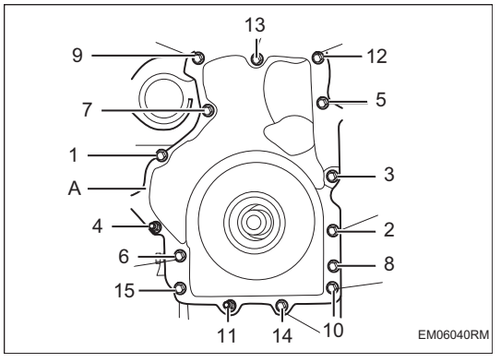
31. Remove solenoid valve assembly (See page ES-71)

32. Remove the chain upper chamber cover assembly



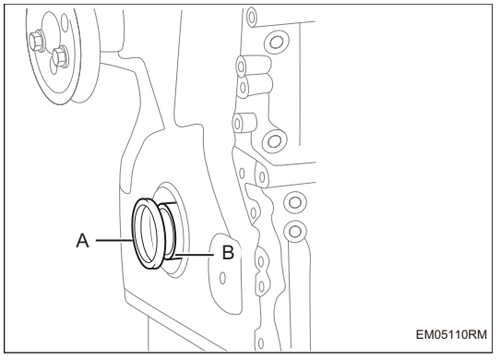
(a) Remove the bolts -1-14-, and remove the chain chamber upper cover assembly -A-.

33. Remove chain chamber lower cover



(a) Remove bolts -1-15-, and remove chain chamber lower cover -A-.

34. Remove crankshaft front oil seal



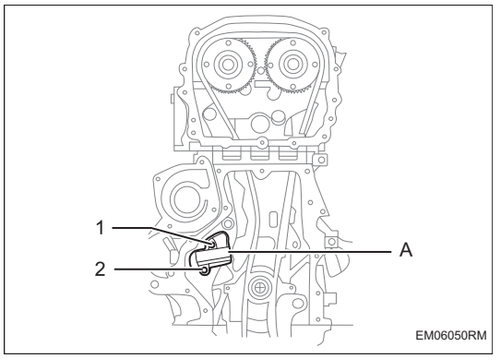
(a) Use a screwdriver to lever off the crankshaft front oil seal -A- from the chain chamber lower cover -B-.

Caution:

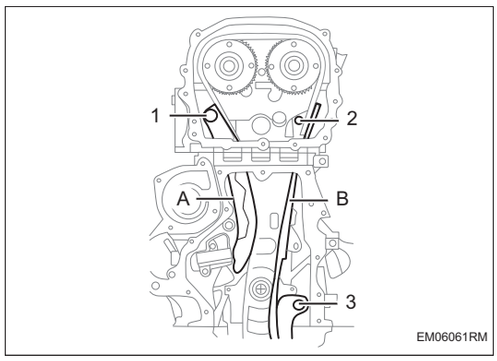
Stick adhesive tape on the tip of the screwdriver before use.

Take care not to damage the oil seal and contact surfaces.

35. Remove camshaft timing chain system

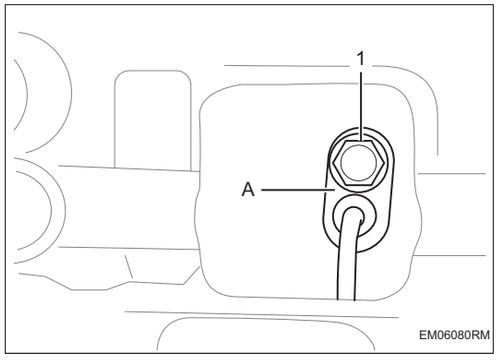


(a) Remove bolts -1-2-, and remove camshaft chain tensioner -A-.

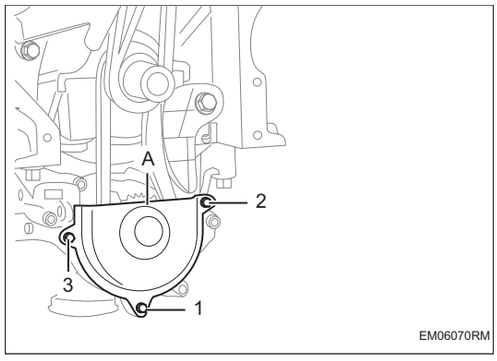


(b) Remove bolt -1- and remove camshaft drive chain tensioner arm -A-.

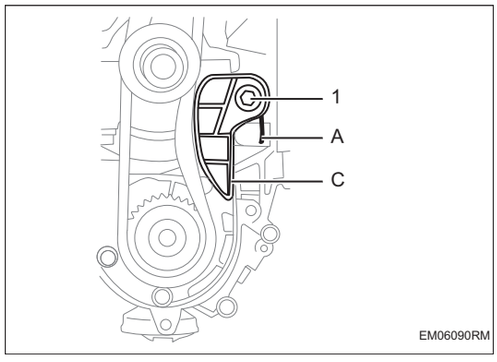
(c) Remove the bolts -2-3-, remove the camshaft drive chain guide assembly -B-, and remove the timing chain assembly.



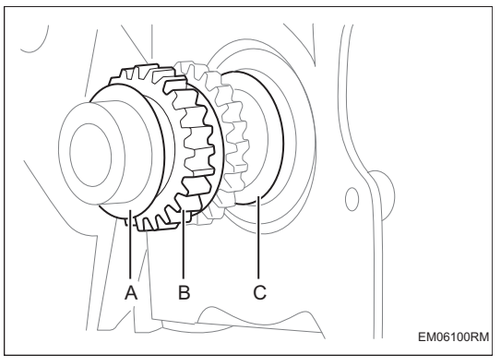
(d) Remove bolt -1- and remove chain lubrication nozzle assembly -A-.



(e) Detach clips -1-3-and remove sprocket cover-A-.



(f) Press and hold the tensioner arm and return spring -A-, remove the bolt -1-, and remove the oil pump tensioner arm assembly -C-.



(g) Remove the crankshaft lock washer-A-.

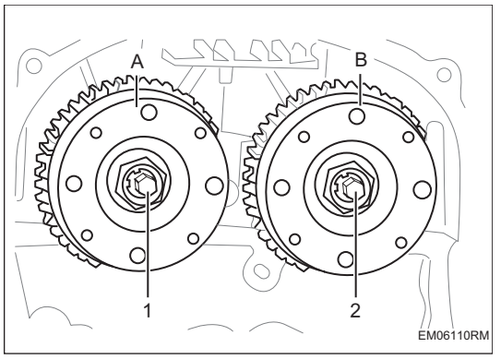
(h) Remove the crankshaft sprocket-B- and the crankshaft lock washer-C-.

36. Remove OCV control valve, intake/exhaust VCT cam sprocket assembly

(a) Install SST (39 GC110085 C) -A- on cylinder head cover -B- and fix the intake camshaft.

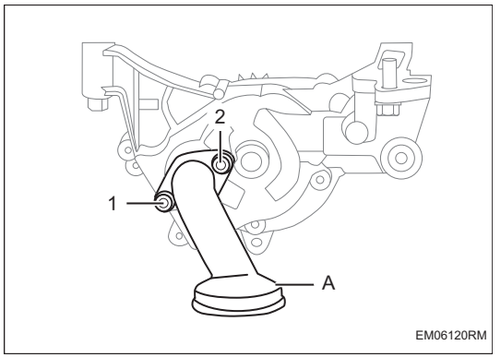
Hint:

The exhaust camshaft SST (39 GC110085 C) -A- shall be installed in the same way as the intake camshaft.



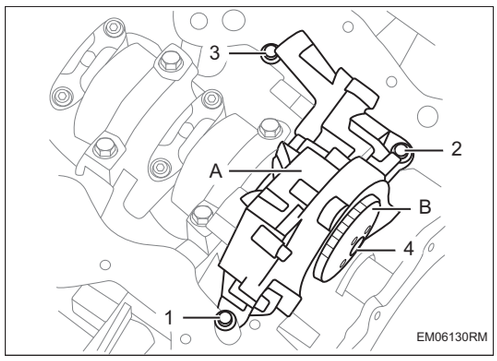
(b) Remove the OCV -1-2-, and remove the exhaust VCT cam sprocket -A-B-.

37. Remove oil collector assembly



(a) Remove assembling bolts -1-2-, and remove oil collector assembly -A-.

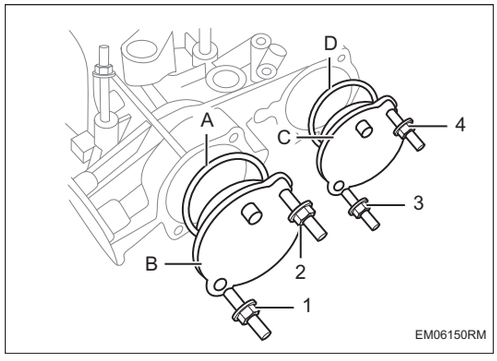
38. Remove oil pump assembly



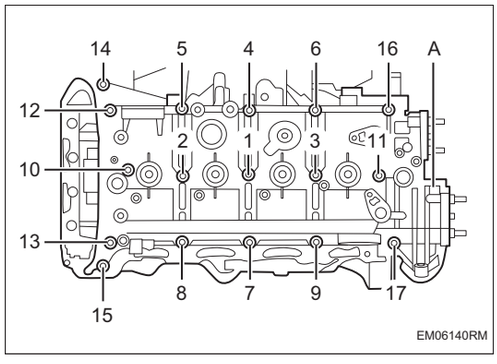
(a) Remove bolt -4- and remove oil pump sprocket -B-.

(b) Remove bolts -1-2-3- and remove oil pump assembly -A-.

39. Remove valve chamber cover

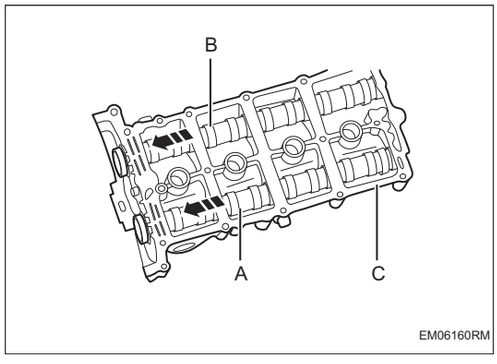


(a) Remove the bolt plug -1-4-, and remove the exhaust side rear cover assembly and seal ring-A-B-C-D-.



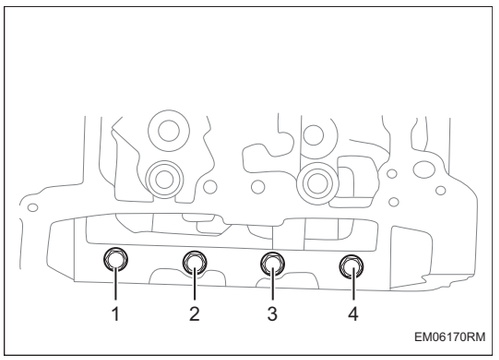
(b) Remove the bolts -1-17-, and remove the valve chamber cover and gasket -A-.

40. Remove intake and exhaust camshafts

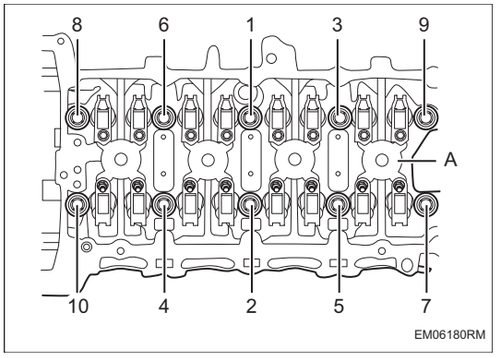


(a) Remove the intake and exhaust camshafts-A-B-as arrowed from the valve chamber cover-C-.

41. Remove cylinder head assembly



(a) Remove the bolt -1-4-.

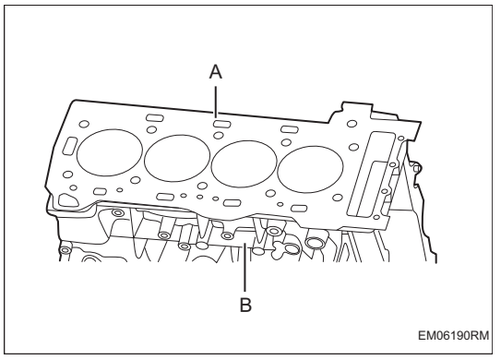


(b) Remove bolts -1-10- and remove cylinder head assembly -A-.

Hint:

The removal sequence is shown in the figure.

42. Remove cylinder head gasket assembly



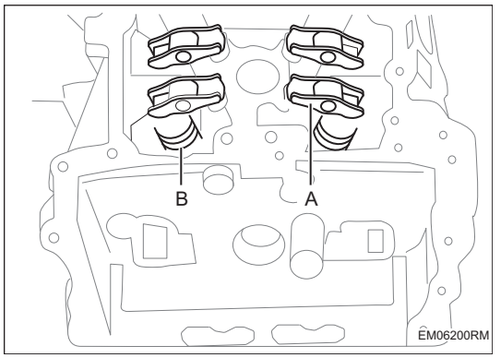
(a) Remove the cylinder head gasket assembly-A- from cylinder block-B.

Hint:

Make the cylinder head gasket side with pressure wave line face upwards.

Reuse is not allowed.

43. Remove rocker arm and hydraulic lash adjuster

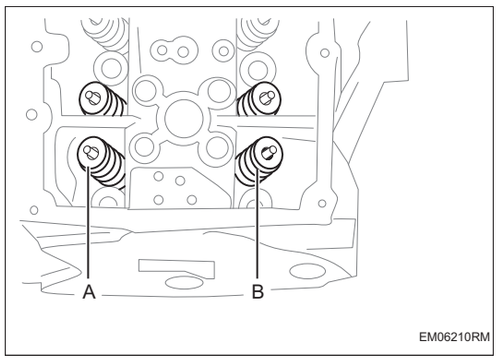


(a) Remove the rocker arm-A- and hydraulic lash adjuster-B-.

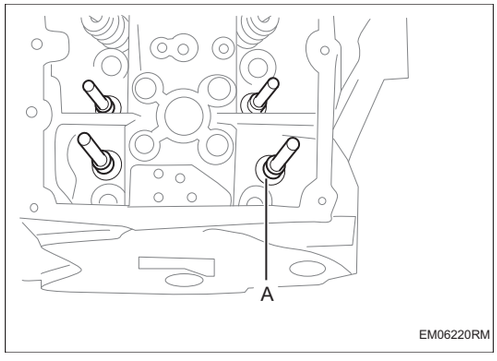
44. Remove intake/exhaust valve

Hint:

There are 2 valve lock blocks on each valve, and the removal sequence of all valve lock blocks are same.

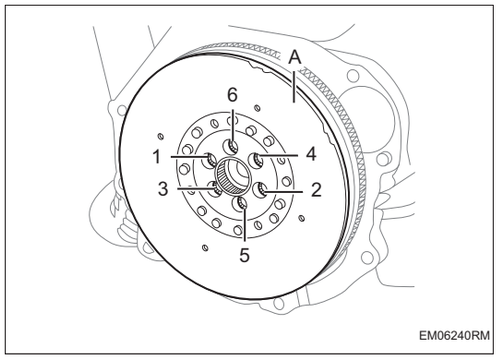


(a) Remove the valve lock block, and remove the valve spring gasket -A- and valve spring -B-.

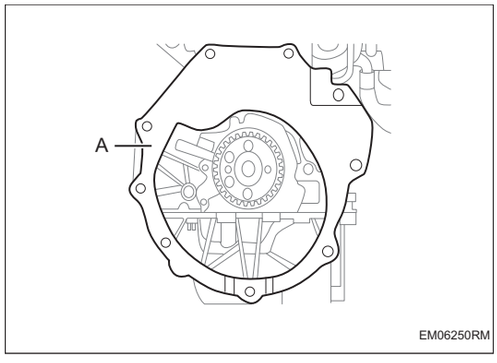


(b) Take out the intake valve and exhaust valve, and remove the valve oil seal-A-.

45. Remove flywheel and ring gear assembly



(a) Remove bolts -1-6- and remove flywheel assembly -A-.

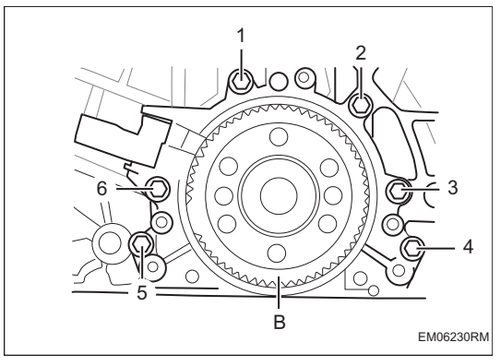


(b) Remove the dust guard assembly-A-.

46. Remove rear oil seal seat and target wheel assembly

Hint:

Before assembling rear oil seal, please rotate the crankshaft to the TDC of 1# cylinder.

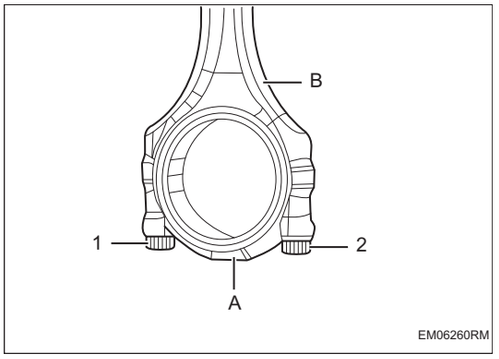


(a) Remove the bolt -1-6-, and remove the rear oil seal seat and target wheel assembly-B-.

47. Remove piston and connecting rod assembly

Hint:

All pistons and connecting rod assembly are removed in the same order.

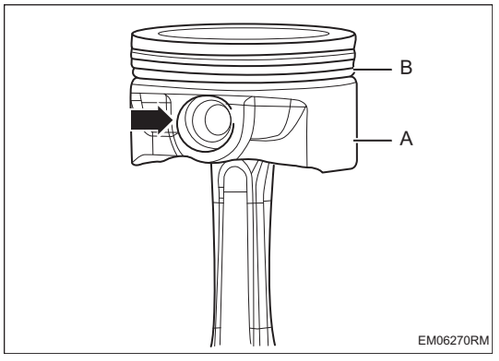


(a) Remove the bolt -1-2-, remove the connecting rod bearing shell and connecting rod bearing shell cover-A-, and take out the piston and connecting rod assembly-B- from the cylinder block.

Hint:

The connecting rod bearing shells shall be placed in order.

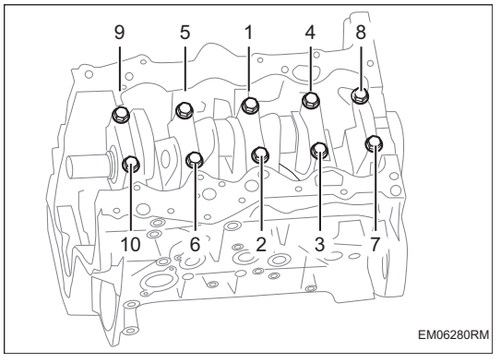
48. Remove piston assembly



(a) Remove the wire retaining ring as arrowed, and remove the piston pin-A-.

(b) Remove the piston and piston ring assembly-B-.

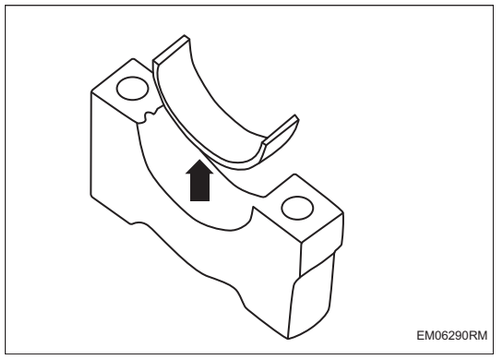
49. Remove main bearing shell and crankshaft



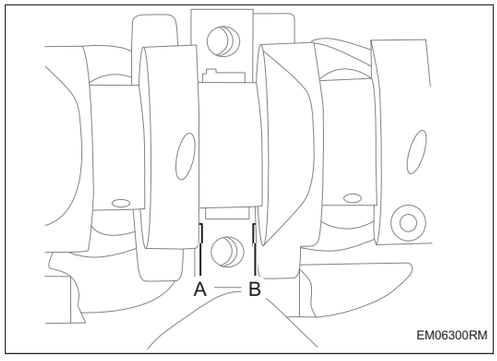
(a) Remove the main bearing bolt -1-10-.

Hint:

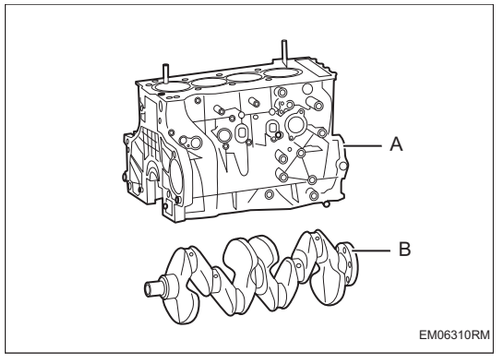
Remove the third main bearing cap first, and then other main bearing caps; After removing the main bearing caps, place them in the process appliance in sequence.



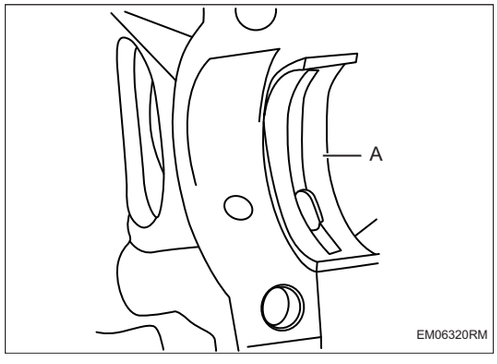
(b) Remove the lower main bearing shell as arrowed from the trapezoid frame.



(c) Remove the thrust plate -A-B-.

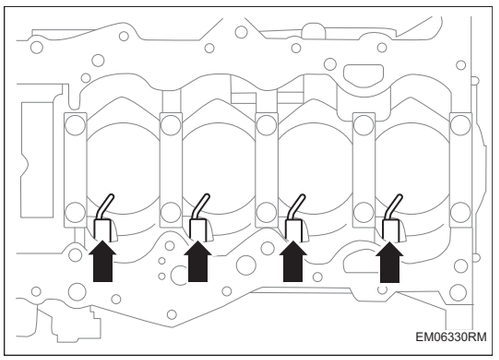


(d) Remove cylinder block-B- from crankshaft-A-.



(e) Remove the upper main bearing shell-A- from the cylinder block.

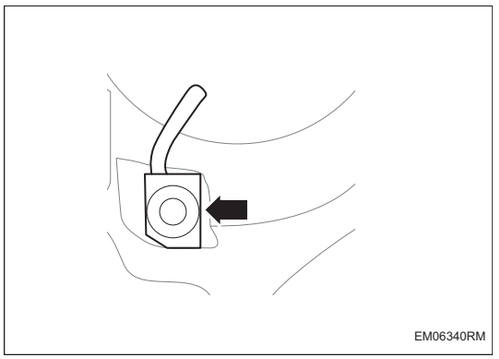
50. Remove piston cooling nozzle



(a) Remove the piston cooling nozzle -arrow-.

Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**
2. **Install the piston cooling nozzle**



(a) Clean the mounting surface of the piston cooling nozzle, fit the piston cooling nozzle -arrow- positioning block with the mounting surface and install it into the corresponding thread hole of the cylinder block.

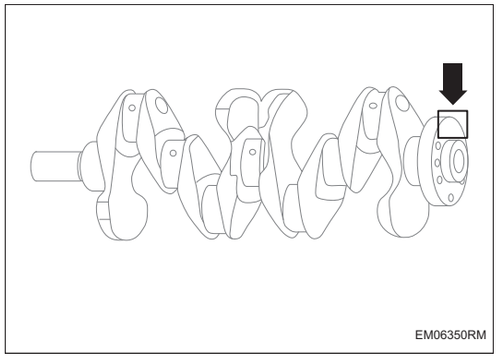
Torque: 27 ~ 33 N·m

3. **Main bearing hole grouping table:**

(a) The group marks are printed on the cylinder block.

Main bearing hole grouping	
Group number	**Group size**
1	>Φ53.02 ~ Φ53.025
2	>Φ53.025 ~ Φ55.03
3	>Φ53.03 ~ Φ53.035

4. **Crankshaft main bearing journal and connecting rod journal grouping table:**



(a) The group marks of the main journal and connecting rod journal are printed on the rear end face of the crankshaft.

Main journal grouping	
Group number	**Group size**
1	>Φ47.972-47.978
2	>Φ47.966-47.972
3	>Φ47.960-47.966

(b) Grouping table of connecting rod journal:

Grouping of connecting rod journal	
Group number	**Group size**
A	>Φ45.972-45.978
B	>Φ45.966-45.972
C	>Φ45.960-45.966

5. Main bearing shell wall thickness grouping table:

(a) The grouping is marked on the shell back, and the upper main bearing shell has oil hole.

Group number	Total central thickness	
1 (Red)	2.5	+ 0.011
		+ 0.006
2 (blue)	2.5	+ 0.016
		+ 0.011
3 (yellow)	2.5	+ 0.021
		+ 0.016

6. Install main bearing shell

(a) Wipe the main bearing cap seat surface clean, determine the group of the lower main bearing shell according to the bearing shell matching scheme, and assemble it on the main bearing cap.

Caution:

The positioning lip on the shell back must fall into the corresponding groove, so that the shell back is firmly against the main bearing cap seating surface; No oil or other foreign matters are allowed between the shell back and the main bearing seat surface.

(b) Wipe the main bearing seat surface clean, determine the group of the upper main bearing shell according to the bearing shell matching scheme, and assemble it on the cylinder block main bearing seat.

Caution:

The positioning lip on the shell back must fall into the corresponding groove, so that the shell back is firmly against the main bearing seat surface; Oil or other foreign matters are strictly prohibited between the shell back and the main bearing seat surface, and the oil hole on the shell shall be connected with the oil hole on the seat surface.

(c) Drop lubricating oil on the installed main bearing shell to install crankshaft assembly -A-.

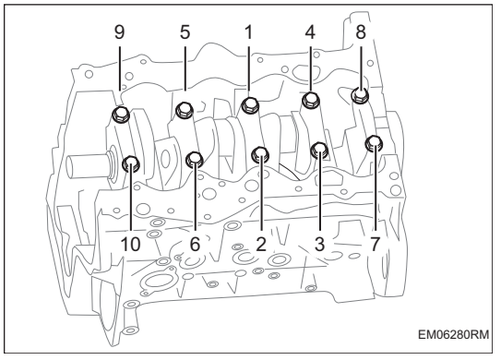
Hint:

Turn it slightly to evenly distribute the lubricating oil on the surface of the crankshaft journal.

(d) Push the crankshaft assembly forward and backward, and push the upper thrust plate coated with lubricating oil into the two sides of the third bearing seat respectively.

Hint:

The slotted surface of the thrust plate faces the crankshaft.



(e) Assemble the cylinder block and main bearing cap as dowel pin, and install the bolt of the main bearing in the order shown in the figure.

Torque: 45 ~ 55 N·m + plus angle 81 ° ~ 99 °

Hint:

Install the main bearing cap in the direction that the arrow points to the front face of the cylinder block.

7. Crankshaft axial play and crankshaft rotation torque measurement

(a) Crankshaft axial play: (0.22~0.393) mm, using dial indicator.

(b) Place the engine horizontally. When rotating the crankshaft with the torque wrench, the rotation shall be smooth without hysteresis, and the maximum rotation torque is 4 N·m.

Hint:

The stuck dead spots are not allowed in the rotation process.

8. Main bearing shell gap

(a) Main bearing shell gap size

Hole			Upper shell		
	Nominal value	Tolerance		Nominal value	Tolerance
1	53	0.025	1	2.5	0.011
		0.02			0.006
	53	0.025		2.5	0.011
		0.02			0.006
	53	0.025		2.5	0.011
		0.02			0.006
2	53	0.03	2	2.5	0.016
		0.025			0.011
	53	0.03		2.5	0.016
		0.025			0.011
	53	0.03		2.5	0.016
		0.025			0.011
3	53	0.035	3	2.5	0.021
		0.03			0.016
	53	0.035		2.5	0.021
		0.03			0.016
	53	0.035		2.5	0.021
		0.03			0.016

Shaft			Lower shell			Gap (theory)	
	Nominal value	Tolerance		Nominal value	Tolerance	min	max
1	48	—0.022	1	2.5	0.011	0.02	0.041
		—0.028			0.006		
	48	—0.028	2	2.5	0.016	0.021	0.042
		—0.034			0.011		
	48	—0.034	3	2.5	0.021	0.022	0.043
		—0.04			0.016		
2	48	—0.022	1	2.5	0.011	0.02	0.041
		—0.028			0.006		
	48	—0.028	2	2.5	0.016	0.021	0.042
		—0.034			0.011		
	48	—0.034	3	2.5	0.021	0.022	0.043
		—0.04			0.016		

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Shaft			Lower shell			Gap (theory)	
	Nominal value	Tolerance		Nominal value	Tolerance	min	max
3	48	—0.022	1	2.5	0.011	0.02	0.041
		—0.028			0.006		
	48	—0.028	2	2.5	0.016	0.021	0.042
		—0.034			0.011		
	48	—0.034	3	2.5	0.021	0.022	0.043
		—0.04			0.016		

Hint:

The amount of expansion is not taken into account in the gap; Minimum hole + maximum journal = using thinnest shell; Maximum hole + minimum journal = using thickest shell

9. Connecting rod bearing shell gap

(a) Connecting rod bearing shell gap size

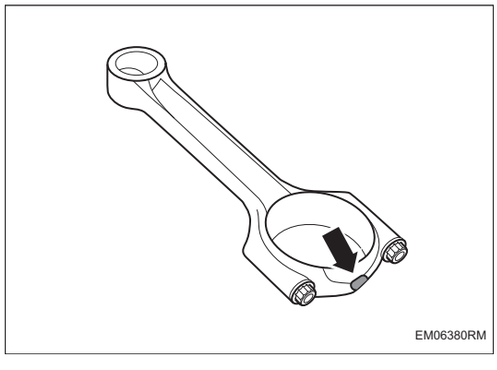
Hole			Upper shell		
	Nominal value	Tolerance		Nomi-nal value	Tolerance
1	48.8	0.005	1	1.4	0.002
		0			—0.003
	48.8	0.005		1.4	0.002
		0			—0.003
	48.8	0.005		1.4	0.002
		0			—0.003
2	48.8	0.01	2	1.4	0.007
		0.005			0.002
	48.8	0.01		1.4	0.007
		0.005			0.002
	48.8	0.01		1.4	0.007
		0.005			0.002
3	48.8	0.015	3	1.4	0.012
		0.1			0.007
	48.8	0.015		1.4	0.012
		0.1			0.007
	48.8	0.015		1.4	0.012
		0.1			0.007

Shaft			Lower shell			Gap (theory)	
	Nominal value	Tolerance		Nominal value	Tolerance	min	max
1	46	—0.022 —0.028	1	1.4	0.002 —0.003	0.018	0.039
2	46	—0.028 —0.034	2	1.4	0.007 0.002	0.019	0.04
3	46	—0.034 —0.04	3	1.4	0.012 0.007	0.02	0.041
1	46	—0.022 —0.028	1	1.4	0.002 —0.003	0.018	0.039
2	46	—0.028 —0.034	2	1.4	0.007 0.002	0.019	0.04
3	46	—0.034 —0.04	3	1.4	0.012 0.007	0.02	0.041
1	46	—0.022 —0.028	1	1.4	0.002 —0.003	0.018	0.039
2	46	—0.028 —0.034	2	1.4	0.007 0.002	0.019	0.04
3	46	—0.034 —0.04	3	1.4	0.012 0.007	0.02	0.041

Hint:

The amount of expansion is not taken into account in the gap; Minimum hole + maximum journal = using thinnest shell; Maximum hole + minimum journal = using thickest shell

10. Install piston and connecting rod assembly



(a) Select 4 connecting rods of the same mass group, and the group mark printing position is as shown in the figure.

Mass unit: g

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(b) Take the E3 mass group in E3 1 A for example, 1 represents grouping of connecting rod big end hole, and A represents grouping of connecting rod small end hole.

		Mass of big head (g)				
		＞271 ~ 275	＞275 ~ 279	＞279 ~ 283	＞283 ~ 287	＞287 ~ 291
Mass of small head	＞116 ~ 120	D3	E3	F3	G3	H3
	＞120 ~ 124	D4	E4	F4	G4	H4

(c) Grouping of connecting rod big end hole

Group number	Group size
1	Φ48.800 ~ Φ48.805
2	>Φ48.805 ~ Φ48.810
3	>Φ48.810 ~ Φ48.815

(d) Grouping of connecting rod small end hole

Group mark	Group size
A	Φ20.006 ~ Φ20.009
B	>Φ20.009 ~ Φ20.012

(e) Piston pin outer diameter grouping

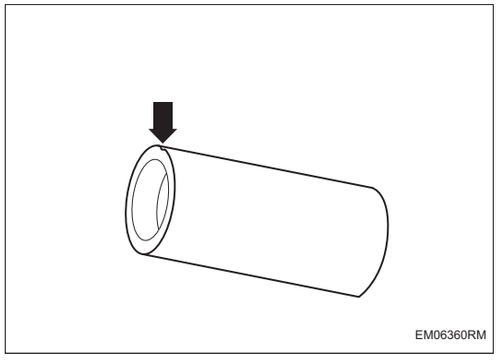
Group number	Group size
A	Φ20 ~ Φ20.002
B	>Φ20.002 ~ Φ20.004

(f) Selection table of connecting rod assembly and piston pin.

Piston pin	Connecting rod small end	Gap (theory)
A	A	0.004 ~ 0.009
B	B	0.005 ~ 0.010

(g) Connecting rod bearing shell grouping.

Group number	Color mark	Group size	
1	Red	1.4	+0.002
			-0.003
2	Blue	1.4	+0.007
			+0.002
3	Yellow	1.4	+0.012
			+0.007



(h) Select the piston pin according to the group marks of connecting rod small end hole, 1 (red) piston pin for group 1 connecting rod small end hole, and 2 (blue) piston pin for group 2 connecting rod small end hole. The printed size group mark of the piston pin is shown in the figure.

(i) Apply oil to the surface of the piston pin, gently rotate it into the piston pin seat and connecting rod small end hole, and install the wire retaining ring for hole with special tools on both sides.

Hint:

the forward mark on the top of the piston is placed on the same side as the forward mark of the connecting rod; The retaining ring groove shall not be damaged during assembly.

11. Install piston ring

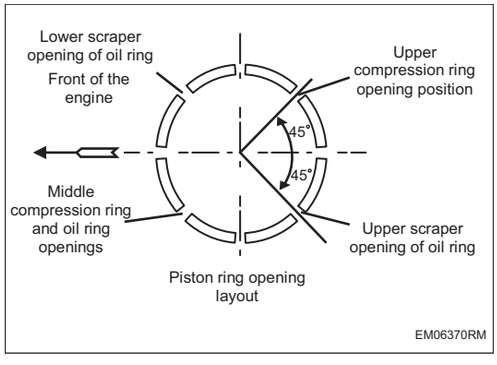
(a) Wipe the piston ring groove clean, ensure no foreign body is in the ring groove, and install the rings in sequence.

Caution:

The side clearance between the first compression ring and the piston ring groove is (0.02~0.07) mm.

The side clearance between the second compression ring and the piston ring groove is (0.02~0.06) mm.

The side clearance between oil ring and piston ring groove is (0.04~0.16) mm.



(b) Adjust the opening position of each ring as shown in the figure.

Caution:

Adjust the opening position of each ring to ensure that the upper compression ring opening is 180 ° apart from the middle compression ring opening, the spacing between the oil ring and two scraper openings is greater than 60°, and the spacing between the oil ring and the lining ring opening is greater than 30°

The surface of the piston ring with Up mark must be up, and the piston ring should be able to rotate flexibly after being installed into the groove.

12. Install the piston and connecting rod assembly

(a) Turn the crankshaft so that the crankshaft is near the TDC of 1# cylinder.

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(b) According to the connecting rod journal group mark and connecting rod big end hole group mark on the crankshaft, select the connecting rod bearing shell according to the assembly relationship table.

(c) Install the connecting rod upper bearing shell into the connecting rod bearing shell seat hole.

Hint:

During manual installation, it is necessary to align the bearing shell positioning lip with the groove, and make the shell back against the seat surface of the connecting rod big end hole.

No oil or other foreign matters are allowed between the back of the connecting rod bearing shell and the seat hole.

(d) Wipe the cylinder bore and spray oil mist around the cylinder bore wall with sprayer.

Hint:

Ensure that an appropriate amount of lubricating oil is applied to the whole circumference of the cylinder within 10 mm from the top surface.

Apply oil to the surface of the piston ring, piston skirt, and connecting rod bearing shell of the piston and connecting rod assembly.

(e) Check whether the split ring position is correct.

Hint:

Ensure that the piston ring opening are staggered with each other, and follow the location distribution diagram of piston ring opening.

(f) Push the piston and connecting rod assembly into the cylinder with a suitable tool.

Hint:

Ensure that the connecting rod and the piston cooling nozzle are not scratched during the pushing process.

(g) Keep the connecting rod bearing shell firmly fitting against the connecting rod journal; install the connecting rod big end cover with the lower bearing shell into the connecting rod; manually tighten the connecting rod bolt.

Torque: 17 ~ 23 N · m + rotation angle 87 ° ~ 93 °

Hint:

When assembling the piston and connecting rod assembly, the forward mark on the piston and the forward mark on the connecting rod shall point to the front end of the engine.

(h) Turn the crankshaft so that each connecting rod journal is in the position of TDC and repeat the above steps,

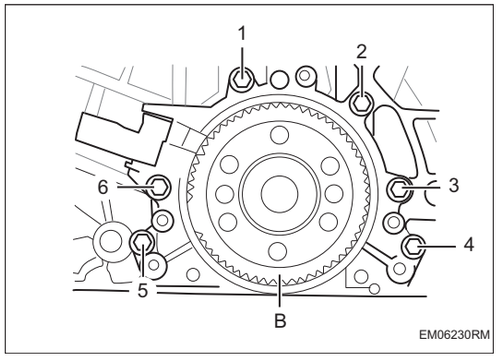
Hint:

Place the engine horizontally with all pistons and connecting rods installed.

When rotating the crankshaft at a constant speed, the allowable range of rotation torque is: (4~10) N·m.

The seizure phenomenon is not allowed in the rotation process.

13. Install rear oil seal seat and target wheel assembly



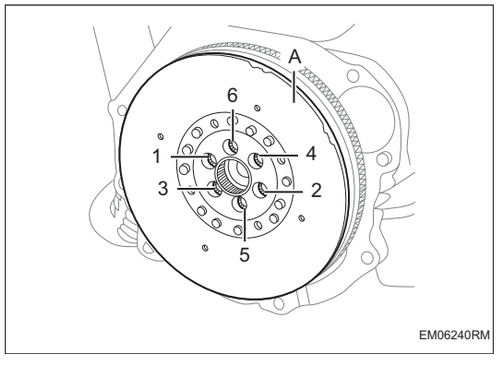
(a) Apply engine oil to the crankshaft rear oil seal journal, insert the rear oil seal assembly guide tool into the crankshaft rear end hole and push it against it, put the rear oil seal-B- on the guide tool, slowly push it against the rear end surface of the cylinder block, and remove the rear oil seal guide tool.

Hint:

Tighten sealing flange bolts alternately in a diagonal manner.

Before assembling rear oil seal, please rotate the crankshaft to the TDC of 1# cylinder.

14. Install flywheel and ring gear assembly

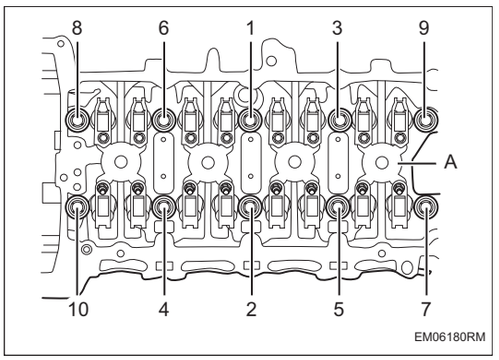


(a) Fix the crankshaft, prevent the flywheel from rotating clockwise, and align the dust guard, flywheel and ring gear with the rear end of the crankshaft.

(b) The installation sequence of bolts is as shown in the figure, and the fixing bolts of the flywheel-A are cross-mounted.

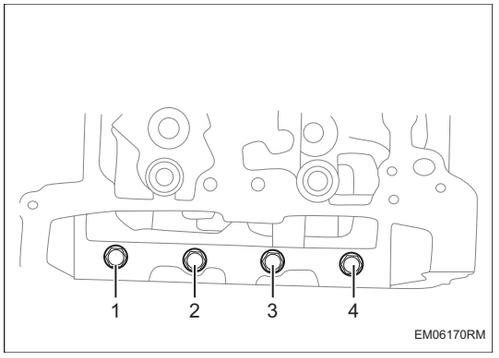
15. Install cylinder head

(a) Clean the bottom surface and front end surface of the cylinder head assembly and dry them with compressed air. Place it onto the cylinder head gasket carefully with the dowel pin hole aligned with the dowel pin on the cylinder block.



(b) Insert the cylinder head bolt -1-10- into the cylinder head bolt holes. The tightening sequence is shown in the figure.

Torque: 38 ~ 42 N · m + (180 ° ± 3 °)



(c) Insert the bolt -1-4- into the cylinder head bolt hole and tighten it.

Torque: 10.5~14.5 N · m

16. Install camshaft

(a) Clean the intake/exhaust camshaft assembly and camshaft frame.

(b) Apply an appropriate amount of lubricating oil to the camshaft and camshaft frame journals.

(c) Measure camshaft axial play:(0.09~0.31) mm.

(d) Rotate the camshaft by hand, without obvious seizure.

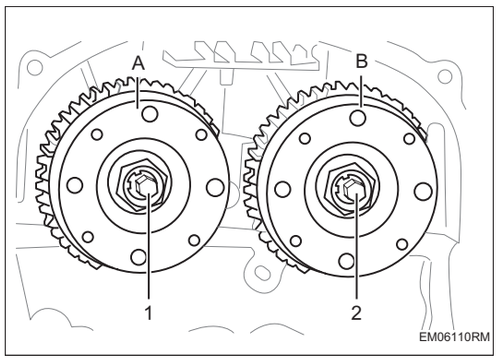
17. Install the timing tool

(a) Rotate the crankshaft near the 1# cylinder TDC and screw the crankshaft timing tool into the timing hole of the cylinder block.

(b) Lock the flywheel with a special tool.

(c) Install SST (39 GC110085 C) -A- on the cylinder head cover and fix the intake and exhaust camshafts.

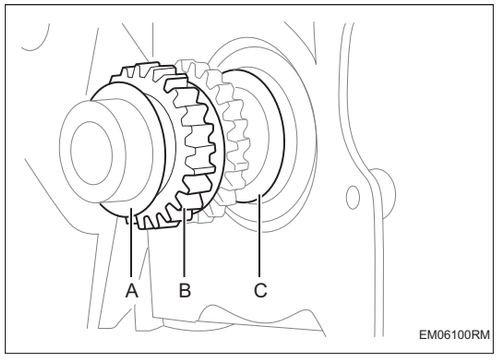
18. Install OCV control valve, intake/exhaust VCT cam sprocket assembly



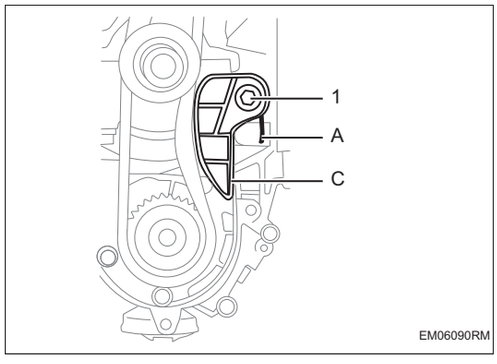
(a) Use the OCV -1-2-to install the intake and exhaust VCT cam sprockets -A-B- without tightening them temporarily.

Final torque: 48 ~ 52 N · m + (30 ° ± 3 °).

19. Install the camshaft timing chain system



(a) Install crankshaft lock washer-C-, crankshaft sprocket-B- and crankshaft lock washer-A- respectively.

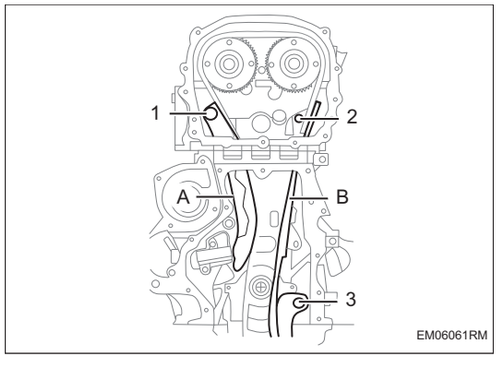


(b) Press and hold the tensioner arm return spring -A-, and fit it in the cylinder block hole. Install the oil pump tensioner arm assembly-C- with the bolt -1-.

Torque: 8 ~ 12 N · m.

Hint:

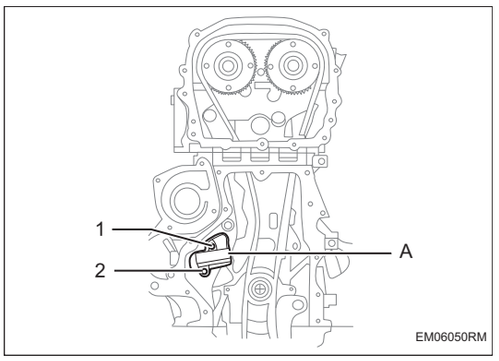
After installation, check whether the oil pump chain is tensioned and whether the tensioner and its return spring are loose.



(c) Install the timing chain, camshaft drive chain tensioner arm-A- and guide-B-.

Bolt torque of chain guide rail assembly: 8 ~ 12 N · m.

Bolt torque of chain tensioner arm assembly: 18 ~ 22 N · m.



(d) Use bolt -1-2- to install camshaft chain tensioner arm-A-.

Torque: 8 ~ 12 N · m.

Hint:

Pinch the snap spring on the chain tensioner to make the tensioner plunger pop out and check whether the chain is slack.

(e) Tighten the OCV -1-2- and the exhaust VCT cam sprocket -A-B-.

Torque: 48 ~ 52 N · m + (30 ° ± 3 °)

(f) Remove the crankshaft timing tool SST (39GC110110C) and the camshaft timing tool SST (39GC110085C), and install the crankshaft timing bolt.

20. Engine main parts tightening torque table:

S/N	Name	Quantity	Specification	Tightening torque (N.m)	Torque monitoring range
1	Mounting stud	3	M12	10±2	8 ~ 12
2	TDC adjusting bolt assembly	1	M10	30±3	27 ~ 33
3	Chain chamber upper cover bolt	5	M10	30±3	27 ~ 33
		7	M6	8±1	7 ~ 9
		2	M6	10±2	8 ~ 12
4	Chain chamber lower cover bolt	15	M6	10±2	8 ~ 12
5	Cylinder head bolt	10	M10×1.5	40±2+180°±3°	55 ~ 90
6	Cylinder head cover bolt	17	M6	8±1+90°±2°	14 ~ 30
7	Rear cover plate bolt	4	M6	10±2	8 ~ 12
8	Connecting rod bolt	8	M8×1	20±3+90°±3°	39 ~ 55
9	Piston cooling nozzle	4	M10	30±3	27 ~ 33
10	Crankshaft pulley bolt	1	M14×1.5	100±5+180°±3°	164 ~ 321
11	Rear oil seal seat bolt	6	M6	10±2	8 ~ 12

12	Flywheel bolt	6	M10×1	60±5+90°±10°	100 ~ 135
13	Main bearing cap bolt	10	M10	50±5+90°±9°	62 ~ 105
14	Intake manifold bolt	6	M8	20±2	18 ~ 22
15	Intake manifold bracket bolt	3	M8	20±2	18 ~ 22
16	Oil baffle bolt	6	M6	10±2	8 ~ 12
17	Oil sump bolt	13	M8	20±2	18 ~ 22
		2	M6	10±2	8 ~ 12
18	Drain plug	1	M14X1.5	35±5	30 ~ 40
19	Oil collector assembling bolt	2	M6	10±2	8 ~ 12
20	Oil pump bolt	3	M8	20±2	18 ~ 22
21	Piston cooling nozzle valve assembly bolt	1	M6	10±2	8 ~ 12
22	Variable displacement oil pump solenoid valve assembly bolt	1	M6	10±2	8 ~ 12
23	Oil filter connector	1	3/4-UNF	35±5	30 ~ 40
24	Oil filter assembly	1	3/4-UNF	17±2	15 ~ 19
25	Oil cooler bolt	5	M6	10±2	8 ~ 12
26	Bolt of water inlet steel pipe joint of oil cooler	1	M6	10±2	8 ~ 12
27	Oil-mist separator assembly bolt	9	M6	10±2	8 ~ 12
28	Bolt of check valve assembly	2	M6	10±2	8 ~ 12
29	Chain lubrication nozzle bolt	1	M6	10±2	8 ~ 12
30	Chain tensioner bolt	2	M6	10±2	8 ~ 12

31	Chain guide rail bolt	2	M6	10±2	8 ~ 12
32	Chain tensioner arm bolt	1	M8	20±2	18 ~ 22
33	Bolt of solenoid valve assembly	4	M6	10±2	8 ~ 12
34	OCV assembly	2	M22	50±2+30°±3°	150 ~ 180
35	Oil pump sprocket bolt	1	M8	20±2+90°±3°	40 ~ 70
36	Oil pump chain tensioner arm bolt	1	M6	10±2	8 ~ 12
37	High-pressure fuel pump bolt	2	M8	20±2	18 ~ 22
38	Turbocharger installation stud	4	M8	10±2	8 ~ 12
39	Turbocharger anti-loose nut	4	M8	22±2	20 ~ 24
40	Turbocharger outlet stud	4	M8	9±2	7 ~ 11
41	Turbocharger inlet and return pipe bolt	3	M6	10±2	8 ~ 12
42	Turbocharger inlet and return pipe bolt	3	M6	10±2	8 ~ 12
43	High-pressure fuel rail installation bolt	4	M8	25±2	23 ~ 27
44	Engine water inlet pipe assembly bolt	2	M6	10±2	8 ~ 12
45	Thermostat cover bolt	2	M6	10±2	8 ~ 12
46	Bracket assembly-temperature control valve bolt	2	M6	10±2	8 ~ 12

47	Bolt of coolant pump assembly	4	M6	10±2	8 ~ 12
48	Coolant pump pulley bolt	3	M8	20±2	18 ~ 22
49	Diverting pipe bolt	2	M6	10±2	8 ~ 12
50	Water outlet pipe bolt	4	M6	10±2	8 ~ 12
51	Temperature control valve fixing bolt	1	M6	10±2	8 ~ 12
52	MAP/IAT sensor tapping screw	1	M6	3.2±0.5	2.7 ~ 3.7
53	Coolant temperature sensor	1	M12×1.5	18±2	16 ~ 20
54	Crankshaft position sensor bolt	1	M5	4.5±1	3.5 ~ 5.5
55	Oil pressure and temperature sensor assembly	1	M14×1.5	11±2	9 ~ 13
56	Camshaft position sensor bolt	2	M6	10±2	8 ~ 12
57	Knock sensor bolt	1	M8	20±2	18 ~ 22
58	Spark plug assembly	4	M12×1.25	23±3	20 ~ 26
59	Mounting bolts of the electronic throttle body	4	M6	10±2	8 ~ 12
60	Ignition coil bolt	4	M6	10±2	8 ~ 12

21. Matching gap table of engine main parts:

S/N	Name of matching parts	Matching property	Nominal size (mm)	Gap or interference value (mm)
1	Cylinder bore and piston skirt	Gap	Φ76.5	0.06 ~ 0.08
2	Crankshaft main bearing journal and main bearing bore	Gap	Φ48/Φ53	0.02 ~ 0.043
3	Crankshaft thrust surface and thrust plate	Axial clearance	0.2	0.22 ~ 0.393

4	Crankshaft connecting rod journal and connecting rod big end hole	Gap	Φ46/Φ48.8	0.018 ~ 0.041
5	Crankshaft connecting rod journal and connecting rod big end side	Axial clearance	20.5	0.14 ~ 0.36
6	Crankshaft front-side journal and crankshaft timing gear	Gap	Φ23	0.007 ~ 0.049
7	Piston pin and connecting rod small end hole	Gap	Φ20	0.004 ~ 0.01
8	Piston pin and piston pin seat hole	Gap	Φ20	0.002 ~ 0.01
9	First compression ring (opening gap)	Gap	In Φ76.5 gauge	0.15 ~ 0.30
	Second compression ring (opening gap)	Gap	In Φ76.5 gauge	0.4 ~ 0.6
	Oil ring (opening gap)	Gap	In Φ76.5 gauge	0.2 ~ 0.7
10	First compression ring and piston ring groove	Gap	1.2	0.02 ~ 0.07
	Second compression ring and piston ring groove	Gap	1.2	0.02 ~ 0.06
	Oil ring and piston ring groove	Gap	2	0.04 ~ 0.16
11	Piston TDC and cylinder block top surface	-	0.75 below top surface	0.75 below top surface
12	Hydraulic lash adjuster and seat hole	Gap	Φ12	0.006 ~ 0.035
13	Intake valve and valve guide	Gap	Φ6	0.020 ~ 0.046
14	Exhaust valve and valve guide	Gap	Φ6	0.040 ~ 0.066
15	Camshaft frame dowel pin hole	Gap	Φ6	0.028 ~ 0.054
16	The 1st journal of camshaft and bearing bore of camshaft	Gap	Φ28	0.028 ~ 0.054
17	The 2nd, 3rd, 4th and 5th journals of camshaft and bearing bore of camshaft	Gap	Φ24	0.03 ~ 0.071
18	Intake camshaft and thrust face	Gap	0	0.09 ~ 0.31
19	Exhaust camshaft and thrust surface	Gap	0	0.09 ~ 0.31

22. Engine sealant/oil application position and sealant model:

S/N	Name of application part	Mating surface requirements	Model	Assembly requirements
1	Bowl plug	Fitting seal	Anaerobic sealant (Loctite 11747)	Apply the sealant to the mounting hole at the corresponding part of the tail end after the bowl plug is installed.
2	Press-fit pipe joints on cylinder block and cylinder head	Fitting seal	Anaerobic sealant (Loctite 11747)	Apply the sealant to the mounting hole at the corresponding part of the pipe orifice after the pipe joint is installed.
3	Joint between chain chamber upper cover, chain chamber lower cover, cylinder head and valve chamber cover	Plane seal	Silicone sealant (ThreeBond 1217G)	Assemble within 10 minutes after sealant application and tighten within 5 minutes thereafter
4	Oil sump	Plane seal	Silicone sealant (ThreeBond 1217G)	Assemble within 10 minutes after sealant application and tighten within 5 minutes thereafter
5	Cooling pipe hose	Lubrication	Additive	It is required to lubricate the mating surface during assembly.

6	Cylinder bore, crankshaft journal, inner surface of crankshaft upper bearing shell, inner surface of connecting rod bearing shell, valve (within the maximum range of 40-65 mm from the rod end), hydraulic tappet, sealing surface of crankshaft pulley assembly, camshaft position sensor (O-ring), MAP/IAT sensor (O-ring), oil filter assembly (O-ring), crankshaft connecting rod journal, solenoid valve assembly (O-ring), fuel injector assembly seal ring, oil filter seal ring (O-ring), oil dipstick (O-ring), oil filler cap (O-ring), turbocharger water inlet pipe, water outlet pipe, oil inlet pipe, oil return pipe (O-ring), intake manifold seal ring, high-pressure fuel pump (O-ring)	Lubrication	1009100-13L Engine oil (5 W-30) Special for supercharging	It is required to apply oil to the mating surface during assembly
7	Cylinder head bottom surface and mating surface, chain chamber cover sealant application surface, oil sump sealant application surface and mating surface	Cleaning	Detergent	Glued surface degreasing before sealant application

EMS (HEV)

ECM ES-1
ECU terminal ES-1
DTC chart ES-4
P053A00 ..... ES-19
P053B00 ..... ES-19
P053C00 ..... ES-19
P121B00 ..... ES-23
P121C00 ..... ES-23
P121D00 ..... ES-23
P121E00 ..... ES-23
P12C600 ..... ES-29
P12C700 ..... ES-29
U012100 ..... ES-32
U041500 ..... ES-32
U015100 ..... ES-32
U045200 ..... ES-32
U010F00 ..... ES-32
U007300 ..... ES-32
U014600 ..... ES-32
U029300 ..... ES-32
U059481 ..... ES-32
U015500 ..... ES-32
P000A00 ..... ES-33
P003C00 ..... ES-33
P001000 ..... ES-33
P001676 ..... ES-33
P001678 ..... ES-33
P208800 ..... ES-33
P208900 ..... ES-33
P001100 ..... ES-33
P000B00 ..... ES-33
P005A00 ..... ES-33
P001300 ..... ES-33
P001776 ..... ES-33
P001778 ..... ES-33
P209000 ..... ES-33
P209100 ..... ES-33
P001400 ..... ES-33
P003000 ..... ES-33

P003100 ..... ES-33
P003200 ..... ES-33
P003600 ..... ES-33
P003700 ..... ES-34
P003800 ..... ES-34
P003A22 ..... ES-34
P003A21 ..... ES-34
P003A72 ..... ES-34
P003A73 ..... ES-34
P024477 ..... ES-34
P024437 ..... ES-34
P256400 ..... ES-34
P256500 ..... ES-34
P170300 ..... ES-34
P024300 ..... ES-34
P024600 ..... ES-34
P005300 ..... ES-34
P005400 ..... ES-34
P008700 ..... ES-34
P008800 ..... ES-34
P008985 ..... ES-34
P008984 ..... ES-35
P009000 ..... ES-35
P025100 ..... ES-35
P025400 ..... ES-35
P025900 ..... ES-35
P00C600 ..... ES-35
P01062A ES-35
P010622 ..... ES-35
P010621 ..... ES-35
P120000 ..... ES-35
P120100 ..... ES-35
P00C721 ..... ES-35
P00C722 ..... ES-35
P010700 ..... ES-35
P010800 ..... ES-35
P011126 ..... ES-35
P011200 ..... ES-35
P011300 ..... ES-35
P011400 ..... ES-35
P00CE24 ..... ES-36
P00CE23 ..... ES-36
P012300 ..... ES-36

P012200 ..... ES-36
P012100 ..... ES-36
P022300 ..... ES-36
P022200 ..... ES-36
P022100 ..... ES-36
P012800 ..... ES-36
P013300 ..... ES-36
P013A00 ..... ES-36
P219500 ..... ES-36
P219600 ..... ES-36
P209700 ..... ES-36
P209600 ..... ES-36
P013800 ..... ES-36
P013700 ..... ES-37
P013600 ..... ES-37
P017F00 ..... ES-37
P128000 ..... ES-37
P128100 ..... ES-37
P043E00 ..... ES-37
P043F00 ..... ES-37
P24C100 ..... ES-37
P240700 ..... ES-37
P044200 ..... ES-37
P019800 ..... ES-37
P019700 ..... ES-37
P019664 ..... ES-37
P019629 ..... ES-37
P121800 ..... ES-37
P052300 ..... ES-37
P052200 ..... ES-37
P021900 ..... ES-37
P023400 ..... ES-37
P029900 ..... ES-37
P023700 ..... ES-38
P023800 ..... ES-38
P138024 ..... ES-38
P138023 ..... ES-38
P009800 ..... ES-38
P009700 ..... ES-38
P009900 ..... ES-38
P009626 ..... ES-38
P020100 ..... ES-38
P026200 ..... ES-38

P02EE00 ..... ES-38
P02CD00 ..... ES-38
P02CC00 ..... ES-38
P126100 ..... ES-38
P020200 ..... ES-38
P026500 ..... ES-38
P02EF00 ..... ES-38
P02CF00 ..... ES-38
P02CE00 ..... ES-38
P126200 ..... ES-38
P020300 ..... ES-39
P026800 ..... ES-39
P02F000 ..... ES-39
P02D100 ..... ES-39
P02D000 ..... ES-39
P126300 ..... ES-39
P020400 ..... ES-39
P027100 ..... ES-39
P02F100 ..... ES-39
P02D300 ..... ES-39
P02D200 ..... ES-39
P126400 ..... ES-39
P030000 ..... ES-39
P030100 ..... ES-39
P030200 ..... ES-39
P030300 ..... ES-39
P030400 ..... ES-39
P036300 ..... ES-39
P032700 ..... ES-39
P032714 ..... ES-39
P032800 ..... ES-39
P032815 ..... ES-40
P032500 ..... ES-40
P151000 ..... ES-40
P032600 ..... ES-40
P033900 ..... ES-40
P261700 ..... ES-40
P033664 ..... ES-40
P034A00 ..... ES-40
P034B00 ..... ES-40
P034100 ..... ES-40
P034200 ..... ES-40
P034300 ..... ES-40

P035100 ..... ES-40
P230000 ..... ES-40
P230100 ..... ES-40
P035200 ..... ES-40
P230300 ..... ES-40
P230400 ..... ES-40
P035300 ..... ES-40
P230600 ..... ES-41
P230700 ..... ES-41
P035400 ..... ES-41
P230900 ..... ES-41
P231000 ..... ES-41
P036600 ..... ES-41
P036800 ..... ES-41
P036700 ..... ES-41
P042000 ..... ES-41
P044400 ..... ES-41
P045800 ..... ES-41
P045900 ..... ES-41
P049700 ..... ES-41
P046000 ..... ES-41
P25B000 ..... ES-41
P046129 ..... ES-41
P046300 ..... ES-41
P046200 ..... ES-41
U067681 ..... ES-41
P046700 ..... ES-41
P046800 ..... ES-41
P128500 ..... ES-42
P128600 ..... ES-42
P04F000 ..... ES-42
P050B20 ..... ES-42
P053F22 ..... ES-42
P053F21 ..... ES-42
P05EC00 ..... ES-42
P050C24 ..... ES-42
P050C23 ..... ES-42
P011623 ..... ES-42
P011626 ..... ES-42
P011800 ..... ES-42
P011700 ..... ES-42
P011900 ..... ES-42
P145200 ..... ES-42

P056300 ..... ES-42
P056200 ..... ES-42
P050400 ..... ES-42
P061A00 ..... ES-43
P060D00 ..... ES-43
P152000 ..... ES-43
P152100 ..... ES-43
P152200 ..... ES-43
P153900 ..... ES-43
P153700 ..... ES-43
P153500 ..... ES-43
P153600 ..... ES-43
P062900 ..... ES-43
P062800 ..... ES-43
P062700 ..... ES-43
P062B9A ES-43
P062B64 ..... ES-43
P062B96 ..... ES-43
P063000 ..... ES-43
P064100 ..... ES-43
P065100 ..... ES-43
P069700 ..... ES-43
P064D00 ..... ES-43
P223700 ..... ES-43
P225100 ..... ES-43
P224300 ..... ES-43
P013200 ..... ES-43
P013100 ..... ES-44
P241400 ..... ES-44
P064D13 ..... ES-44
P223713 ..... ES-44
P013000 ..... ES-44
P068500 ..... ES-44
P068700 ..... ES-44
P068600 ..... ES-44
P06869E ES-44
P06B842 ..... ES-44
P06B843 ..... ES-44
P06DC00 ..... ES-44
P06DB00 ..... ES-44
P06DA00 ..... ES-44
P120400 ..... ES-44
P120500 ..... ES-44

P023622 ..... ES-44
P023621 ..... ES-44
P121200 ..... ES-44
P050000 ..... ES-44
P050166 ..... ES-44
P019000 ..... ES-45
P019128 ..... ES-45
P019129 ..... ES-45
P019200 ..... ES-45
P019300 ..... ES-45
P019400 ..... ES-45
P142000 ..... ES-45
P142100 ..... ES-45
P153800 ..... ES-45
P152700 ..... ES-45
P152800 ..... ES-45
P061C00 ..... ES-45
P152900 ..... ES-45
P153000 ..... ES-45
P153100 ..... ES-45
P157100 ..... ES-45
P157200 ..... ES-45
P157300 ..... ES-45
P157400 ..... ES-45
P261000 ..... ES-45
P157500 ..... ES-45
P155000 ..... ES-46
P155100 ..... ES-46
P155600 ..... ES-46
P155700 ..... ES-46
P155800 ..... ES-46
P155900 ..... ES-46
P155A00 ..... ES-46
P155B00 ..... ES-46
P155400 ..... ES-46
P155500 ..... ES-46
P156100 ..... ES-46
P156000 ..... ES-46
P15A000 ..... ES-46
P15A100 ..... ES-46
P15A200 ..... ES-46
P15A300 ..... ES-46
P15A400 ..... ES-46

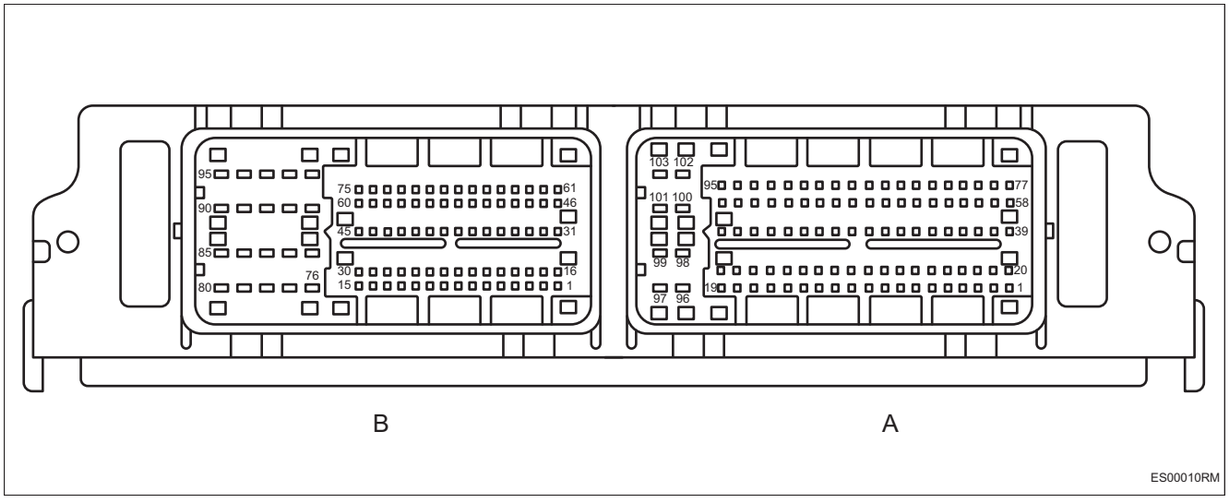
P15A500 ..... ES-46
P15A600 ..... ES-46
P15A700 ..... ES-46
P15A800 ..... ES-46
P15A900 ..... ES-46
P15AA00 ..... ES-46
P15AB00 ..... ES-47
P15AC00 ..... ES-47
P15AD00 ..... ES-47
P15AE00 ..... ES-47
P15AF00 ..... ES-47
P15B000 ..... ES-47
P15B100 ..... ES-47
P15B200 ..... ES-47
P15B300 ..... ES-47
P15B400 ..... ES-47
P15B500 ..... ES-47
P15B600 ..... ES-47
P15B700 ..... ES-47
P15B800 ..... ES-47
P15B900 ..... ES-47
P15BA00 ..... ES-47
P15BB00 ..... ES-47
P15BC00 ..... ES-47
P15BD00 ..... ES-47
P15BE00 ..... ES-47
P15BF00 ..... ES-47
P15C000 ..... ES-47
P15C100 ..... ES-47
P15C200 ..... ES-47
P15C300 ..... ES-48
P15C400 ..... ES-48
P15C500 ..... ES-48
P15C600 ..... ES-48
P15C700 ..... ES-48
P15C800 ..... ES-48
P15C900 ..... ES-48
P15CA00 ..... ES-48
P15CB00 ..... ES-48
P15CC00 ..... ES-48
P15CD00 ..... ES-48
P15CE00 ..... ES-48
P15CF00 ..... ES-48

P15D000 ..... ES-48
P15D100 ..... ES-48
P15D200 ..... ES-48
P15D300 ..... ES-48
P15D400 ..... ES-48
P15D500 ..... ES-48
P15D600 ..... ES-48
P15D700 ..... ES-48
P15D800 ..... ES-49
P15D900 ..... ES-49
P15DA00 ..... ES-49
P15DB00 ..... ES-49
P15DD00 ..... ES-49
P15DE00 ..... ES-49
P15DF00 ..... ES-49
P15E000 ..... ES-49
P210300 ..... ES-49
P211800 ..... ES-49
P210600 ..... ES-49
P210000 ..... ES-49
P214800 ..... ES-49
P215100 ..... ES-49
P217700 ..... ES-49
P217800 ..... ES-49
P218500 ..... ES-50
P218400 ..... ES-50
P218324 ..... ES-50
P218323 ..... ES-50
P222900 ..... ES-50
P222800 ..... ES-50
P222729 ..... ES-50
P222722 ..... ES-50
P222721 ..... ES-50
P222785 ..... ES-50
P222784 ..... ES-50
P120200 ..... ES-50
P120300 ..... ES-50
P223200 ..... ES-50
P227000 ..... ES-50
P227100 ..... ES-50
P240C00 ..... ES-50
P240B00 ..... ES-51
P240A00 ..... ES-51

P24BF00 ..... ES-51
P24BE00 ..... ES-51
P24BD00 ..... ES-51
P240200 ..... ES-51
P240100 ..... ES-51
P240000 ..... ES-51
P25AB00 ..... ES-51
P25AA00 ..... ES-51
P25A900 ..... ES-51
P063441 ..... ES-51
P063444 ..... ES-51
P150000 ..... ES-51
P150100 ..... ES-51
P150200 ..... ES-51
P150300 ..... ES-51
P138824 ..... ES-51
P138823 ..... ES-52
P007300 ..... ES-52
P007200 ..... ES-52
P007000 ..... ES-52
P003300 ..... ES-52
P003400 ..... ES-52
P003500 ..... ES-52
P226100 ..... ES-52
P12C400 ..... ES-52
P12C500 ..... ES-52
P261D00 ..... ES-52
P261C00 ..... ES-52
P261A00 ..... ES-52

ECM

ECU terminal



ES

ECM A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	—	53	—
2	—	54	—
3	—	55	—
4	Electronic canister pump	56	—
5	—	57	—
6	Main relay coil	58	Electronic canister purge valve heater
7	–	59	Variable displacement oil pump
8	Downstream oxygen sensor	60	—
9	—	61	Downstream oxygen sensor heating
10	Analog sensor ground 6	62	Upstream oxygen sensor heating
11	G.R. SENANA7 (crankcase ventilation diagnosis conduit)	63	B+
12	—	64	Hybrid CAN_L
13	—	65	Hybrid CAN_H
14	—	66	Upstream oxygen sensor
15	—	67	Upstream oxygen sensor VN
16	—	68	—
17	—	69	—
18	—	70	—
19	—	71	—
20	Electronic canister purge valve	72	—
21	—	73	—
22	PCV heater	74	—

ECM A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
23	Piston cooling nozzle control valve	75	—
24	—	76	—
25	Relief control valve	77	—
26	Low-pressure fuel pump relay	78	—
27	—	79	—
28	Downstream oxygen sensor ground	80	—
29	—	81	—
30	I.A.PCV3 (crankcase ventilation diagnosis conduit 3)	82	—
31	—	83	—
32	—	84	—
33	—	85	—
34	—	86	—
35	I.A.PCV1 (crankcase ventilation diagnosis conduit)	87	—
36	—	88	—
37	—	89	—
38	—	90	—
39	—	91	—
40	VVT valve (exhaust)	92	—
41	VVT valve (intake)	93	—
42	Canister control valve	94	—
43	—	95	—
44	—	96	ECU ground 4
45	—	97	ECU ground 2
46	IG1	98	ECU ground 3
47	—	99	ECU ground 1
48	Upstream oxygen sensor IP	100	Main relay power supply 1
49	Upstream oxygen sensor VM	101	Main relay power supply 2
50	—	102	Main relay power supply 3
51	—	103	Main relay power supply 4
52	Radiator coolant temperature sensor	-	-

ECM B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Sensor power supply (5 V)	49	—
2	Sensor power supply (5 V)	50	—
3	Sensor power supply	51	—
4	—	52	—

ECM B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
5	—	53	—
6	Analog sensor ground	54	Electric actuator position signal (electronic wastegate)
7	Analog sensor ground	55	—
8	Analog sensor ground	56	Airbag impact
9	Analog sensor ground	57	Engine speed sensor signal
10	Exhaust CMP sensor ground	58	—
11	Intake CMP sensor ground	59	—
12	2# cylinder ignition	60	–
13	4# cylinder ignition	61	—
14	1# cylinder ignition	62	—
15	3# cylinder ignition	63	—
16	Sensor power supply (5 V)	64	—
17	Sensor power supply (5 V)	65	—
18	Speed sensor power supply	66	—
19	—	67	—
20	Speed sensor ground	68	—
21	—	69	—
22	Engine coolant temperature sensor signal	70	—
23	Oil pressure sensor	71	—
24	—	72	—
25	—	73	—
26	High-load desorption pressure sensor	74	—
27	Charge air pressure sensor signal	75	—
28	MAP sensor signal	76	4# cylinder fuel injector+
29	Charge air temperature sensor signal	77	4# cylinder fuel injector-
30	Intake CMP sensor signal	78	1# cylinder fuel injector-
31	—	79	3# cylinder fuel injector+
32	Oil temperature sensor	80	2# cylinder fuel injector+
33	—	81	Electric actuator control - (electronic wastegate)
34	Electronic throttle feedback signal 2	82	Electric actuator control + (electronic wastegate)
35	I.A.PCV2 (crankcase ventilation diagnosis conduit 2)	83	1# cylinder fuel injector+
36	Rail pressure sensor signal	84	3# cylinder fuel injector-
37	—	85	2# cylinder fuel injector-
38	IAT sensor signal	86	Electronic throttle control-
39	—	87	—

ECM B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
40	Electronic throttle feedback signal 1	88	—
41	—	89	—
42	—	90	Fuel pressure control valve -
43	—	91	Electronic throttle control +
44	—	92	—
45	Exhaust CMP sensor signal	93	—
46	Knock sensor +	94	—
47	Knock sensor -	95	Fuel pressure control valve +
48	—	-	-

DTC chart

DTC	Description	Reference page
P000A00	Intake VVT operation fault (retarded)	(See page ES-52)
P003C00	Intake VVT operation fault (stuck)	(See page ES-52)
P001000	Intake VVT control circuit open	(See page ES-52)
P001676	Crankshaft-Intake camshaft initial installation position implausible (Bank1)	(See page ES-52)
P001678	Excessive relative position deviation between crankshaft and intake camshaft (Bank1)	(See page ES-52)
P208800	Intake VVT control circuit undervoltage	(See page ES-52)
P208900	Intake VVT control circuit overvoltage	(See page ES-52)
P001100	Intake camshaft locking position operation implausible	(See page ES-52)
P000B00	Exhaust VVT operation fault (retarded)	(See page ES-52)
P005A00	Exhaust VVT operation fault (stuck)	(See page ES-52)
P001300	Exhaust VVT control circuit open	(See page ES-52)
P001776	Crankshaft-exhaust camshaft initial installation position implausible (Bank1)	(See page ES-52)
P001778	Excessive relative position deviation between crankshaft and exhaust camshaft (Bank1)	(See page ES-52)
P209000	Exhaust VVT control circuit undervoltage	(See page ES-52)
P209100	Exhaust VVT control circuit overvoltage	(See page ES-52)
P001400	Exhaust camshaft locking position operation implausible	(See page ES-52)
P003000	Upstream oxygen sensor heater control circuit open	(See page ES-52)
P003100	Upstream oxygen sensor heater control circuit undervoltage	(See page ES-52)
P003200	Upstream oxygen sensor heater control circuit overvoltage	(See page ES-52)

DTC	Description	Reference page
P003600	Downstream oxygen sensor heater control circuit open	(See page ES-52)
P003700	Downstream oxygen sensor heater control circuit undervoltage	(See page ES-52)
P003800	Downstream oxygen sensor heater control circuit overvoltage	(See page ES-52)
P003A22	Turbocharger electronic wastegate initial zero self-learning above upper limit	(See page ES-52)
P003A21	Turbocharger electronic wastegate initial zero self-learning below lower limit	(See page ES-52)
P003A72	Turbocharger electronic wastegate zero self-learning above upper limit	(See page ES-52)
P003A73	Turbocharger electronic wastegate zero self-learning below lower limit	(See page ES-52)
P024477	Deviation between turbocharger electronic wastegate target position and actual position out of limit	(See page ES-52)
P024437	Turbocharger electronic wastegate duty cycle out of limit	(See page ES-52)
P256400	Turbocharger electronic wastegate position sensor undervoltage	(See page ES-52)
P256500	Turbocharger electronic wastegate position sensor overvoltage	(See page ES-52)
P170300	Turbocharger wastegate control circuit communication failure	(See page ES-52)
P024300	Turbocharger wastegate control circuit open	(See page ES-52)
P024600	Turbocharger wastegate control circuit overvoltage or undervoltage	(See page ES-52)
P005300	Upstream oxygen sensor heater circuit fault	(See page ES-52)
P005400	Downstream oxygen sensor heater internal resistance implausible	(See page ES-52)
P008700	High-pressure fuel rail pressure low	(See page ES-52)
P008800	High-pressure fuel rail pressure high	(See page ES-52)
P008985	Too large PID control deviation of high-pressure fuel supply pressure	(See page ES-52)
P008984	Too small PID control deviation of high-pressure fuel supply pressure	(See page ES-52)
P009000	Flow control valve high side control circuit high side and low side circuits shorted to each other	(See page ES-52)
P025100	Flow control valve high or low side control circuit open	(See page ES-52)
P025400	Flow control valve high side control circuit overvoltage or undervoltage	(See page ES-52)
P025900	Flow control valve low side control circuit overvoltage or undervoltage	(See page ES-52)
P00C600	High-voltage start failure	(See page ES-52)
P01062A	Abnormal signal value without fluctuation of MAP sensor	(See page ES-52)

DTC	Description	Reference page
P010622	MAP sensor pressure implausibly higher than model pressure	(See page ES-52)
P010621	MAP sensor pressure implausibly lower than model pressure	(See page ES-52)
P120000	MAP sensor pressure above upper limit	(See page ES-52)
P120100	MAP sensor pressure below lower limit	(See page ES-52)
P00C721	MAP sensor signal pressure value too low during start	(See page ES-52)
P00C722	MAP sensor signal pressure value too high during start	(See page ES-52)
P010700	MAP sensor circuit shorted to ground	(See page ES-52)
P010800	MAP sensor circuit shorted to power supply fault	(See page ES-52)
P011126	IAT sensor 1 signal implausible (sticky)	(See page ES-52)
P011200	IAT sensor 1 circuit undervoltage	(See page ES-52)
P011300	IAT sensor 1 circuit overvoltage	(See page ES-52)
P011400	IAT sensor 1 circuit voltage implausible	(See page ES-52)
P00CE24	Air temperature sensor 1 cold start check implausible (positive deviation)	(See page ES-52)
P00CE23	IAT sensor 1 cold start check implausible (negative deviation)	(See page ES-52)
P012300	Electronic throttle position sensor 1 signal circuit overvoltage	(See page ES-52)
P012200	Electronic throttle position sensor 1 signal circuit undervoltage	(See page ES-52)
P012100	Electronic throttle position sensor 1 signal implausible	(See page ES-52)
P022300	Electronic throttle position sensor 2 signal circuit overvoltage	(See page ES-52)
P022200	Electronic throttle position sensor 2 signal circuit undervoltage	(See page ES-52)
P022100	Electronic throttle position sensor 2 signal implausible	(See page ES-52)
P012800	Thermostat performance implausible (coolant temperature failed to reach the nominal thermostat opening temperature)	(See page ES-52)
P013300	Upstream oxygen sensor aging	(See page ES-52)
P013A00	Downstream oxygen sensor rich-lean response slow	(See page ES-52)
P219500	LSU oxygen sensor characteristic deviation (biased lean)	(See page ES-52)
P219600	LSU oxygen sensor characteristic deviation (biased rich)	(See page ES-52)
P209700	Closed-loop correction value based on downstream oxygen sensor above upper limit - biased rich	(See page ES-52)
P209600	Closed-loop correction value based on downstream oxygen sensor below lower limit -biased lean	(See page ES-52)

DTC	Description	Reference page
P013800	Downstream oxygen sensor signal line shorted to power supply	(See page ES-52)
P013700	Downstream oxygen sensor signal line shorted to ground	(See page ES-52)
P013600	Downstream oxygen sensor signal circuit open	(See page ES-52)
P017F00	DMTL air cleaner flow resistance high	(See page ES-52)
P128000	DMTL pump current frequency high	(See page ES-52)
P128100	DMTL pump current frequency low	(See page ES-52)
P043E00	EVAP system leakage diagnosis DMTL reference pump current high	(See page ES-52)
P043F00	EVAP system leakage diagnosis DMTL reference pump current relatively low	(See page ES-52)
P24C100	DMTL pump idle current high	(See page ES-52)
P240700	DMTL pump current fluctuation out of plausible range (caused by humidity)	(See page ES-52)
P044200	EVAP system 1.0mm leakage	(See page ES-52)
P019800	Oil temperature sensor circuit overvoltage	(See page ES-52)
P019700	Oil temperature sensor circuit undervoltage	(See page ES-52)
P019664	Oil temperature sensor signal implausible (high side)	(See page ES-52)
P019629	Oil temperature sensor signal implausible (low side)	(See page ES-52)
P121800	Oil temperature sensor signal above upper limit	(See page ES-52)
P052300	High oil pressure sensor circuit voltage/duty cycle	(See page ES-52)
P052200	Low oil pressure sensor circuit voltage/duty cycle	(See page ES-52)
P021900	High engine speed	(See page ES-52)
P023400	Turbocharger charge air pressure display high	(See page ES-52)
P029900	Turbocharger charge air pressure display low	(See page ES-52)
P023700	Charge air pressure sensor circuit shorted to ground	(See page ES-52)
P023800	Charge air pressure sensor circuit shorted to power supply	(See page ES-52)
P138024	IAT sensor 2 cold start check implausible (positive deviation)	(See page ES-52)
P138023	IAT sensor 2 cold start check implausible (negative deviation)	(See page ES-52)
P009800	IAT sensor 2 circuit overvoltage	(See page ES-52)
P009700	IAT sensor 2 circuit undervoltage	(See page ES-52)
P009900	IAT sensor 2 circuit voltage implausible	(See page ES-52)
P009626	IAT sensor 2 signal implausible (sticky)	(See page ES-52)
P020100	1# cylinder fuel injector control circuit open	(See page ES-52)

DTC	Description	Reference page
P026200	1# cylinder fuel injector low side control circuit overvoltage or undervoltage	(See page ES-52)
P02EE00	1# cylinder fuel injector high side and low side control circuits shorted to each other	(See page ES-52)
P02CD00	1# cylinder CVO self-learning adjustment up to upper limit	(See page ES-52)
P02CC00	1# cylinder CVO self-learning adjustment up to lower limit	(See page ES-52)
P126100	1# cylinder CVO circuit signal implausible	(See page ES-52)
P020200	2# cylinder fuel injector control circuit open	(See page ES-52)
P026500	2# cylinder fuel injector low side control circuit overvoltage or undervoltage	(See page ES-52)
P02EF00	2# cylinder fuel injector high side and low side control circuits shorted to each other	(See page ES-52)
P02CF00	#2 Cylinder CVO self-learning adjustment at upper limit	(See page ES-52)
P02CE00	2# cylinder CVO self-learning adjustment at lower limit	(See page ES-52)
P126200	2# cylinder CVO circuit signal implausible	(See page ES-52)
P020300	3# cylinder fuel injector control circuit open	(See page ES-52)
P026800	3# cylinder fuel injector low side control circuit overvoltage or undervoltage	(See page ES-52)
P02F000	3# cylinder fuel injector high side and low side control circuits shorted to each other	(See page ES-52)
P02D100	3# cylinder CVO self-learning adjustment at upper limit	(See page ES-52)
P02D000	4# cylinder CVO self-learning adjustment at lower limit	(See page ES-52)
P126300	3# cylinder CVO circuit signal implausible	(See page ES-52)
P020400	4# cylinder fuel injector control circuit open	(See page ES-52)
P027100	4# cylinder fuel injector low side control circuit overvoltage or undervoltage	(See page ES-52)
P02F100	4# cylinder fuel injector high side and low side control circuits shorted to each other	(See page ES-52)
P02D300	4# cylinder CVO self-learning adjustment at upper limit	(See page ES-52)
P02D200	4# cylinder CVO self-learning adjustment at lower limit	(See page ES-52)
P126400	4# cylinder CVO circuit signal implausible	(See page ES-52)
P030000	Engine random or multi-cylinder misfire	(See page ES-52)
P030100	1# Cylinder misfire detected	(See page ES-52)
P030200	2# Cylinder misfire detected	(See page ES-52)
P030300	3# Cylinder misfire detected	(See page ES-52)
P030400	4# cylinder misfire detected	(See page ES-52)
P036300	Engine misfire triggering fuel cutoff	(See page ES-52)
P032700	Knock sensor A end shorted to ground	(See page ES-52)

DTC	Description	Reference page
P032714	Knock sensor B end shorted to ground	(See page ES-52)
P032800	Diagnosis of short circuit to power supply of knock sensor end A	(See page ES-52)
P032815	Diagnosis of short circuit to power supply of knock sensor end B	(See page ES-52)
P032500	Knock sensor signal circuit undervoltage	(See page ES-52)
P151000	Knock sensor signal evaluation and diagnosis	(See page ES-52)
P032600	Knock sensor signal circuit overvoltage	(See page ES-52)
P033900	Speed sensor signal Implausible	(See page ES-52)
P261700	Speed sensor signal lost	(See page ES-52)
P033664	Crankshaft sensor pulse width signal implausible	(See page ES-52)
P034A00	Crankshaft position sensor –crankshaft starting position incorrect (stop position implausible)	(See page ES-52)
P034B00	Crankshaft position sensor -crankshaft rotation direction incorrect (reverse signal implausible)	(See page ES-52)
P034100	Intake camshaft sensor signal Implausible (Bank1)	(See page ES-52)
P034200	Intake camshaft sensor signal circuit shorted to ground (Bank1)	(See page ES-52)
P034300	Intake camshaft sensor signal circuit shorted to power supply (Bank1)	(See page ES-52)
P035100	1# cylinder ignition coil control circuit open	(See page ES-52)
P230000	1# cylinder ignition coil control circuit undervoltage	(See page ES-52)
P230100	1# cylinder ignition coil control circuit overvoltage	(See page ES-52)
P035200	2# cylinder ignition coil control circuit open	(See page ES-52)
P230300	2# cylinder ignition coil control circuit undervoltage	(See page ES-52)
P230400	2# cylinder ignition coil control circuit overvoltage	(See page ES-52)
P035300	3# cylinder ignition coil control circuit open	(See page ES-52)
P230600	3# cylinder ignition coil control circuit undervoltage	(See page ES-52)
P230700	3# cylinder ignition coil control circuit overvoltage	(See page ES-52)
P035400	4# cylinder ignition coil control circuit open	(See page ES-52)
P230900	4# cylinder ignition coil control circuit undervoltage	(See page ES-52)
P231000	4# cylinder ignition coil control circuit overvoltage	(See page ES-52)
P036600	Exhaust camshaft sensor signal implausible (Bank1)	(See page ES-52)

DTC	Description	Reference page
P036800	Exhaust camshaft sensor signal circuit shorted to power supply (Bank1)	(See page ES-52)
P036700	Exhaust camshaft sensor signal circuit shorted to ground (Bank1)	(See page ES-52)
P042000	TWC OSC aging	(See page ES-52)
P044400	Canister control valve control circuit open	(See page ES-52)
P045800	Canister control valve circuit undervoltage	(See page ES-52)
P045900	Canister control valve circuit overvoltage	(See page ES-52)
P049700	Canister solenoid valve stuck closed	(See page ES-52)
P046000	Fuel level sensor original signal out of range	(See page ES-52)
P25B000	Fuel level sensor signal stuck	(See page ES-52)
P046129	Fuel level signal implausible	(See page ES-52)
P046300	Fuel level sensor circuit overvoltage	(See page ES-52)
P046200	Fuel level sensor circuit undervoltage	(See page ES-52)
U067681	Fuel level sensor signal loss/failure/check error	(See page ES-52)
P046700	High-load desorption pipeline pressure sensor circuit undervoltage	(See page ES-52)
P046800	High-load desorption pipeline pressure sensor circuit overvoltage	(See page ES-52)
P128500	High-load desorption pipeline pressure sensor signal above upper threshold	(See page ES-52)
P128600	High-load desorption pipeline pressure sensor signal below lower threshold	(See page ES-52)
P04F000	High-load desorption pipeline fault - canister valve fault	(See page ES-52)
P050B20	Ignition angle efficiency monitoring during catalytic converter heating (partial load)	(See page ES-52)
P053F22	High-pressure fuel passage pressure high during catalytic converter heating	(See page ES-52)
P053F21	High-pressure fuel passage pressure low during catalytic converter heating	(See page ES-52)
P05EC00	Multiple injection monitoring faults during catalytic converter heating	(See page ES-52)
P050C24	Coolant temperature sensor 1 cold start check implausible (positive deviation)	(See page ES-52)
P050C23	Coolant temperature sensor 1 cold start check implausible (negative deviation)	(See page ES-52)
P011623	Coolant temperature sensor 1 signal implausible (low side)	(See page ES-52)
P011626	Coolant temperature sensor 1 signal implausible (stuck)	(See page ES-52)
P011800	Coolant temperature sensor 1 circuit overvoltage	(See page ES-52)
P011700	Coolant temperature sensor 1 circuit undervoltage	(See page ES-52)

DTC	Description	Reference page
P011900	Coolant temperature sensor 1 circuit voltage implausible	(See page ES-52)
P145200	Unreasonable brake chamber pressure	(See page ES-52)
P056300	Battery overvoltage	(See page ES-52)
P056200	Battery undervoltage	(See page ES-52)
P050400	Brake signal correlation failure	(See page ES-52)
P061A00	Second layer torque monitoring fault (torque comparison fault)	(See page ES-52)
P060D00	Second accelerator pedal signal implausible	(See page ES-52)
P152000	Load forecast monitoring fault	(See page ES-52)
P152100	Pipe monitoring fault in fuel cutoff mode	(See page ES-52)
P152200	Pipe monitoring fault in fuel supply mode	(See page ES-52)
P153900	Synchronization process plausibility check (based on speed and sync count)	(See page ES-52)
P153700	Load comparison monitoring fault	(See page ES-52)
P153500	Mixture monitoring fault	(See page ES-52)
P153600	Operating mode monitoring fault	(See page ES-52)
P062900	Fuel pump relay control circuit overvoltage	(See page ES-52)
P062800	Fuel pump relay control circuit undervoltage	(See page ES-52)
P062700	Fuel pump relay control circuit open	(See page ES-52)
P062B9A	Similar working condition path of self-learning adjustment out of limit	(See page ES-52)
P062B64	Similar working condition path of circuit signal implausible	(See page ES-52)
P062B96	ECU fault (CVO failure in all cylinders)	(See page ES-52)
P063000	VIN not written or incompatible	(See page ES-52)
P064100	5V power supply module 1 faulty	(See page ES-52)
P065100	Chip 5 V power supply voltage 2 fault	(See page ES-52)
P069700	5V power supply module 3 faulty	(See page ES-52)
P064D00	LSU integrated chip register writing failure	(See page ES-52)
P223700	LSU type oxygen sensor APE circuit open (near ECU end)	(See page ES-52)
P225100	Upstream oxygen sensor IPE circuit open	(See page ES-52)
P224300	Upstream oxygen sensor RE circuit open	(See page ES-52)
P013200	Upstream oxygen sensor signal circuit overvoltage (APE / IPE / RE circuit shorted to power supply)	(See page ES-52)
P013100	Upstream oxygen sensor signal circuit undervoltage (APE / IPE / RE circuit shorted to ground)	(See page ES-52)
P241400	Upstream oxygen sensor output voltage implausible	(See page ES-52)
P064D13	LSU integrated chip SPI communication failure	(See page ES-52)

DTC	Description	Reference page
P223713	LSU type oxygen sensor APE circuit open	(See page ES-52)
P013000	Upstream oxygen sensor compensation resistor circuit open	(See page ES-52)
P068500	Main relay open circuit	(See page ES-52)
P068700	Main relay circuit shorted to power supply	(See page ES-52)
P068600	Main relay circuit shorted to ground	(See page ES-52)
P06869E	ECM/PCM main relay stuck or circuit shorted to ground	(See page ES-52)
P06B842	Error in reading NVM Block	(See page ES-52)
P06B843	Error in writing NVM Block	(See page ES-52)
P06DC00	Two-stage oil pump control circuit overvoltage	(See page ES-52)
P06DB00	Two-stage oil pump control circuit undervoltage	(See page ES-52)
P06DA00	Two-stage oil pump control circuit open	(See page ES-52)
P120400	Charge air pressure above upper limit	(See page ES-52)
P120500	Charge air pressure below lower limit	(See page ES-52)
P023622	Charge air pressure implausibly high	(See page ES-52)
P023621	Charge air pressure implausible, low	(See page ES-52)
P121200	Vehicle speed sensor performance failure (vehicle speed above upper limit)	(See page ES-52)
P050000	Vehicle speed sensor input signal failure	(See page ES-52)
P050166	Vehicle speed implausible - Low vehicle speed during high engine load	(See page ES-52)
P019000	High-pressure fuel rail pressure sensor voltage signal implausible	(See page ES-52)
P019128	Negative deviation of characteristic curve of high-pressure fuel rail pressure sensor	(See page ES-52)
P019129	Positive deviation of characteristic curve of high-pressure fuel rail pressure sensor	(See page ES-52)
P019200	High-pressure fuel rail pressure sensor circuit undervoltage	(See page ES-52)
P019300	High-pressure fuel rail pressure sensor circuit overvoltage	(See page ES-52)
P019400	High-pressure fuel rail pressure sensor signal stuck	(See page ES-52)
P142000	CAN hardware register response timeout	(See page ES-52)
P142100	LIN hardware register response timeout	(See page ES-52)
P153800	Ignition angle signal, harness or ECU fault	(See page ES-52)
P152700	First layer safety fuel cutoff monitoring fault	(See page ES-52)
P152800	Second layer safety fuel cutoff monitoring fault	(See page ES-52)
P061C00	Second layer engine speed monitoring fault	(See page ES-52)
P152900	Starter control monitoring fault	(See page ES-52)
P153000	AD converter zero test monitoring fault	(See page ES-52)

DTC	Description	Reference page
P153100	AD converter set voltage test monitoring fault	(See page ES-52)
P157100	Drive stage check fault or communication failure in the shutdown path check	(See page ES-52)
P157200	ABE activated at normal voltage	(See page ES-52)
P157300	Monitoring error response fault	(See page ES-52)
P157400	Errorpin activated with normal monitoring communication	(See page ES-52)
P261000	Engine off timer implausible	(See page ES-52)
P157500	DVE drive cutoff due to overvoltage	(See page ES-52)
P155000	Electronic throttle self-learning condition not met	(See page ES-52)
P155100	Electronic throttle lower limit position initialization self-learning fault	(See page ES-52)
P155600	Throttle mechanical BDC re-self-learning maximum error	(See page ES-52)
P155700	Throttle mechanical BDC re-self-learning ninimum value error	(See page ES-52)
P155800	Deviation of throttle limp home position from initial self-learning value out of limit	(See page ES-52)
P155900	Throttle limp position above upper limit	(See page ES-52)
P155A00	Deviation of throttle limp home position from last self-learning value out of limit	(See page ES-52)
P155B00	Throttle limp position below lower limit	(See page ES-52)
P155400	Return spring stuck in maximum position	(See page ES-52)
P155500	Return spring stuck in minimum position	(See page ES-52)
P156100	DVE position control deviation	(See page ES-52)
P156000	Throttle body PID adjustment out of limit	(See page ES-52)
P15A000	CPU0: MPU fault (register, DSPR, PSPR)	(See page ES-52)
P15A100	CPU0: DCACHE/DSPRECC uncorrectable	(See page ES-52)
P15A200	CPU0: DCACHE/DSPR address failure	(See page ES-52)
P15A300	CPU0: DCACHE TAG SRAM ECC uncorrectable	(See page ES-52)
P15A400	CPU0: DCACHE TAG SRAM address failure	(See page ES-52)
P15A500	CPU0: PCACHE TAGRAM ECC uncorrectable	(See page ES-52)
P15A600	CPU0: PCACHE TAGRAM address failure	(See page ES-52)
P15A700	CPU0: PCACHE/PSPR ECC uncorrectable	(See page ES-52)
P15A800	CPU0: PCACHE/PSPR address failure	(See page ES-52)
P15A900	CPU1: Lockstep comparator fault	(See page ES-52)
P15AA00	CPU1: MPU fault (register, DSPR, PSPR)	(See page ES-52)
P15AB00	CPU1: DCACHE/DSPR ECC uncorrectable	(See page ES-52)
P15AC00	CPU1: DCACHE/DSPR address failure	(See page ES-52)

DTC	Description	Reference page
P15AD00	CPU1: DCACHE TAGRAM ECC uncorrectable	(See page ES-52)
P15AE00	CPU1: DCACHE TAGRAM address failure	(See page ES-52)
P15AF00	CPU1: PCACHE TAGRAM ECC uncorrectable	(See page ES-52)
P15B000	CPU1: PCACHE TAGRAM address failure	(See page ES-52)
P15B100	CPU1: PCACHE/PSPR ECC uncorrectable	(See page ES-52)
P15B200	CPU1:PCACHE/PSPR address failure	(See page ES-52)
P15B300	LMU: SRAM ECC monitoring fault	(See page ES-52)
P15B400	LMU: SRAM ECC uncorrectable	(See page ES-52)
P15B500	LMU: SRAM address failure	(See page ES-52)
P15B600	SMU: Timer0 recovery timeout	(See page ES-52)
P15B700	SMU: Timer1 recovery timeout	(See page ES-52)
P15B800	PMU: PFLASH ECC uncorrectable multiple bit faults	(See page ES-52)
P15B900	PMU: PFLASH address failure	(See page ES-52)
P15BA00	PMU: PFLASH ECC monitoring fault (covering all ECC modules)	(See page ES-52)
P15BB00	PMU: PFLASH EDC comparator failure (covering all PFLASH instances)	(See page ES-52)
P15BC00	SCU/CGU: system PLL OSC_WDT: input clock out of limit	(See page ES-52)
P15BD00	SCU/CGU: system PLL VCO clock event loss	(See page ES-52)
P15BE00	SCU/EVR: EVR 1.3 V digital undervoltage	(See page ES-52)
P15BF00	SCU/EVR: EVR 3.3 V overvoltage	(See page ES-52)
P15C000	SCU/EVR: external power supply overvoltage	(See page ES-52)
P15C100	SCU/WDTS: safety watchdog timeout	(See page ES-52)
P15C200	SCU/WDTCPU0: watchdog CPU0 timeout	(See page ES-52)
P15C300	SCU/WDTCPU1: watchdog CPU1 timeout	(See page ES-52)
P15C400	SCU/CGU: PLL_ERAY VCO clock event loss	(See page ES-52)
P15C500	SCU/WDTCPU2: watchdog CPU2 timeout	(See page ES-52)
P15C600	SCU/ DTS: temperature sensor overflow	(See page ES-52)
P15C700	Registers: fault detected by register monitoring	(See page ES-52)
P15C800	SCU/LSCU: SCU configuration failure: monitoring dual-rail property (reverse signal) from lockstep comparator (LSCU) alarm	(See page ES-52)
P15C900	SCU/CGU: clock monitoring: STM out of frequency range	(See page ES-52)
P15CA00	SCU/CGU: clock monitoring: PLL_ERAY out of frequency range	(See page ES-52)
P15CB00	SCU/CGU: clock monitoring: PLL out of frequency range	(See page ES-52)

DTC	Description	Reference page
P15CC00	SCU/CGU: clock monitoring: SRI out of frequency range	(See page ES-52)
P15CD00	SCU/CGU: clock monitoring: SPB out of frequency range	(See page ES-52)
P15CE00	SCU/CGU: clock monitoring: GTM out of frequency range	(See page ES-52)
P15CF00	SCU/CGU: clock monitoring: ADC out of frequency range	(See page ES-52)
P15D000	GTM: SRAMs uncorrectable	(See page ES-52)
P15D100	FLEXRAY: SRAM address failure	(See page ES-52)
P15D200	Misc SRAMs: SRAM ECC uncorrectable	(See page ES-52)
P15D300	Misc SRAMs: SRAM address failure	(See page ES-52)
P15D400	GTM: SRAMs address failure	(See page ES-52)
P15D500	CAN: SRAM uncorrectable	(See page ES-52)
P15D600	CAN: SRAM address failure	(See page ES-52)
P15D700	FLEXRAY: SRAM ECC uncorrectable	(See page ES-52)
P15D800	CPU2: MPU fault (register, DSPR, PSPR)	(See page ES-52)
P15D900	CPU2: DCACHE/DSPR ECC uncorrectable	(See page ES-52)
P15DA00	CPU2: DCACHE/DSPR address failure	(See page ES-52)
P15DB00	CPU2: DCACHE TAG SRAM ECC uncorrectable	(See page ES-52)
P15DD00	CPU2: 121 PCACHE TAGRAM ECC uncorrectable	(See page ES-52)
P15DE00	CPU2: PCACHE TAGRAM address failure	(See page ES-52)
P15DF00	CPU2: PCACHE/PSPR ECC uncorrectable	(See page ES-52)
P15E000	CPU2 PCACHE/PSPR address failure	(See page ES-52)
P210300	Electronic throttle drive stage fault (short circuit)	(See page ES-52)
P211800	Electronic throttle drive stage fault (overheat or overcurrent)	(See page ES-52)
P210600	Electronic throttle drive stage fault (implausible)	(See page ES-52)
P210000	Electronic throttle drive stage fault (open circuit)	(See page ES-52)
P214800	1# and 4# cylinder fuel injector high side control circuit overvoltage/undervoltage or 4# cylinder fuel injector low side control circuit overvoltage/undervoltage	(See page ES-52)
P215100	2# and 3# cylinder fuel injector high side control circuit overvoltage/undervoltage or #2 cylinder fuel injector low side control circuit overvoltage/undervoltage	(See page ES-52)
P217700	Air-fuel ratio closed-loop control self-learning value above upper limit (medium load zone)	(See page ES-52)
P217800	Air-fuel ratio closed-loop control self-learning value below lower limit (medium load zone)	(See page ES-52)

DTC	Description	Reference page
P218500	Coolant temperature sensor 2 circuit over-voltage	(See page ES-52)
P218400	Coolant temperature sensor 2 circuit under-voltage	(See page ES-52)
P218324	Coolant temperature sensor 2 cold start check implausible (positive deviation)	(See page ES-52)
P218323	Coolant temperature sensor 2 cold start check implausible (negative deviation)	(See page ES-52)
P222900	Ambient pressure sensor circuit shorted to power supply	(See page ES-52)
P222800	Ambient pressure sensor circuit shorted to ground	(See page ES-52)
P222729	Ambient pressure sensor signal fault	(See page ES-52)
P222722	Ambient pressure sensor pressure implausi-bly high	(See page ES-52)
P222721	Ambient pressure sensor pressure implausi-bly low	(See page ES-52)
P222785	Ambient pressure sensor signal pressure value high during starting	(See page ES-52)
P222784	Ambient pressure sensor signal pressure value low during starting	(See page ES-52)
P120200	Ambient pressure sensor pressure above upper limit	(See page ES-52)
P120300	Ambient pressure sensor pressure below lower limit	(See page ES-52)
P223200	Coupling of downstream oxygen sensor sig-nal line to heater wire	(See page ES-52)
P227000	Downstream oxygen sensor aging - signal biased lean continuously	(See page ES-52)
P227100	Downstream oxygen sensor aging - signal biased rick continuously	(See page ES-52)
P240C00	EVAP system leakage diagnosis DMTL heating unit circuit overvoltage	(See page ES-52)
P240B00	EVAP system leakage diagnosis DMTL heating unit circuit undervoltage	(See page ES-52)
P240A00	EVAP system leakage diagnosis DMTL heating unit circuit open	(See page ES-52)
P24BF00	EVAP system DMTL solenoid valve control circuit overvoltage	(See page ES-52)
P24BE00	EVAP system DMTL solenoid valve control circuit undervoltage	(See page ES-52)
P24BD00	EVAP system DMTL solenoid valve control circuit open	(See page ES-52)
P240200	EVAP system DMTL pump control circuit overvoltage	(See page ES-52)
P240100	EVAP system DMTL pump control circuit undervoltage	(See page ES-52)
P240000	EVAP system DMTL pump control circuit open	(See page ES-52)

DTC	Description	Reference page
P25AB00	Piston cooling nozzle control valve control circuit overvoltage	(See page ES-52)
P25AA00	Piston cooling nozzle control valve control circuit undervoltage	(See page ES-52)
P25A900	Piston cooling nozzle control valve control circuit open	(See page ES-52)
P063441	Starter drive chip 1 overheating	(See page ES-52)
P063444	Starter drive chip 2 overheating	(See page ES-52)
P150000	Collision and fuel cutoff signal received by vehicle	(See page ES-52)
P150100	Airbag communication information implausible	(See page ES-52)
P150200	Collision and fuel cutoff signal received by vehicle	(See page ES-52)
P150300	Airbag signal implausible	(See page ES-52)
P138824	Ambient temperature sensor cold start check implausible (positive deviation)	(See page ES-52)
P138823	Ambient temperature sensor cold start check implausible (negative deviation)	(See page ES-52)
P007300	Ambient temperature sensor circuit overvoltage	(See page ES-52)
P007200	Ambient temperature sensor circuit undervoltage	(See page ES-52)
P007000	Lost communication with ambient temperature sensor CAN	(See page ES-52)
P003300	Turbocharger relief valve control circuit open	(See page ES-52)
P003400	Turbocharger relief valve control circuit undervoltage	(See page ES-52)
P003500	Turbocharger relief valve control circuit overvoltage	(See page ES-52)
P226100	Turbocharger relief valve mechanical fault	(See page ES-52)
P12C400	Crankcase ventilation pipe 2 diagnostic circuit voltage high	(See page ES-52)
P12C500	Crankcase ventilation pipe 2 diagnostic circuit voltage low	(See page ES-52)
P261D00	Turbocharger electronic coolant pump control circuit overvoltage	(See page ES-52)
P261C00	Turbocharger electronic coolant pump control circuit undervoltage/implausibility	(See page ES-52)
P261A00	Turbocharger electronic coolant pump control circuit open	(See page ES-52)
P053A00	Crankcase heater pipeline circuit open	(See page ES-19)
P053C00	Crankcase heater pipeline circuit overvoltage	(See page ES-19)
P053B00	Crankcase heater pipeline circuit undervoltage	(See page ES-19)
P12C600	Crankcase ventilation pipe 3 diagnostic circuit voltage high	(See page ES-29)

DTC	Description	Reference page
P12C700	Crankcase ventilation pipe 3 diagnostic circuit voltage low	(See page ES-29)
P121B00	Left front wheel wheel speed sensor signal abnormal	(See page ES-23)
P121C00	Abnormal right front wheel speed sensor signal	(See page ES-23)
P121D00	Left rear wheel speed sensor signal abnormal	(See page ES-23)
P121E00	Right rear wheel speed sensor signal abnormal	(See page ES-23)
U012100	Lost communication with ABS module	(See page ES-32)
U041500	ABS module communication Check Sum/ Rolling Counter fault	(See page ES-32)
U015100	Lost communication with ACU module	(See page ES-32)
U045200	ACU module communication Check Sum/ Rolling Counter fault	(See page ES-32)
U010F00	Lost communication with A/C module	(See page ES-32)
U007300	CAN bus 1 OFF	(See page ES-32)
U014600	Lost communication with GW module	(See page ES-32)
U029300	Lost communication with VCU module	(See page ES-32)
U059481	HCU signal Checksum error	(See page ES-32)
U015500	Lost communication with ICM or abnormal signal	(See page ES-32)

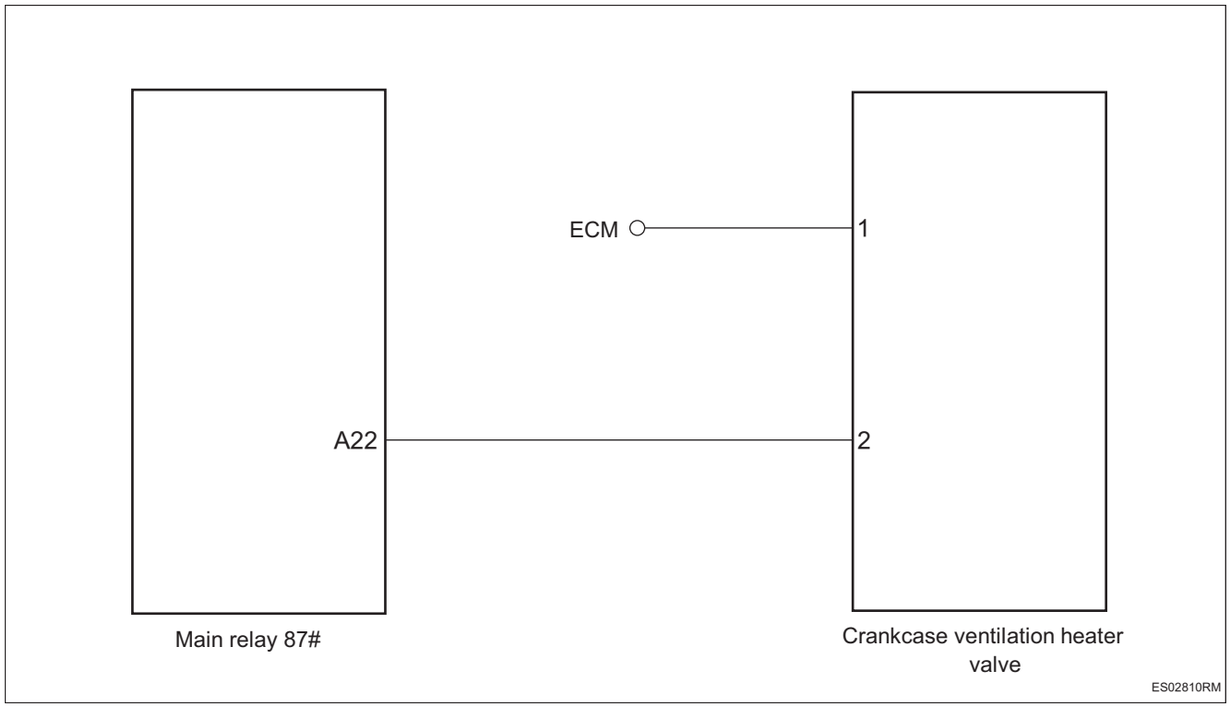
DTC	P053A00	Crankcase heater pipeline circuit open
DTC	P053B00	Crankcase ventilation pipe diagnosis circuit undervoltage
DTC	P053C00	Crankcase ventilation pipe diagnosis circuit overvoltage

Description

When the crankcase ventilation heater valve circuit voltage is out of the normal range, the ECM records the DTC.

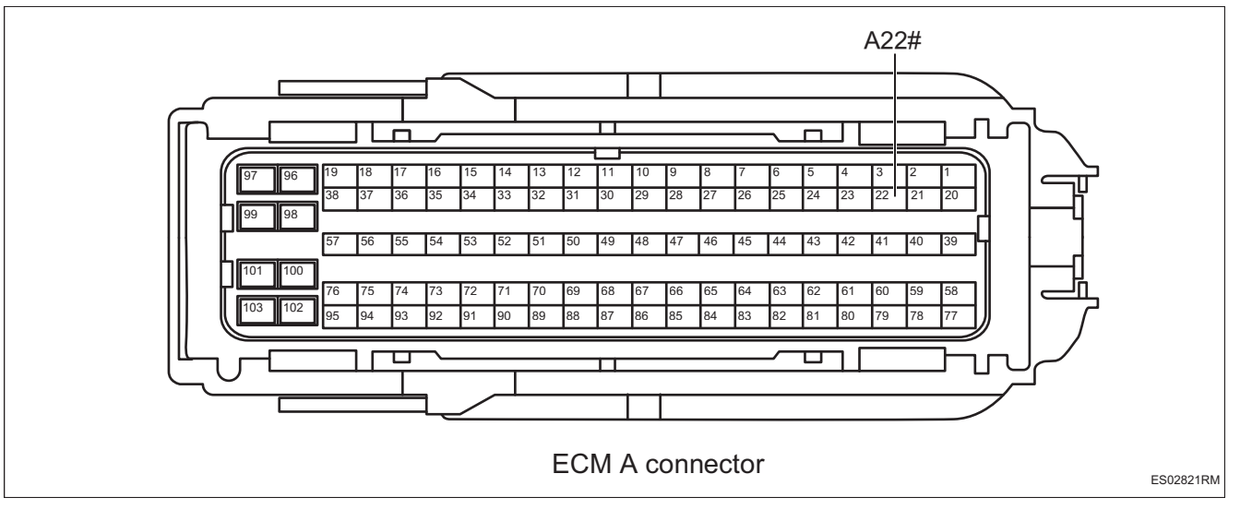
DTC	DTC detection conditions	Faulty location
P053A00	(a) Crankcase ventilation heater valve is open-circuited.	• ECM • Harness and connector • Crankcase ventilation heater valve
P053B00	(a) Crankcase ventilation heater valve circuit voltage low.	• ECM • Harness and connector • Crankcase ventilation heater valve
P053C00	(a) Crankcase ventilation heater valve circuit voltage low.	• ECM • Harness and connector • Crankcase ventilation heater valve

Circuit diagram



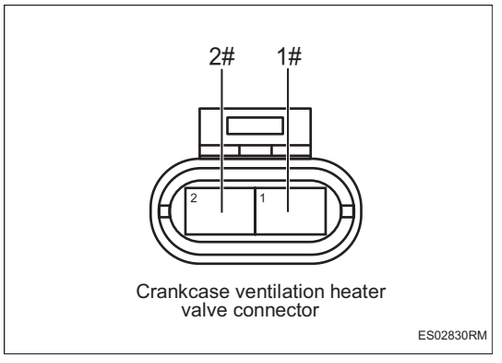
Inspection procedure

1	Check crankcase ventilation heater valve harness and connector for open circuit



ECM A connector

ES02821RM



Crankcase ventilation heater valve connector

ES02830RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Remove the main relay.

(e) Disconnect the crankcase ventilation heater valve connector.

(f) Measure the resistance according to the values in the table below.

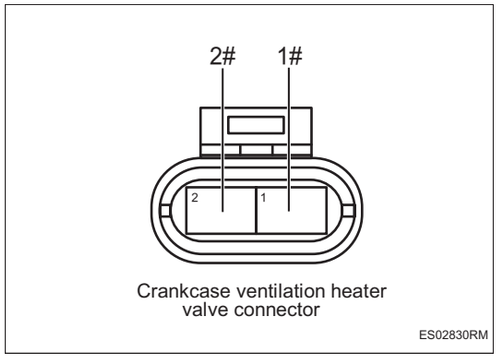
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A22# - crankcase ventilation heater valve connector 2#	Always connected	Less than 1Ω
Crankcase ventilation heater valve connector 1# - main relay connector 87#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check crankcase ventilation heater valve harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

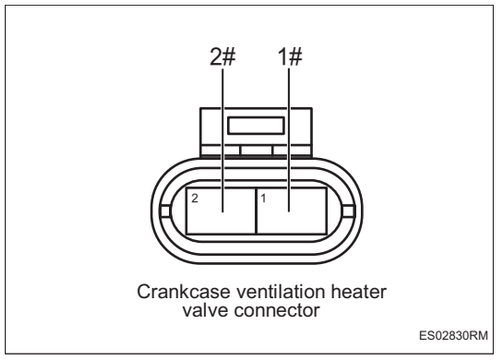
Detector connection	Detection conditions	Specified state
Crankcase ventilation heater valve connector 1#- body GND	Always connected	10 KΩ or greater
Crankcase ventilation heater valve connector 2#- body GND	Always connected	10 KΩ or greater

ES

NG → **Repair or replace the harness and connector**

OK

3	Check crankcase ventilation heater valve harness and connector for circuit shorted to power supply



(a) Install the main relay.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Crankcase ventilation heater valve connector 1#- body GND	Set the ignition switch to "ON"	Less than 1 V
Crankcase ventilation heater valve connector 2#- body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	Replace the crankcase ventilation heater valve

(a) Replace the crankcase ventilation heater valve.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM**

OK

5	**End**

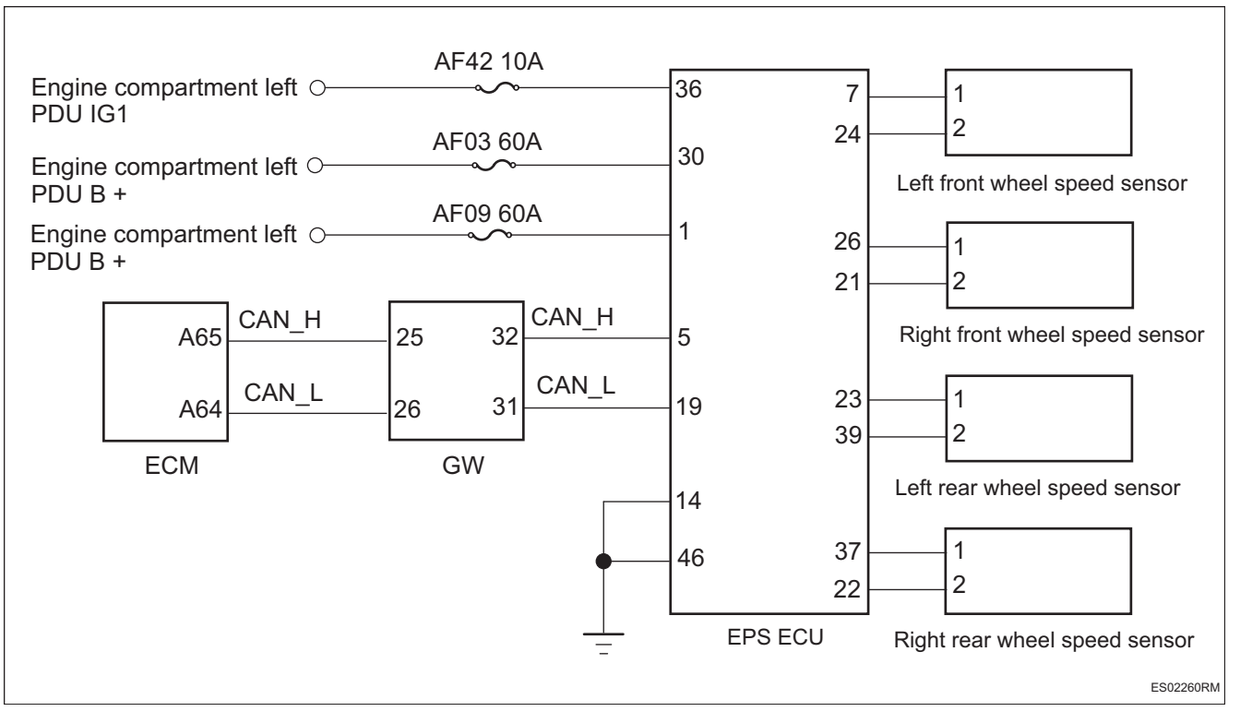
DTC	P121B00	Left front wheel wheel speed sensor signal abnormal
DTC	P121C00	Abnormal right front wheel speed sensor signal
DTC	P121D00	Left rear wheel speed sensor signal abnormal
DTC	P121E00	Right rear wheel speed sensor signal abnormal

Description

In case of short or open circuit, abnormal signal or communication of the wheel speed sensor, the ECM will record the DTC.

DTC	DTC detection conditions	Faulty location
P121B00	(a) Abnormal wheel speed sensor signal.	• ECM • Harness and connector • GW • GW • ESC • Left front wheel wheel speed sensor signal
P121C00	(a) Abnormal wheel speed sensor signal.	• ECM • Harness and connector • GW • GW • ESC • Right front wheel speed sensor
P121D00	(a) Abnormal wheel speed sensor signal.	• ECM • Harness and connector • GW • GW • ESC • Left rear wheel speed sensor
P121E00	(a) Abnormal wheel speed sensor signal.	• ECM • Harness and connector • GW • GW • ESC • Right right wheel speed sensor

Circuit diagram



Inspection procedure

1	Check vehicle tire

(a) Check whether the tire air pressure is insufficient.

(b) Check whether the tire size meets the specification.

(c) Check whether the tires are seriously worn.

NG → **Repair according to the fault**

OK

2	Check the wheel speed sensor signal ring gear

(a) Check whether the gap between wheel speed sensor and ring gear is correct.

(b) Check the wheel speed sensor ring gear for dirt and foreign matter.

(c) Check each wheel speed sensor ring gear for damage.

NG → **Repair according to the fault**

OK

3	**Check wheel speed sensor harness and connector**

(a) Check whether the wheel speed sensor harness and connector are properly connected.

(b) Check the wheel speed sensor harness and connector for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

ES

OK

4	**Check wheel speed sensor**

(a) Check whether the wheel speed sensor is installed correctly.

(b) Check whether the wheel speed sensor is damaged.

NG → **Replace wheel speed sensor**

OK

5	**Check chassis CAN bus (GW-ESC)**

(a) Check the CAN line for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

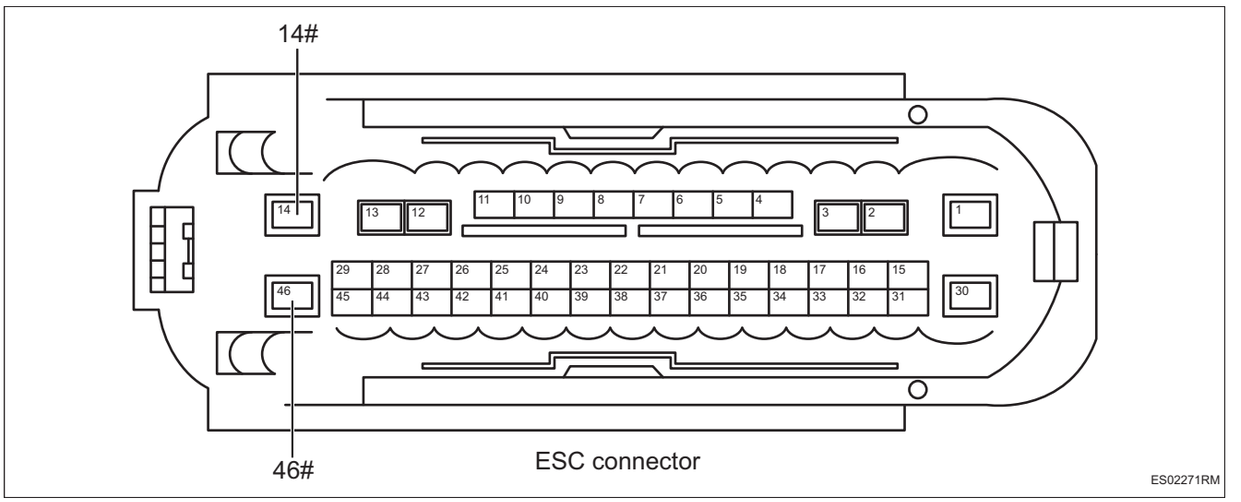
6	**Check powertrain CAN bus (ECM-GW)**

(a) Check the CAN line for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

7	**Check ESC ground**



ES

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ESC connector.

(d) Measure the resistance according to the values in the table below.

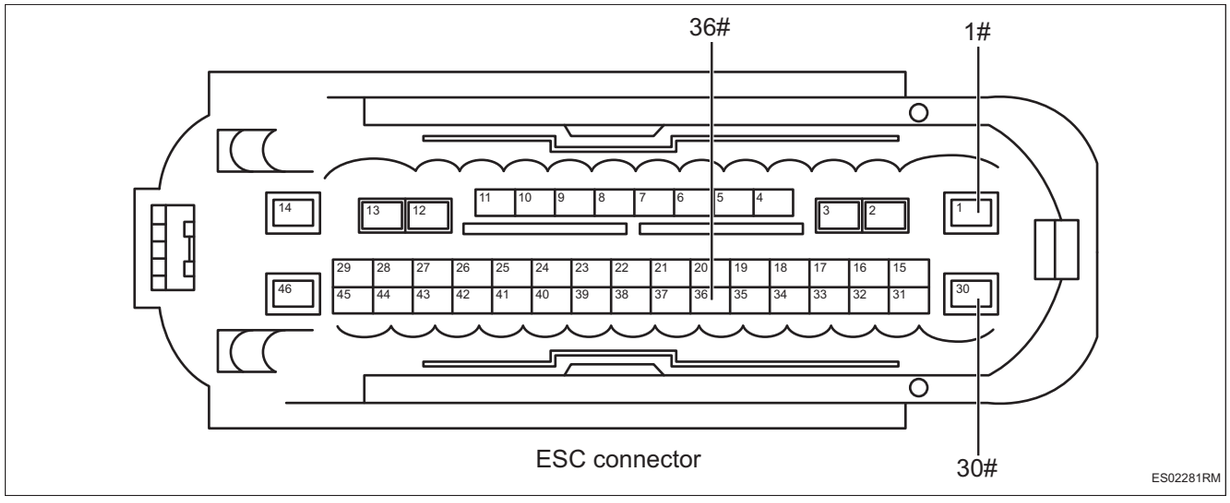
Standard value

Detector connection	Detection conditions	Specified state
ESC connector 14# - body GND	Always connected	Less than 1Ω
ESC connector 46# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

8	**Check the ESC power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

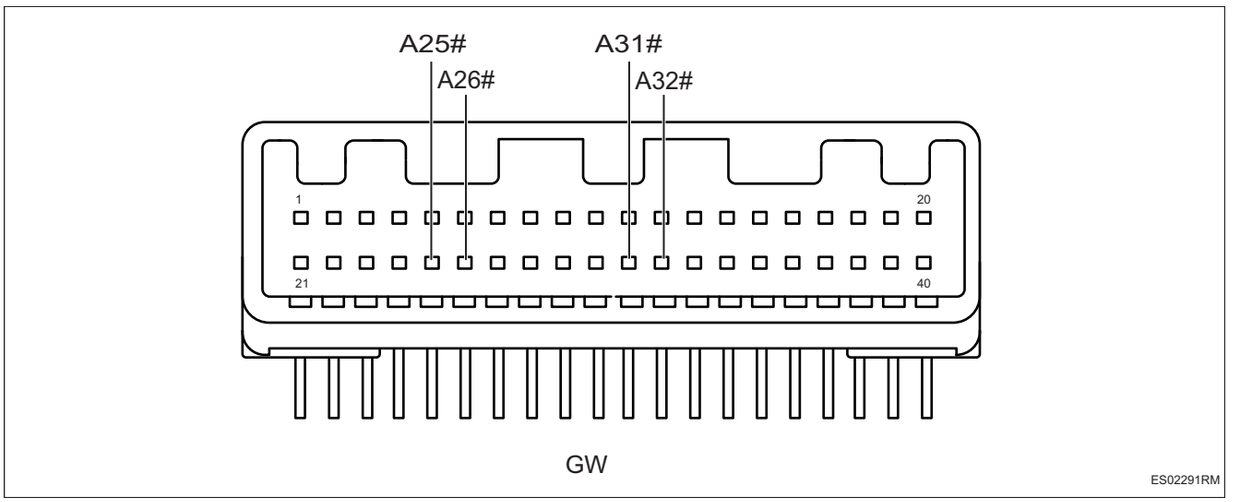
Standard value

Detector connection	Detection conditions	Specified state
ESC connector 1# - body GND	Set the ignition switch to "ON"	Battery voltage
ESC connector 30# - body GND	Set the ignition switch to "ON"	Battery voltage
ESC connector 36# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector, relay and fuse**

OK

9	**Check GW terminal resistor**



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
GW 31#- GW 32#	Always connected	About 120 Ω
GW 25#- GW 26#	Always connected	About 120 Ω

NG → **Replace GW**

OK

10	**Replace the ESC**

(a) Replace the ESC.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM**

OK

11	**End**

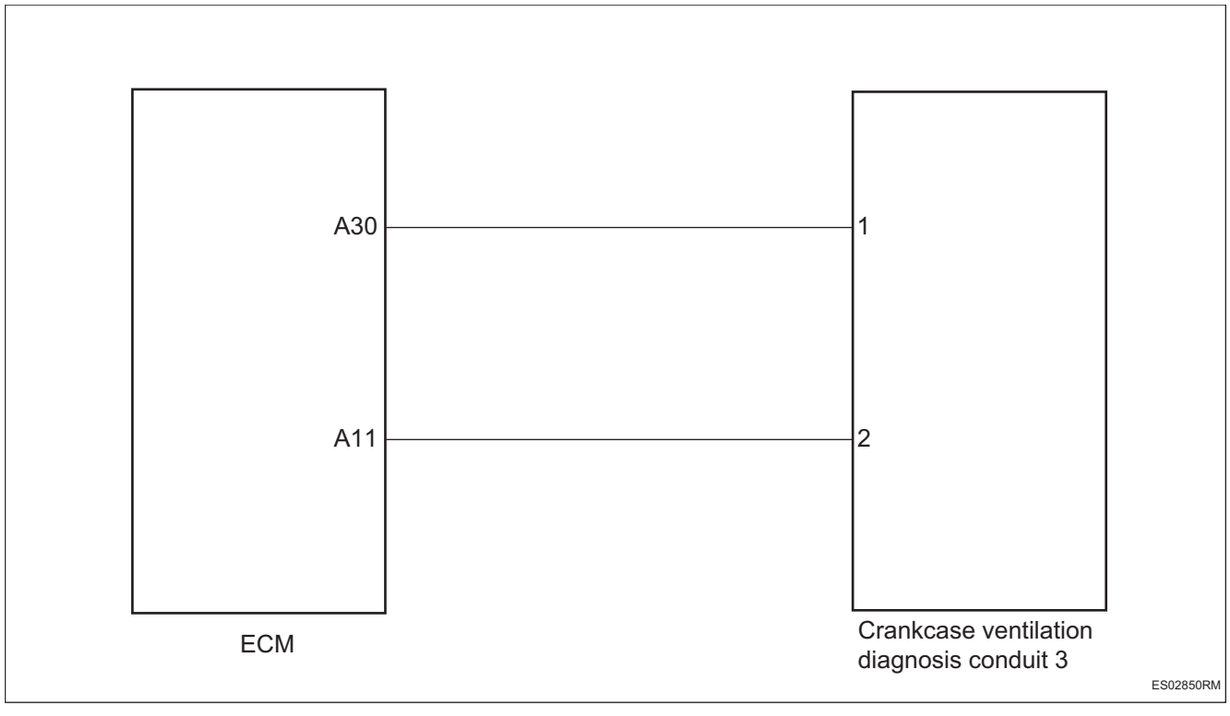
DTC	P12C600	Crankcase ventilation pipe 3 diagnostic circuit voltage high
DTC	P12C700	Crankcase ventilation pipe 3 diagnostic circuit voltage low

Description

When the crankcase ventilation diagnosis conduit 3 circuit voltage is out of the normal range, the ECM records the DTC.

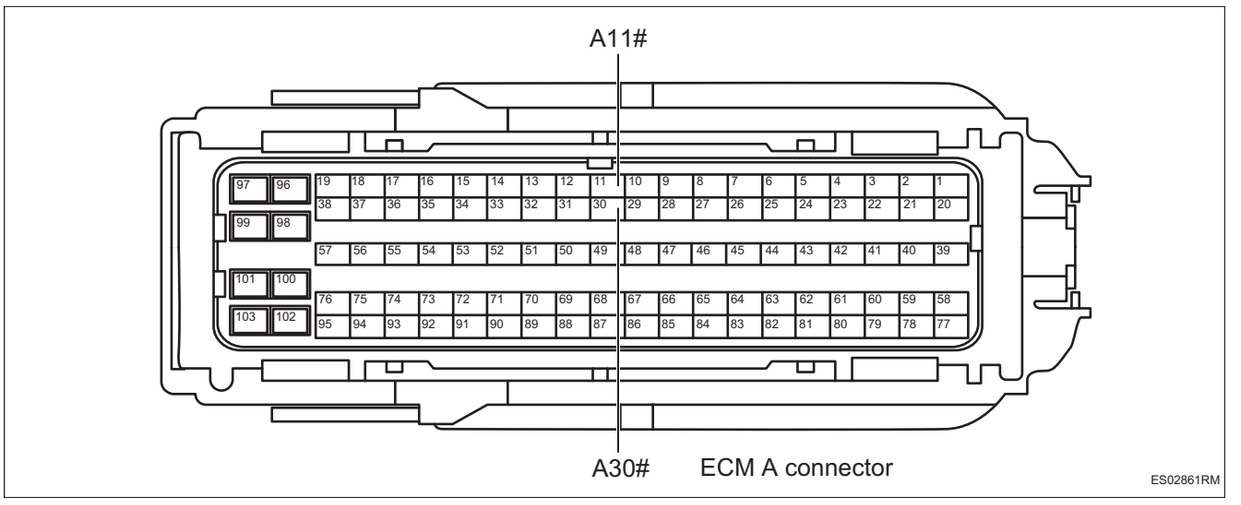
DTC	DTC detection conditions	Faulty location
P12C600	(a) Crankcase ventilation pipe 3 diagnostic circuit voltage high.	• ECM • Harness and connector • Crankcase ventilation diagnosis conduit 3
P12C700	(a) Crankcase ventilation pipe 3 diagnostic circuit voltage low.	• ECM • Harness and connector • Crankcase ventilation diagnosis conduit 3

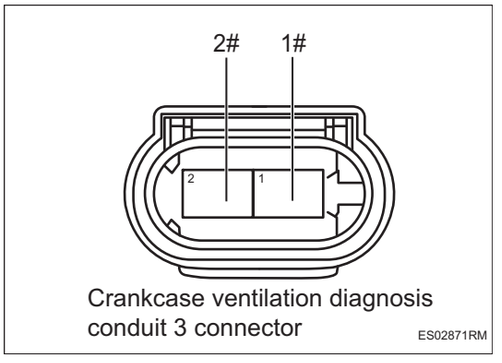
Circuit diagram



Inspection procedure

1	Check crankcase ventilation diagnosis conduit 3 harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the crankcase ventilation diagnosis conduit 3 connector.

(e) Measure the resistance according to the values in the table below.

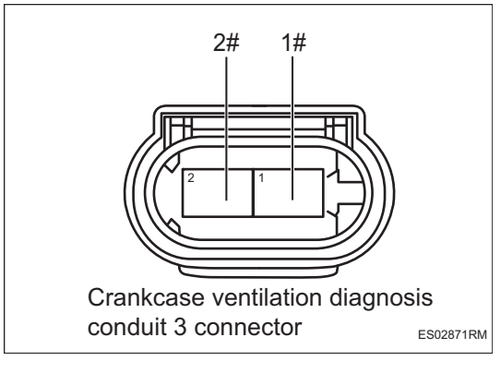
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A11# - crankcase ventilation diagnosis conduit 3 connector 2#	Always connected	Less than 1Ω
ECM connector A30# - crankcase ventilation diagnosis conduit 3 connector 1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check diagnosis conduit 3 harness and connector for circuit shorted to ground



(a) Measure the resistance according to the values in the table below.

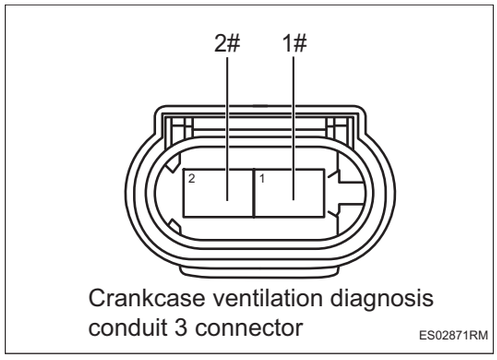
Standard value

Detector connection	Detection conditions	Specified state
Crankcase ventilation diagnosis conduit 3 connector 1#- body GND	Always connected	10 KΩ or greater
Crankcase ventilation diagnosis conduit 2#- body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	Check diagnosis conduit 3 harness and connector for circuit shorted to power supply



Crankcase ventilation diagnosis conduit 3 connector

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Crankcase ventilation diagnosis conduit 3 connector 1#- body GND	Set the ignition switch to "ON"	Less than 1 V
Crankcase ventilation diagnosis conduit 2#- body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	Replace the crankcase ventilation diagnosis conduit 3

(a) Replace the crankcase ventilation diagnosis conduit 3.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ECM**

OK

5	End

DTC	U012100	Lost communication with ABS module
DTC	U041500	ABS module communication Check Sum/ Rolling Counter fault
DTC	U015100	Lost communication with ACU module
DTC	U045200	ACU module communication Check Sum/ Rolling Counter fault
DTC	U010F00	Lost communication with A/C module
DTC	U007300	CAN bus 1 OFF
DTC	U014600	Lost communication with GW module
DTC	U029300	Lost communication with VCU module
DTC	U059481	HCU signal Checksum error
DTC	U015500	Lost communication with ICM or abnormal signal

Description

When the communication between the ECM and other control units is abnormal or interrupted, the ECM records the DTC.

DTC	DTC detection conditions	Faulty location
U012100	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U041500	(a) Abnormal or interrupted communication.	
U015100	(a) Abnormal or interrupted communication.	
U045200	(a) Abnormal or interrupted communication.	
U010F00	(a) Abnormal or interrupted communication.	
U007300	(a) Abnormal or interrupted communication.	
U014600	(a) Abnormal or interrupted communication.	
U029300	(a) Abnormal or interrupted communication.	
U059481	(a) Abnormal or interrupted communication.	
U015500	(a) Abnormal or interrupted communication.	

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

DTC	P000A00	Intake VVT operation fault (retarded)
DTC	P003C00	Intake VVT operation fault (stuck)
DTC	P001000	Intake VVT control circuit open
DTC	P001676	Crankshaft-Intake camshaft initial installation position implausible (Bank1)
DTC	P001678	Excessive relative position deviation between crankshaft and intake camshaft (Bank1)
DTC	P208800	Intake VVT control circuit undervoltage
DTC	P208900	Intake VVT control circuit overvoltage
DTC	P001100	Intake camshaft locking position operation implausible
DTC	P000B00	Exhaust VVT operation fault (retarded)
DTC	P005A00	Exhaust VVT operation fault (stuck)
DTC	P001300	Exhaust VVT control circuit open
DTC	P001776	Crankshaft-exhaust camshaft initial installation position implausible (Bank1)
DTC	P001778	Excessive relative position deviation between crankshaft and exhaust camshaft (Bank1)
DTC	P209000	Exhaust VVT control circuit undervoltage
DTC	P209100	Exhaust VVT control circuit overvoltage
DTC	P001400	Exhaust camshaft locking position operation implausible
DTC	P003000	Upstream oxygen sensor heater control circuit open
DTC	P003100	Upstream oxygen sensor heater control circuit undervoltage
DTC	P003200	Upstream oxygen sensor heater control circuit overvoltage
DTC	P003600	Downstream oxygen sensor heater control circuit open

DTC	P003700	Downstream oxygen sensor heater control circuit undervoltage
DTC	P003800	Downstream oxygen sensor heater control circuit overvoltage
DTC	P003A22	Turbocharger electronic wastegate initial zero self-learning above upper limit
DTC	P003A21	Turbocharger electronic wastegate initial zero self-learning below lower limit
DTC	P003A72	Turbocharger electronic wastegate zero self-learning above upper limit
DTC	P003A73	Turbocharger electronic wastegate zero self-learning below lower limit
DTC	P024477	Deviation between turbocharger electronic wastegate target position and actual position out of limit
DTC	P024437	Turbocharger electronic wastegate duty cycle out of limit
DTC	P256400	Turbocharger electronic wastegate position sensor undervoltage
DTC	P256500	Turbocharger electronic wastegate position sensor overvoltage
DTC	P170300	Turbocharger wastegate control circuit communication failure
DTC	P024300	Turbocharger wastegate control circuit open
DTC	P024600	Turbocharger wastegate control circuit overvoltage or undervoltage
DTC	P005300	Upstream oxygen sensor heater circuit fault
DTC	P005400	Downstream oxygen sensor heater internal resistance implausible
DTC	P008700	High-pressure fuel rail pressure low
DTC	P008800	High-pressure fuel rail pressure high
DTC	P008985	Too large PID control deviation of high-pressure fuel supply pressure

DTC	P008984	Too small PID control deviation of high-pressure fuel supply pressure
DTC	P009000	Flow control valve high side control circuit high side and low side circuits shorted to each other
DTC	P025100	Flow control valve high or low side control circuit open
DTC	P025400	Flow control valve high side control circuit overvoltage or undervoltage
DTC	P025900	Flow control valve low side control circuit overvoltage or undervoltage
DTC	P00C600	High-voltage start failure
DTC	P01062A	Abnormal signal value without fluctuation of MAP sensor
DTC	P010622	MAP sensor pressure implausibly higher than model pressure
DTC	P010621	MAP sensor pressure implausibly lower than model pressure
DTC	P120000	MAP sensor pressure above upper limit
DTC	P120100	MAP sensor pressure below lower limit
DTC	P00C721	MAP sensor signal pressure value too low during start
DTC	P00C722	MAP sensor signal pressure value too high during start
DTC	P010700	MAP sensor circuit shorted to ground
DTC	P010800	MAP sensor circuit shorted to power supply fault
DTC	P011126	IAT sensor 1 signal implausible (sticky)
DTC	P011200	IAT sensor 1 circuit undervoltage
DTC	P011300	IAT sensor 1 circuit overvoltage
DTC	P011400	IAT sensor 1 circuit voltage implausible

ES

DTC	P00CE24	Air temperature sensor 1 cold start check implausible (positive deviation)
DTC	P00CE23	IAT sensor 1 cold start check implausible (negative deviation)
DTC	P012300	Electronic throttle position sensor 1 signal circuit overvoltage
DTC	P012200	Electronic throttle position sensor 1 signal circuit undervoltage
DTC	P012100	Electronic throttle position sensor 1 signal implausible
DTC	P022300	Electronic throttle position sensor 2 signal circuit overvoltage
DTC	P022200	Electronic throttle position sensor 2 signal circuit undervoltage
DTC	P022100	Electronic throttle position sensor 2 signal implausible
DTC	P012800	Thermostat performance implausible (coolant temperature failed to reach the nominal thermostat opening temperature)
DTC	P013300	Upstream oxygen sensor aging
DTC	P013A00	Downstream oxygen sensor rich-lean response slow
DTC	P219500	LSU oxygen sensor characteristic deviation (biased lean)
DTC	P219600	LSU oxygen sensor characteristic deviation (biased rich)
DTC	P209700	Closed-loop correction value based on downstream oxygen sensor above upper limit - biased rich
DTC	P209600	Closed-loop correction value based on downstream oxygen sensor below lower limit -biased lean
DTC	P013800	Downstream oxygen sensor signal line shorted to power supply

DTC	P013700	Downstream oxygen sensor signal line shorted to ground
DTC	P013600	Downstream oxygen sensor signal circuit open
DTC	P017F00	DMTL air cleaner flow resistance high
DTC	P128000	DMTL pump current frequency high
DTC	P128100	DMTL pump current frequency low
DTC	P043E00	EVAP system leakage diagnosis DMTL reference pump current high
DTC	P043F00	EVAP system leakage diagnosis DMTL reference pump current relatively low
DTC	P24C100	DMTL pump idle current high
DTC	P240700	DMTL pump current fluctuation out of plausible range (caused by humidity)
DTC	P044200	EVAP system 1.0mm leakage
DTC	P019800	Oil temperature sensor circuit overvoltage
DTC	P019700	Oil temperature sensor circuit undervoltage
DTC	P019664	Oil temperature sensor signal implausible (high side)
DTC	P019629	Oil temperature sensor signal implausible (low side)
DTC	P121800	Oil temperature sensor signal above upper limit
DTC	P052300	High oil pressure sensor circuit voltage/duty cycle
DTC	P052200	Low oil pressure sensor circuit voltage/duty cycle
DTC	P021900	High engine speed
DTC	P023400	Turbocharger charge air pressure display high
DTC	P029900	Turbocharger charge air pressure display low

DTC	P023700	Charge air pressure sensor circuit shorted to ground
DTC	P023800	Charge air pressure sensor circuit shorted to power supply
DTC	P138024	IAT sensor 2 cold start check implausible (positive deviation)
DTC	P138023	IAT sensor 2 cold start check implausible (negative deviation)
DTC	P009800	IAT sensor 2 circuit overvoltage
DTC	P009700	IAT sensor 2 circuit undervoltage
DTC	P009900	IAT sensor 2 circuit voltage implausible
DTC	P009626	IAT sensor 2 signal implausible (sticky)
DTC	P020100	1# cylinder fuel injector control circuit open
DTC	P026200	1# cylinder fuel injector low side control circuit overvoltage or undervoltage
DTC	P02EE00	1# cylinder fuel injector high side and low side control circuits shorted to each other
DTC	P02CD00	1# cylinder CVO self-learning adjustment up to upper limit
DTC	P02CC00	1# cylinder CVO self-learning adjustment up to lower limit
DTC	P126100	1# cylinder CVO circuit signal implausible
DTC	P020200	2# cylinder fuel injector control circuit open
DTC	P026500	2# cylinder fuel injector low side control circuit overvoltage or undervoltage
DTC	P02EF00	2# cylinder fuel injector high side and low side control circuits shorted to each other
DTC	P02CF00	#2 Cylinder CVO self-learning adjustment at upper limit
DTC	P02CE00	2# cylinder CVO self-learning adjustment at lower limit
DTC	P126200	2# cylinder CVO circuit signal implausible

DTC	P020300	3# cylinder fuel injector control circuit open
DTC	P026800	3# cylinder fuel injector low side control circuit overvoltage or undervoltage
DTC	P02F000	3# cylinder fuel injector high side and low side control circuits shorted to each other
DTC	P02D100	3# cylinder CVO self-learning adjustment at upper limit
DTC	P02D000	4# cylinder CVO self-learning adjustment at lower limit
DTC	P126300	3# cylinder CVO circuit signal implausible
DTC	P020400	4# cylinder fuel injector control circuit open
DTC	P027100	4# cylinder fuel injector low side control circuit overvoltage or undervoltage
DTC	P02F100	4# cylinder fuel injector high side and low side control circuits shorted to each other
DTC	P02D300	4# cylinder CVO self-learning adjustment at upper limit
DTC	P02D200	4# cylinder CVO self-learning adjustment at lower limit
DTC	P126400	4# cylinder CVO circuit signal implausible
DTC	P030000	Engine random or multi-cylinder misfire
DTC	P030100	1# Cylinder misfire detected
DTC	P030200	2# Cylinder misfire detected
DTC	P030300	3# Cylinder misfire detected
DTC	P030400	4# cylinder misfire detected
DTC	P036300	Engine misfire triggering fuel cutoff
DTC	P032700	Knock sensor A end shorted to ground
DTC	P032714	Knock sensor B end shorted to ground
DTC	P032800	Diagnosis of short circuit to power supply of knock sensor end A

DTC	P032815	Diagnosis of short circuit to power supply of knock sensor end B
DTC	P032500	Knock sensor signal circuit undervoltage
DTC	P151000	Knock sensor signal evaluation and diagnosis
DTC	P032600	Knock sensor signal circuit overvoltage
DTC	P033900	Speed sensor signal Implausible
DTC	P261700	Speed sensor signal lost
DTC	P033664	Crankshaft sensor pulse width signal implausible
DTC	P034A00	Crankshaft position sensor –crankshaft starting position incorrect (stop position implausible)
DTC	P034B00	Crankshaft position sensor -crankshaft rotation direction incorrect (reverse signal implausible)
DTC	P034100	Intake camshaft sensor signal Implausible (Bank1)
DTC	P034200	Intake camshaft sensor signal circuit shorted to ground (Bank1)
DTC	P034300	Intake camshaft sensor signal circuit shorted to power supply (Bank1)
DTC	P035100	1# cylinder ignition coil control circuit open
DTC	P230000	1# cylinder ignition coil control circuit undervoltage
DTC	P230100	1# cylinder ignition coil control circuit overvoltage
DTC	P035200	2# cylinder ignition coil control circuit open
DTC	P230300	2# cylinder ignition coil control circuit undervoltage
DTC	P230400	2# cylinder ignition coil control circuit overvoltage
DTC	P035300	3# cylinder ignition coil control circuit open

DTC	P230600	3# cylinder ignition coil control circuit undervoltage
DTC	P230700	3# cylinder ignition coil control circuit over-voltage
DTC	P035400	4# cylinder ignition coil control circuit open
DTC	P230900	4# cylinder ignition coil control circuit undervoltage
DTC	P231000	4# cylinder ignition coil control circuit over-voltage
DTC	P036600	Exhaust camshaft sensor signal implausible (Bank1)
DTC	P036800	Exhaust camshaft sensor signal circuit shorted to power supply (Bank1)
DTC	P036700	Exhaust camshaft sensor signal circuit shorted to ground (Bank1)
DTC	P042000	TWC OSC aging
DTC	P044400	Canister control valve control circuit open
DTC	P045800	Canister control valve circuit undervoltage
DTC	P045900	Canister control valve circuit overvoltage
DTC	P049700	Canister solenoid valve stuck closed
DTC	P046000	Fuel level sensor original signal out of range
DTC	P25B000	Fuel level sensor signal stuck
DTC	P046129	Fuel level signal implausible
DTC	P046300	Fuel level sensor circuit overvoltage
DTC	P046200	Fuel level sensor circuit undervoltage
DTC	U067681	Fuel level sensor signal loss/failure/check error
DTC	P046700	High-load desorption pipeline pressure sensor circuit undervoltage
DTC	P046800	High-load desorption pipeline pressure sensor circuit overvoltage

DTC	P128500	High-load desorption pipeline pressure sensor signal above upper threshold
DTC	P128600	High-load desorption pipeline pressure sensor signal below lower threshold
DTC	P04F000	High-load desorption pipeline fault - canister valve fault
DTC	P050B20	Ignition angle efficiency monitoring during catalytic converter heating (partial load)
DTC	P053F22	High-pressure fuel passage pressure high during catalytic converter heating
DTC	P053F21	High-pressure fuel passage pressure low during catalytic converter heating
DTC	P05EC00	Multiple injection monitoring faults during catalytic converter heating
DTC	P050C24	Coolant temperature sensor 1 cold start check implausible (positive deviation)
DTC	P050C23	Coolant temperature sensor 1 cold start check implausible (negative deviation)
DTC	P011623	Coolant temperature sensor 1 signal implausible (low side)
DTC	P011626	Coolant temperature sensor 1 signal implausible (stuck)
DTC	P011800	Coolant temperature sensor 1 circuit overvoltage
DTC	P011700	Coolant temperature sensor 1 circuit undervoltage
DTC	P011900	Coolant temperature sensor 1 circuit voltage implausible
DTC	P145200	Unreasonable brake chamber pressure
DTC	P056300	Battery overvoltage
DTC	P056200	Battery undervoltage
DTC	P050400	Brake signal correlation failure

DTC	P061A00	Second layer torque monitoring fault (torque comparison fault)
DTC	P060D00	Second accelerator pedal signal implausible
DTC	P152000	Load forecast monitoring fault
DTC	P152100	Pipe monitoring fault in fuel cutoff mode
DTC	P152200	Pipe monitoring fault in fuel supply mode
DTC	P153900	Synchronization process plausibility check (based on speed and sync count)
DTC	P153700	Load comparison monitoring fault
DTC	P153500	Mixture monitoring fault
DTC	P153600	Operating mode monitoring fault
DTC	P062900	Fuel pump relay control circuit overvoltage
DTC	P062800	Fuel pump relay control circuit undervoltage
DTC	P062700	Fuel pump relay control circuit open
DTC	P062B9A	Similar working condition path of self-learning adjustment out of limit
DTC	P062B64	Similar working condition path of circuit signal implausible
DTC	P062B96	ECU fault (CVO failure in all cylinders)
DTC	P063000	VIN not written or incompatible
DTC	P064100	5V power supply module 1 faulty
DTC	P065100	Chip 5 V power supply voltage 2 fault
DTC	P069700	5V power supply module 3 faulty
DTC	P064D00	LSU integrated chip register writing failure
DTC	P223700	LSU type oxygen sensor APE circuit open (near ECU end)
DTC	P225100	Upstream oxygen sensor IPE circuit open
DTC	P224300	Upstream oxygen sensor RE circuit open
DTC	P013200	Upstream oxygen sensor signal circuit overvoltage (APE / IPE / RE circuit shorted to power supply)

ES

DTC	P013100	Upstream oxygen sensor signal circuit undervoltage (APE / IPE / RE circuit shorted to ground)
DTC	P241400	Upstream oxygen sensor output voltage implausible
DTC	P064D13	LSU integrated chip SPI communication failure
DTC	P223713	LSU type oxygen sensor APE circuit open
DTC	P013000	Upstream oxygen sensor compensation resistor circuit open
DTC	P068500	Main relay open circuit
DTC	P068700	Main relay circuit shorted to power supply
DTC	P068600	Main relay circuit shorted to ground
DTC	P06869E	ECM/PCM main relay stuck or circuit shorted to ground
DTC	P06B842	Error in reading NVM Block
DTC	P06B843	Error in writing NVM Block
DTC	P06DC00	Two-stage oil pump control circuit overvoltage
DTC	P06DB00	Two-stage oil pump control circuit undervoltage
DTC	P06DA00	Two-stage oil pump control circuit open
DTC	P120400	Charge air pressure above upper limit
DTC	P120500	Charge air pressure below lower limit
DTC	P023622	Charge air pressure implausibly high
DTC	P023621	Charge air pressure implausible, low
DTC	P121200	Vehicle speed sensor performance failure (vehicle speed above upper limit)
DTC	P050000	Vehicle speed sensor input signal failure
DTC	P050166	Vehicle speed implausible - Low vehicle speed during high engine load

DTC	P019000	High-pressure fuel rail pressure sensor voltage signal implausible
DTC	P019128	Negative deviation of characteristic curve of high-pressure fuel rail pressure sensor
DTC	P019129	Positive deviation of characteristic curve of high-pressure fuel rail pressure sensor
DTC	P019200	High-pressure fuel rail pressure sensor circuit undervoltage
DTC	P019300	High-pressure fuel rail pressure sensor circuit overvoltage
DTC	P019400	High-pressure fuel rail pressure sensor signal stuck
DTC	P142000	CAN hardware register response timeout
DTC	P142100	LIN hardware register response timeout
DTC	P153800	Ignition angle signal, harness or ECU fault
DTC	P152700	First layer safety fuel cutoff monitoring fault
DTC	P152800	Second layer safety fuel cutoff monitoring fault
DTC	P061C00	Second layer engine speed monitoring fault
DTC	P152900	Starter control monitoring fault
DTC	P153000	AD converter zero test monitoring fault
DTC	P153100	AD converter set voltage test monitoring fault
DTC	P157100	Drive stage check fault or communication failure in the shutdown path check
DTC	P157200	ABE activated at normal voltage
DTC	P157300	Monitoring error response fault
DTC	P157400	Errorpin activated with normal monitoring communication
DTC	P261000	Engine off timer implausible
DTC	P157500	DVE drive cutoff due to overvoltage

DTC	P155000	Electronic throttle self-learning condition not met
DTC	P155100	Electronic throttle lower limit position initial-ization self-learning fault
DTC	P155600	Throttle mechanical BDC re-self-learning maximum error
DTC	P155700	Throttle mechanical BDC re-self-learning ninimum value error
DTC	P155800	Deviation of throttle limp home position from initial self-learning value out of limit
DTC	P155900	Throttle limp position above upper limit
DTC	P155A00	Deviation of throttle limp home position from last self-learning value out of limit
DTC	P155B00	Throttle limp position below lower limit
DTC	P155400	Return spring stuck in maximum position
DTC	P155500	Return spring stuck in minimum position
DTC	P156100	DVE position control deviation
DTC	P156000	Throttle body PID adjustment out of limit
DTC	P15A000	CPU0: MPU fault (register, DSPR, PSPR)
DTC	P15A100	CPU0: DCACHE/DSPRECC uncorrectable
DTC	P15A200	CPU0: DCACHE/DSPR address failure
DTC	P15A300	CPU0: DCACHE TAG SRAM ECC uncorrect-able
DTC	P15A400	CPU0: DCACHE TAG SRAM address failure
DTC	P15A500	CPU0: PCACHE TAGRAM ECC uncorrect-able
DTC	P15A600	CPU0: PCACHE TAGRAM address failure
DTC	P15A700	CPU0: PCACHE/PSPR ECC uncorrectable
DTC	P15A800	CPU0: PCACHE/PSPR address failure
DTC	P15A900	CPU1: Lockstep comparator fault
DTC	P15AA00	CPU1: MPU fault (register, DSPR, PSPR)

DTC	P15AB00	CPU1: DCACHE/DSPR ECC uncorrectable
DTC	P15AC00	CPU1: DCACHE/DSPR address failure
DTC	P15AD00	CPU1: DCACHE TAGRAM ECC uncorrectable
DTC	P15AE00	CPU1: DCACHE TAGRAM address failure
DTC	P15AF00	CPU1: PCACHE TAGRAM ECC uncorrectable
DTC	P15B000	CPU1: PCACHE TAGRAM address failure
DTC	P15B100	CPU1: PCACHE/PSPR ECC uncorrectable
DTC	P15B200	CPU1:PCACHE/PSPR address failure
DTC	P15B300	LMU: SRAM ECC monitoring fault
DTC	P15B400	LMU: SRAM ECC uncorrectable
DTC	P15B500	LMU: SRAM address failure
DTC	P15B600	SMU: Timer0 recovery timeout
DTC	P15B700	SMU: Timer1 recovery timeout
DTC	P15B800	PMU: PFLASH ECC uncorrectable multiple bit faults
DTC	P15B900	PMU: PFLASH address failure
DTC	P15BA00	PMU: PFLASH ECC monitoring fault (covering all ECC modules)
DTC	P15BB00	PMU: PFLASH EDC comparator failure (covering all PFLASH instances)
DTC	P15BC00	SCU/CGU: system PLL OSC_WDT: input clock out of limit
DTC	P15BD00	SCU/CGU: system PLL VCO clock event loss
DTC	P15BE00	SCU/EVR: EVR 1.3 V digital undervoltage
DTC	P15BF00	SCU/EVR: EVR 3.3 V overvoltage
DTC	P15C000	SCU/EVR: external power supply overvoltage
DTC	P15C100	SCU/WDTS: safety watchdog timeout
DTC	P15C200	SCU/WDTCPU0: watchdog CPU0 timeout

ES

DTC	P15C300	SCU/WDTCPU1: watchdog CPU1 timeout
DTC	P15C400	SCU/CGU: PLL_ERAY VCO clock event loss
DTC	P15C500	SCU/WDTCPU2: watchdog CPU2 timeout
DTC	P15C600	SCU/ DTS: temperature sensor overflow
DTC	P15C700	Registers: fault detected by register monitoring
DTC	P15C800	SCU/LSCU: SCU configuration failure: monitoring dual-rail property (reverse signal) from lockstep comparator (LSCU) alarm
DTC	P15C900	SCU/CGU: clock monitoring: STM out of frequency range
DTC	P15CA00	SCU/CGU: clock monitoring: PLL_ERAY out of frequency range
DTC	P15CB00	SCU/CGU: clock monitoring: PLL out of frequency range
DTC	P15CC00	SCU/CGU: clock monitoring: SRI out of frequency range
DTC	P15CD00	SCU/CGU: clock monitoring: SPB out of frequency range
DTC	P15CE00	SCU/CGU: clock monitoring: GTM out of frequency range
DTC	P15CF00	SCU/CGU: clock monitoring: ADC out of frequency range
DTC	P15D000	GTM: SRAMs uncorrectable
DTC	P15D100	FLEXRAY: SRAM address failure
DTC	P15D200	Misc SRAMs: SRAM ECC uncorrectable
DTC	P15D300	Misc SRAMs: SRAM address failure
DTC	P15D400	GTM: SRAMs address failure
DTC	P15D500	CAN: SRAM uncorrectable
DTC	P15D600	CAN: SRAM address failure
DTC	P15D700	FLEXRAY: SRAM ECC uncorrectable

DTC	P15D800	CPU2: MPU fault (register, DSPR, PSPR)
DTC	P15D900	CPU2: DCACHE/DSPR ECC uncorrectable
DTC	P15DA00	CPU2: DCACHE/DSPR address failure
DTC	P15DB00	CPU2: DCACHE TAG SRAM ECC uncorrectable
DTC	P15DD00	CPU2: 121 PCACHE TAGRAM ECC uncorrectable
DTC	P15DE00	CPU2: PCACHE TAGRAM address failure
DTC	P15DF00	CPU2: PCACHE/PSPR ECC uncorrectable
DTC	P15E000	CPU2 PCACHE/PSPR address failure
DTC	P210300	Electronic throttle drive stage fault (short circuit)
DTC	P211800	Electronic throttle drive stage fault (overheat or overcurrent)
DTC	P210600	Electronic throttle drive stage fault (implausible)
DTC	P210000	Electronic throttle drive stage fault (open circuit)
DTC	P214800	1# and 4# cylinder fuel injector high side control circuit overvoltage/undervoltage or 4# cylinder fuel injector low side control circuit overvoltage/undervoltage
DTC	P215100	2# and 3# cylinder fuel injector high side control circuit overvoltage/undervoltage or #2 cylinder fuel injector low side control circuit overvoltage/undervoltage
DTC	P217700	Air-fuel ratio closed-loop control self-learning value above upper limit (medium load zone)
DTC	P217800	Air-fuel ratio closed-loop control self-learning value below lower limit (medium load zone)

DTC	P218500	Coolant temperature sensor 2 circuit over-voltage
DTC	P218400	Coolant temperature sensor 2 circuit under-voltage
DTC	P218324	Coolant temperature sensor 2 cold start check implausible (positive deviation)
DTC	P218323	Coolant temperature sensor 2 cold start check implausible (negative deviation)
DTC	P222900	Ambient pressure sensor circuit shorted to power supply
DTC	P222800	Ambient pressure sensor circuit shorted to ground
DTC	P222729	Ambient pressure sensor signal fault
DTC	P222722	Ambient pressure sensor pressure implausibly high
DTC	P222721	Ambient pressure sensor pressure implausibly low
DTC	P222785	Ambient pressure sensor signal pressure value high during starting
DTC	P222784	Ambient pressure sensor signal pressure value low during starting
DTC	P120200	Ambient pressure sensor pressure above upper limit
DTC	P120300	Ambient pressure sensor pressure below lower limit
DTC	P223200	Coupling of downstream oxygen sensor signal line to heater wire
DTC	P227000	Downstream oxygen sensor aging - signal biased lean continuously
DTC	P227100	Downstream oxygen sensor aging - signal biased rick continuously
DTC	P240C00	EVAP system leakage diagnosis DMTL heating unit circuit overvoltage

DTC	P240B00	EVAP system leakage diagnosis DMTL heating unit circuit undervoltage
DTC	P240A00	EVAP system leakage diagnosis DMTL heating unit circuit open
DTC	P24BF00	EVAP system DMTL solenoid valve control circuit overvoltage
DTC	P24BE00	EVAP system DMTL solenoid valve control circuit undervoltage
DTC	P24BD00	EVAP system DMTL solenoid valve control circuit open
DTC	P240200	EVAP system DMTL pump control circuit overvoltage
DTC	P240100	EVAP system DMTL pump control circuit undervoltage
DTC	P240000	EVAP system DMTL pump control circuit open
DTC	P25AB00	Piston cooling nozzle control valve control circuit overvoltage
DTC	P25AA00	Piston cooling nozzle control valve control circuit undervoltage
DTC	P25A900	Piston cooling nozzle control valve control circuit open
DTC	P063441	Starter drive chip 1 overheating
DTC	P063444	Starter drive chip 2 overheating
DTC	P150000	Collision and fuel cutoff signal received by vehicle
DTC	P150100	Airbag communication information implausible
DTC	P150200	Collision and fuel cutoff signal received by vehicle
DTC	P150300	Airbag signal implausible
DTC	P138824	Ambient temperature sensor cold start check implausible (positive deviation)

DTC	P138823	Ambient temperature sensor cold start check implausible (negative deviation)
DTC	P007300	Ambient temperature sensor circuit over-voltage
DTC	P007200	Ambient temperature sensor circuit under-voltage
DTC	P007000	Lost communication with ambient temperature sensor CAN
DTC	P003300	Turbocharger relief valve control circuit open
DTC	P003400	Turbocharger relief valve control circuit undervoltage
DTC	P003500	Turbocharger relief valve control circuit overvoltage
DTC	P226100	Turbocharger relief valve mechanical fault
DTC	P12C400	Crankcase ventilation pipe 2 diagnostic circuit voltage high
DTC	P12C500	Crankcase ventilation pipe 2 diagnostic circuit voltage low
DTC	P261D00	Turbocharger electronic coolant pump control circuit overvoltage
DTC	P261C00	Turbocharger electronic coolant pump control circuit undervoltage/implausibility
DTC	P261A00	Turbocharger electronic coolant pump control circuit open

Inspection procedure

Note: For the DTCs in the above table, please refer to the relevant contents of EMS (2.0 T and 1.8 T) and the circuit diagram manual for specific analysis steps.

Lubrication system 1.5 T

On-board inspection LU-1

Oil and oil filter assembly LU-3

Replace LU-3

Variable displacement oil pump solenoid valve LU-6

Parts LU-6

Removal LU-7

Installation LU-7

Oil pressure sensor LU-8

Parts LU-8

Removal LU-9

Installation LU-9

Oil sump assembly LU-10

Parts LU-10

Removal LU-12

Installation LU-12

Piston cooling nozzle control valve LU-14

Parts LU-14

Removal LU-15

Installation LU-15

On-board inspection

1. Check engine oil quality

(a) Check whether the engine oil deteriorates and whether the oil is mixed with water, discolored or thinned. If the quality is obviously inferior, replace the engine oil and oil filter element.

2. Check engine oil level

(a) After engine warm-up, stop the engine and wait for 5 minutes.

(b) Check and confirm that the engine oil level is between the minimum oil level mark and maximum oil level mark of the oil dipstick. If the engine oil level is too low, check Check for oil leakage and add oil to the full oil level mark.

Notice:

When filling the engine oil, do not exceed the full oil level mark.

When filling the engine oil, do not allow the oil to spill out of the filler. If the oil spills on the engine gear train, it is necessary to thoroughly clean the oil on the pulley of the gear train and replace the belt; The oil spilled in other parts of the engine needs to be cleaned with cleaner to ensure that there is no residual oil.

Hint:

A certain amount of engine oil will be consumed during driving. In the following cases, the oil consumption will increase and it may be necessary to refill the engine oil during the oil maintenance interval.

When the engine is new, for example, after buying a vehicle or replacing the engine.

If low-quality oil or oil of improper viscosity is used.

When driving with high engine speed or heavy load, towing or frequent acceleration or deceleration during driving.

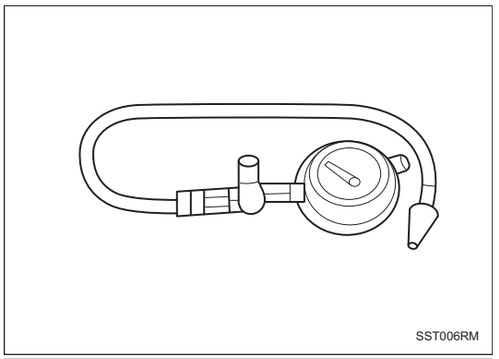
When the engine is idling for a long time, or when driving frequently in heavy traffic.

3. Check oil pressure.

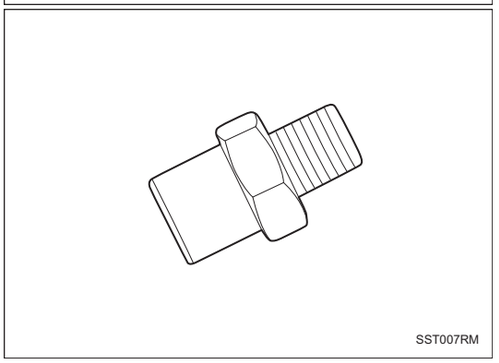
(a) Check oil quantity.

(b) Remove oil pressure and temperature sensor assembly

(c) Install the SST (39 GV 210520 B 39 GV 210530 B).



SST006RM



SST007RM

(d) Start the engine to warm it up.

(e) Check the oil pressure. If the oil pressure does not meet the regulations, check the oil pump.

Oil pressure when oil temperature is 85 ℃

idle speed	2000r/min	4000r/min
>100kPa	⩾ 150kPa	⩾ 350kPa

Idle speed:>100 kPa

Oil pressure in normal working range: (150~600) kPa

Alarm pressure: (14.7~29.4) kPa

(f) Remove SST (39GV210520B 39GV210530B).

(g) Install oil pressure and temperature sensor assembly

(h) Install oil pressure alarm assembly connector

(i) Start the engine and check whether the engine oil leaks.

Oil and oil filter assembly

Replace

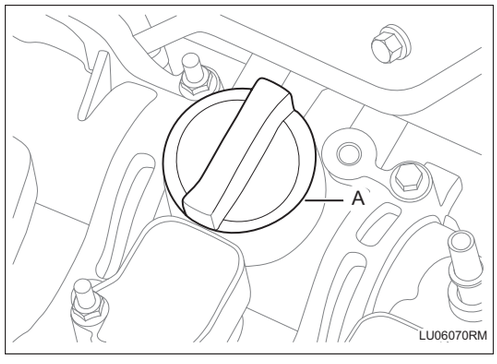
Note:

Long-term and repeated contact with engine oil will cause the skin to lose the natural oil on the surface, and the skin will become dry, allergic and prone to dermatitis. In addition, the used engine oil contains potentially harmful contaminants that may cause skin cancer.

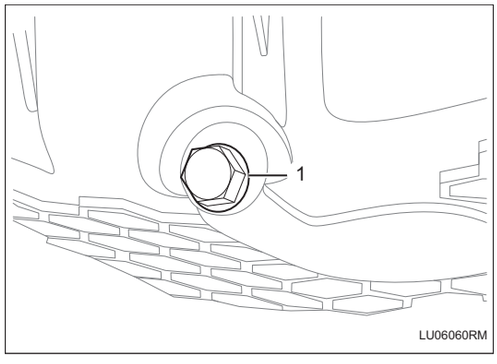
When changing engine oil, to reduce the hazards caused by skin contact with used engine oil, relevant precautions must be followed. Wear protective clothes and gloves that are impermeable to oil. Wash the skin with soap and water, or thoroughly wash away all used engine oil with a water-free hand cleaner. Do not use gasoline, thinner or solvents.

In order to protect the environment, the oil and oil filter should be disposed of at designated scrapping locations.

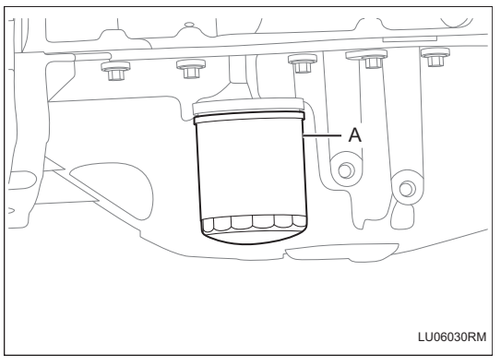
1. **Remove engine bottom guard plate assembly (See page ET-34)**
2. **Draining engine oil**
   (a) Remove oil filler cap-A-.



   (b) Remove the oil sump drain plug -1- and discharge the engine oil into the container.



3. **Remove oil filter assembly**



(a) Remove oil filter -A-.

Hint:

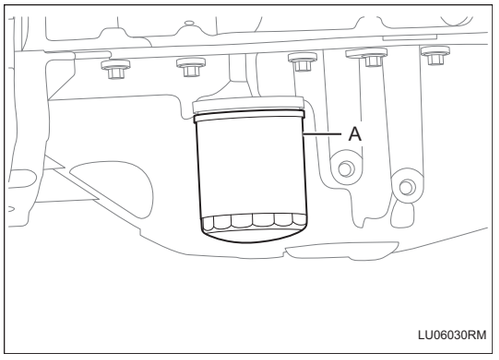
After the oil filter is removed, check whether the oil filter seal ring is left on the oil filter seat.

Hint:

Use a container to collect the drained oil.

4. Install oil filter assembly

(a) Clear the dirt or foreign matter on the engine oil filter mounting surface.



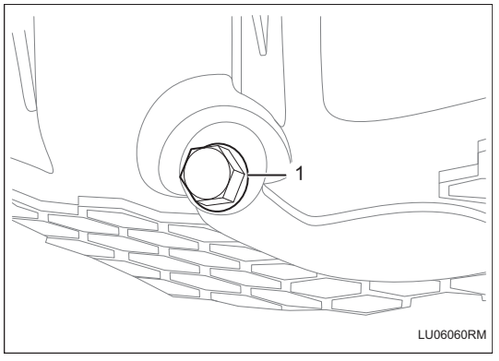
(b) Apply a thin layer of engine oil to the new filter seal ring-A- and install the oil filter.

Torque: 15~18 N · m

Caution:

Make sure that the seal ring is installed in the correct position, otherwise the oil may leak.

Do not twist the seal ring.



(c) Install the drain plug -1-.

Torque: 30 ~ 40 N · m

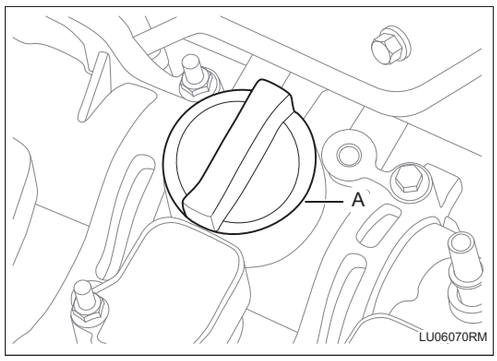
5. Fill in engine oil

(a) Standard oil grade:

Oil quality grade	Oil viscosity	Working ambient temperature
ACEA C3	5W-30	- 35 ℃ ~ 40 ℃ (all-season engine oil)

(b) Standard capacity:

First filling volume of new engine	Filling volume after changing oil and oil filter	Filling volume after oil change only
5.2L	4.8L	4.5(L)



(c) Install the oil filler cap-A-.

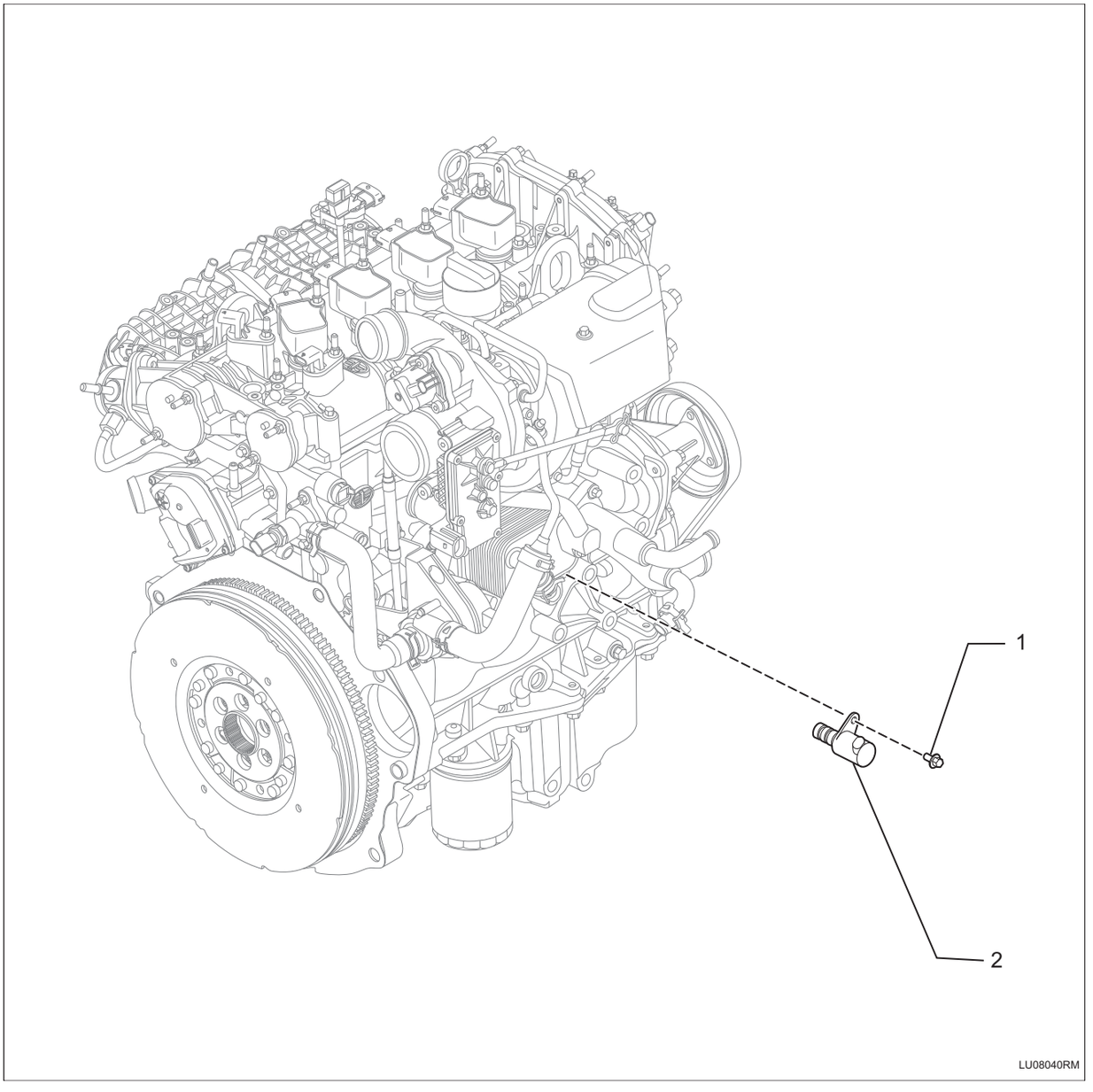
6. Check whether the engine oil leaks.

(a) Start the engine and ensure that the engine oil does not leak from the working area.

(b) Check engine oil level.

Variable displacement oil pump solenoid valve

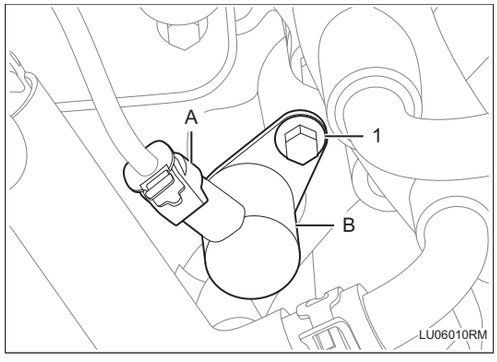
Parts



1. **Bolt**
   - Torque: 8~12 N · m
2. **Variable displacement oil pump solenoid valve**
   - Apply an appropriate amount of lubricating oil to the variable displacement oil pump solenoid valve seal ring before assembly.

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove engine bottom guard plate assembly (See page ET-34)**
3. **Remove variable displacement oil pump solenoid valve**
   (a) Disconnect the harness connector-A-.
   (b) Remove bolt -1- and remove variable displacement oil pump solenoid valve -B-.



Installation

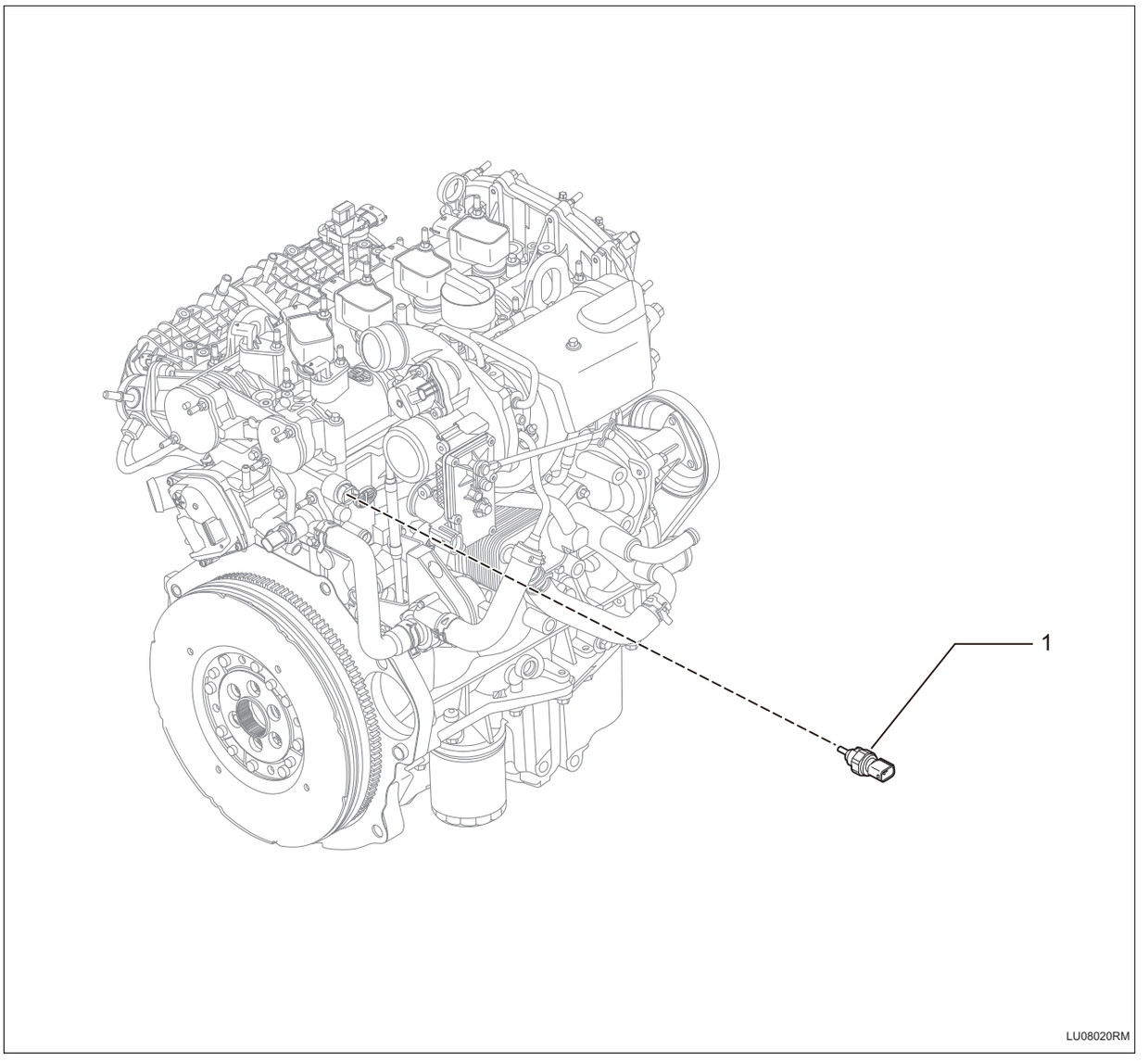
1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

   Caution:

   Apply adhesive onto 2 or 3 threads of the oil pressure and temperature sensor assembly.

Oil pressure sensor

Parts

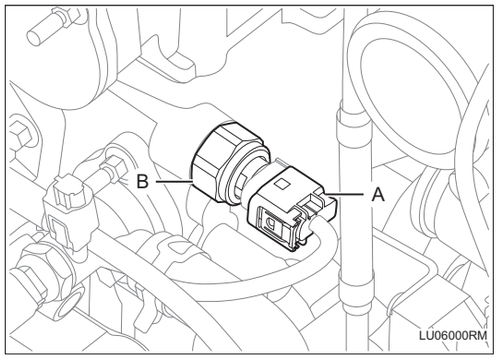


1. Oil pressure sensor

- Torque: 9~13 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the oil pressure sensor**
   (a) Disconnect the harness connector-A-.
   (b) Remove oil pressure sensor -B-.



Installation

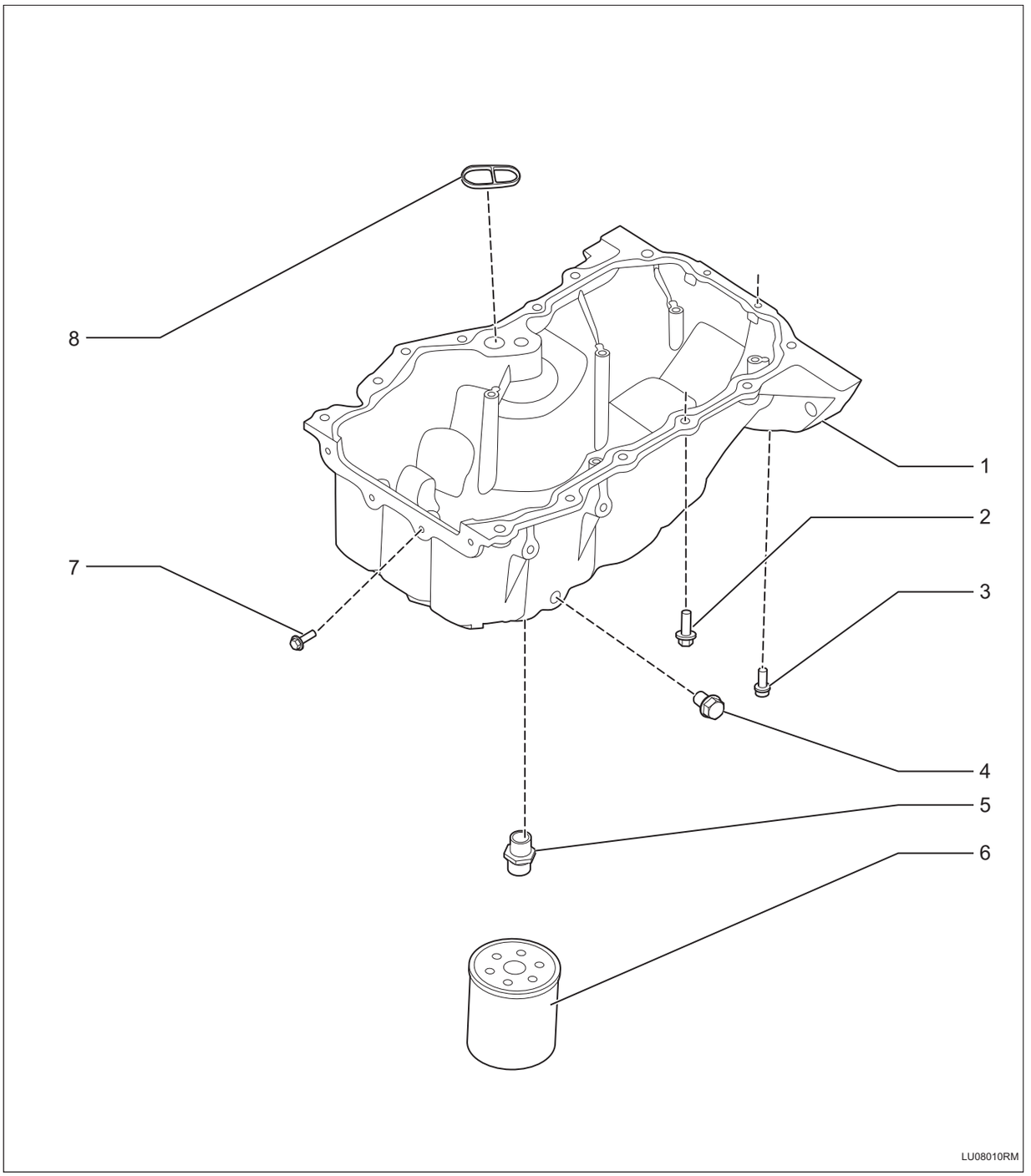
1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

   Caution:

   Apply adhesive onto 2 or 3 threads of the oil pressure and temperature sensor assembly.

Oil sump assembly

Parts



1. **Oil sump assembly**
2. **Hexagon flange bolt**
   - X13
   - Torque: 18~22 N · m
3. **Bolt**

- X2
- Torque: 8~12 N · m

4. Drain plug

- Torque: 30~40 N · m

5. Oil filter connector

- Torque: 30~40 N · m

6. Oil filter

- Torque: 15~18 N · m

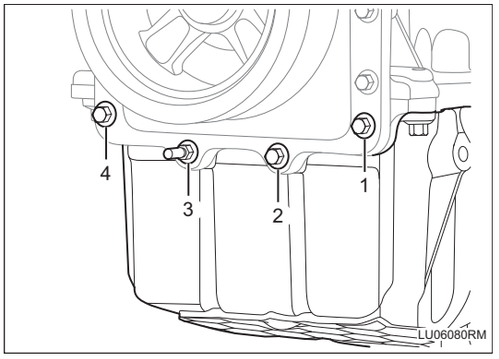
7. Hexagon flange bolt

- X4
- Torque: 8~12 N · m

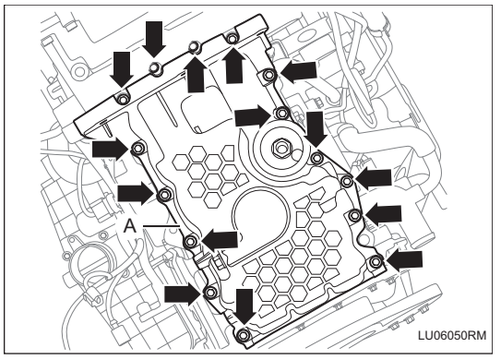
8. Seal ring

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove engine bottom guard plate assembly (See page ET-34)**
3. **Drain engine oil (See page LU-3)**
4. **Remove oil sump assembly**



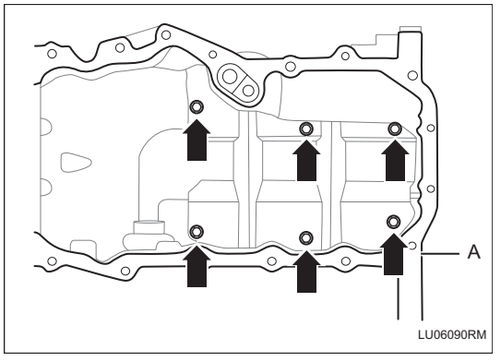
(a) Remove the crankshaft pulley side bolt -1-4-.



(b) Remove the bolt -arrow-, and remove the oil sump assembly -A-.

Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**



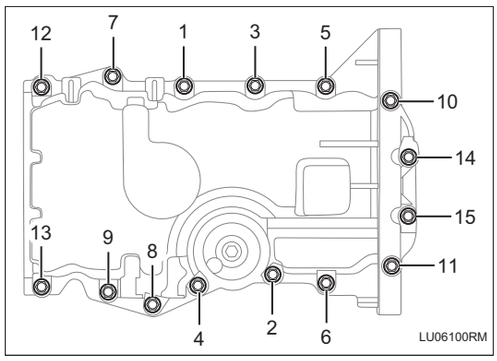
(a) Apply sealant with a diameter of (Φ2~Φ3)mm on the top surface of the oil sump assembly, and the sealant application track is the black line -A- as shown iin the figure.

Caution:

Apply RTV sealant (Loctite 5900) evenly to the bottom surface of the oil sump upper body along the sealing strip direction.

Pay attention to controlling the appropriate amount of sealant.

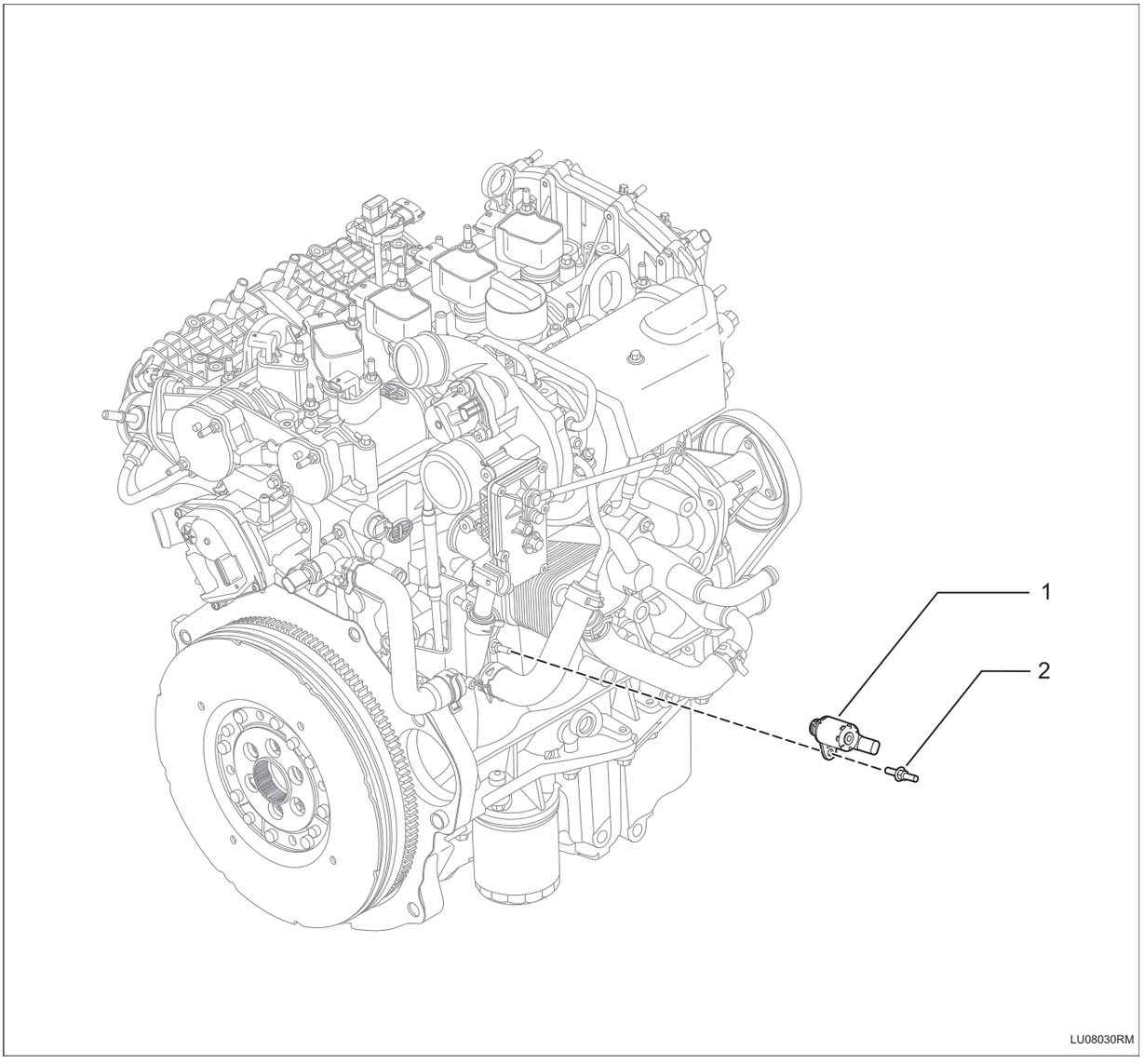
Assemble within 10 minutes after sealant application and tighten within 5 minutes thereafter.



(b) Bolt tightening sequence: Start with the middle bolts, and then the bolts on left and right sides in turn to both ends.

Piston cooling nozzle control valve

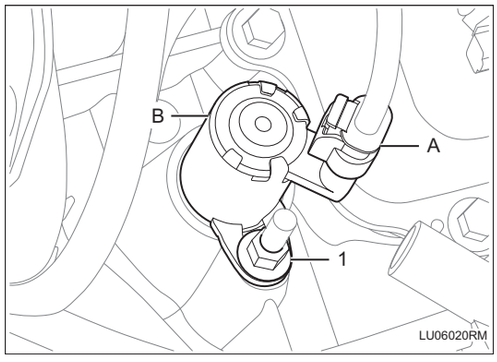
Parts



1. **Piston cooling nozzle control valve**
   - Apply an appropriate amount of lubricating oil to the piston cooling nozzle control valve assembly seal ring before assembly.
2. **Stud**
   - Torque: 8~12 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the piston cooling nozzle control valve**
   (a) Disconnect the harness connector-A-.
   (b) Remove bolt -1- and remove piston cooling nozzle control valve -B-.



Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

   Caution:

   Apply adhesive onto 2 or 3 threads of the oil pressure and temperature sensor assembly.

Lubrication system 2.0T and 1.8T

On-board inspection LU-1

Oil and oil filter assembly LU-3

Replace LU-3

Oil pressure sensor LU-6

Parts LU-6

Removal LU-7

Installation LU-7

Piston cooling nozzle control valve LU-8

Parts LU-8

Removal LU-9

Installation LU-9

Oil sump lower body assembly LU-10

Parts LU-10

Removal LU-12

Installation LU-12

Variable displacement oil pump solenoid valve LU-13

Parts LU-13

Removal LU-14

Installation LU-14

LU

On-board inspection

1. Check engine oil quality

(a) Check whether the engine oil deteriorates and whether the oil is mixed with water, discolored or thinned. If the quality is obviously inferior, replace the engine oil and oil filter element.

2. Check engine oil level

(a) After engine warm-up, stop the engine and wait for 5 minutes.

(b) Check and confirm that the engine oil level is between the minimum oil level mark and maximum oil level mark of the oil dipstick. If the engine oil level is too low, check for oil leakage and add oil to the full oil level mark.

Notice:

When filling the engine oil, do not exceed the full oil level mark.

When filling the engine oil, do not allow the oil to spill out of the filler. If the oil spills on the engine gear train, it is necessary to thoroughly clean the oil on the pulley of the gear train and replace the belt; The oil spilled in other parts of the engine needs to be cleaned with cleaner to ensure that there is no residual oil.

Hint:

A certain amount of engine oil will be consumed during driving. In the following cases, the oil consumption will increase and it may be necessary to refill the engine oil during the oil maintenance interval.

When the engine is new, for example, after buying a vehicle or replacing the engine.

If low-quality oil or oil of improper viscosity is used.

When driving with high engine speed or heavy load, towing or frequent acceleration or deceleration during driving.

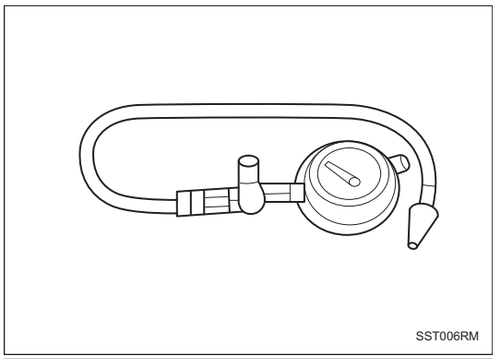
When the engine is idling for a long time, or when driving frequently in heavy traffic.

3. Check oil pressure.

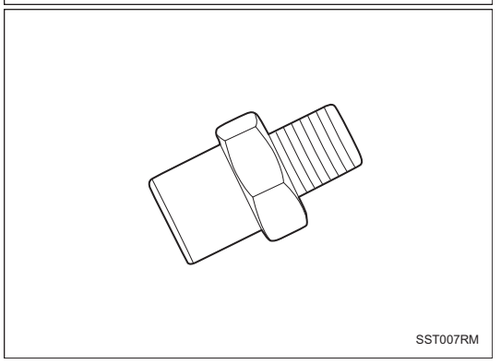
(a) Check oil quantity

(b) Remove oil pressure and temperature sensor assembly

(c) Install the SST (39 GV 210520 B 39 GV 210530 B).



SST006RM



SST007RM

(d) Start the engine to warm it up.

(e) Check the oil pressure. If the oil pressure does not meet the regulations, check the oil pump.

Oil pressure when oil temperature is 85 ℃

idle speed	2000r/min	4000r/min
>100kPa	⩾ 150kPa	⩾ 350kPa

Idle speed:>100 kPa

Oil pressure in normal working range: (150~600) kPa

Alarm pressure: (14.7~29.4) kPa

(f) Remove SST (39GV210520B 39GV210530B).

(g) Install oil pressure and temperature sensor assembly

(h) Install oil pressure alarm assembly connector

(i) Start the engine and check whether the engine oil leaks.

Oil and oil filter assembly

Replace

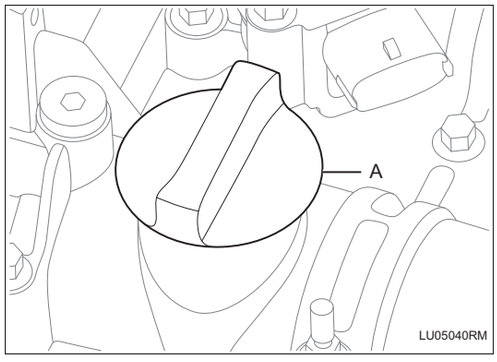
Note:

Long-term and repeated contact with engine oil will cause the skin to lose the natural oil on the surface, and the skin will become dry, allergic and prone to dermatitis. In addition, the used engine oil contains potentially harmful contaminants that may cause skin cancer.

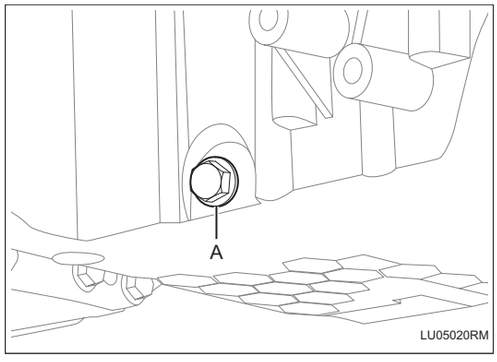
When changing engine oil, to reduce the hazards caused by skin contact with used engine oil, relevant precautions must be followed. Wear protective clothes and gloves that are impermeable to oil. Wash the skin with soap and water, or thoroughly wash away all used engine oil with a water-free hand cleaner. Do not use gasoline, thinner or solvents.

In order to protect the environment, the oil and oil filter should be disposed of at designated scrapping locations.

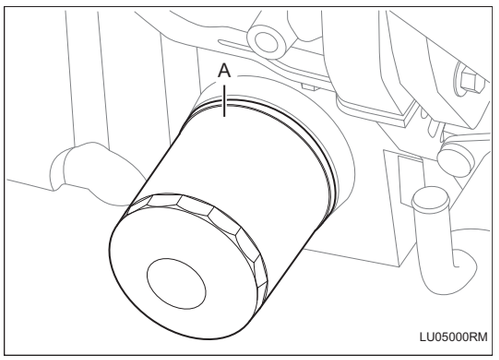
1. **Remove engine bottom guard plate assembly (See page ET-34)**
2. **Draining engine oil**
   (a) Remove oil filler cap-A-.



   (b) Remove the oil sump drain plug -A- and discharge the engine oil into the container.



3. **Remove oil filter assembly**



(a) Remove oil filter -A-.

Hint:

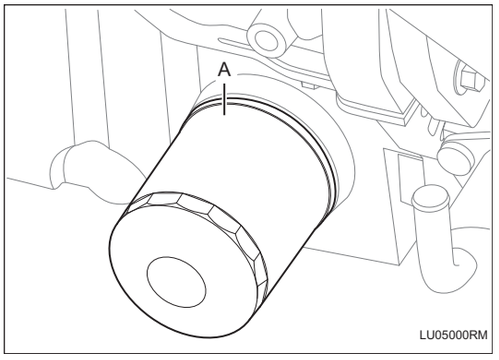
After the oil filter is removed, check whether the oil filter seal ring is left on the oil filter seat.

Hint:

Use a container to collect the drained oil.

4. Install oil filter assembly

(a) Clear the dirt or foreign matter on the engine oil filter mounting surface.



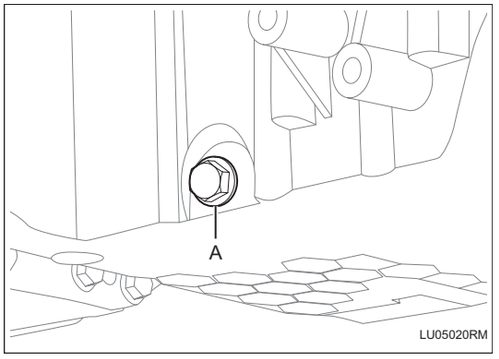
(b) Apply a thin layer of engine oil to the new filter seal ring-A- and install the oil filter.

Torque: 22 ~ 28N · m

Caution:

Make sure that the seal ring is installed in the correct position, otherwise the oil may leak.

Do not twist the seal ring.



(c) Install the drain plug -A-.

Torque: 30 ~ 40 N · m

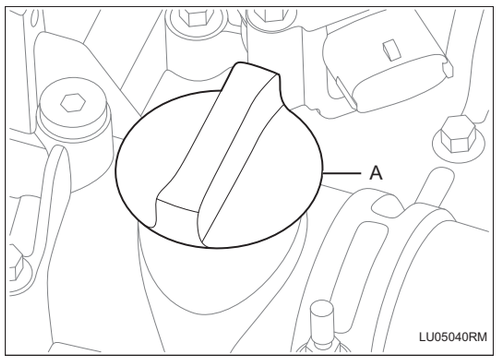
5. Fill in engine oil

(a) Standard oil grade:

Oil quality grade	Oil viscosity	Working ambient temperature
ACEA C3	5W-30	- 35 ℃ ~ 40 ℃ (all-season engine oil)

(b) Standard capacity:

First filling volume of new engine	Filling volume after changing oil and oil filter	Filling volume after oil change
6(L)	5.3(L)	5(L)



(c) Install the oil filler cap-A-.

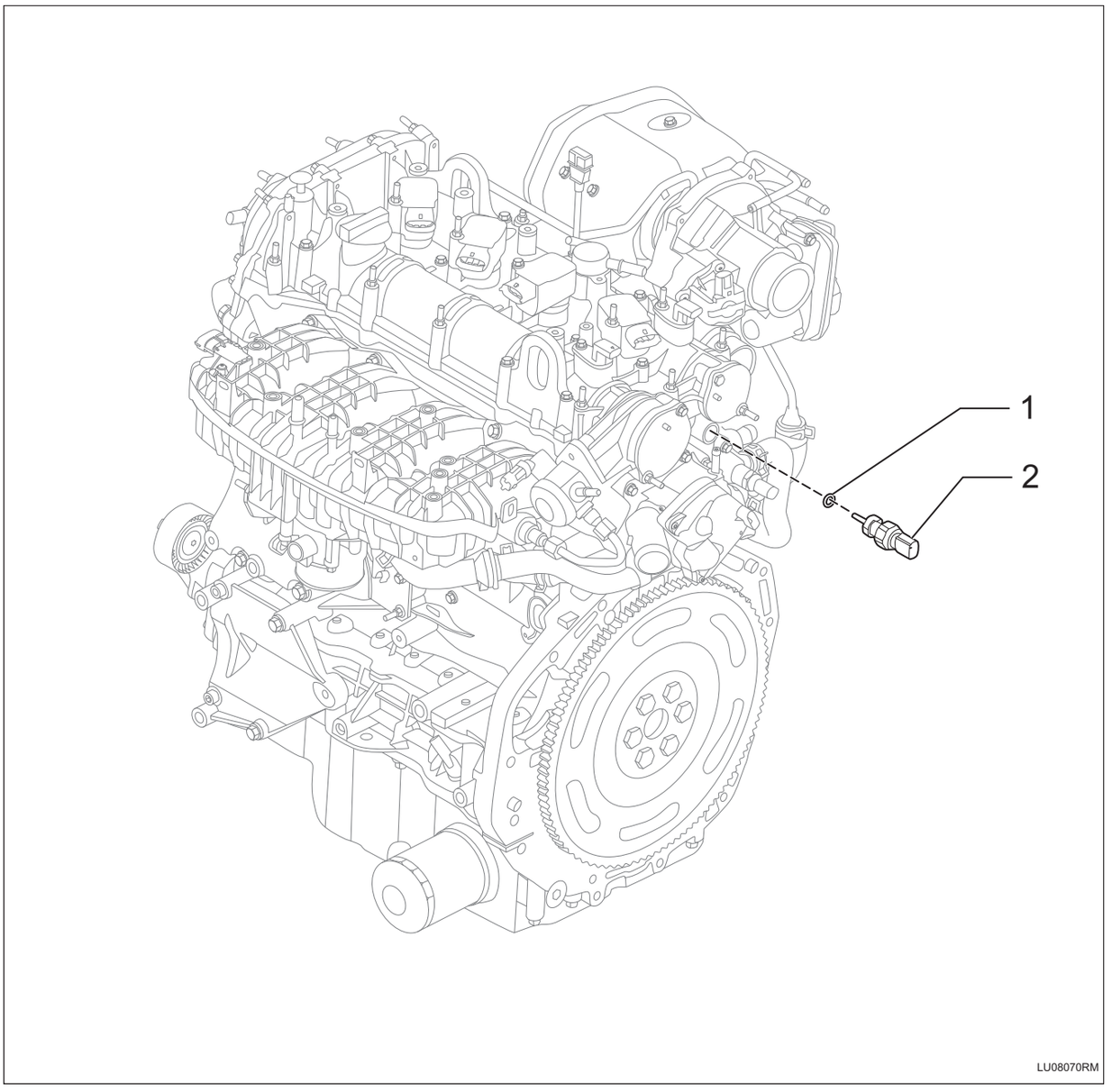
6. Check whether the engine oil leaks.

(a) Start the engine and ensure that the engine oil does not leak from the working area.

(b) Check engine oil level.

Oil pressure sensor

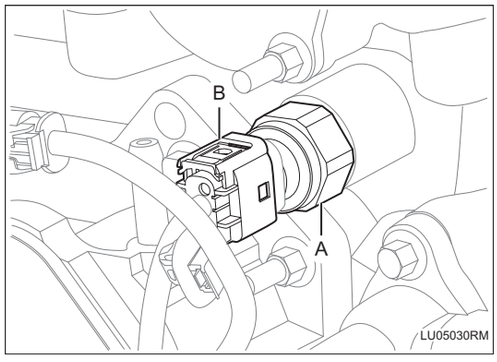
Parts



1. **Seal ring**
2. **Oil pressure sensor**
   - Torque: 9~13 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the oil pressure sensor**
   (a) Disconnect the harness connector-B-.
   (b) Remove oil pressure sensor -A-.



Installation

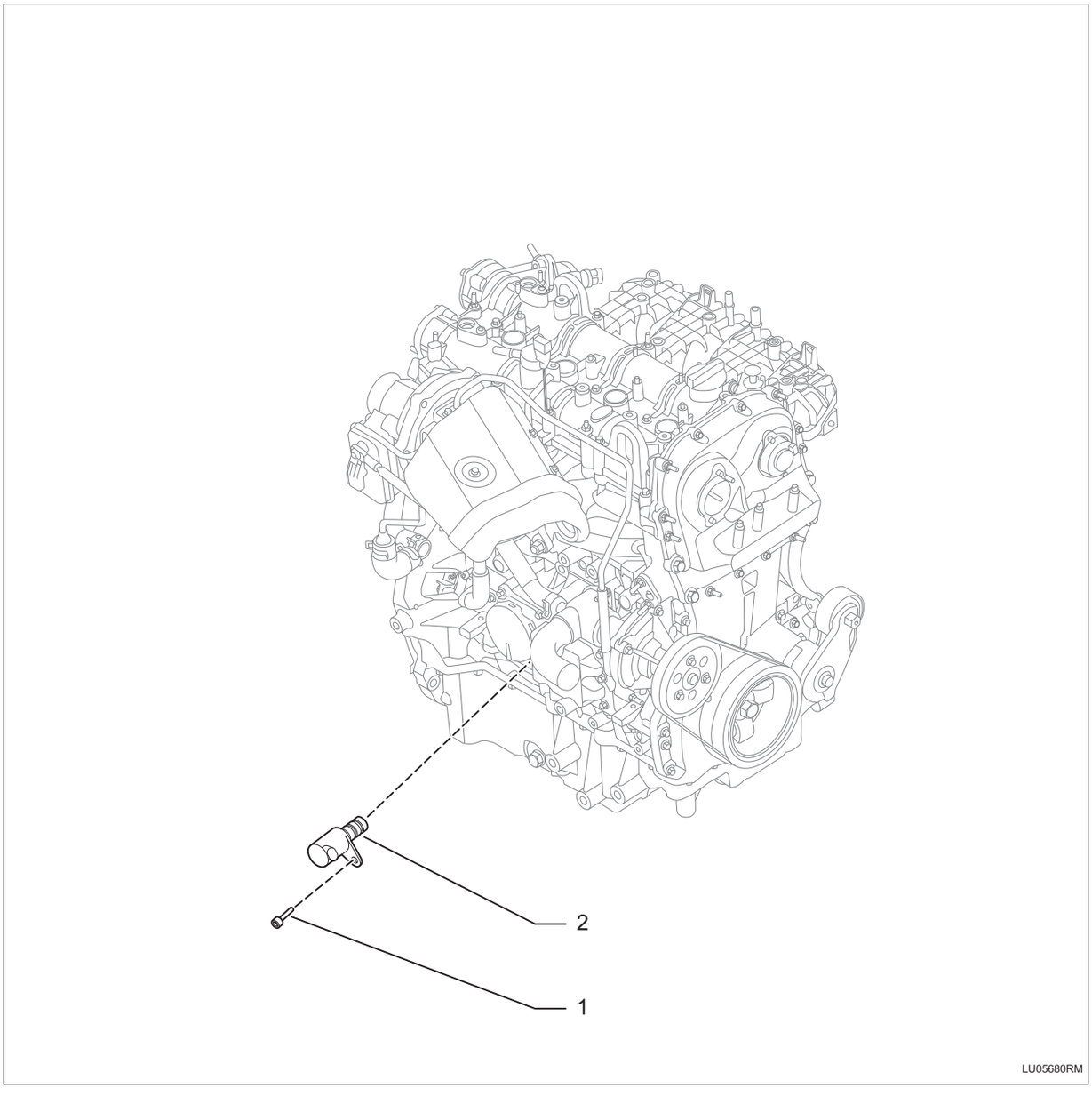
1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

   Caution:

   Apply adhesive onto 2 or 3 threads of the oil pressure and temperature sensor assembly.

Piston cooling nozzle control valve

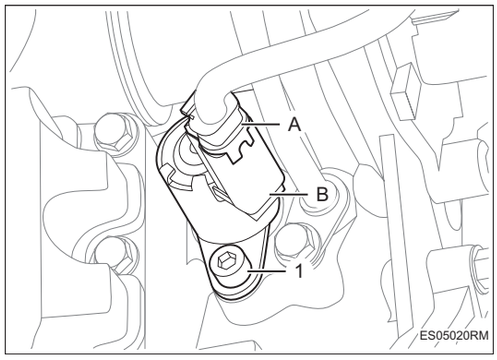
Parts



1. **Bolt**
   - Torque: 8~12 N · m
2. **Piston cooling nozzle control valve**
   - Apply an appropriate amount of lubricating oil to the piston cooling nozzle control valve assembly seal ring before assembly.

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the piston cooling nozzle control valve**
   (a) Disconnect the harness connector-A-.
   (b) Remove bolt -1- and remove piston cooling nozzle control valve -B-.



Installation

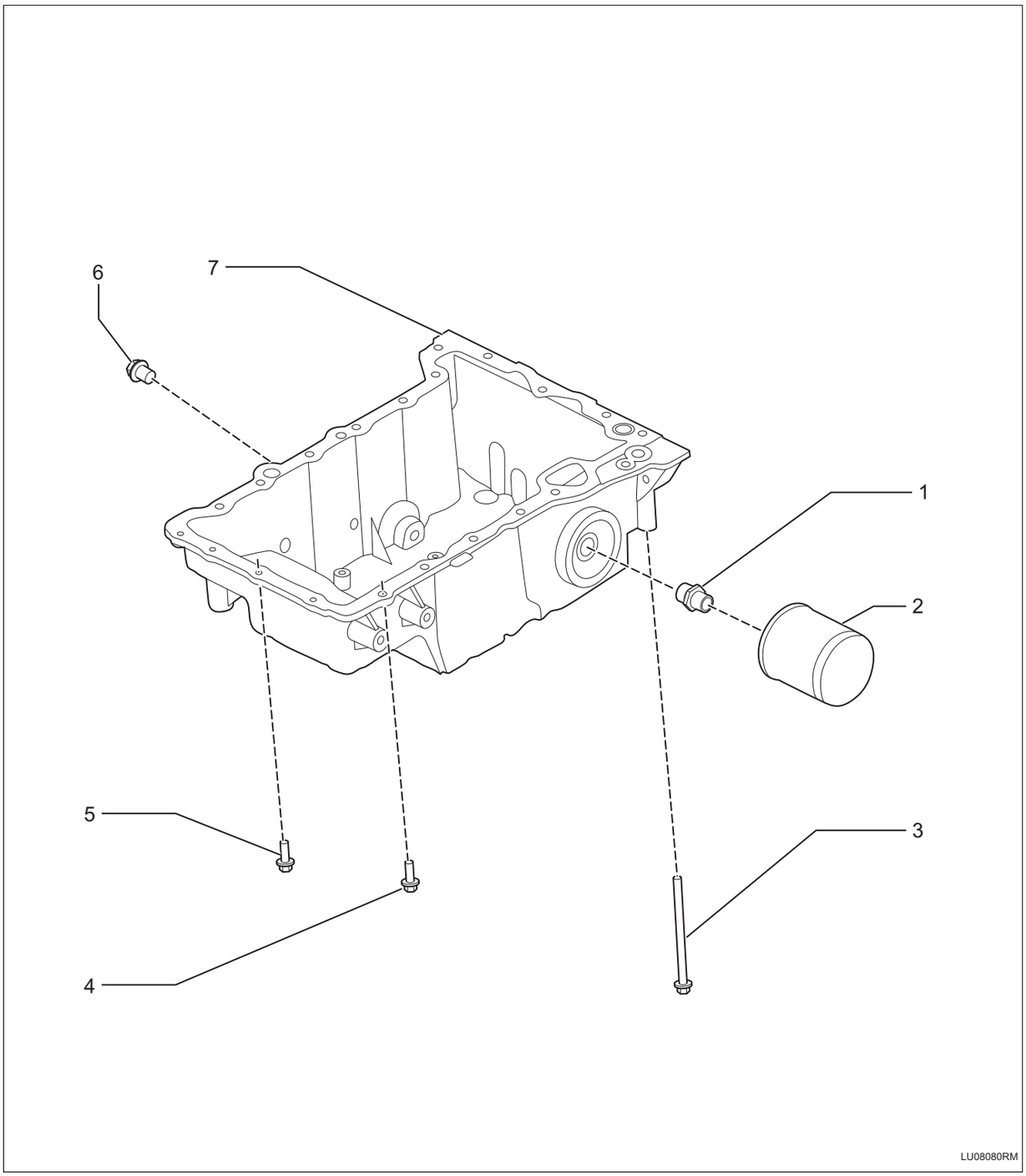
1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

   Caution:

   Apply adhesive onto 2 or 3 threads of the oil pressure and temperature sensor assembly.

Oil sump lower body assembly

Parts



1. **Oil filter connector**
   - Torque: 30~40 N · m
2. **Oil filter**
   - Torque: 15~18 N · m
3. **Hexagon flange bolt**

- X4
- Torque: 18~22 N · m

4. Hexagon flange bolt

- X13
- Torque: 18~22 N · m

5. Hexagon flange bolt

- X4
- Torque: 8~12 N · m

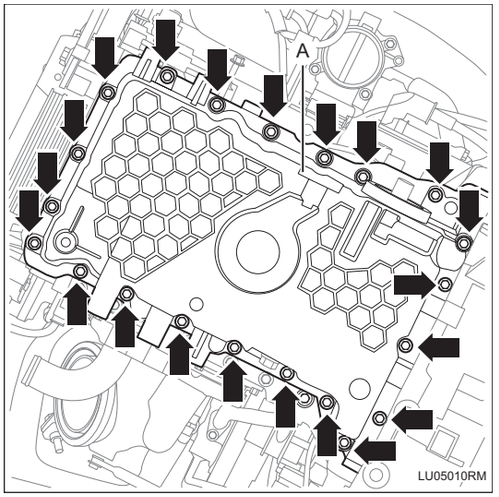
6. Drain plug

- Torque: 30~40 N · m

7. Oil sump assembly

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove engine bottom guard plate assembly (See page ET-34)**
3. **Remove the alternator bracket (See page CH-8)**
4. **Drain engine oil (See page LU-3)**
5. **Remove oil sump assembly**



(a) Remove the bolt -arrow-, and remove the oil sump assembly -A-.

Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

Caution:

Apply RTV sealant (Loctite 5900) evenly to the bottom surface of the oil sump upper body along the sealing strip direction.

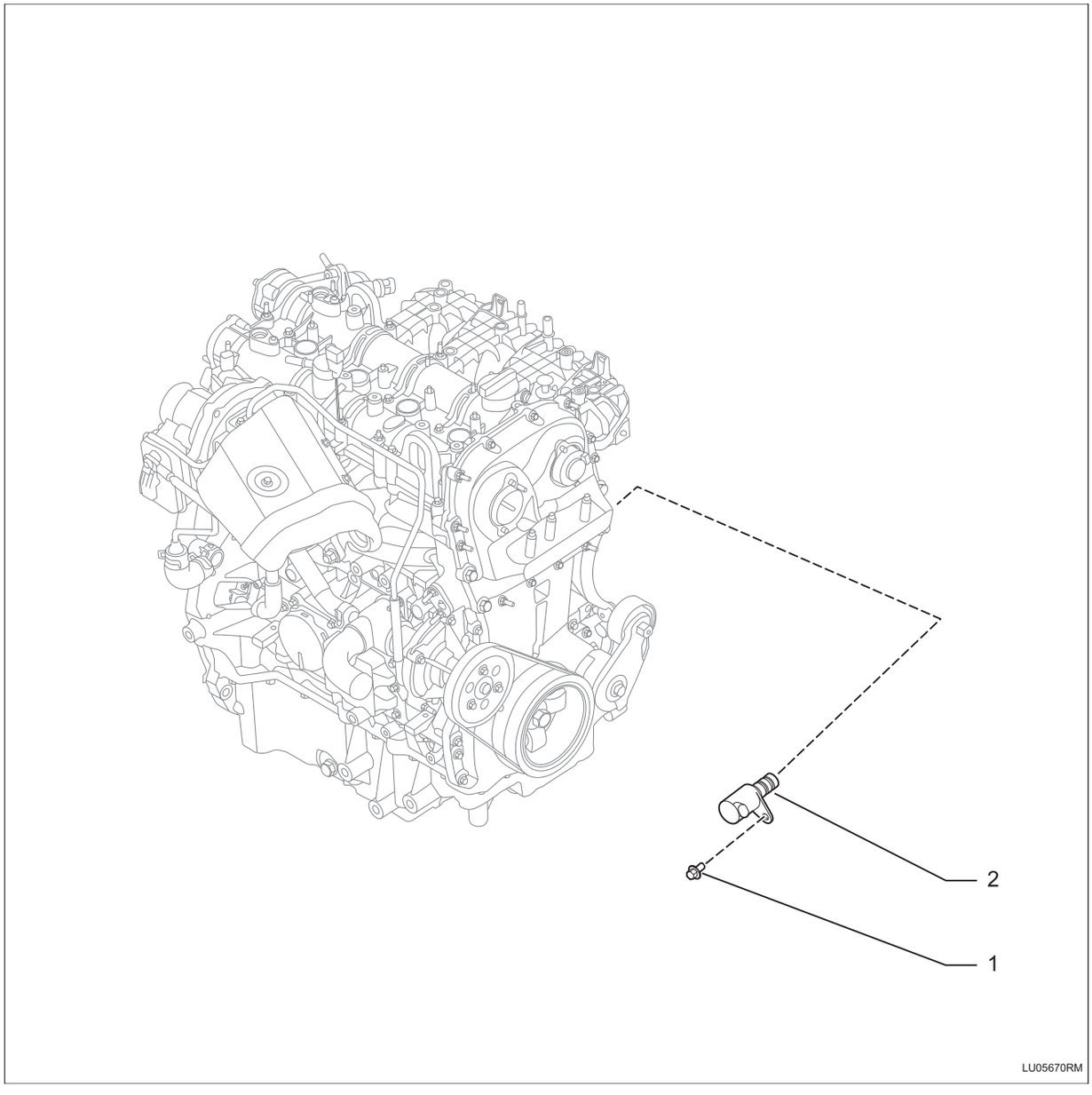
Pay attention to controlling the appropriate amount of sealant.

Assemble within 10 minutes after sealant application and tighten within 5 minutes thereafter.

(a) Bolt tightening sequence: Start with the middle bolts, and then the bolts on left and right sides in turn to both ends.

Variable displacement oil pump solenoid valve

Parts



1. Bolt

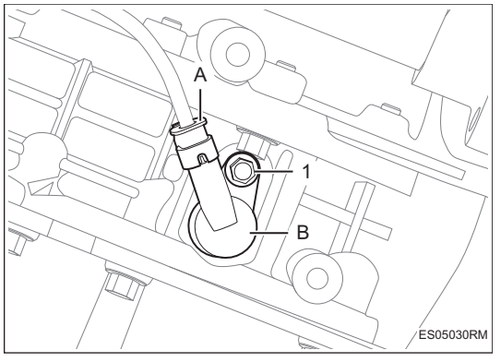
- Torque: 8~12 N · m

2. Variable displacement oil pump solenoid valve

- Apply an appropriate amount of lubricating oil to the variable displacement oil pump solenoid valve seal ring before assembly.

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove engine bottom guard plate assembly (See page ET-34)**
3. **Remove variable displacement oil pump solenoid valve**
   (a) Disconnect the harness connector-A-.
   (b) Remove bolt -1- and remove variable displacement oil pump solenoid valve -B-.



Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

   Caution:

   Apply adhesive onto 2 or 3 threads of the oil pressure and temperature sensor assembly.

Intake system 1.5 T and HEV

On-board inspection IT-1

Intake manifold assembly IT-2

Parts IT-2

Removal IT-4

Installation IT-5

Air cleaner assembly IT-6

Parts IT-6

Part (only for HEV models) IT-8

Removal IT-10

Installation IT-13

Turbocharger pipeline IT-14

Parts IT-14

Removal IT-16

Installation IT-18

Turbocharger assembly IT-19

Parts IT-19

Removal IT-21

Installation IT-22

On-board inspection

1. **Start the vehicle.**
2. **Check the intake system parts for air leakage.**

   Hint:

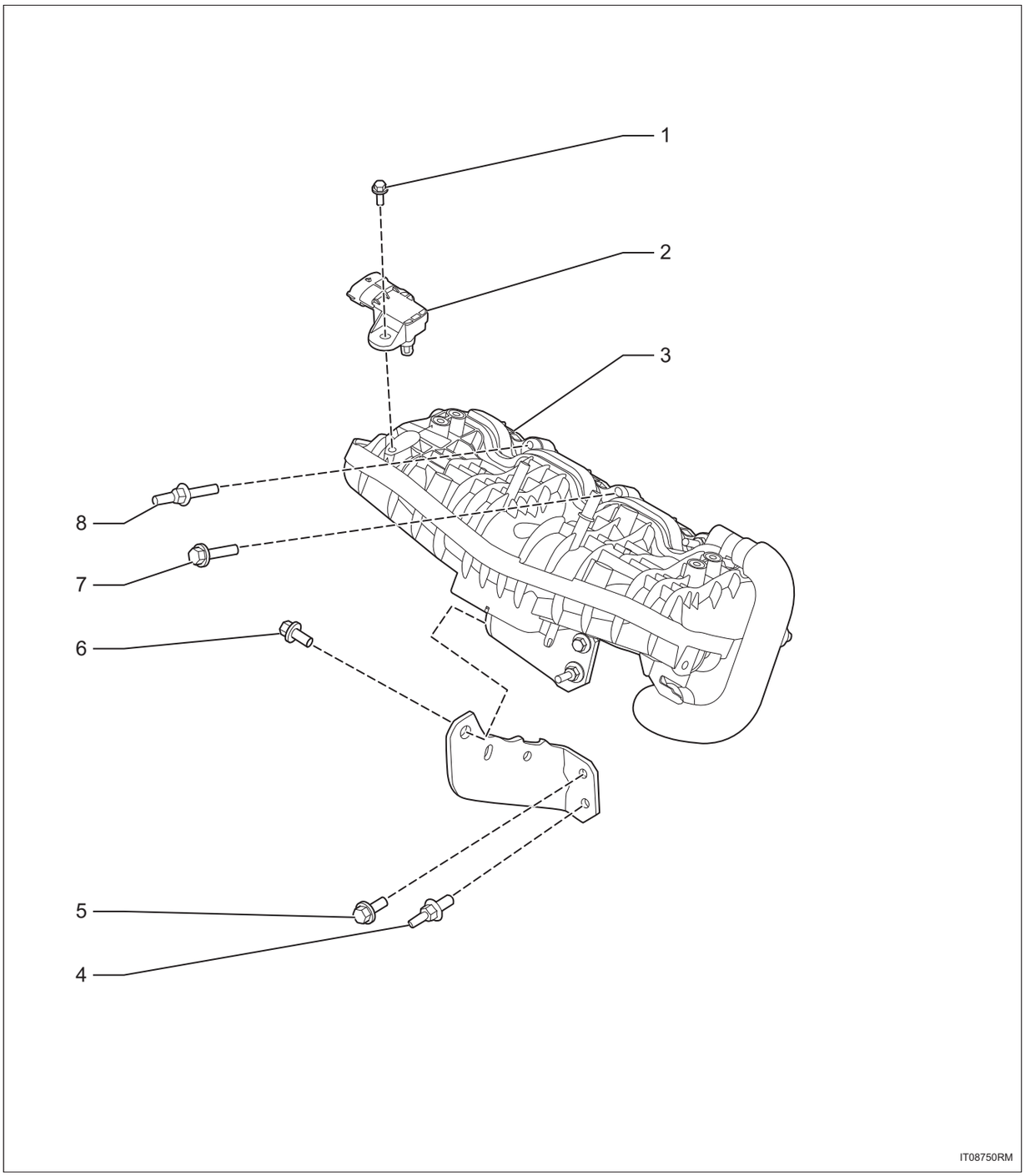
   In case of air leakage, repair or replace the abnormal parts.
3. **Check the intake system parts for damage.**

   Hint:

   In case of damage, replace the abnormal parts.

Intake manifold assembly

Parts



1. **Hexagon flange bolt**
   - Torque: 2.7~3.7 N · m
2. **MAP/IAT sensor**
3. **Intake manifold assembly**
4. **Stud**

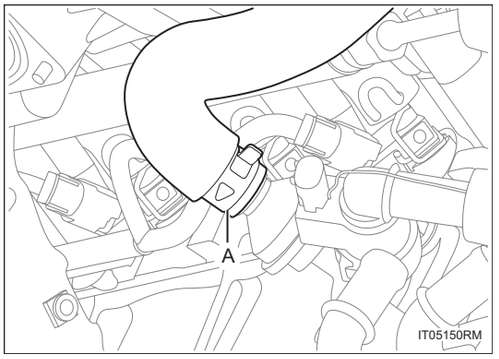
- Torque: 18~22 N · m

5. **Hexagon flange bolt**
   - Torque: 18~22 N · m
6. **Hexagon flange bolt**
   - Torque: 18~22 N · m
7. **Hexagon flange bolt**
   - X4
   - Torque: 18~22 N · m
8. **Composite bolt**
   - X2
   - Torque: 18~22 N · m

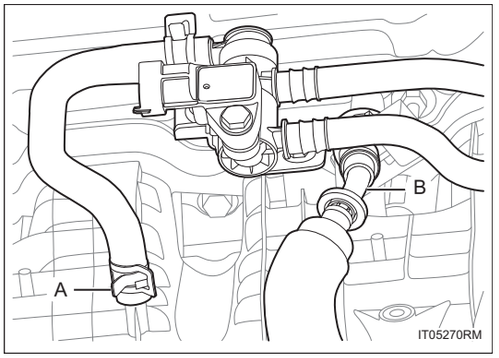
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove electronic throttle body assembly (See page ES-69)**
3. **Remove MAP/IAT sensor assembly (See page ES-73)**
4. **Remove activated canister solenoid valve (only for HEV models) (See page EC-18)**
5. **Remove intake manifold assembly**

(a) Disconnect crankcase ventilation pipe assembly-A-.

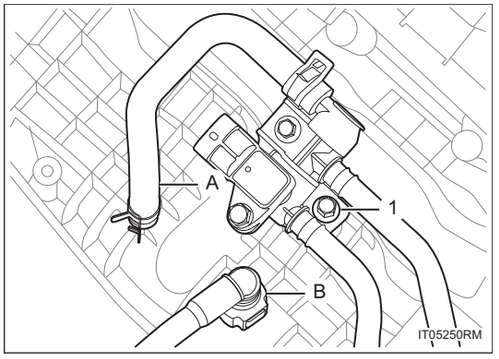


(b) Disconnect the desorption pipe and venturi valve assembly-A-. (Only for HEV models)

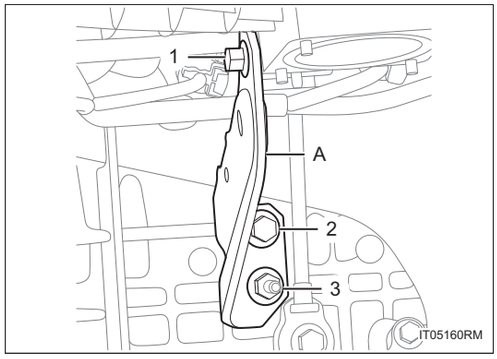


(c) Disconnect the crankcase ventilation pipe assembly-B-(only for HEV models)

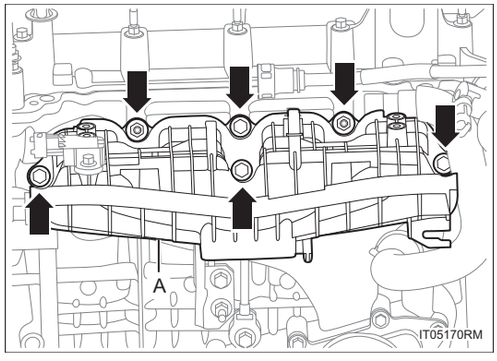
(d) Disconnect intake manifold vacuum pipe -B-, desorption pipe and venturi valve assembly -A-.



(e) Remove the bolt -1- and detach the desorption pipe and venturi valve assembly.



(f) Remove the bolt -1-3- and the intake manifold bracket -A-.



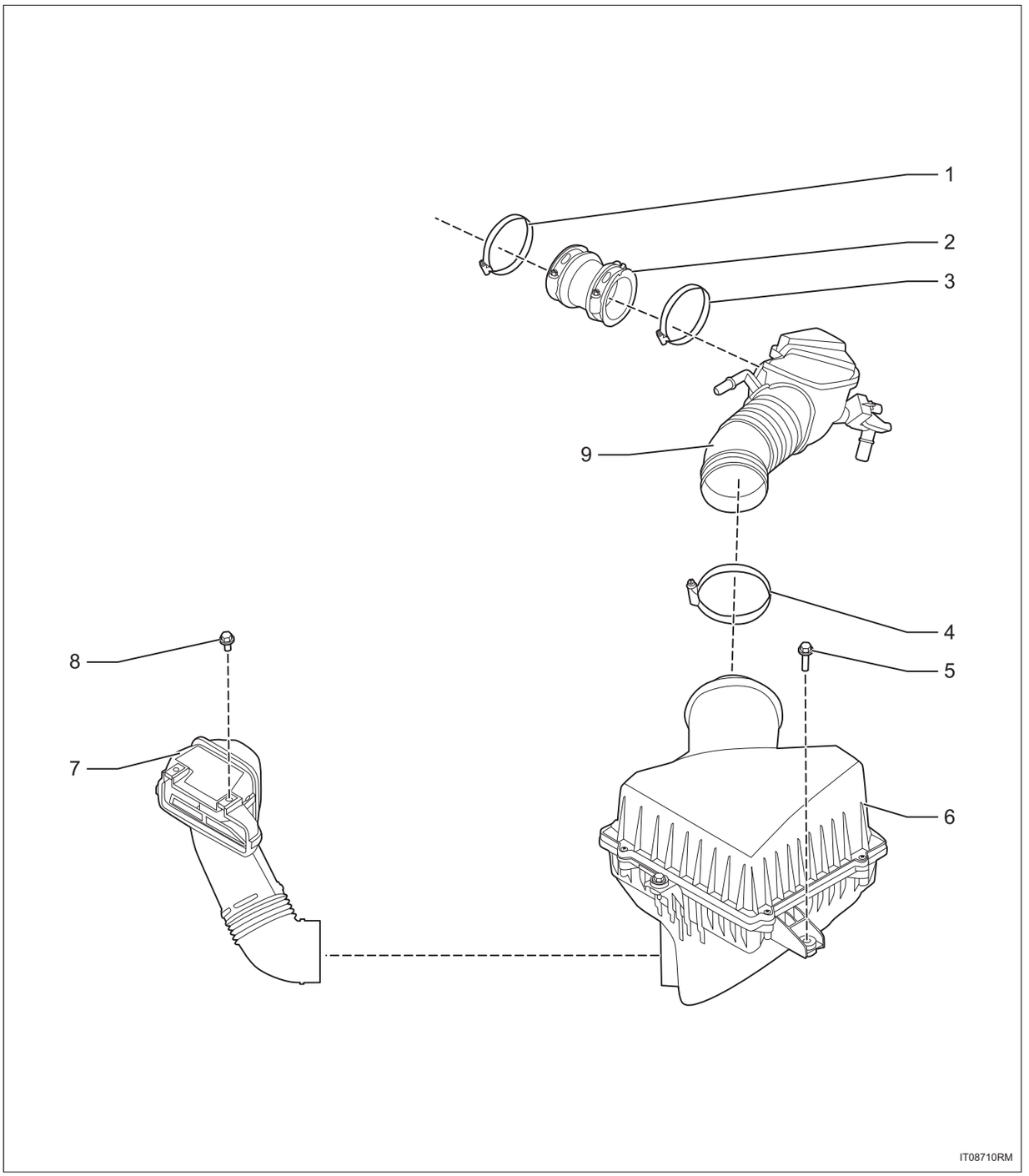
(g) Remove the bolt - arrow - and the intake manifold assembly-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Air cleaner assembly

Parts

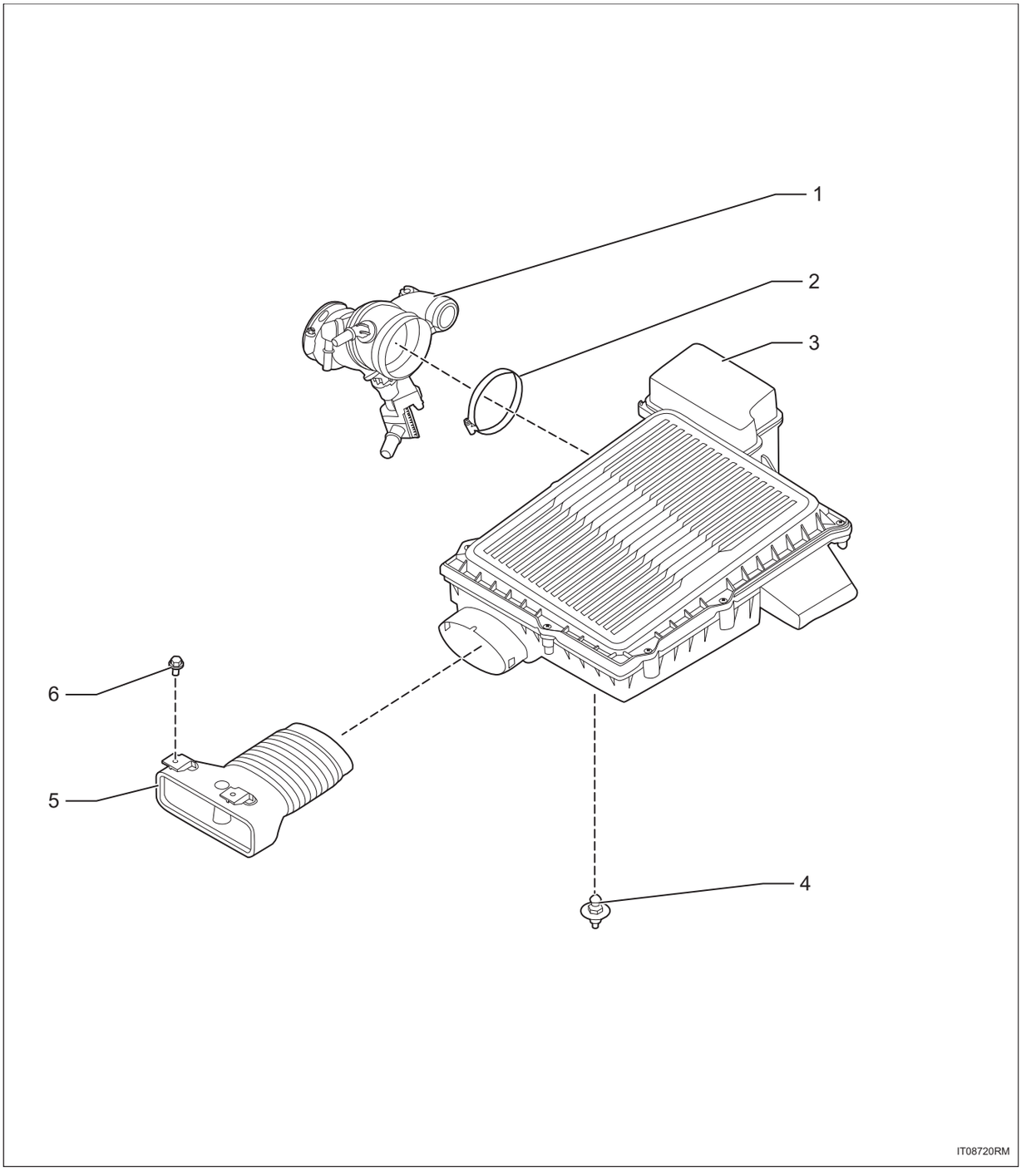


1. **Worm drive hose clamp**
2. **Intake elbow Ⅱ assembly**
3. **Worm drive hose clamp**
4. **Worm drive hose clamp**
5. **Hexagon flange bolt**

- X4
- Torque: 8~12 N · m

6. **Air cleaner assembly**
7. **Cold air inlet assembly**
8. **Hexagon flange bolt**
   - X2
   - Torque: 8~12 N · m
9. **Intake elbow assembly**

Part (only for HEV models)

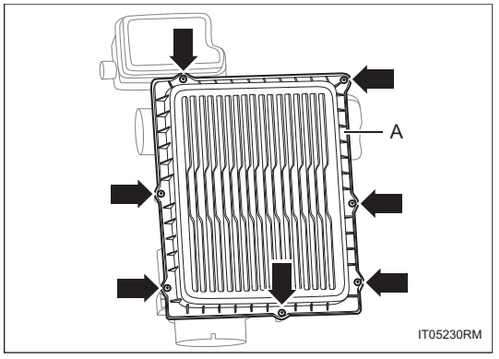


1. **Intake elbow assembly**
2. **Worm drive hose clamp**
3. **Air cleaner assembly**
4. **Round head bolt**
   - X4
   - Torque: 8~12 N · m

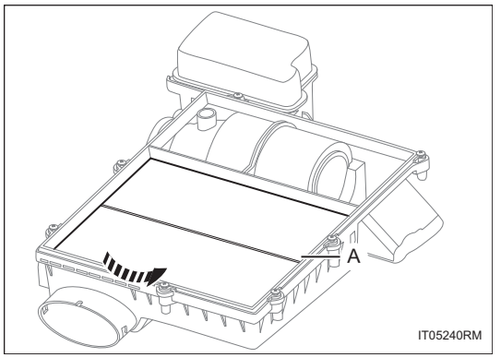
5. **Cold air inlet assembly**
6. **Hexagon flange bolt**
   - X2
   - Torque: 8~12 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the air cleaner element assembly (only for HEV models)**

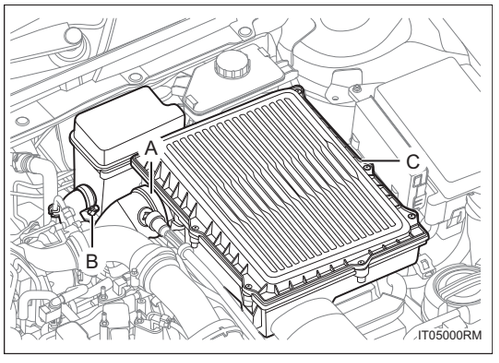


(a) Remove the screw -arrow-, and remove the air cleaner upper housing -A-.



(b) Remove air cleaner element assembly-A- as arrowed.

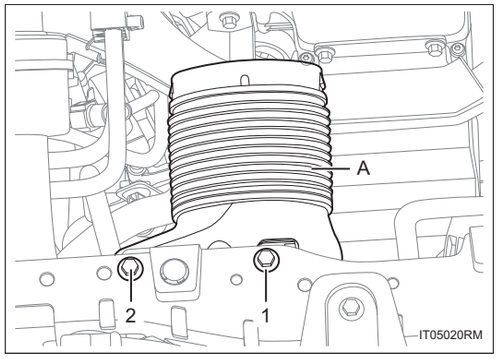
3. **Remove air cleaner assembly (only for HEV models)**



(a) Detach the worm drive hose clamp-A-B- and pull up the air cleaner assembly-C-.

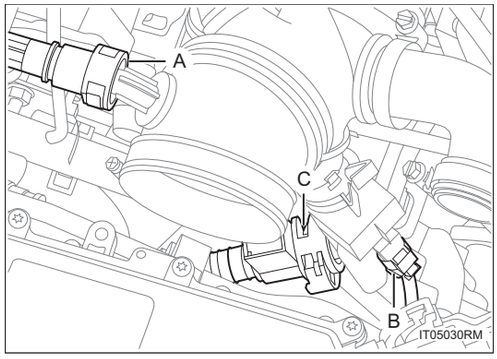
4. **Remove cold air inlet assembly (only for HEV models)**

IT



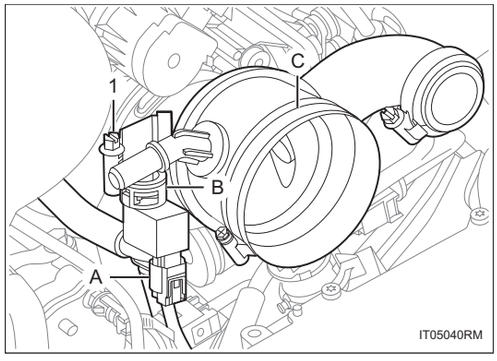
(a) Remove the bolt -1-2-, and the cold air inlet assembly-A-.

5. Remove the intake elbow assembly (only for HEV models)



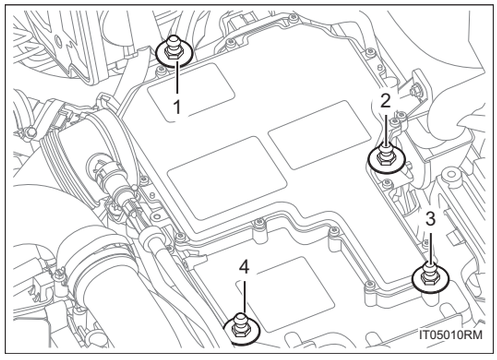
(a) Disconnect the desorption pipe and venturi valve assembly-A-.

(b) Disconnect the cover side ventilation pipe assembly -C- and disconnect the harness connector-B-.



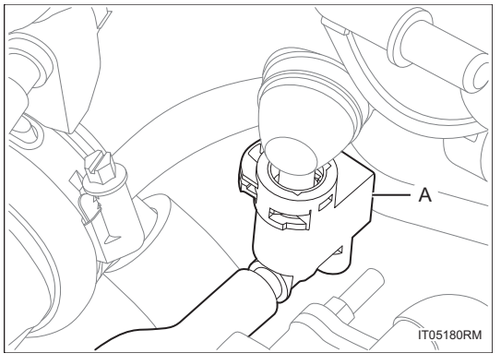
(c) Disconnect the harness connector -A- and detach crankcase ventilation pipe -B-.

(d) Detach the worm drive hose clamp -1-, and remove the intake elbow assembly-C-.

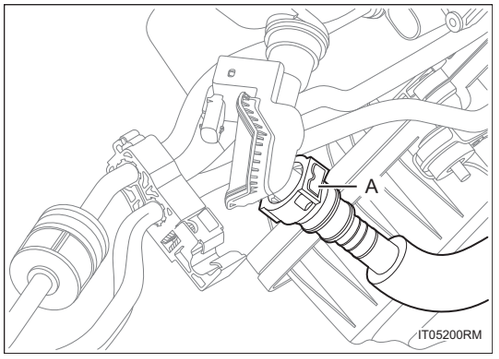


(e) Remove the fixing bolts -1-4- of the air cleaner assembly.

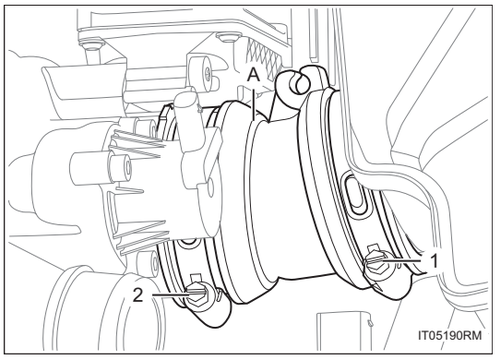
6. Remove intake elbow assembly



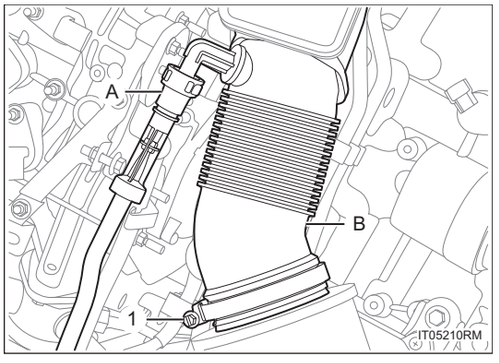
(a) Disconnect cover side ventilation pipe assembly-A-.



(b) Disconnect crankcase ventilation pipe assembly-A-.



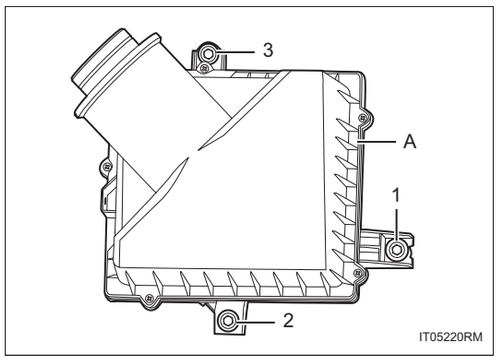
(c) Detach the worm drive hose clamp -1-2-, and remove the intake elbow connecting hose-A-.



(d) Disconnect the desorption pipe and venturi valve assembly-A-.

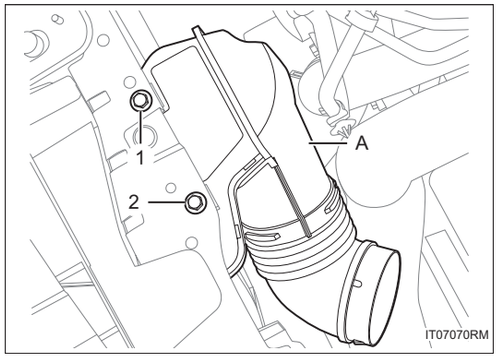
(e) Detach the worm drive hose clamp -1- and remove the intake elbow assembly-B-.

7. Remove air cleaner assembly



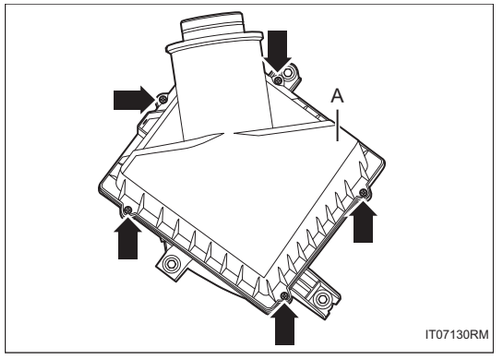
(a) Remove the bolt -1-3-, and the air cleaner assembly-A-.

8. Remove cold air inlet assembly

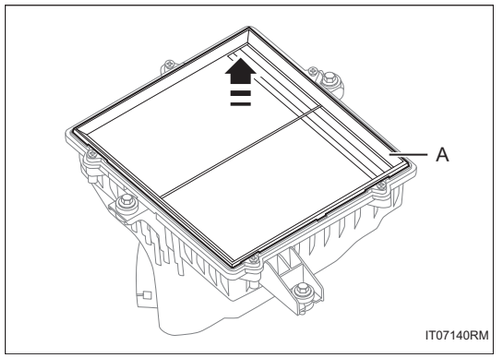


(a) Remove the bolt -1-2-, and the cold air inlet assembly-A-.

9. Remove air cleaner element assembly



(a) Remove the screw -arrow-, and remove the air cleaner upper housing -A-.



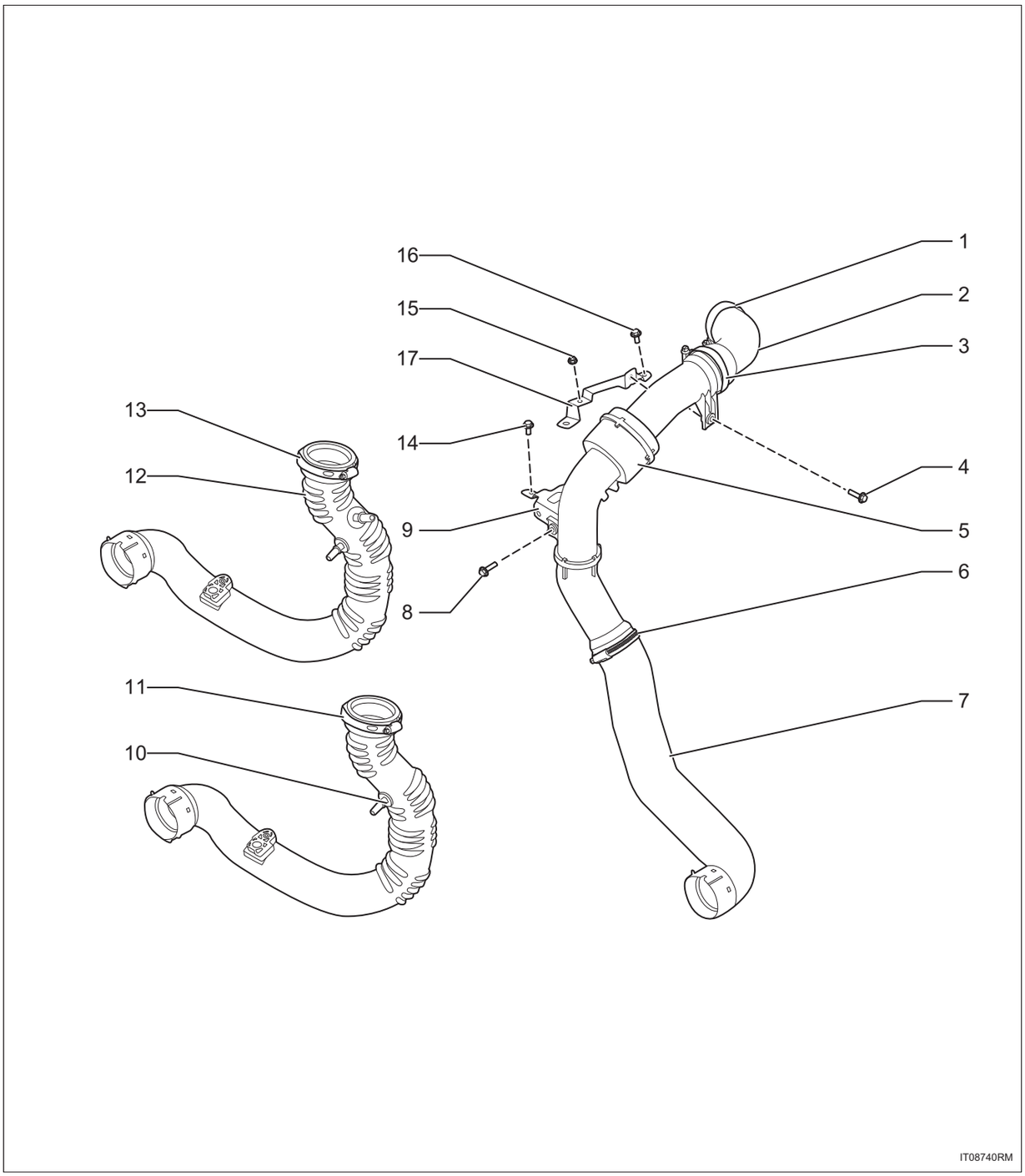
(b) Remove air cleaner element assembly-A- as arrowed.

Installation

1. The installation procedure is the reverse of removal procedure.

Turbocharger pipeline

Parts

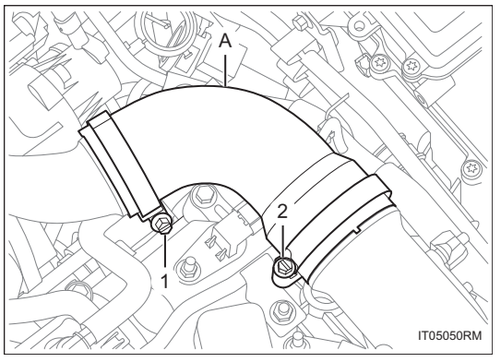


1. **Worm drive spring clamp**
2. **Turbocharger to intercooler hose I**
3. **Worm drive spring clamp**
4. **Hexagon flange bolt**
   - Torque: 8~12 N · m

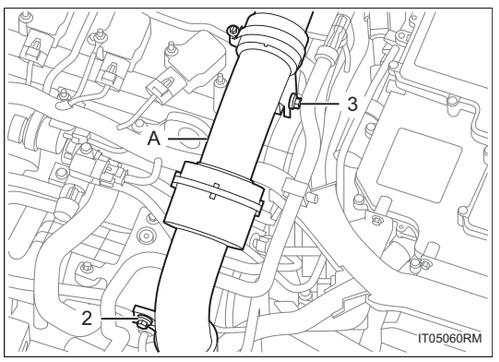
5. **Turbocharger to intercooler pipeline assembly**
6. **Worm drive spring clamp**
7. **Turbocharger to intercooler pipeline III assembly**
8. **Hexagon flange bolt**
   - Torque: 8~12 N · m
9. **Turbocharger to intercooler pipe bracket assembly**
10. **Intercooler to throttle valve pipeline assembly (only for HEV models)**
11. **Worm drive spring clamp**
12. **Intercooler to throttle valve pipeline assembly (only for 1.5T models)**
13. **Worm drive spring clamp**
14. **Hexagon flange bolt**
    - X2
    - Torque: 8~12 N · m
15. **Hexagon flange nut**
    - Torque: 8~12 N · m
16. **Hexagon flange bolt**
    - Torque: 8~12 N · m

Removal

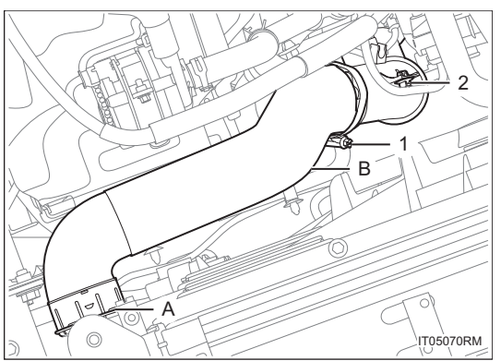
1. **Remove engine bottom guard plate (See page ET-34)**
2. **Remove air cleaner assembly (See page IT-10)**
3. **Remove turbocharger to intercooler pipeline assembly**



(a) Detach the worm drive hose clamp -1-and -2-, and remove the connecting hose-A-.



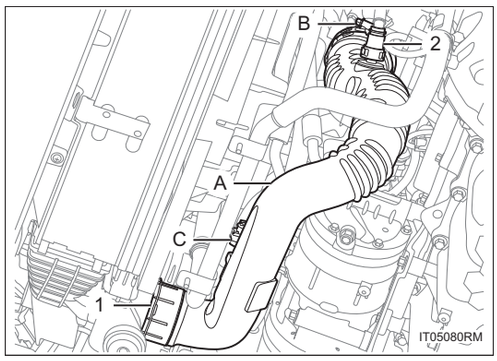
(b) Remove the bolts -2-3- and detach the turbocharger to intercooler pipeline assembly -A-.



(c) Detach the harness fixing clip -2- and detach the worm drive hose clamp -1-.

(d) Detach the intercooler connecting pipeline-A-, and remove the turbocharger to the intercooler pipeline assembly -B-.

4. **Remove intercooler to throttle valve pipeline assembly (only for HEV models)**



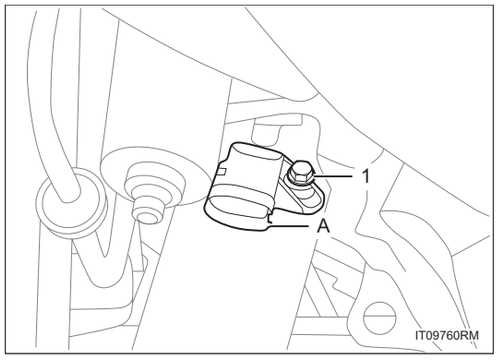
(a) Detach desorption pipe and venturi valve assembly -2-.

(b) Disconnect the harness connector-C-.

(c) Detach the worm drive hose clamp-B- and detach the intercooler to the throttle valve pipeline assembly-A-.

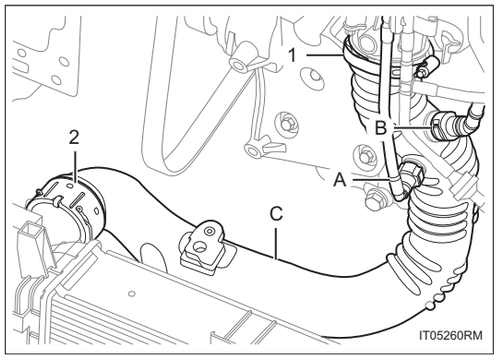
(d) Detach the intercooler-throttle valve pipeline assembly-1-, and remove the intercooler-throttle valve pipeline assembly.

5. Remove charge air pressure sensor



(a) Remove the screw -1-, and the charge air pressure sensor-A-.

6. Remove intercooler to throttle valve pipeline assembly

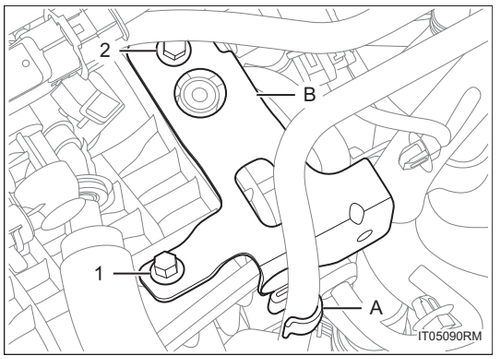


(a) Detach desorption pipe and venturi valve assembly -B- and vacuum pipe -A-.

(b) Detach the worm drive hose clamp -1- and detach the intercooler to throttle valve pipeline assembly-C-.

(c) Detach the intercooler to throttle valve pipeline assembly -2- and remove the intercooler to the throttle valve pipeline assembly -C-.

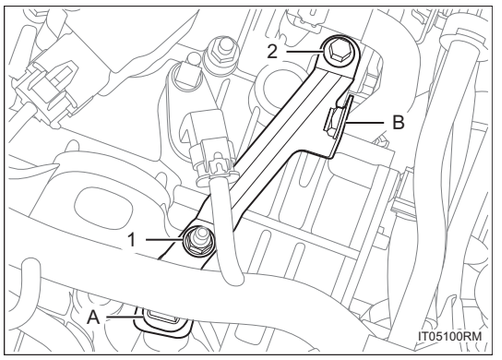
7. Remove turbocharger to intercooler pipe bracket assembly



(a) Disconnect the harness fixing clip -A-.

(b) Remove the bolts -1-2-, and remove the parts from the turbocharger to intercooler pipe bracket assembly -B-.

8. Remove turbocharger to intercooler pipe bracket II assembly



(a) Disconnect the harness fixing clip -A-.

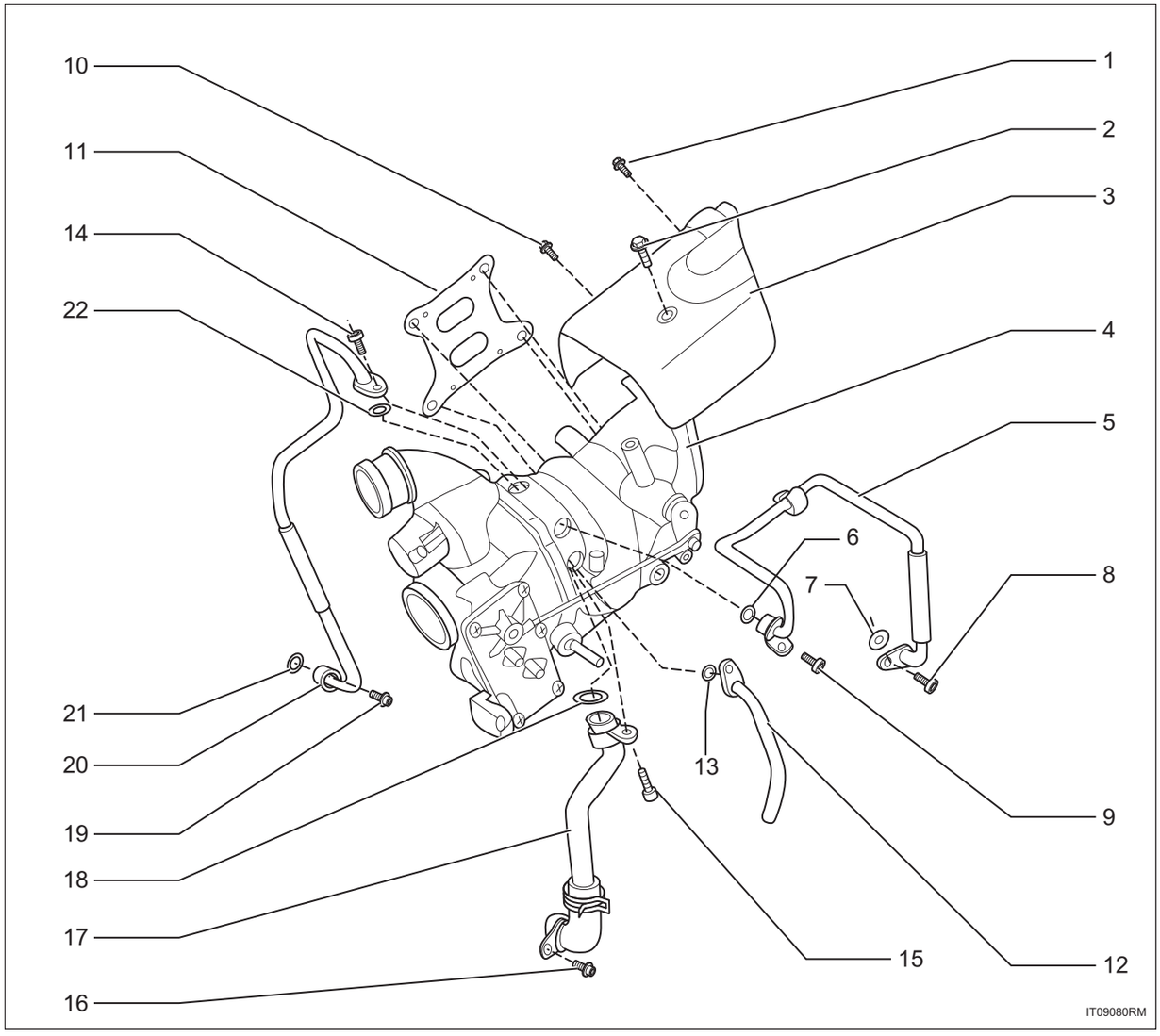
(b) Remove the nut -1-bolt -2-, and remove the parts from the turbocharger to intercooler pipe bracket II assembly -B-.

Installation

1. The installation procedure is the reverse of removal procedure.

Turbocharger assembly

Parts

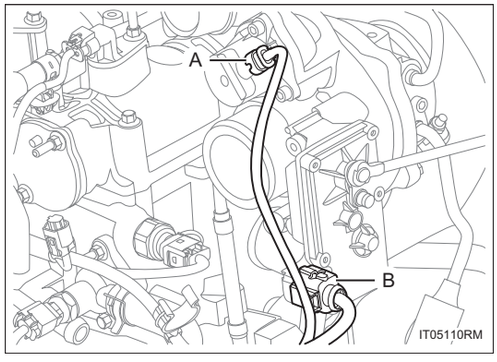


1. **Hexagon flange bolt**
   - Torque: 8~12 N · m
2. **Hexagon flange bolt**
   - Torque: 8~12 N · m
3. **Turbocharger heat shield**
4. **Turbocharger assembly**
5. **Turbocharger water return pipe assembly**
6. **Seal ring**
7. **Seal ring**
8. **Round head bolt**
   - Torque: 8~12 N · m

9. **Round head bolt**
   - Torque: 8~12 N · m
10. **Hexagon flange bolt**
   - Torque: 8~12 N · m
11. **Turbocharger gasket assembly**
12. **Turbocharger water inlet pipe assembly**
13. **Seal ring**
14. **Round head bolt**
   - Torque: 8~12 N · m
15. **Round head bolt**
   - Torque: 8~12 N · m
16. **Round head bolt**
   - Torque: 8~12 N · m
17. **Turbocharger oil return pipe assembly**
18. **Seal ring**
19. **Round head bolt**
   - Torque: 8~12 N · m
20. **Turbocharger oil inlet pipe assembly**
21. **Seal ring**
22. **Seal ring**

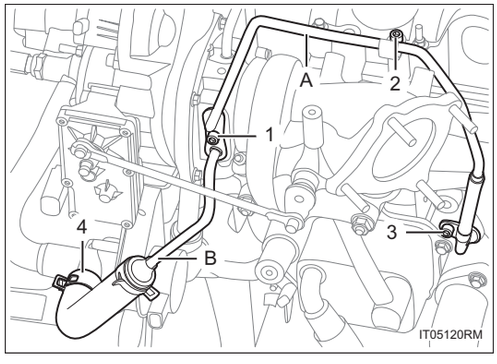
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove catalytic converter weldment (See page EX-6)**
3. **Remove turbocharger assembly**



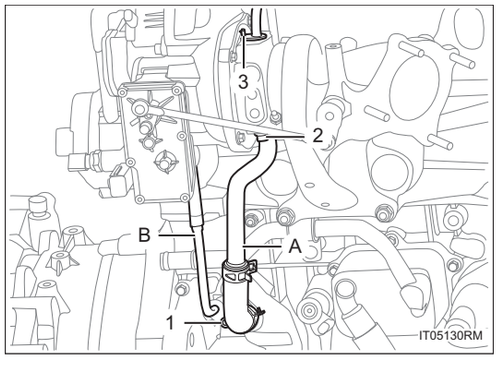
(a) Disconnect the exhaust gas recirculation control solenoid valve connector-A-.

(b) Disconnect the turbocharger recirculation control valve connector-B-.



(c) Detach steel band spring hose clamp -4- and detach turbocharger water inlet pipe -B-.

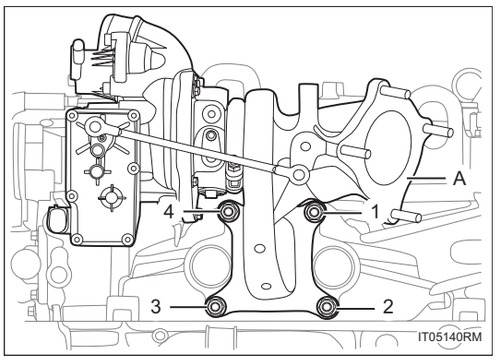
(d) Remove the water pipe bolt -1-3-, and the turbocharger water inlet and outlet pipes-B-A-.



(e) Remove the oil pipe bolt -1-2-, and the turbocharger oil return pipe-A-.

(f) Remove the bolt -3-, and the turbocharger oil pipe-B-.

IT



(g) Remove the nut -1-4-, and the turbocharger assembly-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Intake system 2.0 T and 1.8 T

On-board inspection IT-1

Intake manifold assembly IT-2

Parts IT-2

Removal IT-4

Installation IT-4

Air cleaner assembly IT-5

Parts IT-5

Removal IT-7

Installation IT-9

Turbocharger pipeline IT-10

Parts IT-10

Removal IT-11

Installation IT-12

Intercooler IT-13

Parts IT-13

Removal IT-15

Installation IT-15

Turbocharger assembly IT-16

Parts IT-16

Removal IT-18

Installation IT-19

IT

On-board inspection

1. **Start the vehicle.**
2. **Check the intake system parts for air leakage.**

   Hint:

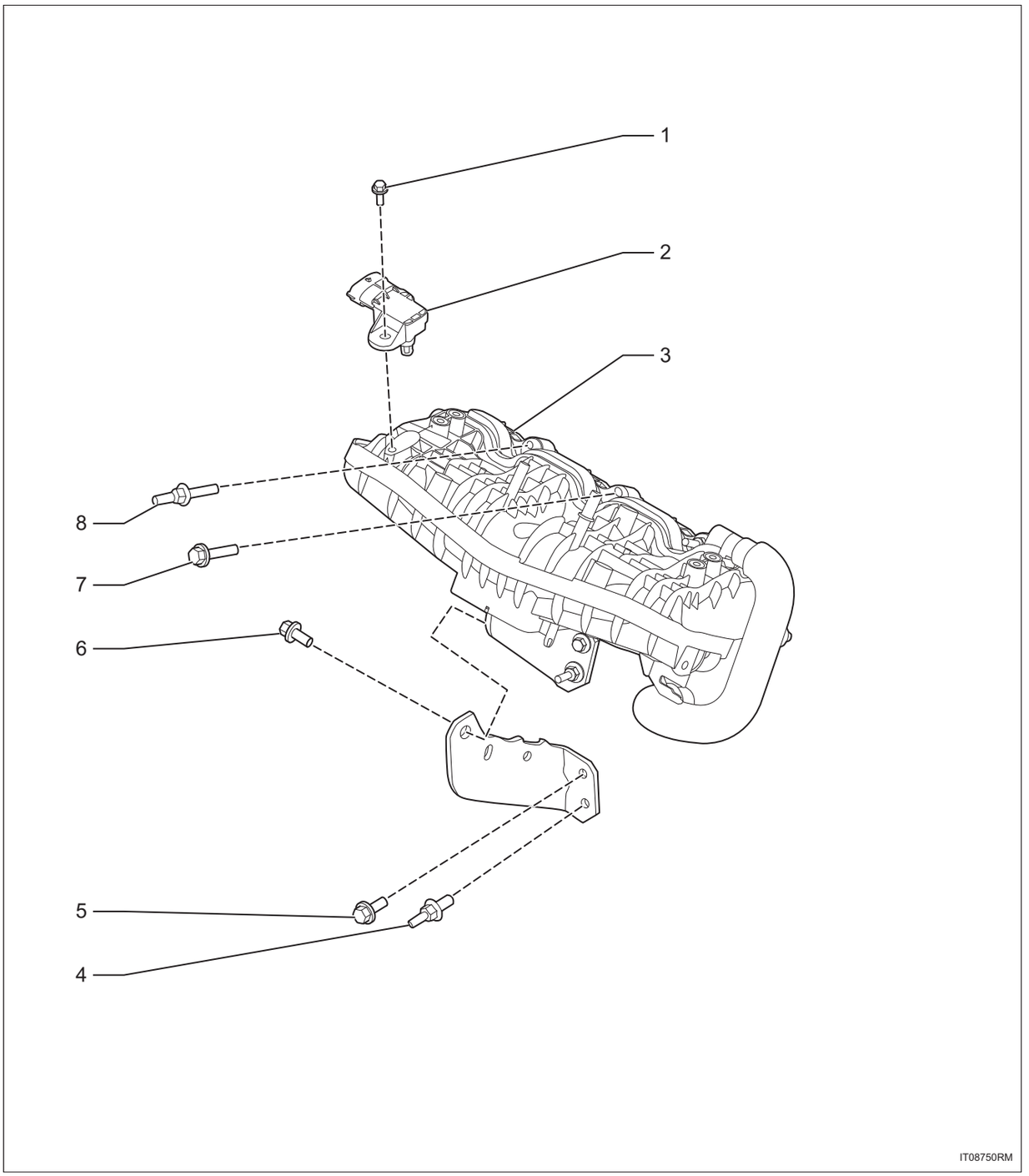
   In case of air leakage, repair or replace the abnormal parts.
3. **Check the intake system parts for damage.**

   Hint:

   In case of damage, replace the abnormal parts.

Intake manifold assembly

Parts



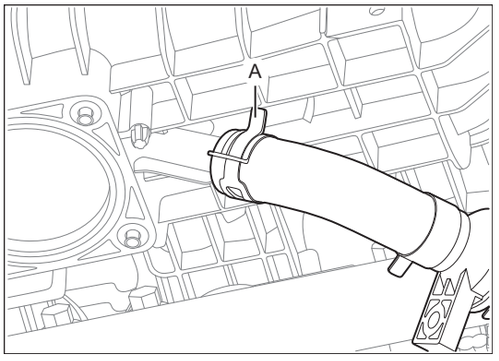
1. **Hexagon flange bolt**
   - Torque: 2.7~3.7 N · m
2. **MAP/IAT sensor**
3. **Intake manifold assembly**
4. **Stud**

- Torque: 18~22 N · m

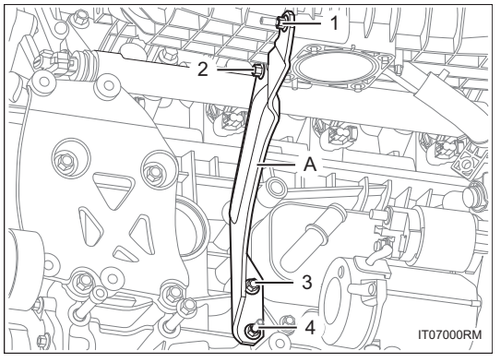
5. **Hexagon flange bolt**
   - Torque: 18~22 N · m
6. **Hexagon flange bolt**
   - Torque: 18~22 N · m
7. **Hexagon flange bolt**
   - X4
   - Torque: 18~22 N · m
8. **Composite bolt**
   - X2
   - Torque: 18~22 N · m

Removal

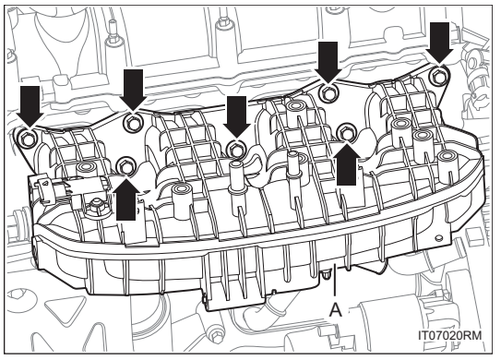
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove electronic throttle body assembly (See page ES-463)**
3. **Remove MAP/IAT sensor assembly (See page ES-467)**
4. **Remove desorption pipe and venturi valve assembly (See page EC-18)**
5. **Remove intake manifold assembly**



(a) Detach intake manifold connection vacuum pipe -A-.



(b) Remove the bolt -1-4-, and the intake manifold bracket-A-.



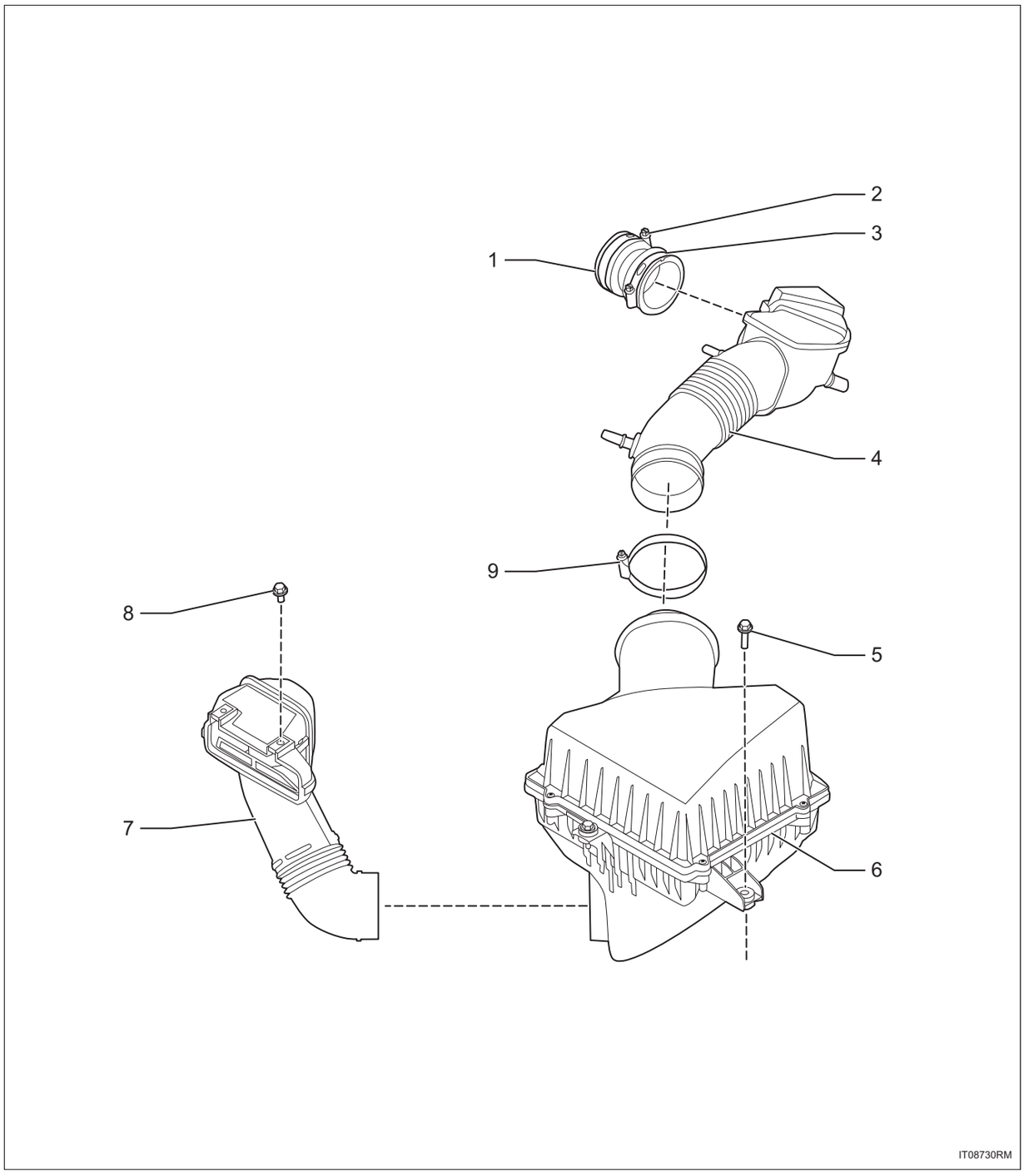
(c) Remove the bolt - arrow - and the intake manifold assembly-A- .

Installation

1. **The installation procedure is the reverse of removal procedure.**

Air cleaner assembly

Parts



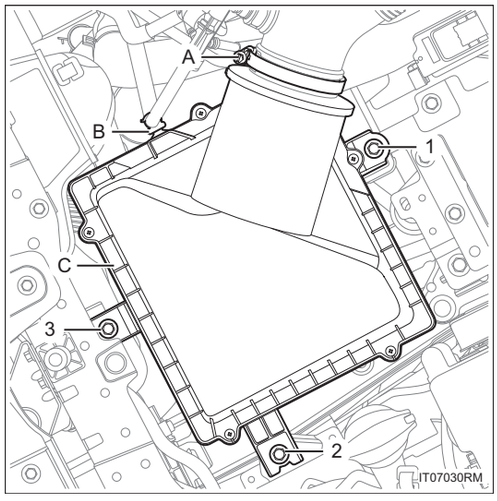
1. **Intake elbow II assembly**
2. **Worm drive hose clamp**
3. **Worm drive hose clamp**
4. **Intake elbow assembly**
5. **Hexagon flange bolt**

- X4
- Torque: 8~12 N · m

6. **Air cleaner assembly**
7. **Cold air inlet assembly**
8. **Hexagon flange bolt**
   - X2
   - Torque: 8~12 N · m
9. **Worm drive hose clamp**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove air cleaner assembly**

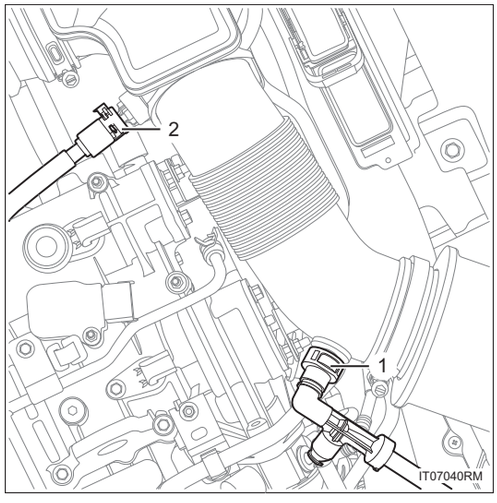


(a) Detach the worm drive hose clamp-A-.

(b) Detach desorption pipe and venturi valve assembly fixing clip-B-.

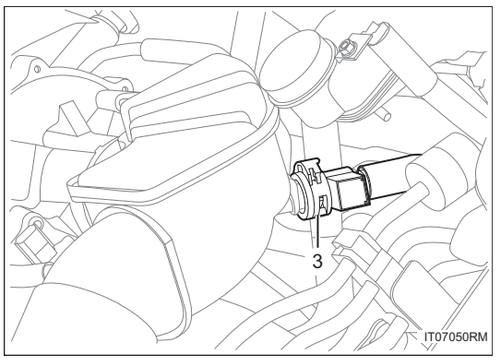
(c) Remove the bolt -1-3-, and the air cleaner assembly-C-.

3. **Remove intake elbow assembly**

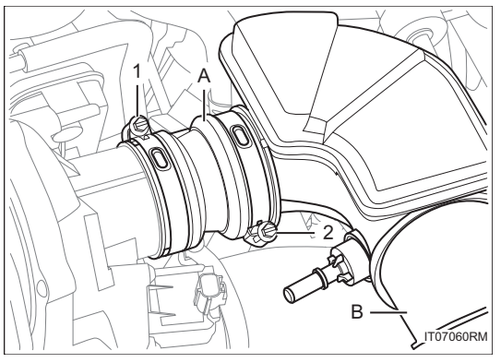


(a) Disconnect the desorption pipe and venturi valve assembly -1- .

(b) Disconnect the cover side ventilation pipe assembly -2-



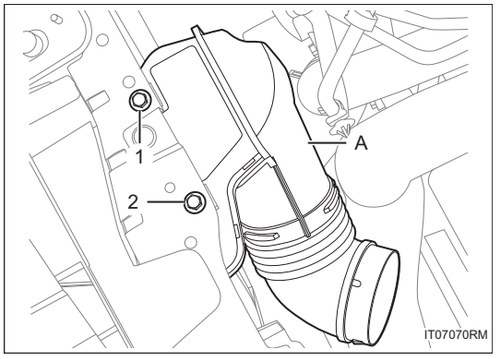
(c) Disconnect the crankcase ventilation pipe assembly -3-



(d) Detach the worm drive hose clamp -1-2-.

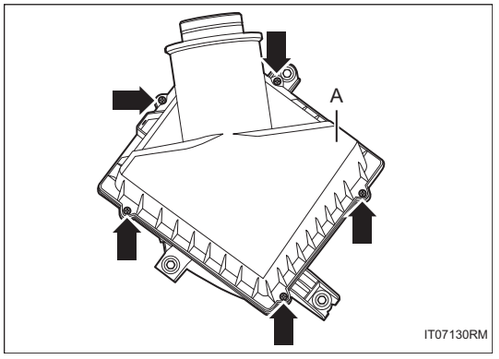
(e) Remove the intake elbow assembly-B- and the intake elbow II assembly-A-

4. Remove cold air inlet assembly

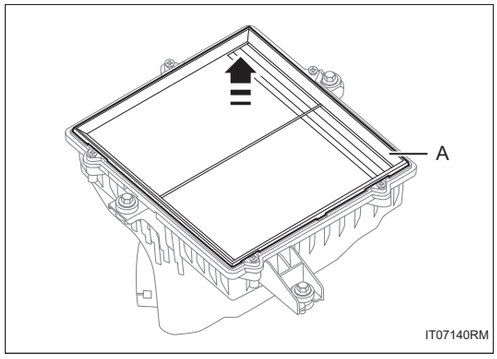


(a) Remove the bolt -1-2-, and the cold air inlet assembly-A-.

5. Remove air cleaner element assembly



(a) Remove the screw -arrow-, and remove the air cleaner upper housing -A-.



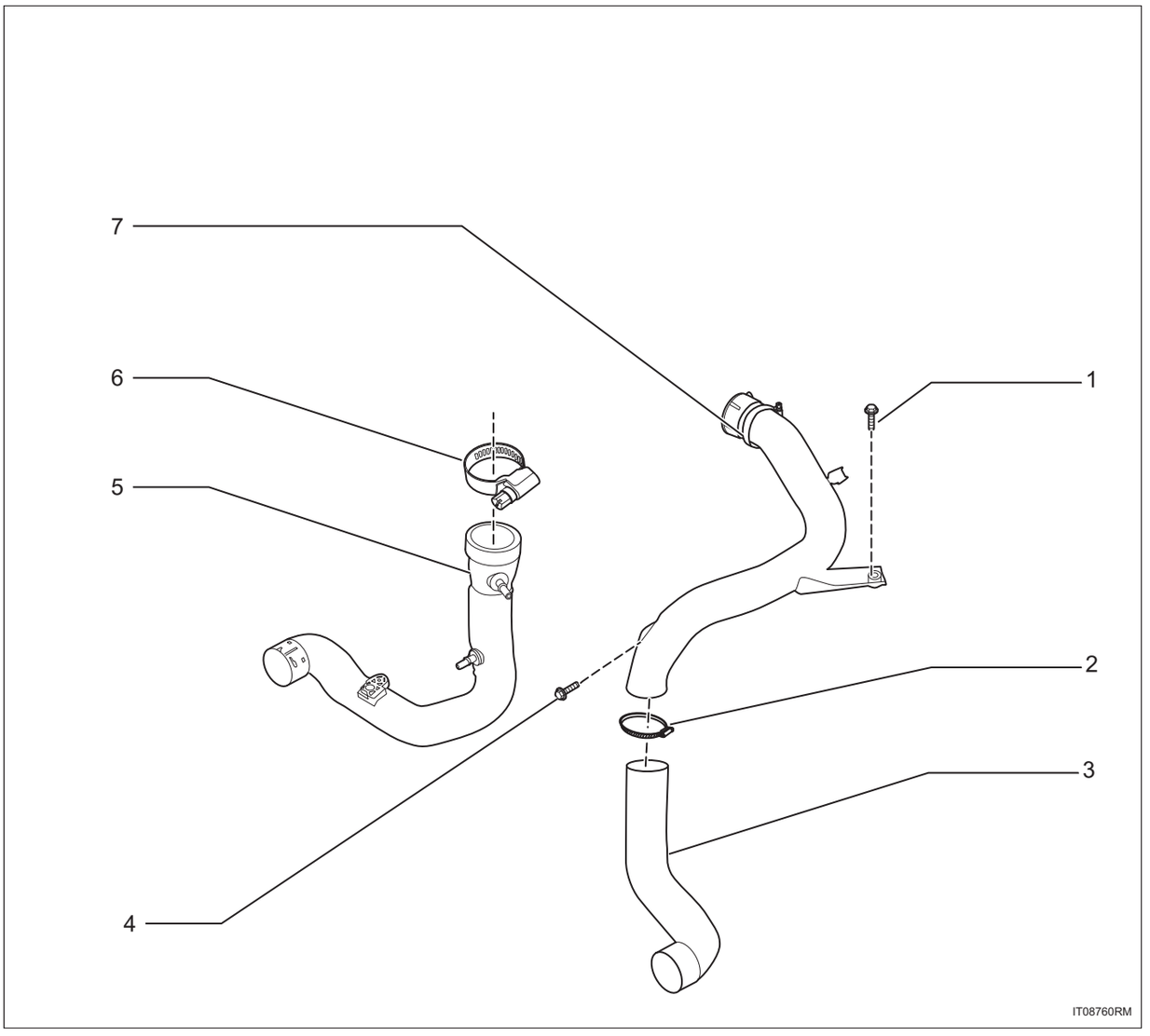
(b) Remove air cleaner element assembly-A- as arrowed.

Installation

1. The installation procedure is the reverse of removal procedure.

Turbocharger pipeline

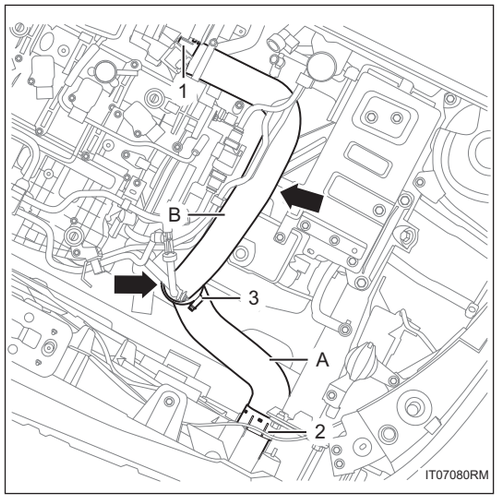
Parts



1. **Hexagon flange bolt**
   - Torque: 8~12 N · m
2. **Worm drive spring clamp**
3. **Turbocharger to intercooler pipeline assembly**
4. **Hexagon flange bolt**
   - Torque: 8~12 N · m
5. **Intercooler to throttle valve pipeline assembly**
6. **Worm drive spring clamp**
7. **Worm drive spring clamp**

Removal

1. **Remove engine bottom guard plate (See page ET-34)**
2. **Remove air cleaner assembly (See page IT-7)**
3. **Remove turbocharger to intercooler pipeline assembly**

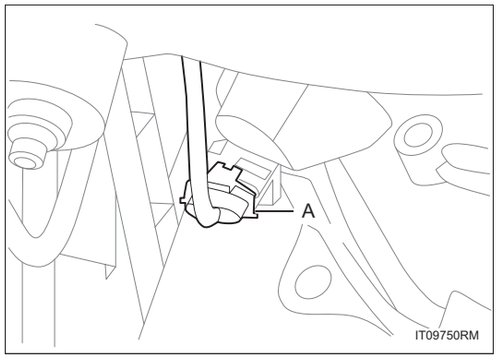


(a) Remove the bolt as arrowed.

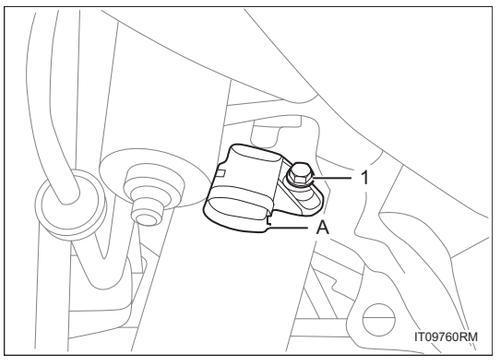
(b) Detach the quick coupler -1-and the worm drive hose clamp -3-, and remove the turbocharger to intercooler pipeline -B-.

(c) Detach the quick joint of the intercooler inlet and remove the turbocharger to the intercooler hose -A-.

4. **Remove charge air pressure sensor**

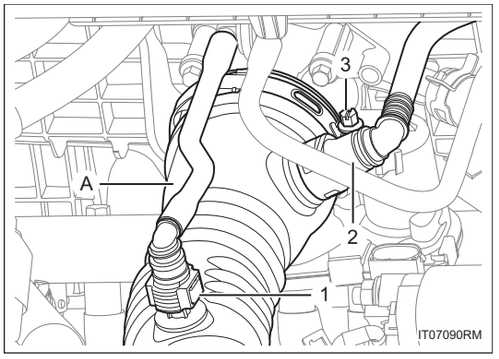


(a) Disconnect the harness connector-A-.



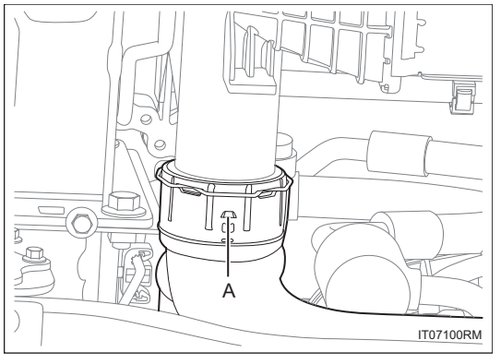
(b) Remove the screw -1-, and the charge air pressure sensor-A-.

5. Remove intercooler to throttle valve pipeline assembly



(a) Detach vacuum pipe -1-, desorption pipe and venturi valve assembly -2-.

(b) Detach the worm drive hose clamp -3- and detach the intercooler to throttle valve pipeline assembly -A-.



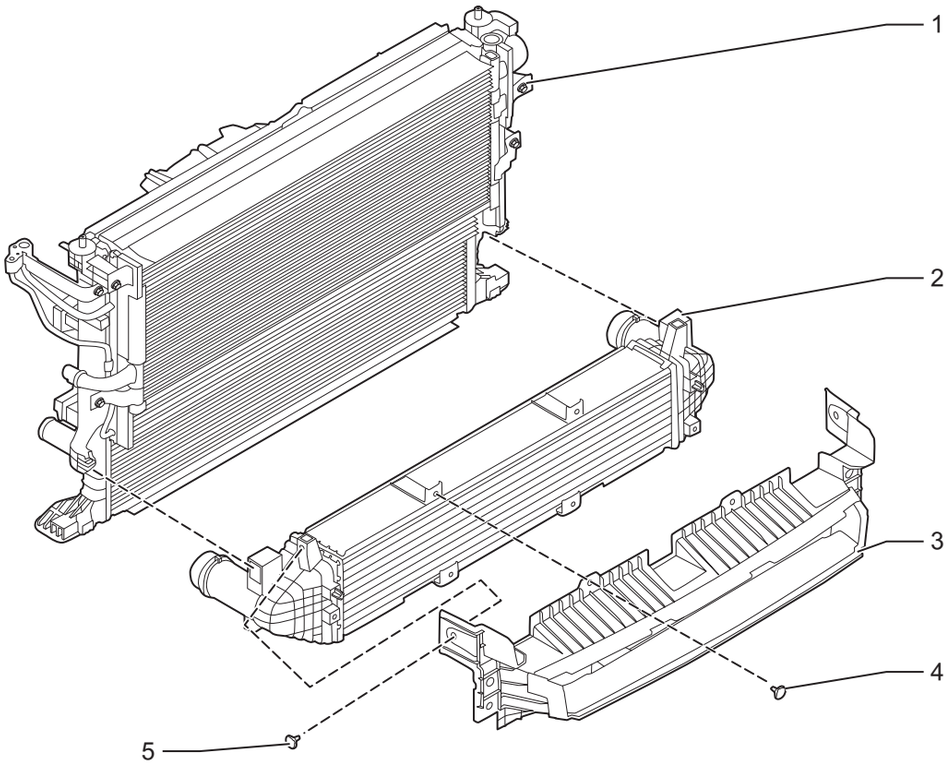
(c) Detach the intercooler-throttle valve pipeline assembly -A-, and remove the intercooler-throttle valve pipeline assembly.

Installation

1. The installation procedure is the reverse of removal procedure.

Intercooler

Parts



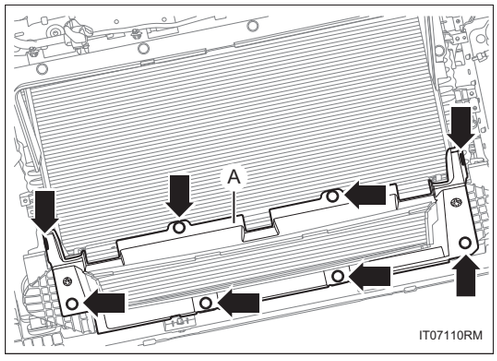
IT08770RM

1. **Radiator assembly**
2. **Intercooler assembly**
3. **Front lower air deflector assembly**

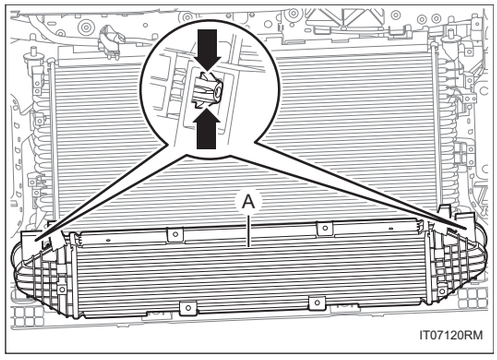
4. **Clip**
   - X4
5. **Clip**
   - X2

Removal

1. **Remove front bumper assembly (See page ET-7)**
2. **Remove front lower air deflector**
   (a) Remove the clip -arrow-, and remove the front lower air deflector -A-.



3. **Remove intercooler**
   (a) Detach claw -arrow- and remove intercooler -A-.

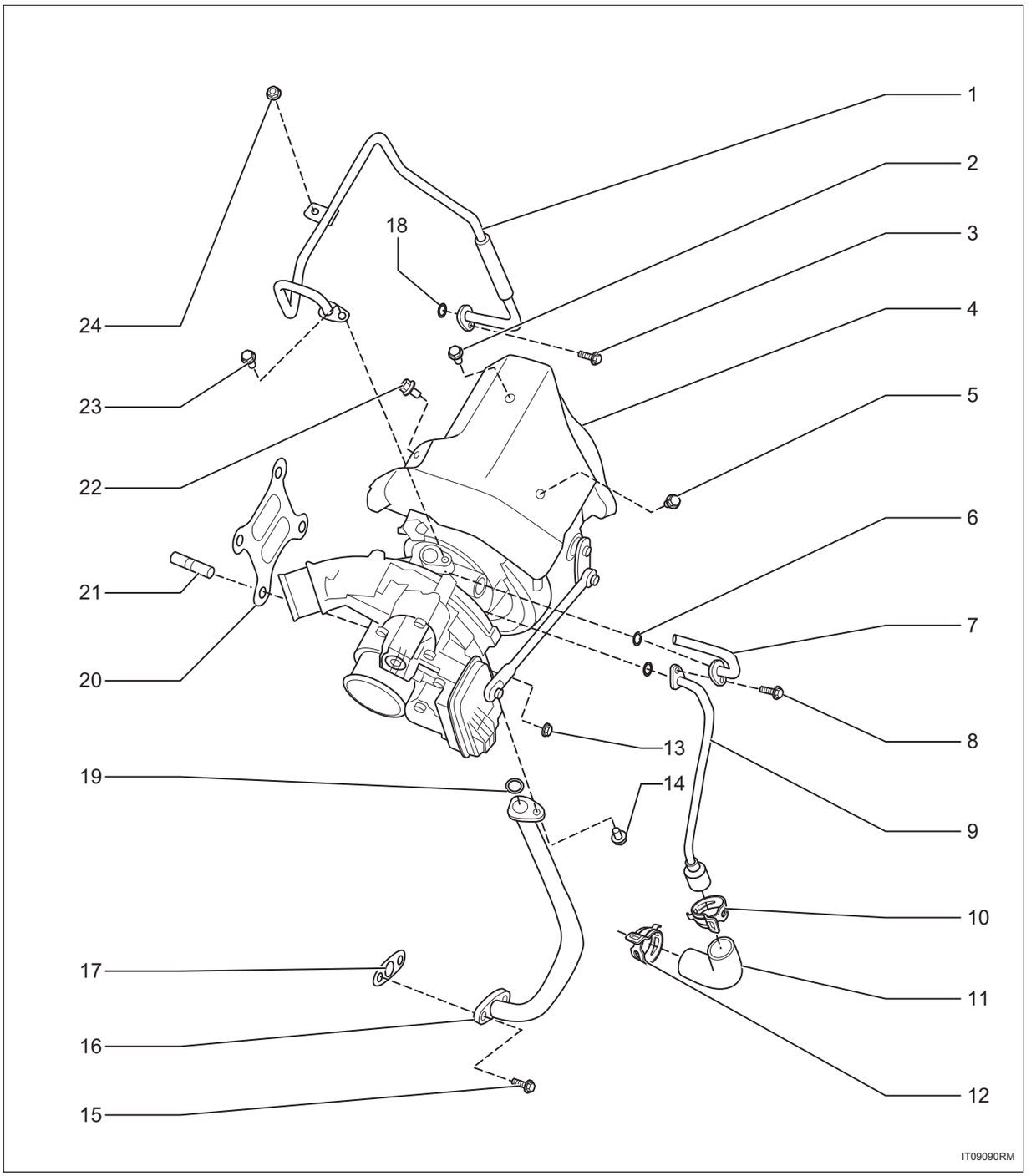


Installation

1. **The installation procedure is the reverse of removal procedure.**

Turbocharger assembly

Parts

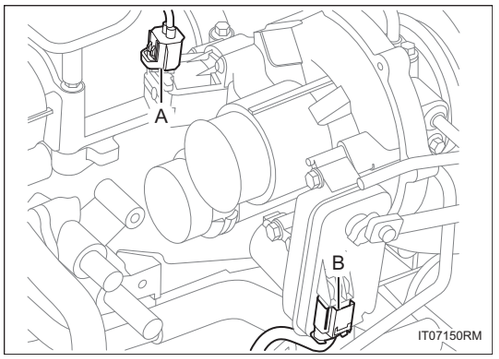


1. **Turbocharger oil inlet pipe assembly**
2. **Hexagon flange bolt**
   - Torque: 8~12 N · m
3. **Hexagon flange bolt**
   - Torque: 8~12 N · m

4. **Turbocharger assembly**
5. **Hexagon flange bolt**
   - Torque: 8~12 N · m
6. **Seal ring**
   - X2
7. **Turbocharger water return pipe assembly**
8. **Hexagon flange bolt**
   - Torque: 8~12 N · m
9. **Turbocharger water inlet pipe assembly**
10. **Steel band spring hose clamp**
11. **Turbocharger water inlet hose**
12. **Steel band spring hose clamp**
13. **Hexagon flange nut**
    - X4
    - Torque: 40~50 N · m
14. **Hexagon flange bolt**
    - Torque: 8~12 N · m
15. **Hexagon flange bolt**
    - Torque: 8~12 N · m
16. **Turbocharger oil return pipe assembly**
17. **Turbocharger oil return pipe gasket**
18. **Seal ring**
19. **Seal ring**
20. **Turbocharger gasket**
21. **Stud**
    - X4
    - Torque: 15~19 N · m
22. **Hexagon flange bolt**
    - Torque: 8~12 N · m
23. **Hexagon flange bolt**
    - Torque: 8~12 N · m
24. **Hexagon flange nut**
    - Torque: 8~12 N · m

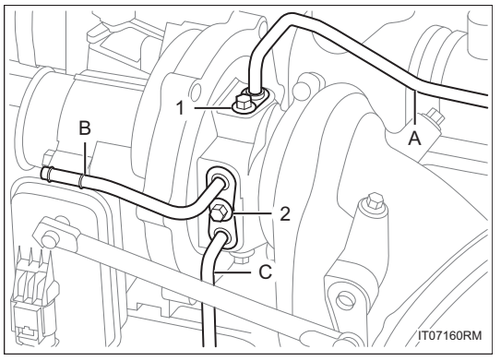
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove catalytic converter weldment (See page EX-4)**
3. **Remove turbocharger assembly**



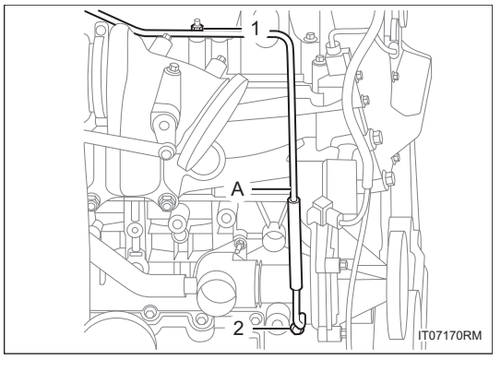
(a) Disconnect the exhaust gas recirculation control solenoid valve connector-A-.

(b) Disconnect the turbocharger recirculation control valve connector-B-.

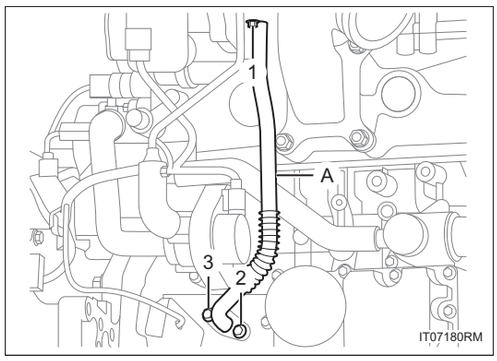


(c) Remove oil pipe bolt -1- and detach turbocharger oil pipe -A-.

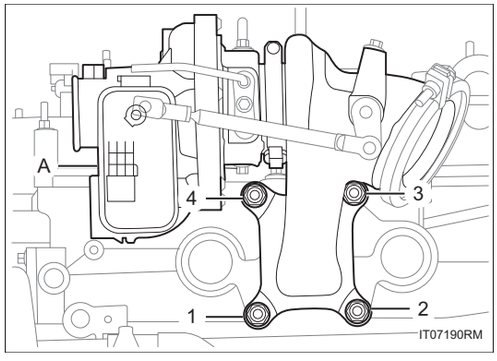
(d) Remove the water pipe bolt -2- and detach the turbocharger water pipe -B-C-.



(e) Remove oil pipe bolt -2- and nut -1-, and remove turbocharger oil pipe -A-.



(f) Remove the oil return pipe bolt -1-3-, and remove the turbocharger oil pipe-A-.



(g) Remove the nut -1-4-, and the turbocharger assembly-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Exhaust system 1.5T and HEV

On-board inspection EX-1

Catalytic converter weldment (exhaust manifold hot end assembly) ... EX-2

Part (only for 1.5T models) EX-2

Part (only for HEV models) EX-4

Removal EX-6

Installation EX-8

Muffler weldment (exhaust manifold cold end assembly) EX-9

Part (only for 1.5T models) EX-9

Part (only for HEV models) EX-11

Removal EX-13

Installation EX-14

EX

On-board inspection

1. **Start the vehicle**
2. **Check the exhaust components of engine compartment for air leakage and damage.**

   Note:

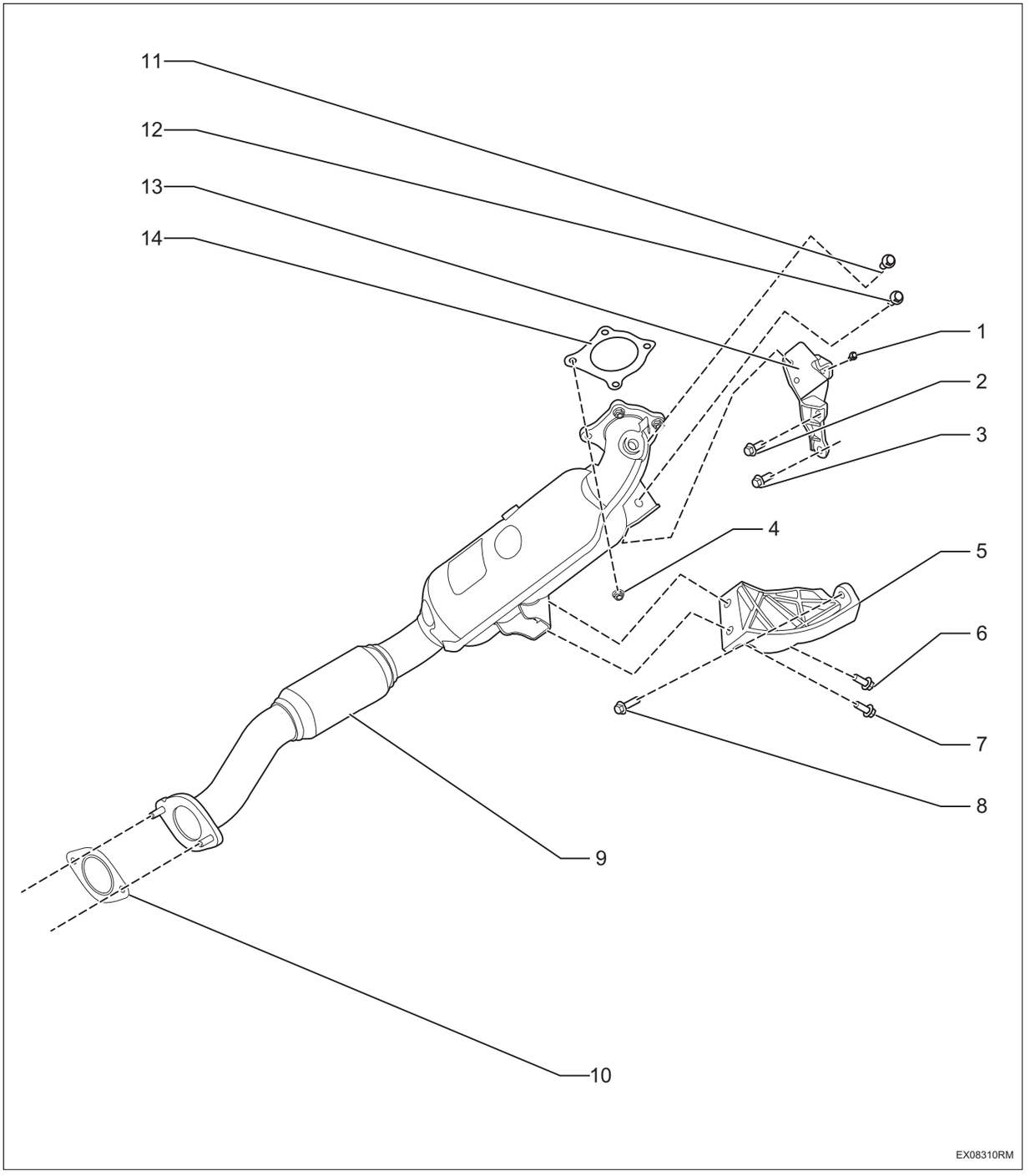
   In case of above air leakage, repair or replace the abnormal parts.
3. **Lift vehicle**
4. **Check the muffler weldment for exterior damage, air leakage, etc.**

   Note:

   In case of above phenomenon, repair or replace the abnormal parts.

Catalytic converter weldment (exhaust manifold hot end assembly)

Part (only for 1.5T models)

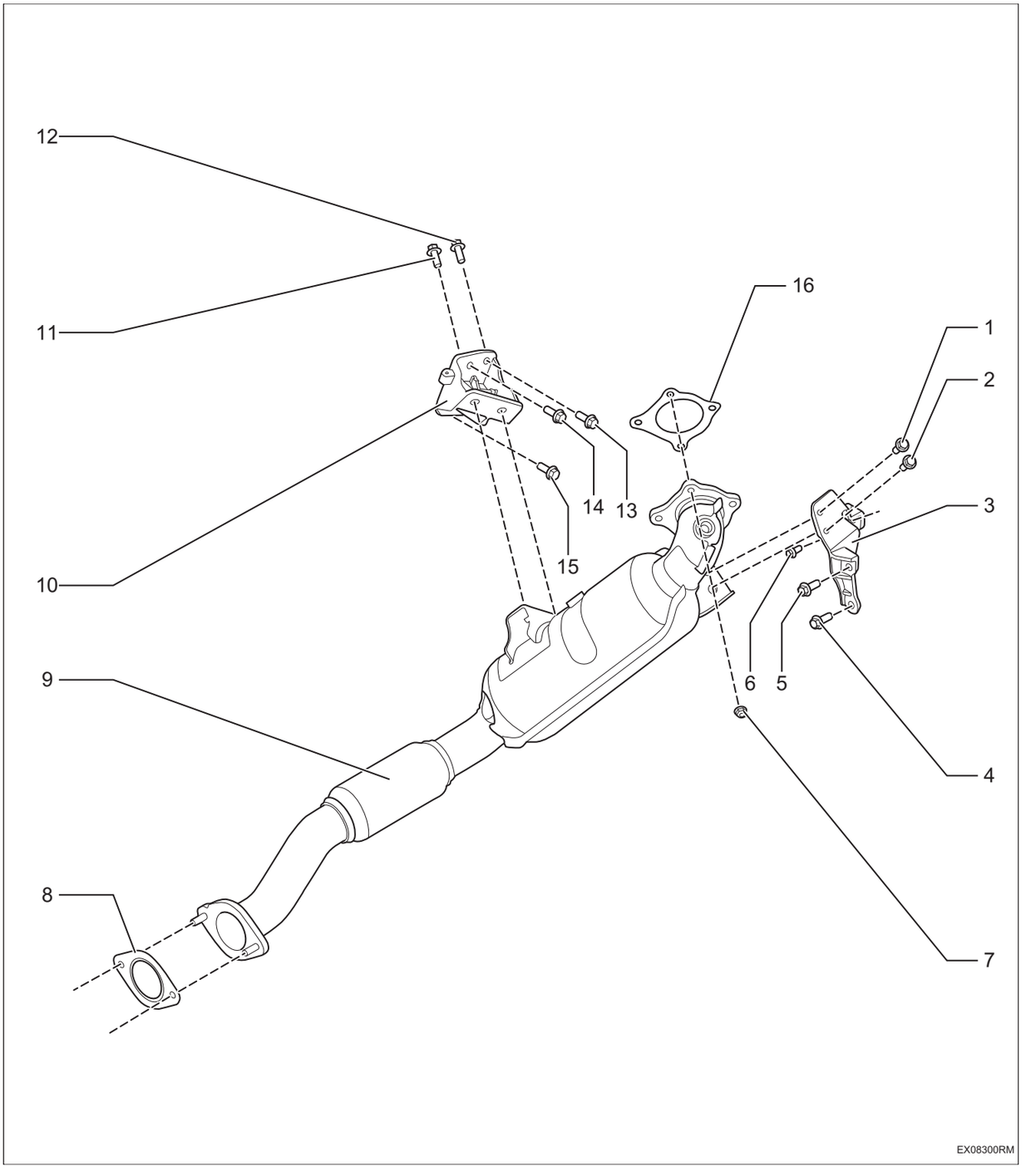


1. Hexagon flange bolt

- Torque: 20 ~ 22 N·m

2. **Hexagon flange bolt**
   - Torque: 40~50 N · m
3. **Hexagon flange bolt**
   - Torque: 40~50 N · m
4. **Heat-resistant nut**
   - X4
   - Torque: 34~40 N · m
   - Disposable part.
5. **Bracket II**
6. **Hexagon flange bolt**
   - Torque: 40~50 N · m
7. **Hexagon flange bolt**
   - Torque: 40~50 N · m
8. **Hexagon flange bolt**
   - X2
   - Torque: 40~50 N · m
9. **Catalytic converter weldment**
10. **Rear gasket assembly**
    - Disposable part.
11. **Hexagon flange bolt**
    - Torque: 40~50 N · m
12. **Hexagon flange bolt**
    - Torque: 40~50 N · m
13. **Bracket I**
14. **Front gasket assembly**
    - Disposable part.

Part (only for HEV models)



1. **Hexagon flange bolt**
   - Torque: 40 ~ 50 N·m
2. **Hexagon flange bolt**
   - Torque: 40 ~ 50 N·m
3. **Bracket I**
4. **Hexagon flange bolt**

- Torque: 40 ~ 50 N·m

5. **Hexagon flange bolt**
   - Torque: 40 ~ 50 N·m
6. **Hexagon flange bolt**
   - Torque: 20 ~ 22 N·m
7. **Heat-resistant nut**
   - X4
   - Torque: 34 ~ 40 N·m
   - Disposable part.
8. **Rear gasket assembly**
   - Disposable part.
9. **Catalytic converter weldment**
10. **Bracket II**
11. **Hexagon flange bolt**
    - Torque: 40 ~ 50 N·m
12. **Hexagon flange bolt**
    - Torque: 40 ~ 50 N·m
13. **Hexagon flange bolt**
    - Torque: 40 ~ 50 N·m
14. **Hexagon flange bolt**
    - Torque: 40 ~ 50 N·m
15. **Hexagon flange bolt**
    - Torque: 40 ~ 50 N·m
16. **Front gasket assembly**
    - Disposable part.

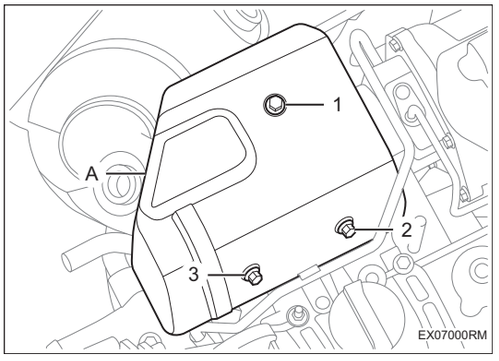
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove engine bottom guard plate (See page ET-34)**
3. **Remove catalytic converter weldment**

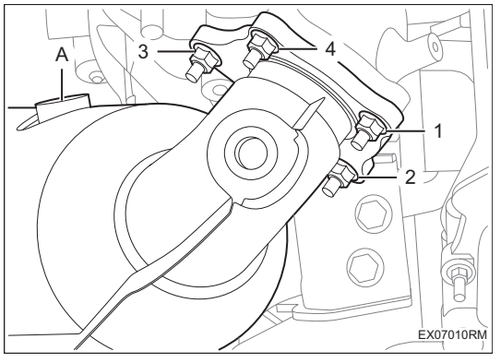
(a) Disconnect the upstream oxygen sensor harness connector (See page ES-62).

(b) Disconnect the downstream oxygen sensor harness connector (See page ES-64).

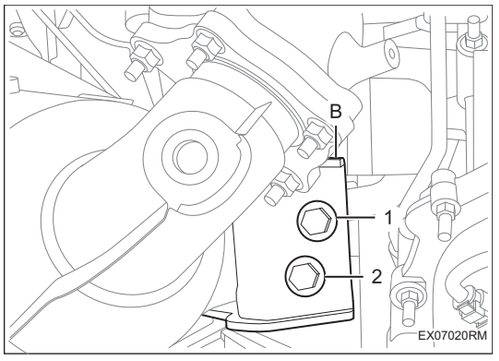
(c) Remove the bolt -1-3-, and the turbocharger heat shield -A-.

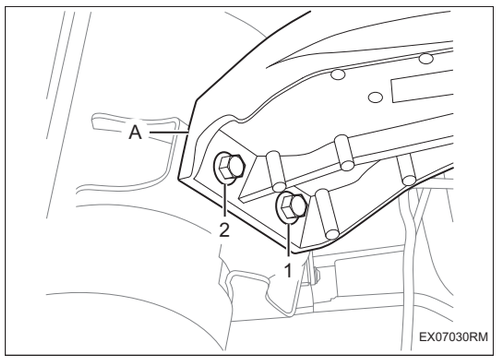


(d) Remove the nut -1-4-, and detach the catalytic converter weldment -A-.

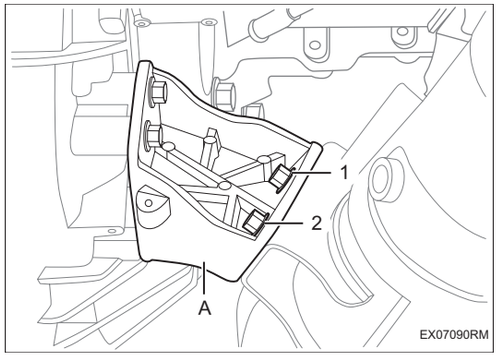


(e) Remove the fixing nuts -1-2- of the catalytic converter weldment -B-.

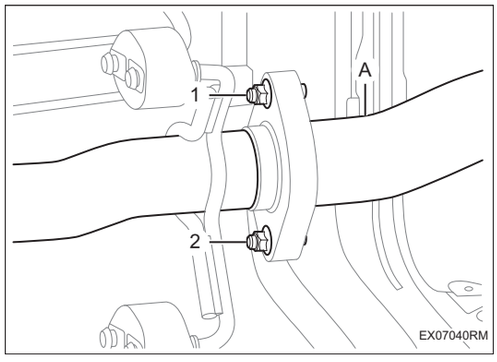




(f) Remove the fixing bolt -1-2- of the catalytic converter weldment bracket-A-. (Only for 1.5 T model)



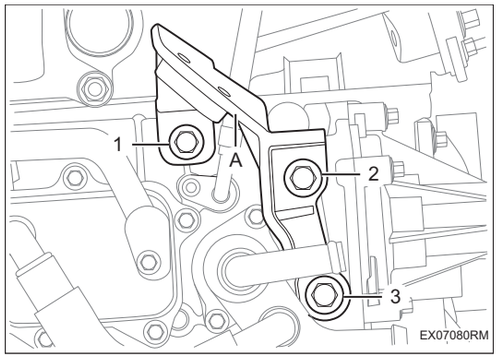
(g) Remove the fixing bolt -1-2- of the catalytic converter weldment bracket -A-. (Only for HEV models)



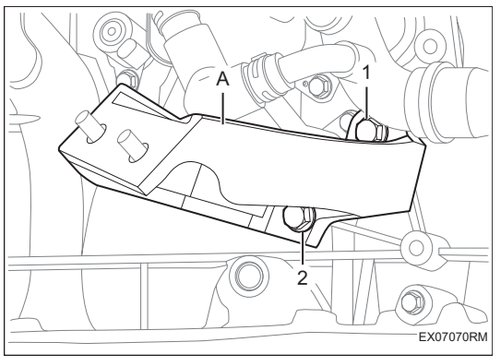
(h) Remove the nut -1-2-, and the catalytic converter weldment-A-.

4. Remove bracket I

(a) Remove the bolt -1-3- and the bracket I-A-.

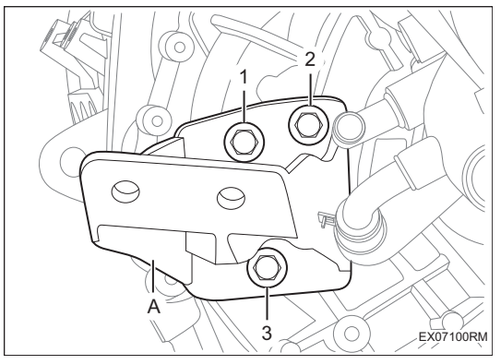


5. Remove bracket II (only for 1.5T model)



(a) Remove the bolt -1-2- and the bracket Ⅱ -A-.

6. Remove bracket II (only for HEV models)



(a) Remove the bolt -1-3- and the bracket Ⅱ -A-.

Installation

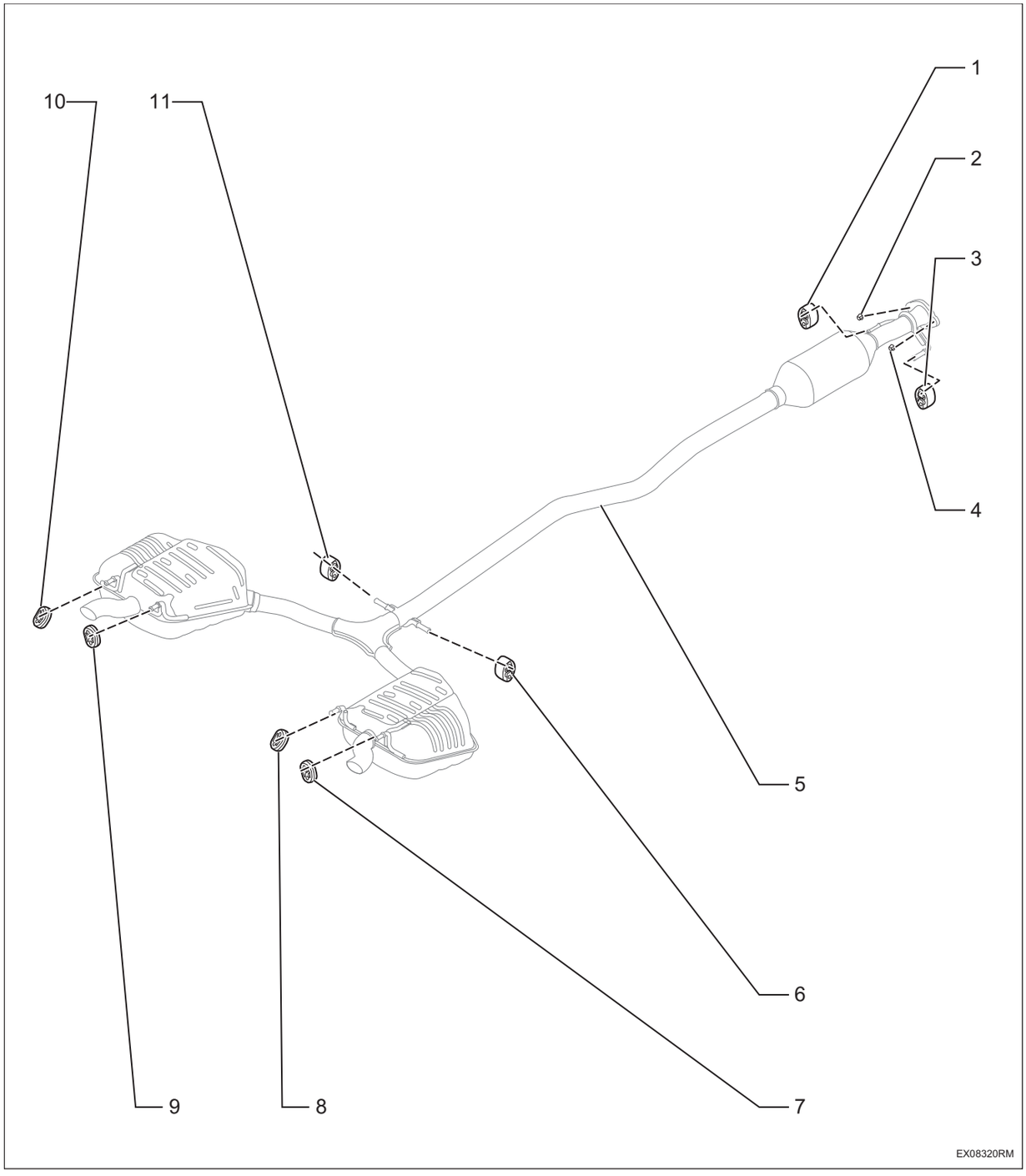
1. The installation procedure is the reverse of removal procedure, and the following points apply:

Caution:

Please renew the front gasket and rear gasket assembly during installation.

Muffler weldment (exhaust manifold cold end assembly)

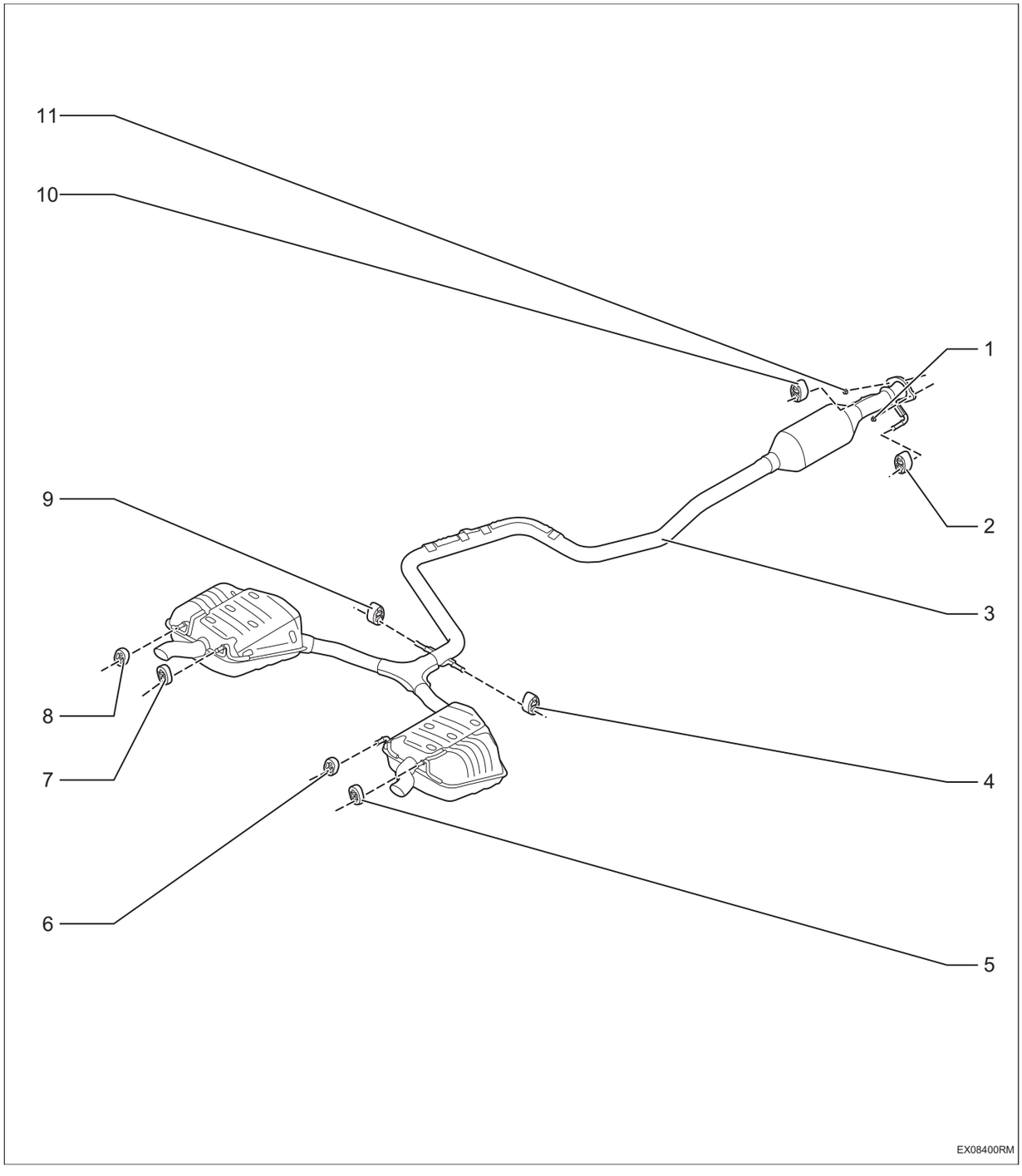
Part (only for 1.5T models)



1. **Rubber hanger I**
2. **Nut**
   - Torque: 60 ~ 70 N·m

3. **Rubber hanger I**
4. **Nut**
   - Torque: 60 ~ 70 N·m
5. **Muffler weldment**
6. **Rubber hanger I**
7. **Rear rubber lifting ring**
8. **Rear rubber lifting ring**
9. **Rear rubber lifting ring**
10. **Rear rubber lifting ring**
11. **Rubber hanger I**

Part (only for HEV models)

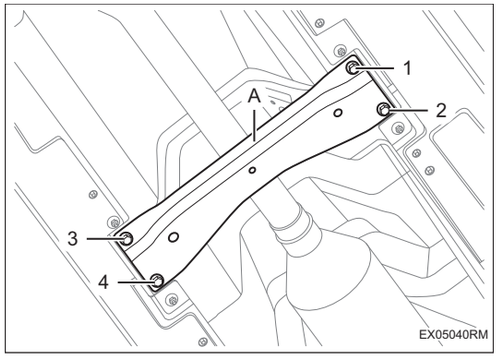


1. **Nut**
   - Torque: 60 ~ 70 N·m
2. **Rubber hanger I**
3. **Muffler weldment**
4. **Rubber hanger I**
5. **Rubber lifting ring**

6. **Rubber lifting ring**
7. **Rubber lifting ring**
8. **Rubber lifting ring**
9. **Rubber hanger I**
10. **Rubber hanger I**
11. **Nut**
    - Torque: 60 ~ 70 N·m

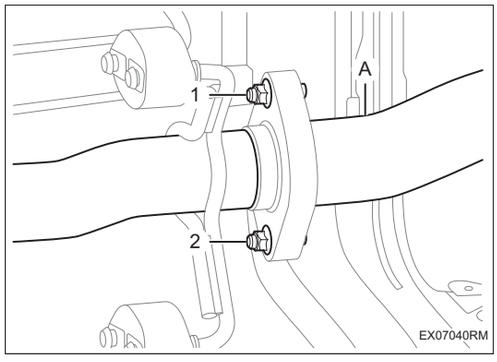
Removal

1. **Remove engine bottom guard plate (See page ET-34)**
2. **Remove middle passage reinforcement cross-member assembly**

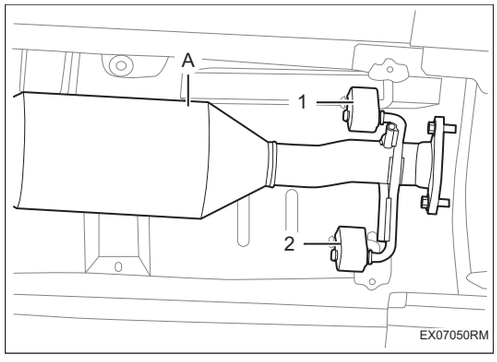


(a) Remove the bolt -1-4-, and the middle passage reinforcement crossmember assembly -A-.

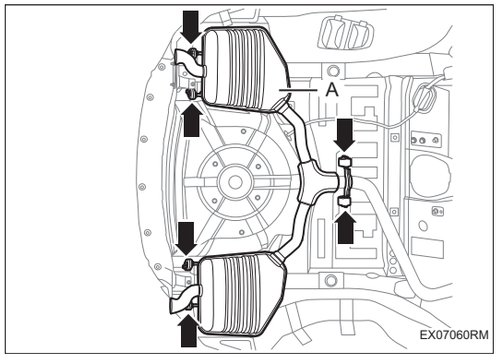
3. **Remove muffler weldment**



(a) Remove the nut -1-2- and detach the catalytic converter weldment -A-.



(b) Remove the rubber hangers Ⅰ -1-2-of muffler weldment -A-.



(c) Remove the rubber hanger I and the rear rubber lifting ring -arrow-, and remove the rear muffler weldment assembly -A-.

EX

Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

   Caution:

   Please renew the rear gasket assembly during installation.

Exhaust system 2.0T and 1.8T

On-board inspection EX-1
Catalytic converter weldment (exhaust manifold hot end assembly) ... EX-2
Parts EX-2
Removal EX-4
Installation EX-5
Muffler weldment (exhaust manifold cold end assembly) EX-6
Parts EX-6
Removal EX-8
Installation EX-9

On-board inspection

1. **Start the vehicle**
2. **Check the exhaust components of engine compartment for air leakage and damage.**

   Note:

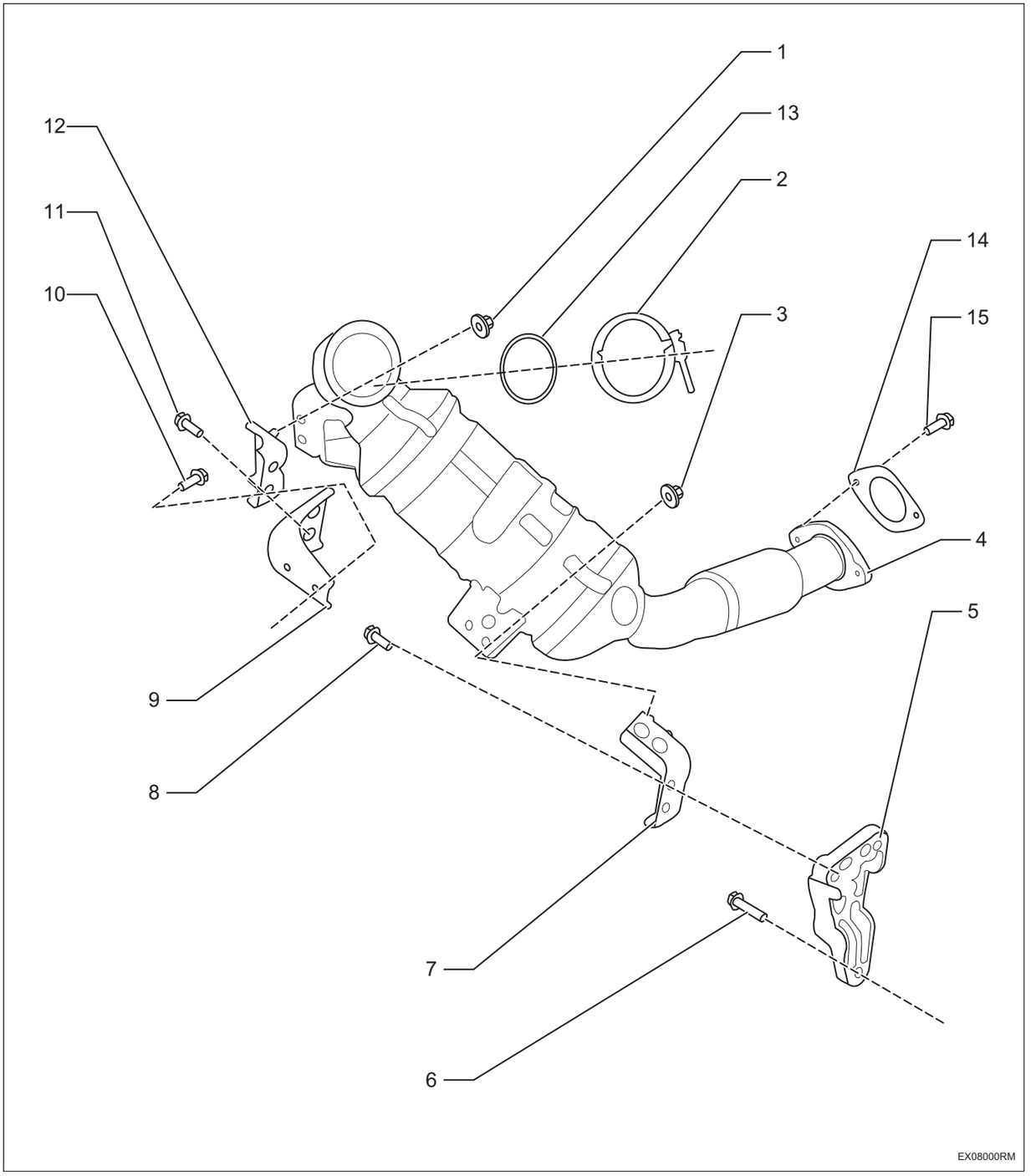
   In case of above air leakage, repair or replace the abnormal parts.
3. **Lift vehicle**
4. **Check the muffler weldment for exterior damage, air leakage, etc.**

   Note:

   In case of above phenomenon, repair or replace the abnormal parts.

Catalytic converter weldment (exhaust manifold hot end assembly)

Parts



1. Hexagon flange nut

- X2

- Torque: 40 ~ 50 N·m

2. **Hoop assembly**
3. **Hexagon flange nut**
   - X2
   - Torque: 40 ~ 50 N·m
4. **Catalytic converter weldment**
5. **Bracket**
6. **Hexagon flange bolt**
   - X3
   - Torque: 80 ~ 90 N·m
7. **Bracket assembly III**
8. **Hexagon flange bolt**
   - X2
   - Torque: 40 ~ 50 N·m
9. **Bracket assembly I**
10. **Hexagon flange bolt**
    - X2
    - Torque: 40 ~ 50 N·m
11. **Hexagon flange bolt**
    - X2
    - Torque: 40 ~ 50 N·m
12. **Bracket assembly II**
13. **Front gasket assembly**
    - Disposable part.
14. **Rear gasket assembly**
    - Disposable part.
15. **Heat-resistant bolt**
    - X2
    - Torque: 56 ~ 68 N·m

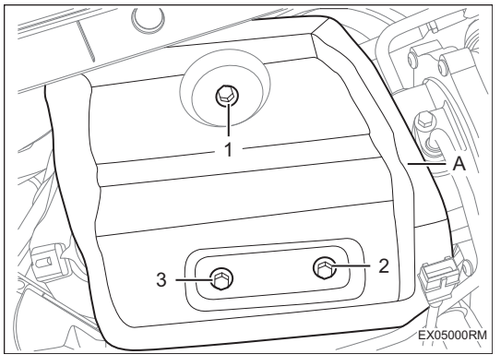
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove engine bottom guard plate (See page ET-34)**
3. **Remove catalytic converter weldment**

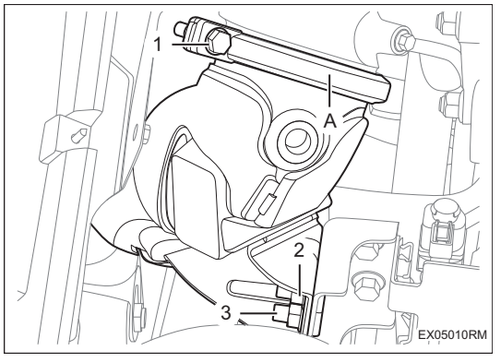
(a) Disconnect the upstream oxygen sensor harness connector (See page ES-62).

(b) Disconnect the downstream oxygen sensor harness connector (See page ES-64).

(c) Remove the bolt -1-3-, and the turbocharger heat shield.

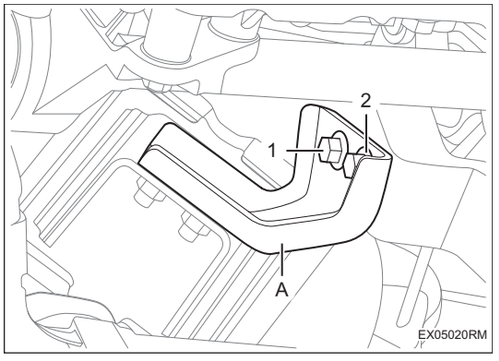


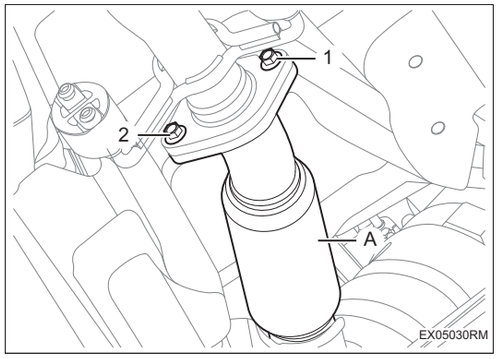
(d) Detach the nut -1- and the hoop assembly -A-.



(e) Remove the fixing nuts -2-3- of the catalytic converter weldment -B-.

(f) Remove the fixing bolt -1-2- of the catalytic converter weldment bracket Ⅲ -A-.





(g) Remove the bolt -1-2-, and the catalytic converter weldment -A-.

Installation

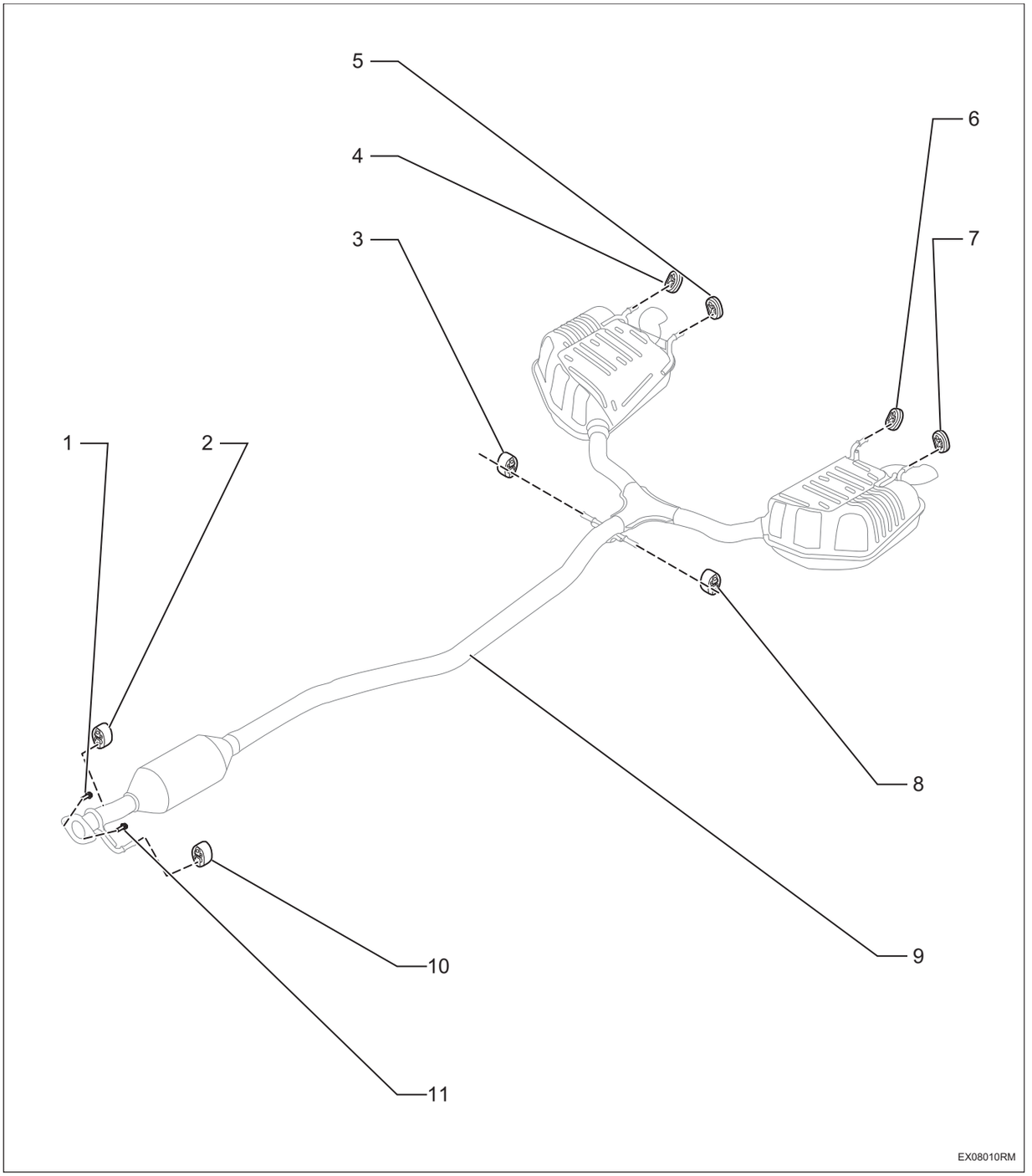
1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

   Caution:

   Please renew the hoop assembly during installation.

Muffler weldment (exhaust manifold cold end assembly)

Parts



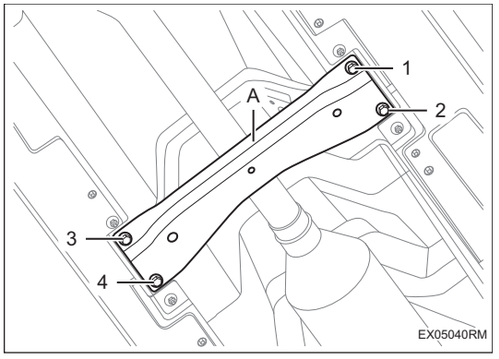
1. **Heat-resistant bolt**
   - Torque: 56 ~ 68 N·m
2. **Rubber hanger I**

3. **Rubber hanger I**
4. **Rear rubber lifting ring**
5. **Rear rubber lifting ring**
6. **Rear rubber lifting ring**
7. **Rear rubber lifting ring**
8. **Rubber hanger I**
9. **Muffler weldment**
10. **Rubber hanger I**
11. **Heat-resistant bolt**
    - Torque: 56 ~ 68 N·m

Removal

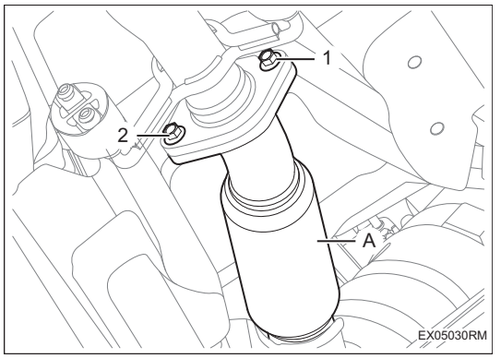
1. **Remove engine bottom guard plate (See page ET-34)**

2. **Remove middle passage reinforcement cross-member assembly**

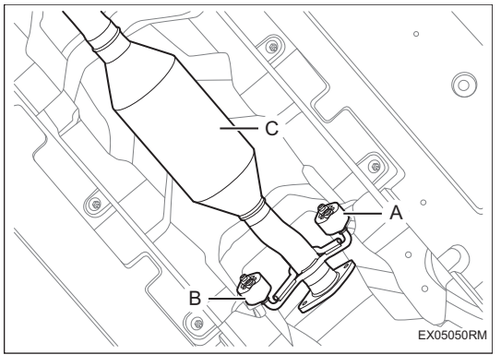


(a) Remove the bolt -1-4-, and the middle passage reinforcement crossmember assembly -A-.

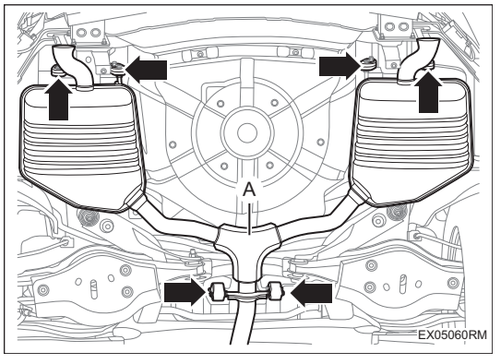
3. **Remove muffler weldment**



(a) Remove bolts -1-2- and detach catalytic converter weldment -A-.



(b) Remove the rubber hangers Ⅰ -A-B- of muffler weldment -C-.



(c) Remove the rubber hanger I and the rear rubber lifting ring -arrow-, and remove the rear muffler weldment assembly -A-.

EX

Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

   Caution:

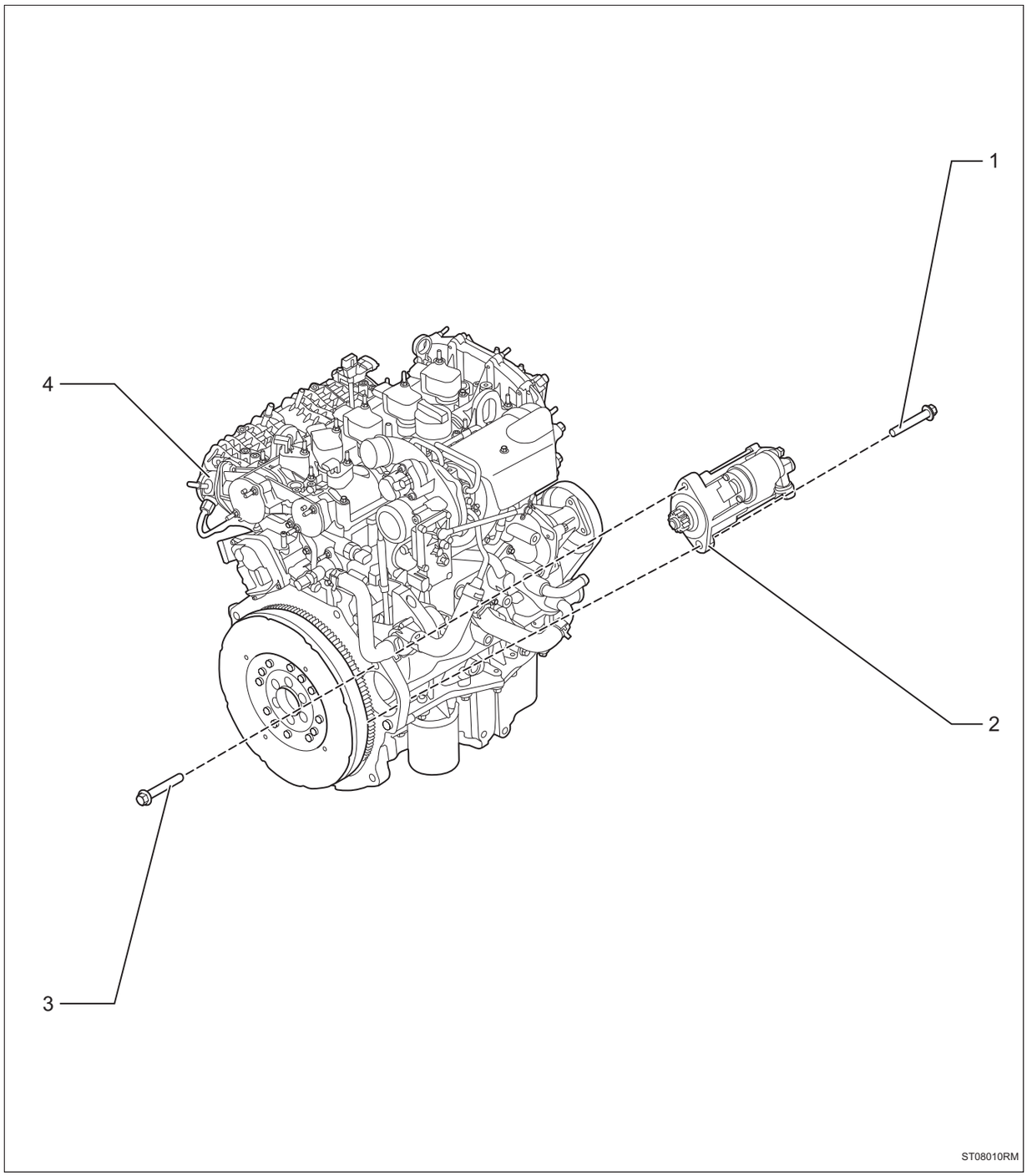
   Please renew the rear gasket assembly during installation.

Starting system 1.5T

Starter assembly ST-1
Parts ST-1
Removal ST-3
Installation ST-3

Starter assembly

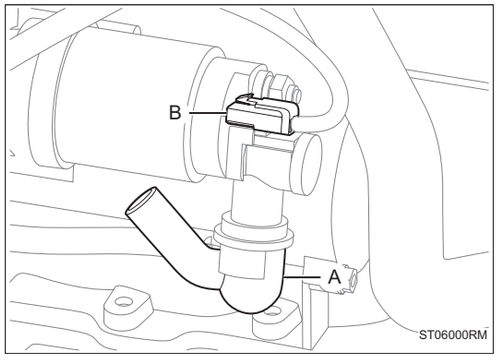
Parts



1. **Hexagon flange bolt**
   - Torque: 72 ~ 88 N·m
2. **Starter assembly**
3. **Hexagon flange bolt**
   - Torque: 72 ~ 88 N·m
4. **Engine assembly**

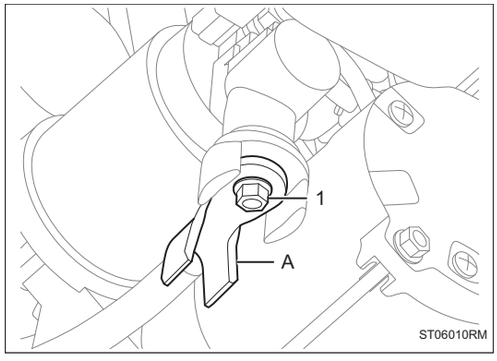
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove engine bottom guard plate (See page ET-34)**
3. **Remove catalytic converter weldment (See page EX-4)**
4. **Remove starter assembly**

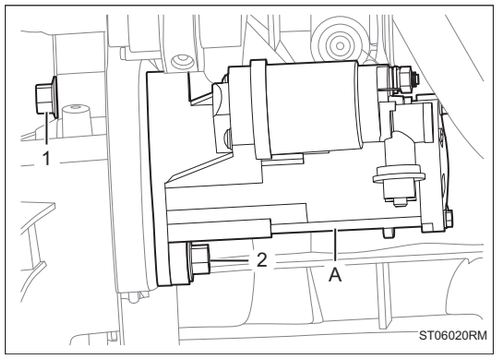


(a) Open the starter (magnetic switch) fixing bolt cover-A-.

(b) Disconnect the connector-B-.



(c) Remove the nut -1-, and the starter assembly (magnetic switch) harness connector terminal -A-.



(d) Remove the bolt -1-2- and the starter assembly -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

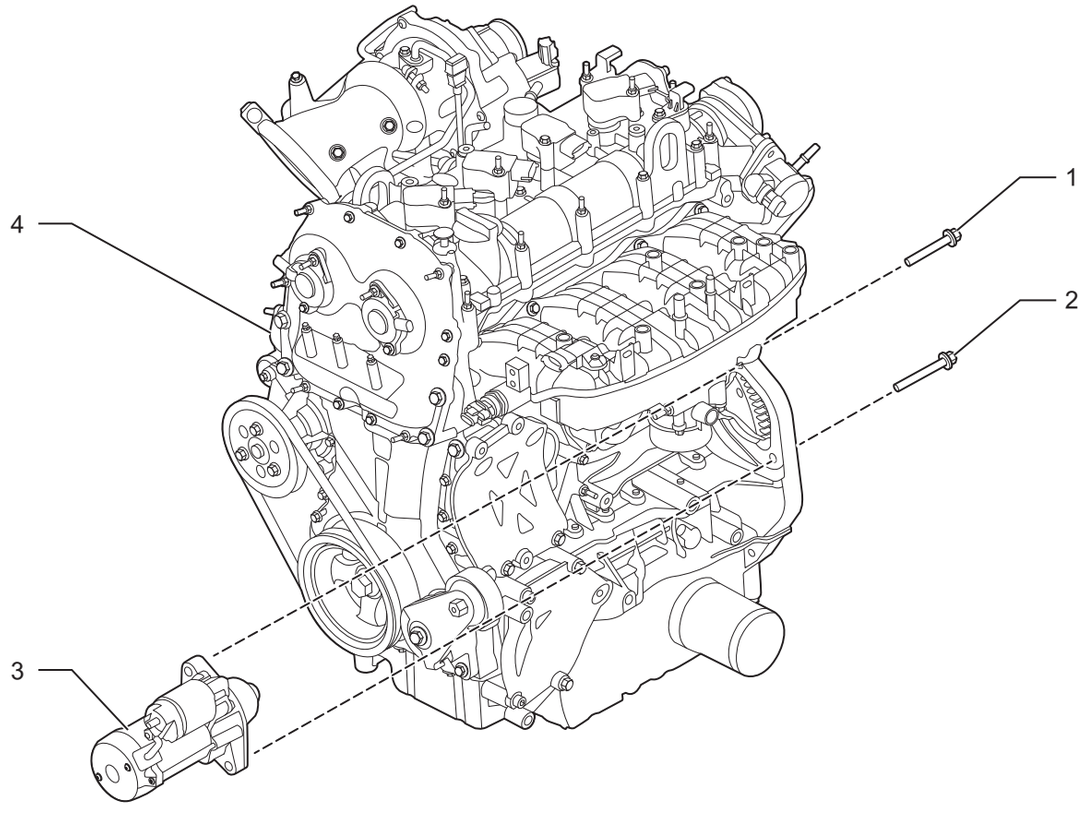
ST

Starting system 2.0T and 1.8T

Starter assembly ST-1
Parts ST-1
Removal ST-3
Installation ST-3

Starter assembly

Parts

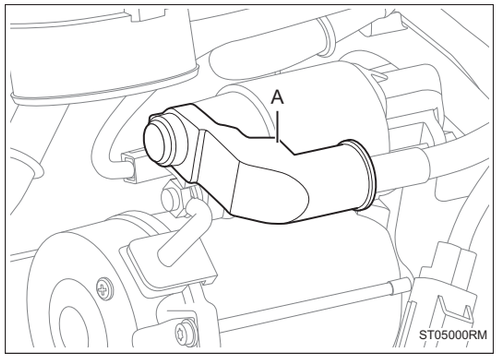


ST08000RM

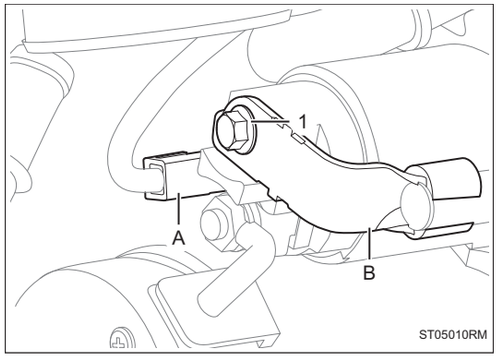
1. **Hexagon flange bolt**
   - Torque: 47 ~ 55 N·m
2. **Hexagon flange bolt**
   - Torque: 47 ~ 55 N·m
3. **Starter assembly**
4. **Engine assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove engine bottom guard plate (See page ET-34)**
3. **Remove air cleaner assembly (See page IT-7)**
4. **Remove turbocharger to intercooler tube assembly (See page IT-11)**
5. **Remove starter assembly**

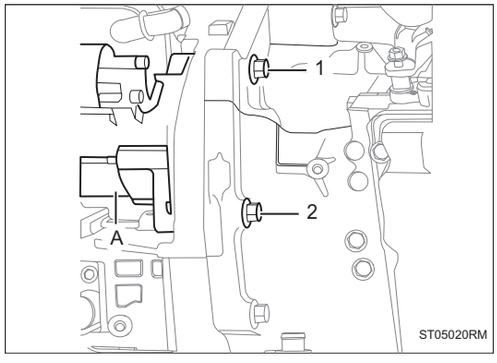


(a) Open the starter (magnetic switch) fixing bolt cover-A-.



(b) Disconnect the connector-A-.

(c) Remove the nut -1-, and the starter assembly (magnetic switch) harness connector terminal -B-.



(d) Remove the bolt -1-2- and the starter assembly -A-.

Installation

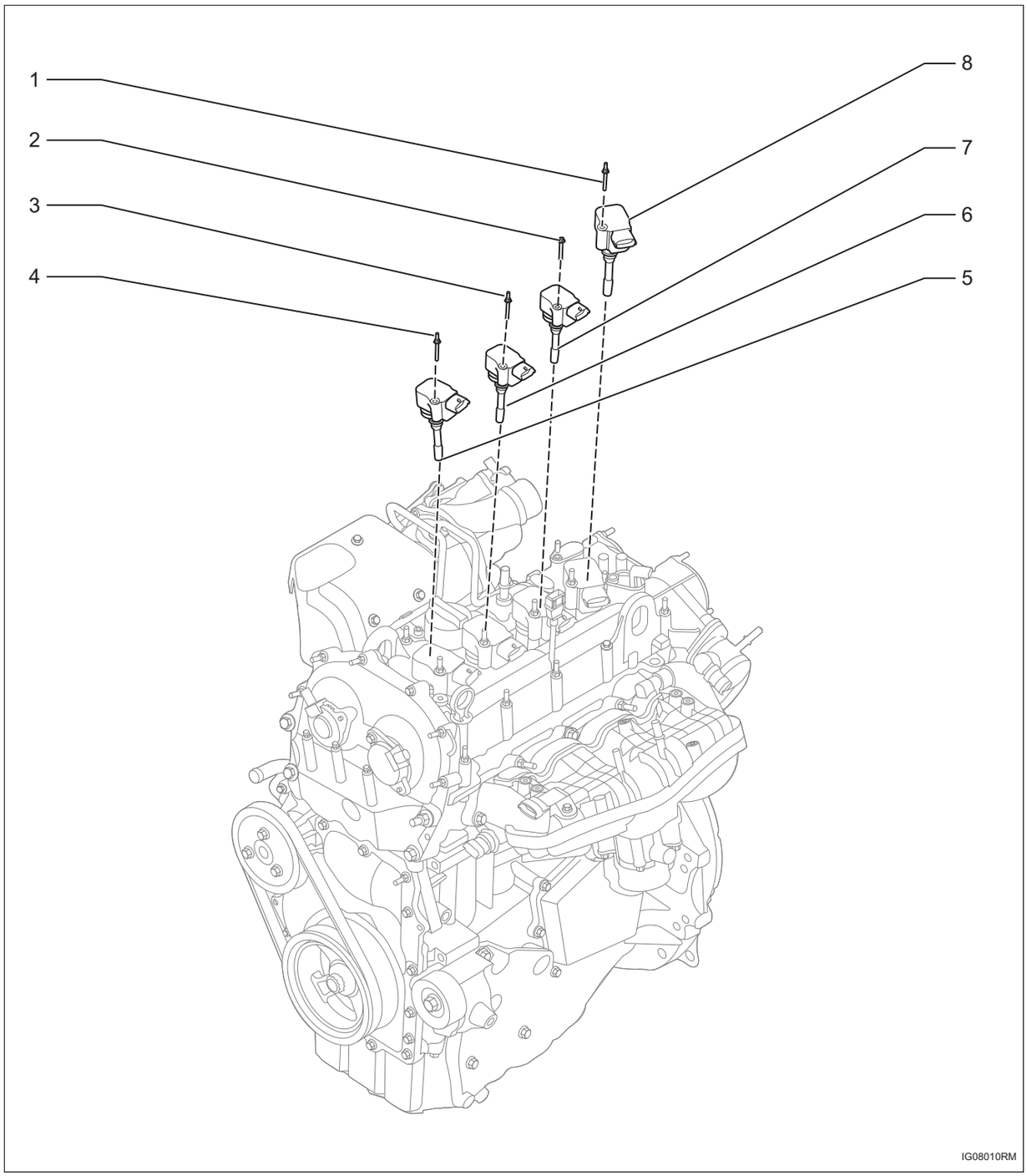
1. **The installation procedure is the reverse of removal procedure.**

Ignition system 1.5T

Ignition coil assembly IG-1
Parts IG-1
Removal IG-3
Installation IG-3
Spark plug assembly IG-4
Parts IG-4
Removal IG-6
Installation IG-6

Ignition coil assembly

Parts



1. Stud

- Torque: 8~12 N · m

2. Stud

- Torque: 8~12 N · m

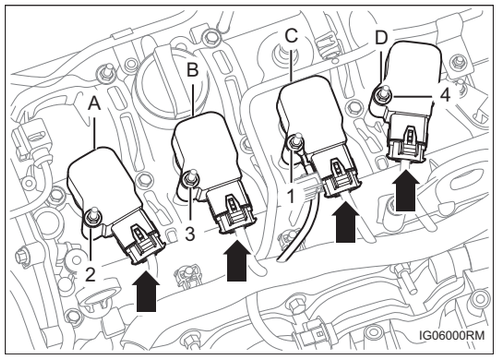
3. Stud

- Torque: 8~12 N · m

4. **Stud**
   - Torque: 8~12 N · m
5. **Ignition coil assembly**
6. **Ignition coil assembly**
7. **Ignition coil assembly**
8. **Ignition coil assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove ignition coil assembly**



(a) Disconnect the harness connector-as arrowed.

(b) Remove the bolt -1- and the ground wire-A-.

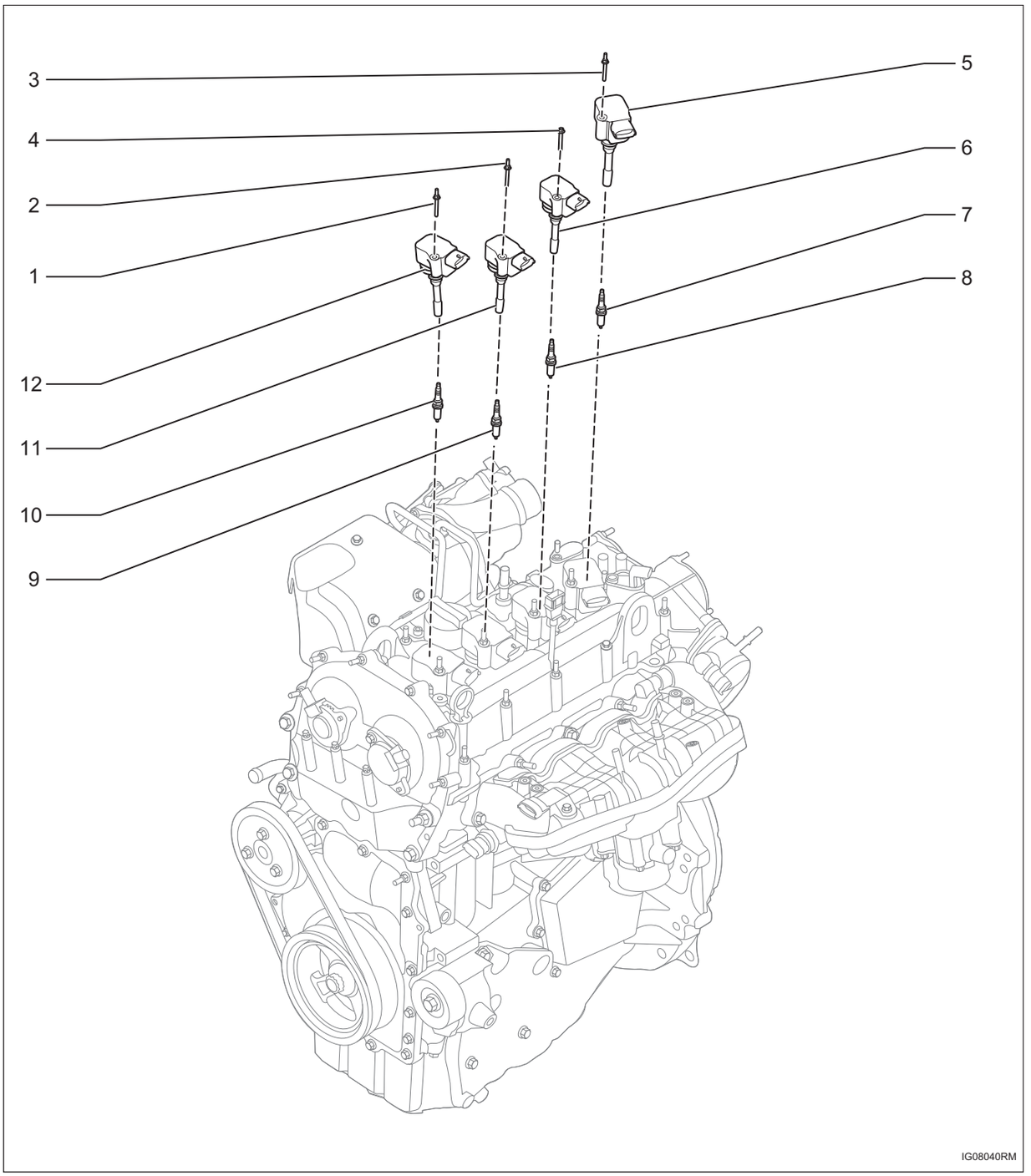
(c) Remove the bolt -2-5-, and remove the ignition coil assembly-A-D-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Spark plug assembly

Parts



1. **Stud**
   - Torque: 8~12 N · m
2. **Stud**
   - Torque: 8~12 N · m
3. **Stud**

- Torque: 8~12 N · m

4. **Stud**
   - Torque: 8~12 N · m
5. **Ignition coil assembly**
6. **Ignition coil assembly**
7. **Spark plug assembly**
   - Torque: 20~26 N · m
8. **Spark plug assembly**
   - Torque: 20~26 N · m
9. **Spark plug assembly**
   - Torque: 20~26 N · m
10. **Spark plug assembly**
    - Torque: 20~26 N · m
11. **Ignition coil assembly**
12. **Ignition coil assembly**

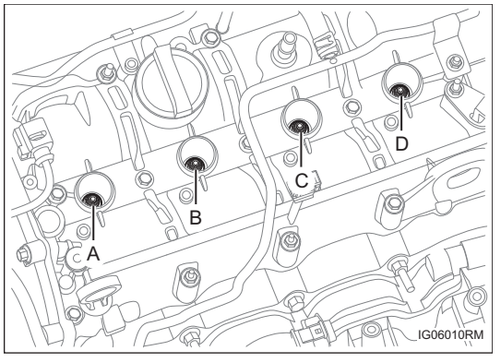
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the ignition coil assembly (See page IG-3)**
3. **Remove spark plug assembly**

   Caution:

   Do not use a pneumatic wrench to remove the spark plug assembly.

   (a) Use a suitable tool to remove the spark plug assembly -A - D-.



4. **Spark plug model**

Spark plug model	3707010A27L
Spark plug gap	0.6-0.7 mm

Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

   Caution:

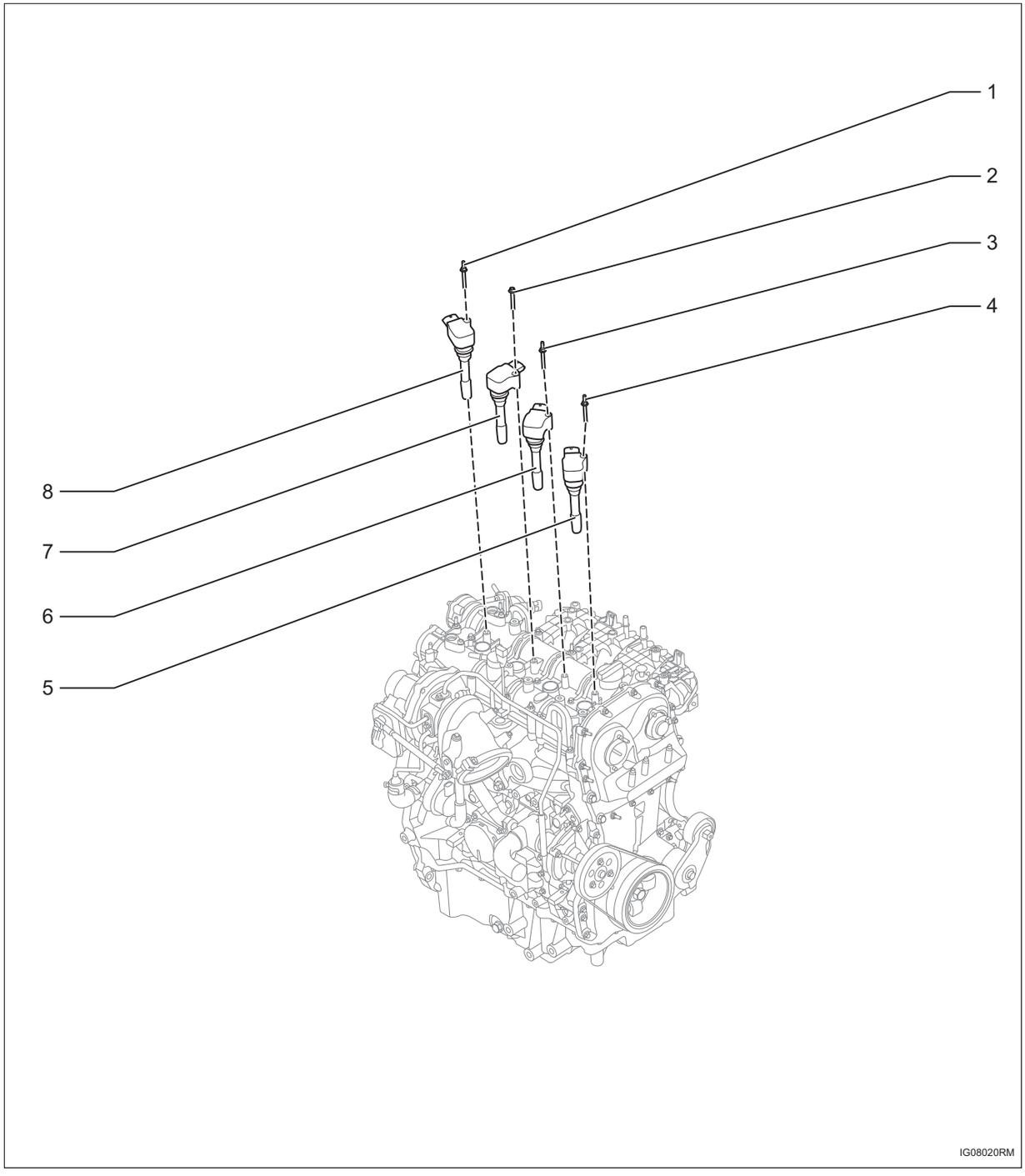
   Do not use a pneumatic wrench to install the spark plug assembly.

Ignition system 2.0T and 1.8T

Ignition coil assembly IG-1
Parts IG-1
Removal IG-3
Installation IG-3
Spark plug assembly IG-4
Parts IG-4
Removal IG-6
Installation IG-6

Ignition coil assembly

Parts



1. Stud

- Torque: 8~12 N · m

2. Hexagon flange bolt

- Torque: 8~12 N · m

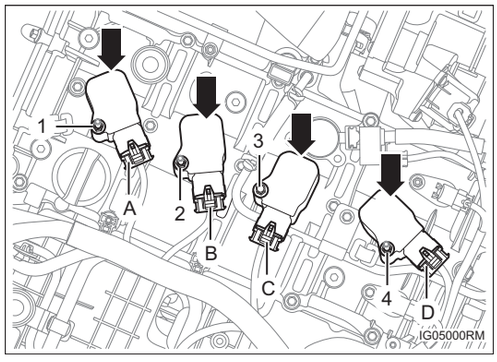
3. Stud

- Torque: 8~12 N · m

4. **Stud**
   - Torque: 8~12 N · m
5. **Ignition coil assembly**
6. **Ignition coil assembly**
7. **Ignition coil assembly**
8. **Ignition coil assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove ignition coil assembly**



(a) Disconnect the harness connector-A-D-.

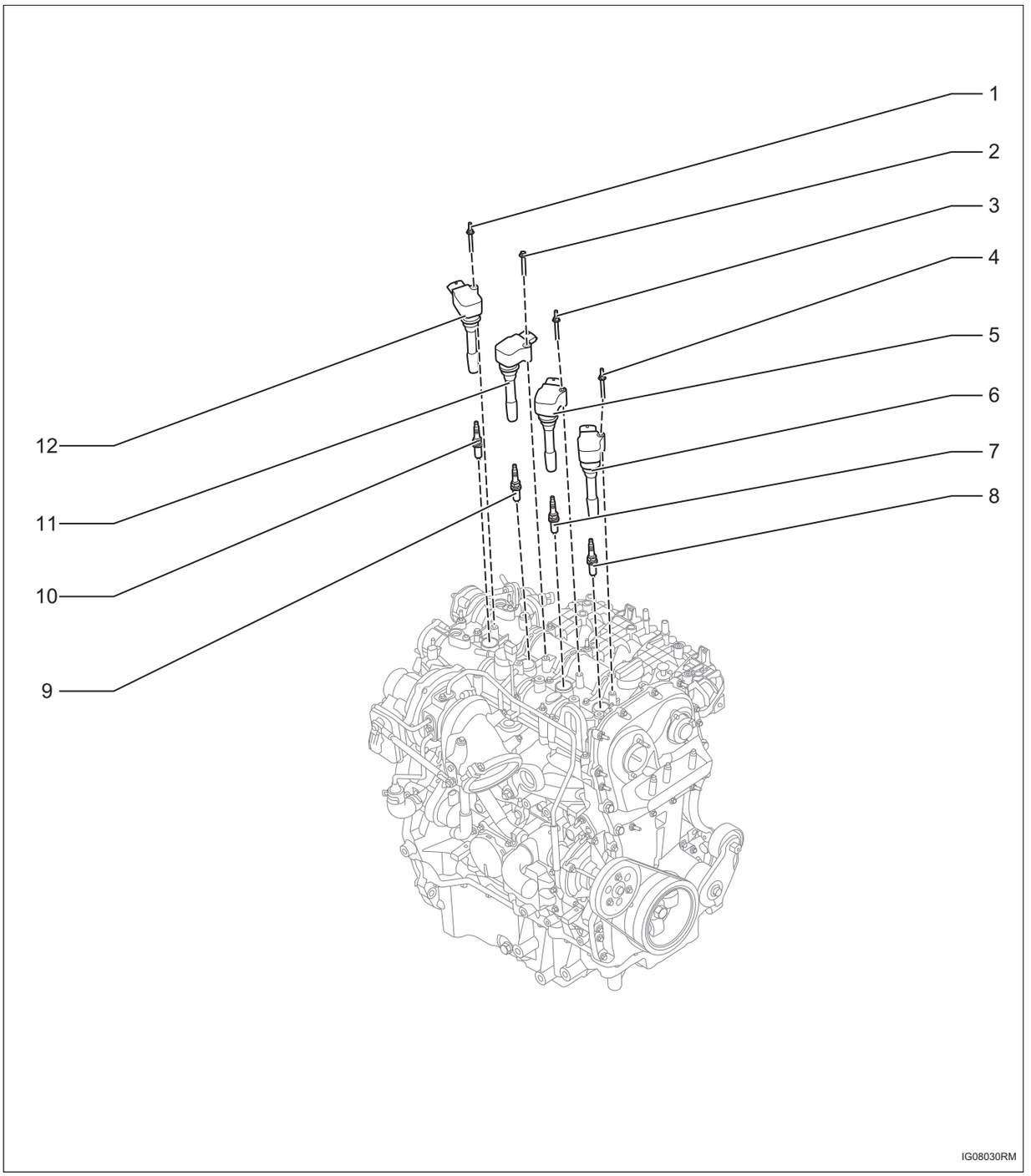
(b) Remove the bolt -1-4-, and remove the ignition coil assembly-arrow-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Spark plug assembly

Parts



1. **Stud**
   - Torque: 8~12 N · m
2. **Hexagon flange bolt**
   - Torque: 8~12 N · m
3. **Stud**

- Torque: 8~12 N · m

4. **Stud**
   - Torque: 8~12 N · m
5. **Ignition coil assembly**
6. **Ignition coil assembly**
7. **Spark plug assembly**
   - Torque: 20~26 N · m
8. **Spark plug assembly**
   - Torque: 20~26 N · m
9. **Spark plug assembly**
   - Torque: 20~26 N · m
10. **Spark plug assembly**
    - Torque: 20~26 N · m
11. **Ignition coil assembly**
12. **Ignition coil assembly**

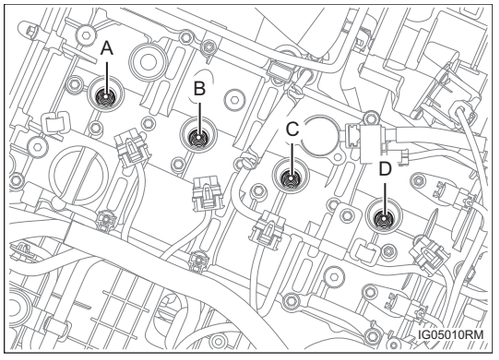
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the ignition coil assembly (See page IG-3)**
3. **Remove spark plug assembly**

   Caution:

   Do not use a pneumatic wrench to remove the spark plug assembly.

   (a) Use a suitable tool to remove the spark plug assembly -A - D-.



4. **Spark plug model**

Spark plug model	3707010A27L-A
Spark plug gap	0.6-0.7 mm

Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

   Caution:

   Do not use a pneumatic wrench to install the spark plug assembly.

Cooling system 1.5T and HEV

Coolant CO-1
On-board inspection CO-1
Replace CO-2
Coolant temperature sensor assembly CO-5
Parts CO-5
Removal CO-6
Installation CO-6
Metal coolant pipe CO-7
Parts CO-7
Parts CO-9
Part (only for HEV models) CO-11
Removal CO-13
Installation CO-17
Oil cooler assembly CO-18
Parts CO-18
Removal CO-20
Installation CO-20
Coolant pump assembly CO-21
Parts CO-21
Removal CO-22
Installation CO-22
Thermal management module assembly CO-23
Parts CO-23
Removal CO-24
Installation CO-24
Electric coolant pump assembly CO-25
Parts CO-25
Removal CO-27
Installation CO-28
Thermostat assembly CO-29
Parts CO-29
Removal CO-31
Installation CO-31

CO

Coolant

On-board inspection

Caution:

When working close to the electric cooling fan or radiator grille, make sure that the ignition switch is in the OFF position. When the ignition switch is in the ON (IG) position, if the engine coolant temperature becomes high or the A/C is turned ON, the electric cooling fan may start to run automatically.

1. Check whether the coolant leaks

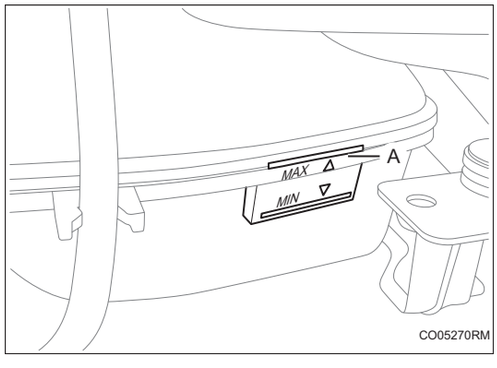
Hint:

To avoid scalding, do not remove the expansion tank pressure cap while the engine and radiator assembly are still hot. Thermal expansion can cause hot engine coolant and steam to escape from the expansion tank.

(a) Fill the expansion tank with engine coolant, and then connect the reservoir pressure cap tester SST (39GV210540B).

(b) Pump to 200 kPa, and then check and confirm that the pressure does not decrease. If the pressure drops, check the hose, radiator assembly and coolant pump assembly for leaks. If there is no trace of coolant leakage outside the engine, check the heater core, cylinder block and cylinder head.

2. Check reservoir coolant level



(a) When the engine is in cold state, the coolant level shall be between the MAX and MIN scale marks.

Hint:

If the engine coolant level is lower than the MIN mark line, check whether the coolant is leaking, and add the special coolant to the MAX mark line.

3. Check the coolant quality

(a) Remove the expansion tank pressure cap.

Hint:

To avoid scalding, do not remove the expansion tank pressure cap while the engine and radiator assembly are still hot. Thermal expansion can cause hot engine coolant and steam to escape from the expansion tank.

(b) Check for excessive rust or scale around the expansion tank pressure cap and expansion tank inlet. There should be no oil in the engine coolant.

Hint:

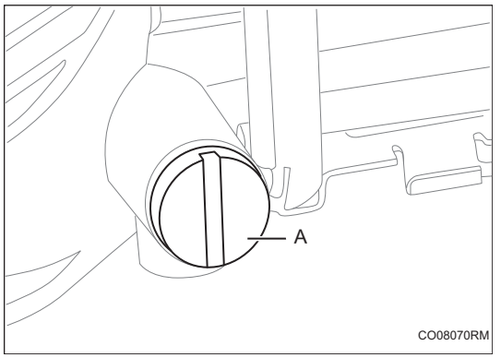
If too dirty, change the engine coolant.

(c) Use the coolant tester to check the freezing point of the coolant. If it is not within the specified range, change the coolant.

Replace

1. **Remove engine bottom guard plate (See page ET-34)**

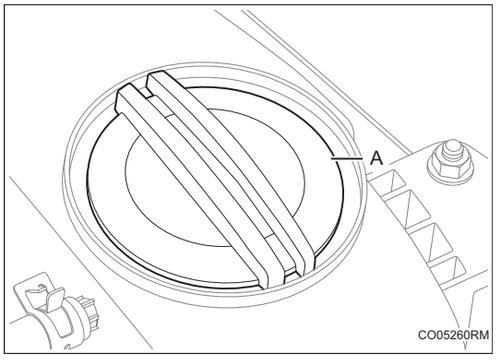
2. **Drain engine coolant**



(a) Detach the radiator coolant drain plug -A- to drain the engine coolant.

Hint:

Collect the coolant in a container for scrapping according to the local regulations.

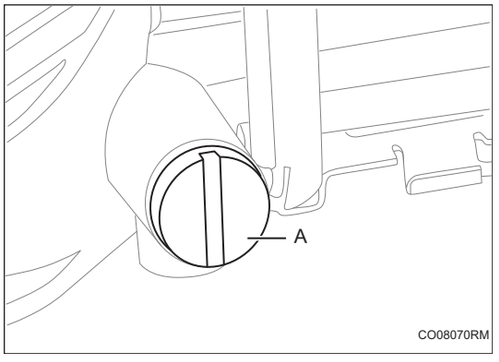


(b) Remove the expansion tank pressure cap-A-.

Hint:

- Do not remove the expansion tank pressure cap when the engine and radiator have not cooled down.
- Pressurized hot engine coolant and steam may be released and cause severe scalding.

3. **Fill engine coolant**



(a) Install the radiator lower coolant drain plug-A-.

(b) Add special coolant to the expansion tank filler.

CO

Caution:

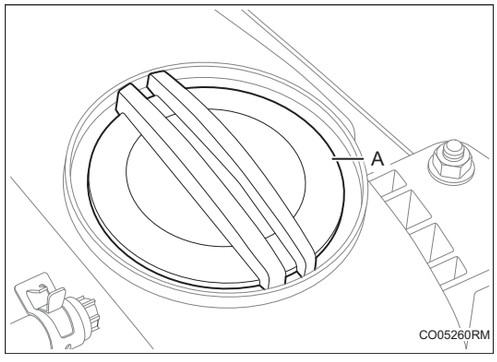
Do not change engine coolant with water.

Applicable vehicle	Standard capacity	Coolant grade
Conventional vehicle	7.7±0.2 (L)	(G30-91) Long-life coolant
HEV models (engine)	7.8±0.2 (L)	(G30-91) Long-life coolant

(c) Press the radiator coolant inlet hose and water outlet hose several times by hand to check the coolant level.

Caution:

If the coolant level is too low, add coolant.



(d) Install expansion tank pressure cap -A-, to make the engine fully warm up.

(e) Bleed the cooling system.

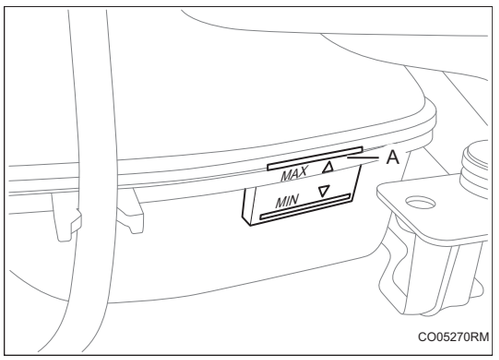
Hint:

- Turn off the A/C switch before starting the engine.
- Adjust the temperature of the A/C to MAX (HOT).
- Set the A/C blower to Lo.

(f) Press the radiator coolant inlet hose and water outlet hose several times by hand to empty the air in the system.

Hint:

- Wear protective gloves when pressing the radiator hose.
- When the radiator hose is hot, be careful to keep away from the radiator fan.



(g) After the engine has cooled down, check and confirm that the coolant level is between the MAX and the MIN scale marks -A-.

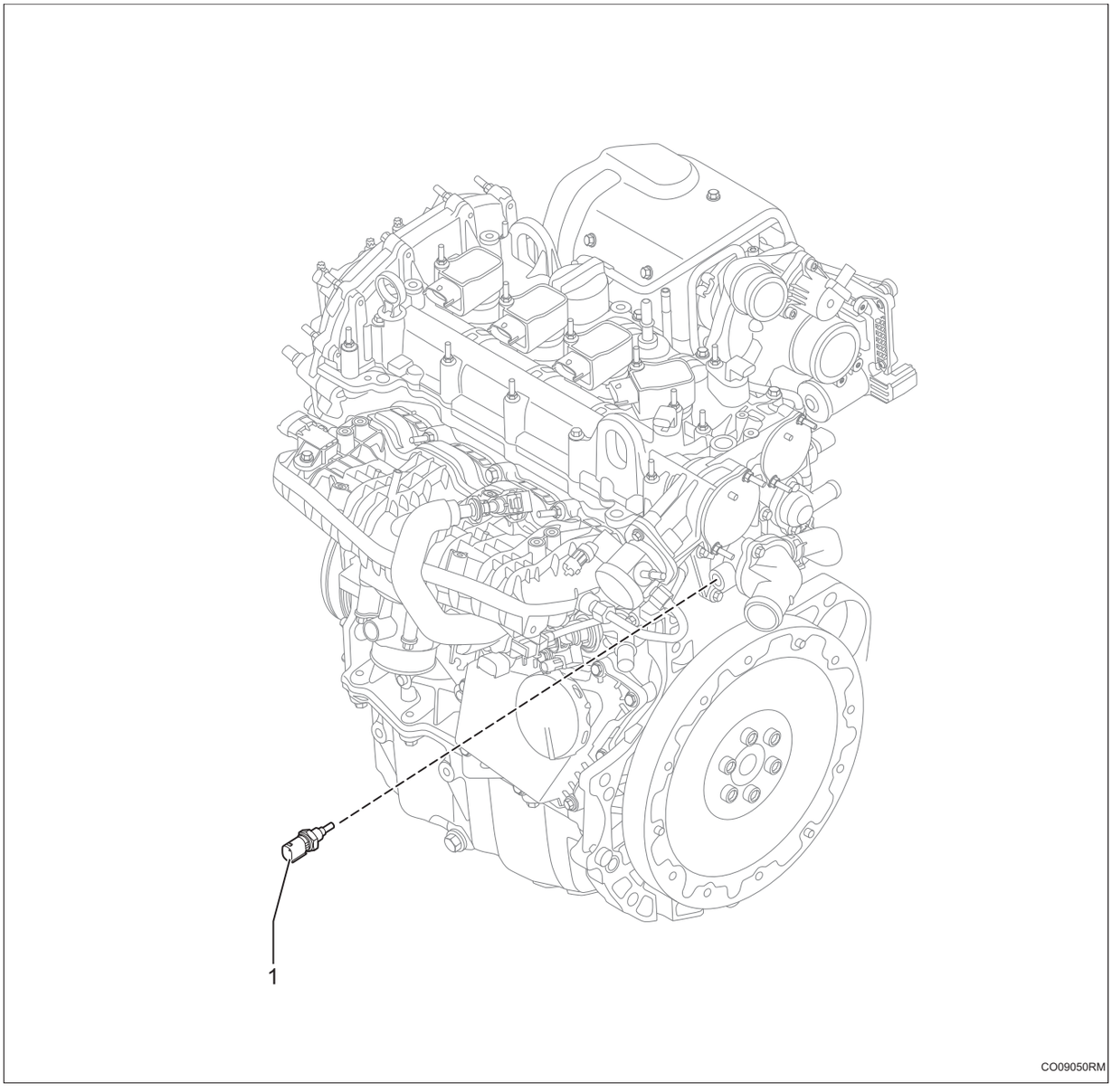
Hint:

If the coolant level is low, add coolant to the expansion tank to the MAX line.

4. Check whether the coolant leaks

Coolant temperature sensor assembly

Parts

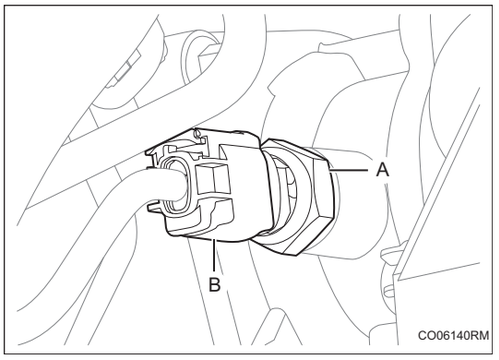


1. Coolant temperature sensor assembly

- Torque: 16~20 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove coolant temperature sensor assembly**



(a) Disconnect coolant temperature sensor assembly-B-.

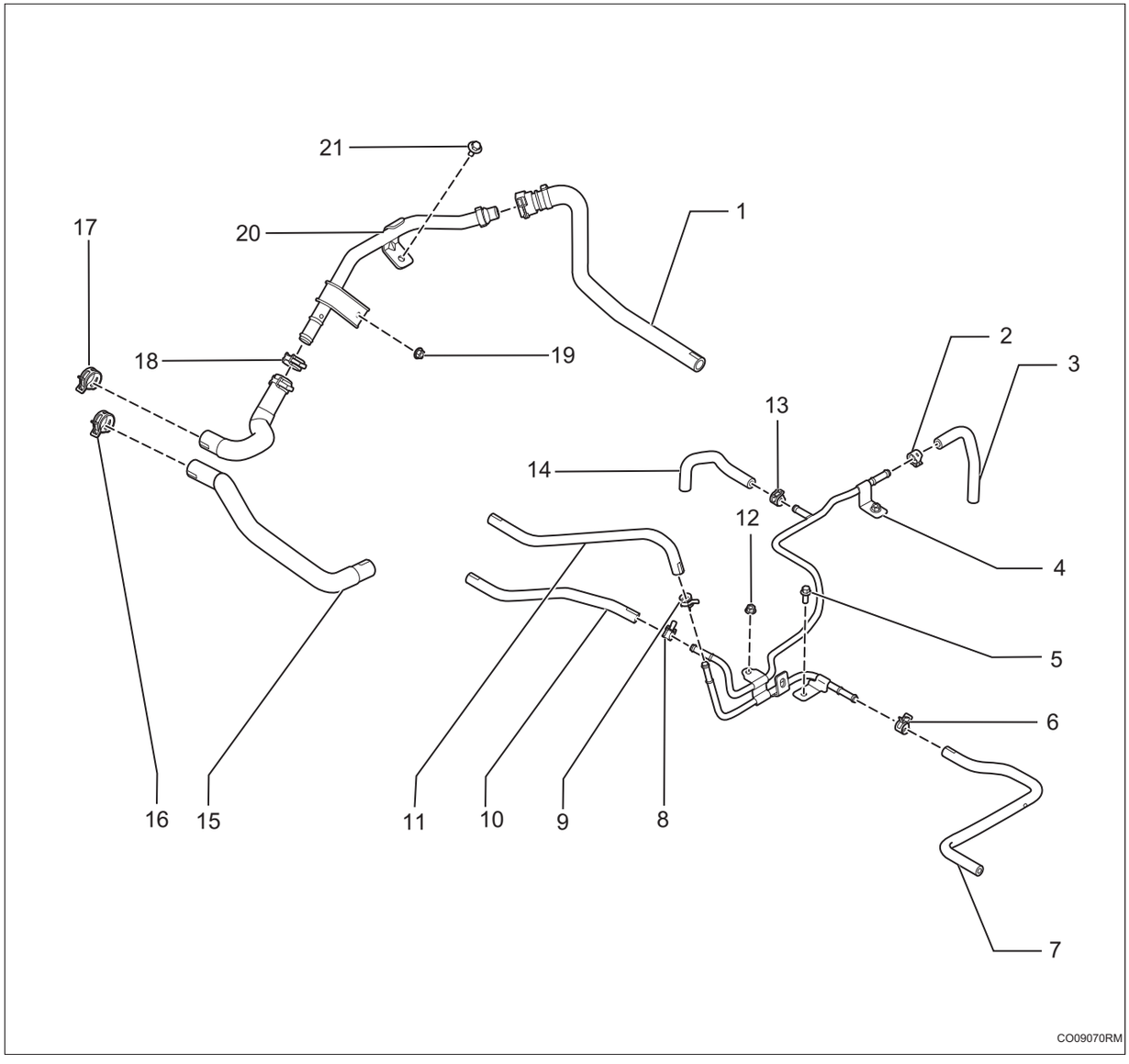
(b) Remove coolant temperature sensor assembly-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Metal coolant pipe

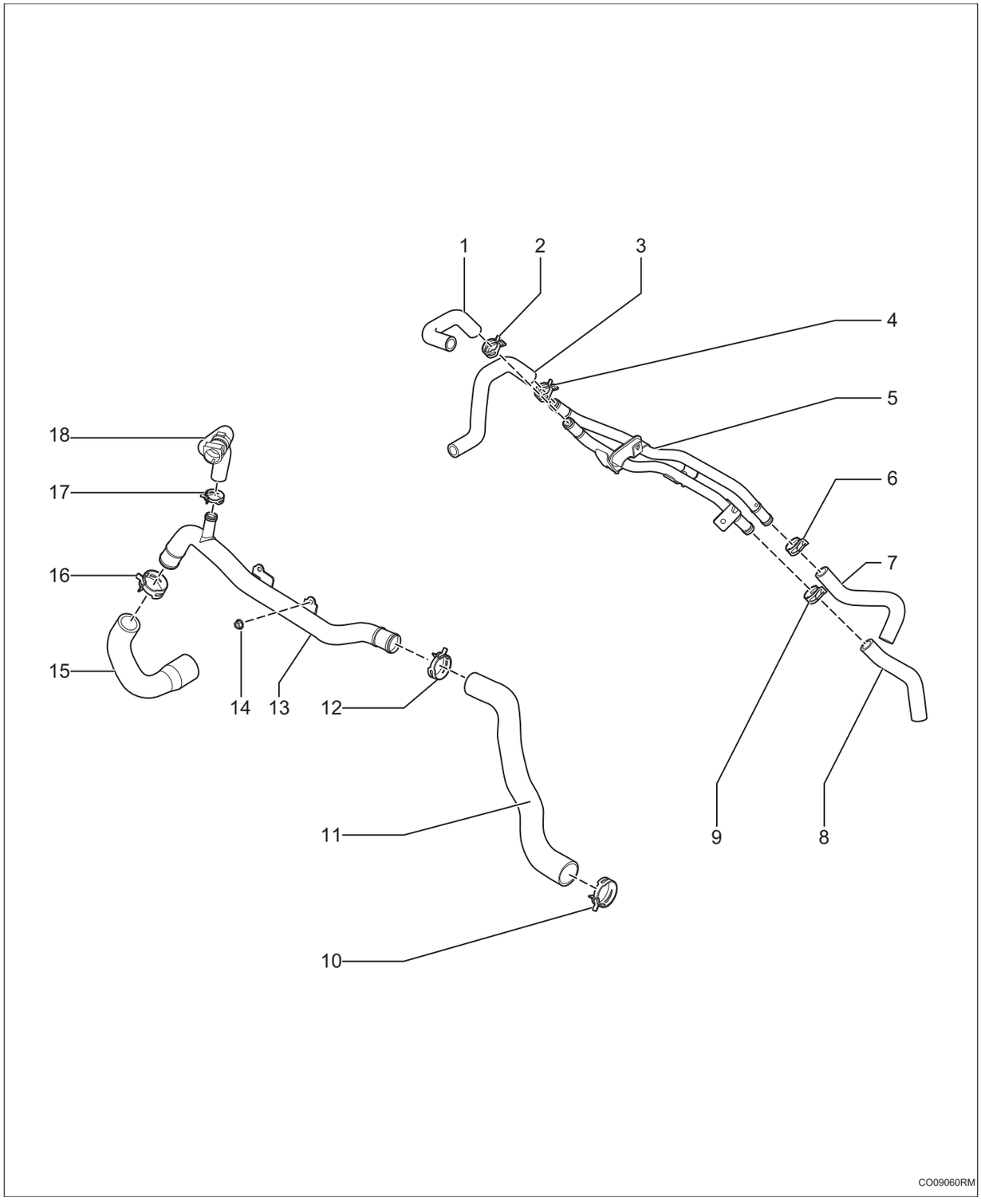
Parts



1. **Heater water inlet pipe assembly**
2. **Steel band spring hose clamp**
3. **Engine water outlet air return hose**
4. **Engine air return metal pipe assembly**
5. **Hexagon flange bolt**
   - Torque: 8~10 N · m
6. **Steel band spring hose clamp**
7. **Radiator air return pipe and pipe clamp assembly**
8. **Steel band spring hose clamp**
9. **Steel band spring hose clamp**

10. **Expansion tank water inlet hose I assembly**
11. **Expansion tank water inlet hose II**
12. **Hexagon flange nut**
    - Torque: 8~10 N · m
13. **Steel band spring hose clamp**
14. **Cylinder head air return hose**
15. **Heater water outlet pipe assembly**
16. **Steel band spring hose clamp**
17. **Steel band spring hose clamp**
18. **Steel band spring hose clamp**
19. **Hexagon flange nut**
    - Torque: 8~10 N · m
20. **Heater water inlet metal pipe assembly**
21. **Hexagon flange bolt**
    - Torque: 8~10 N · m

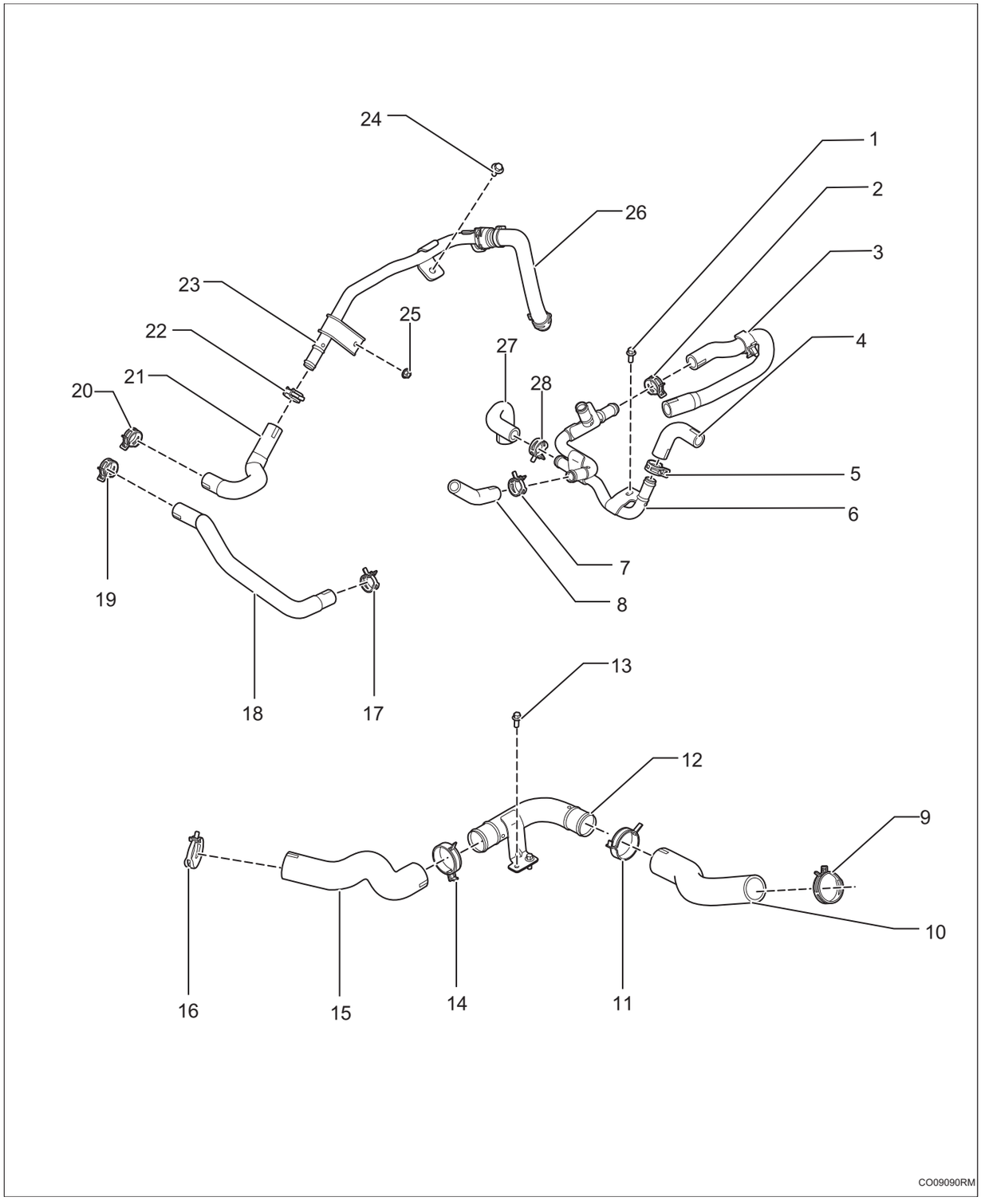
Parts



1. **Metal pipe water inlet hose**
2. **Steel band spring hose clamp**
3. **Metal pipe water outlet hose**
4. **Steel band spring hose clamp**

5. **Transmission oil cooler metal pipe assembly**
6. **Steel band spring hose clamp**
7. **Transmission oil cooler water outlet hose**
8. **Transmission oil cooler water inlet hose**
9. **Steel band spring hose clamp**
10. **Steel band spring hose clamp**
11. **Radiator water outlet hose**
12. **Steel band spring hose clamp**
13. **Radiator water outlet steel pipe assembly**
14. **Hexagon flange nut**
    - X2
    - Torque: 8~10 N · m
15. **Engine water inlet hose**
16. **Steel band spring hose clamp**
17. **Steel band spring hose clamp**
18. **Expansion tank water inlet hose assembly**

Part (only for HEV models)

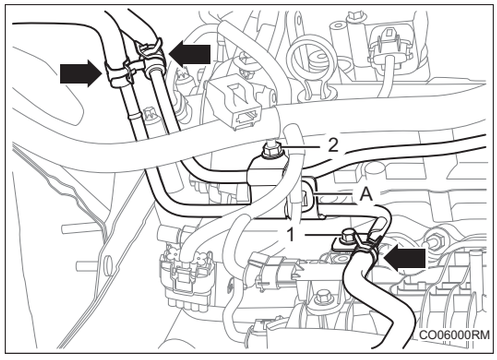


1. **Hexagon flange bolt**
   - X2
   - Torque: 8~12 N · m
2. **Steel band spring hose clamp**

3. **Heater water pump outlet pipe assembly**
4. **Heater water outlet pipe II**
5. **Steel band spring hose clamp**
6. **"Heater air outlet metal pipe assembly"**
7. **Steel band spring hose clamp**
8. **Heater water inlet pipe II assembly**
9. **Steel band spring hose clamp**
10. **Radiator coolant inlet hose**
11. **Steel band spring hose clamp**
12. **Radiator coolant inlet metal pipe assembly**
13. **Hexagon flange bolt**
    - X2
    - Torque: 8~12 N · m
14. **Steel band spring hose clamp**
15. **Radiator coolant inlet hose II**
16. **Steel band spring hose clamp**
17. **Steel band spring hose clamp**
18. **Heater water inlet pipe I assembly**
19. **Steel band spring hose clamp**
20. **Steel band spring hose clamp**
21. **Heater water inlet pipe I assembly**
22. **Steel band spring hose clamp**
23. **Heater water inlet metal pipe assembly**
24. **Hexagon flange bolt**
    - Torque: 8~12 N · m
25. **Hexagon flange nut**
    - Torque: 8~12 N · m
26. **Heater water inlet pipe assembly**
27. **Heater water pump inlet pipe**
28. **Steel band spring hose clamp**

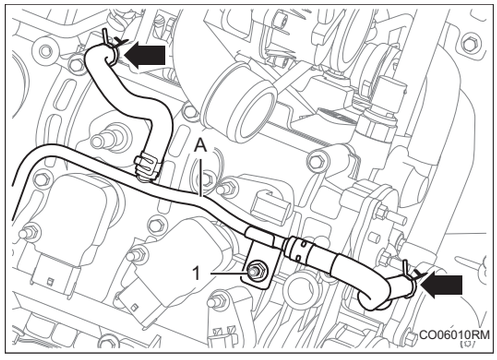
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove engine bottom guard plate (See page ET-34)**
3. **Drain coolant (See page CO-2)**
4. **Remove catalytic converter weldment (See page EX-6)**
5. **Remove the upper air return pipe assembly**



(a) Disconnect the coolant pipe as arrowed and remove the nut -2-.

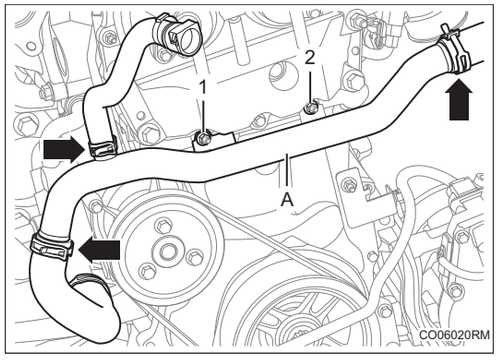
(b) Remove bolt -1- and detach harness fixing clip -A-.



(c) Disconnect the coolant pipe as arrowed and remove the nut -1-.

(d) Remove the upper air return pipe assembly-A-.

6. **Remove powertrain right suspension assembly (See page EM-8)**
7. **Remove radiator water outlet steel pipe assembly**

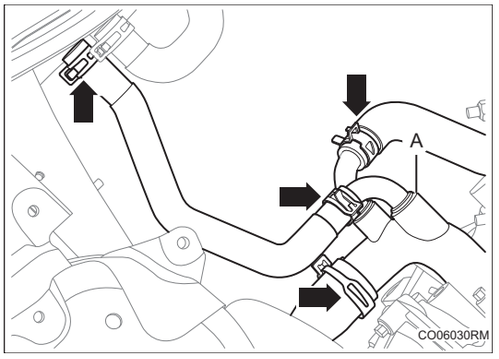


(a) Disconnect the radiator water outlet steel pipe assembly connecting water pipe -arrow-.

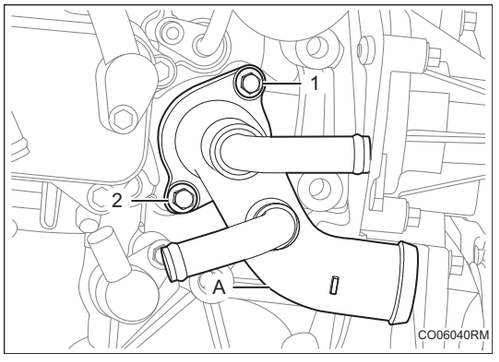
CO

(b) Remove the nut -1-2-, and the radiator water outlet steel pipe assembly-A-.

8. Remove engine water inlet pipe assembly

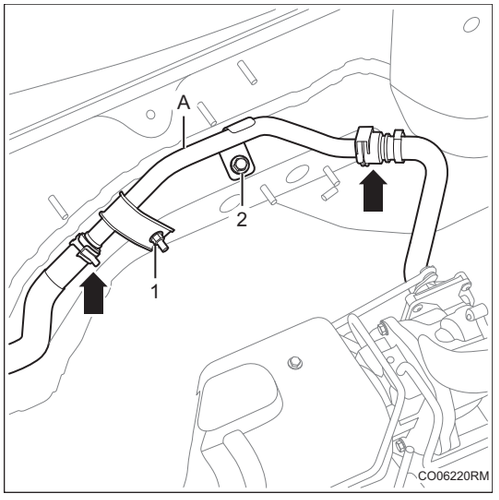


(a) Disconnect engine water inlet pipe assembly (A) connecting water pipe -arrow-.



(b) Remove the bolt -1-2-, and the engine water inlet pipe assembly-A-.

9. Remove heater water inlet metal pipe assembly

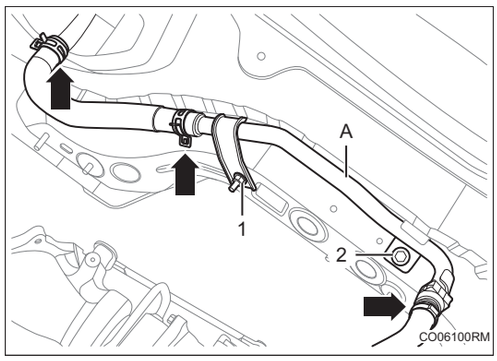


(a) Disconnect the heater water inlet metal pipe assembly connecting water pipe -arrow-.

(b) Remove bolt -2- and nut -1-, and remove the heater water inlet metal pipe assembly -A-.

10. Remove heater water inlet metal pipe assembly (only for HEV models)

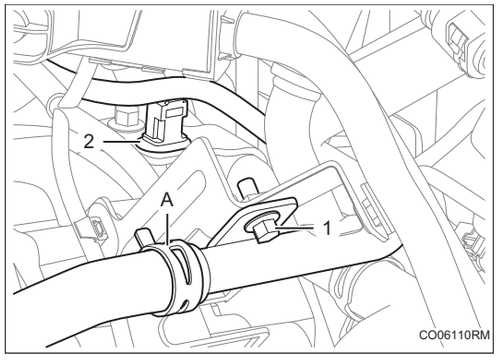
CO



(a) Disconnect the heater water inlet metal pipe assembly connecting water pipe -arrow-.

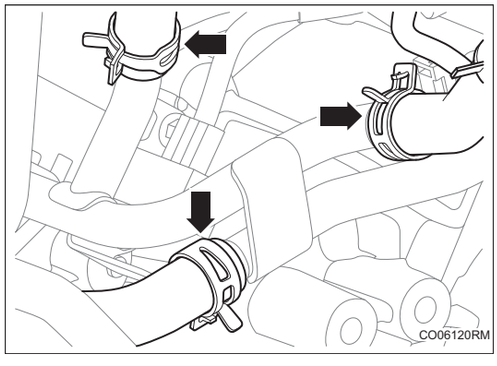
(b) Remove bolt -2- and nut -1-, and remove the heater water inlet metal pipe assembly -A-.

11. Remove heater air outlet metal pipe assembly (only for HEV models)

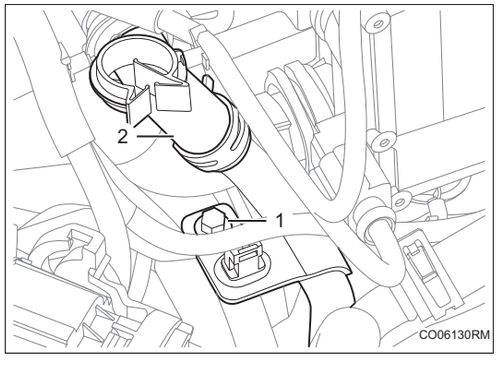


(a) Disconnect the heater air outlet metal pipe assembly connecting water pipe -A-.

(b) Remove bolt -1- and detach harness fixing clip -2-.

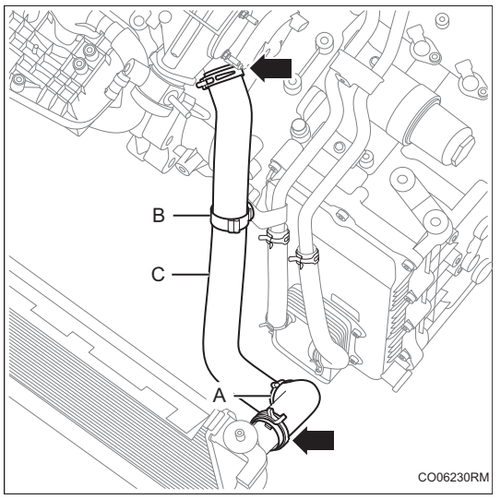


(c) Disconnect the heater air outlet metal pipe assembly connecting water pipe -arrow-.



(d) Remove the bolt -1-, and detach the water pipe -2-.

12. Remove radiator coolant inlet pipe assembly (only for 1.5 T model)



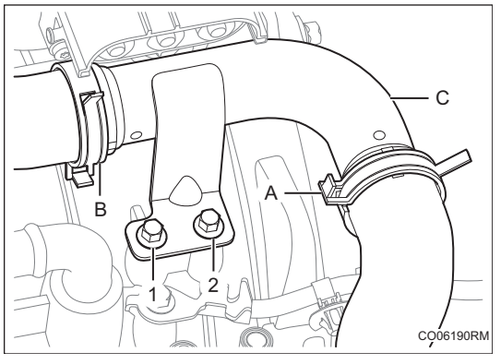
(a) Detach the fixing pipe clamp -A-B- of the radiator coolant inlet pipe assembly.

(b) Disconnect the radiator coolant inlet pipe assembly as arrowed.

(c) Remove radiator coolant inlet pipe assembly -C-.

13. Remove motor high-voltage harness bracket assembly (only for HEV models) (See page HG-3)

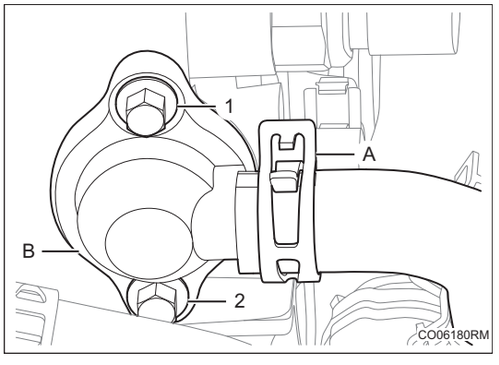
14. Remove the radiator coolant inlet pipe assembly (only for HEV models)



(a) Disconnect the radiator coolant inlet pipe assembly connecting water pipe -A-B-.

(b) Remove the bolt -1-2-, and the radiator coolant inlet pipe assembly-C-.

15. Remove engine water pipe (only for HEV models)

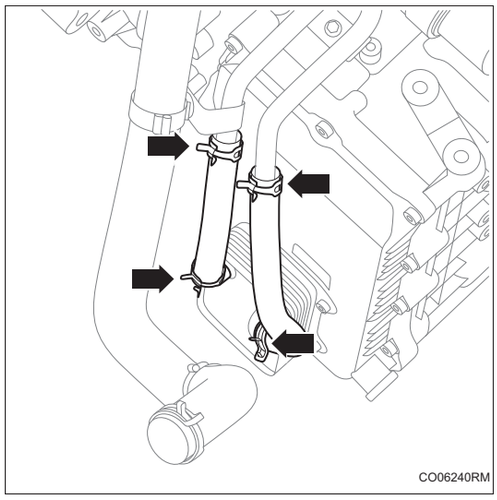


(a) Remove the bolt -1-2-, and detach the water pipe-A-.

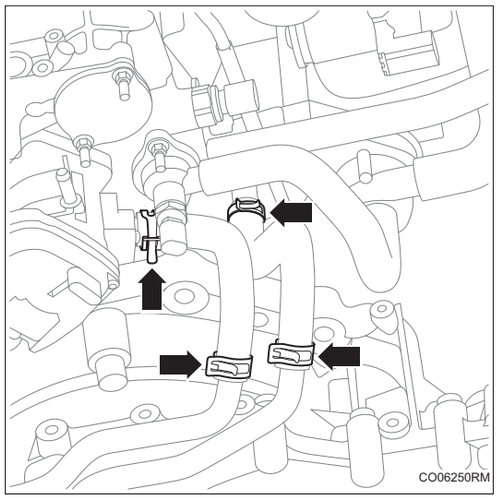
(b) Remove the engine water pipe-B-.

CO

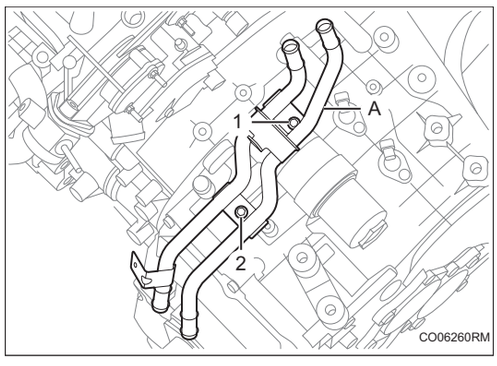
16. Remove transmission oil cooler metal pipe assembly (only for 1.5 T model)



(a) Disconnect the connecting water pipe of the transmission oil cooler metal pipe assembly -arrow-.



(b) Disconnect the connecting water pipe of the transmission oil cooler metal pipe assembly -arrow-.



(c) Remove the bolt -1-2-, and the transmission oil cooler metal pipe assembly-A-.

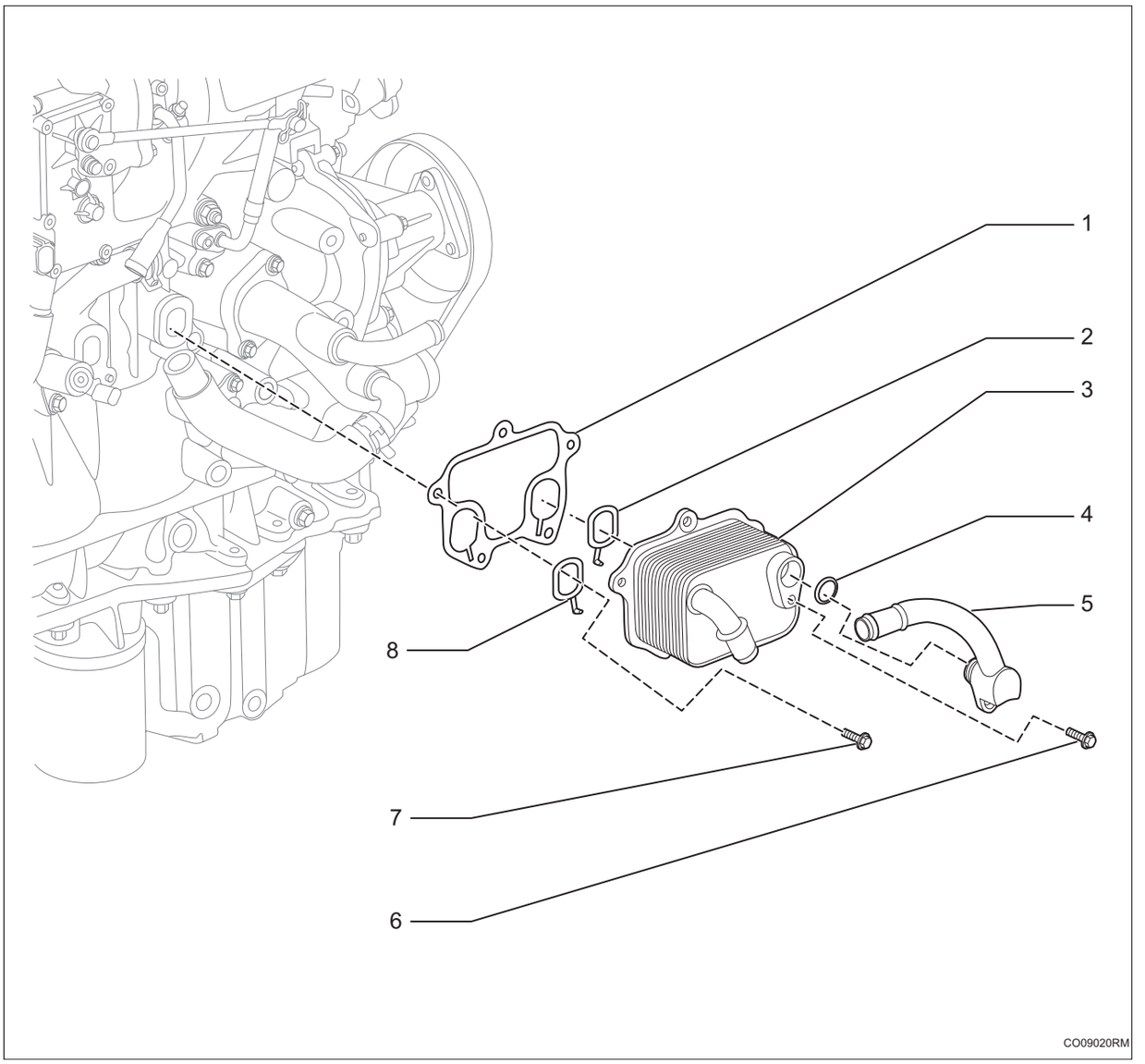
Installation

1. The installation procedure is the reverse of removal procedure.

CO

Oil cooler assembly

Parts



1. **Oil cooler gasket**
   - Disposable part.
2. **Seal ring**
   - Disposable part.
3. **Oil cooler**
4. **Seal ring**
   - Disposable part.
5. **Oil cooler water inlet pipe assembly**
6. **Hexagon flange bolt**
   - Torque: 8~12 N · m

7. Hexagon flange bolt

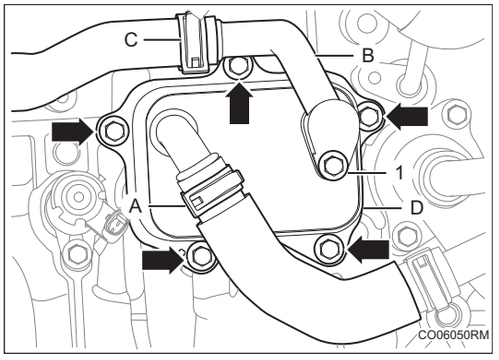
- X5
- Torque: 8~12 N · m

8. Seal ring

- Disposable part.

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove engine bottom guard plate (See page ET-34)**
3. **Drain coolant (See page CO-2)**
4. **Remove catalytic converter weldment (See page EX-6)**
5. **Remove oil cooler assembly**



(a) Disconnect the connecting water pipe-A-C- of the oil cooler assembly-D-.

(b) Remove the bolt -1-, and the oil cooler water inlet pipe assembly-B-.

(c) Remove the bolt-arrow-, and the oil cooler assembly-D-.

Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

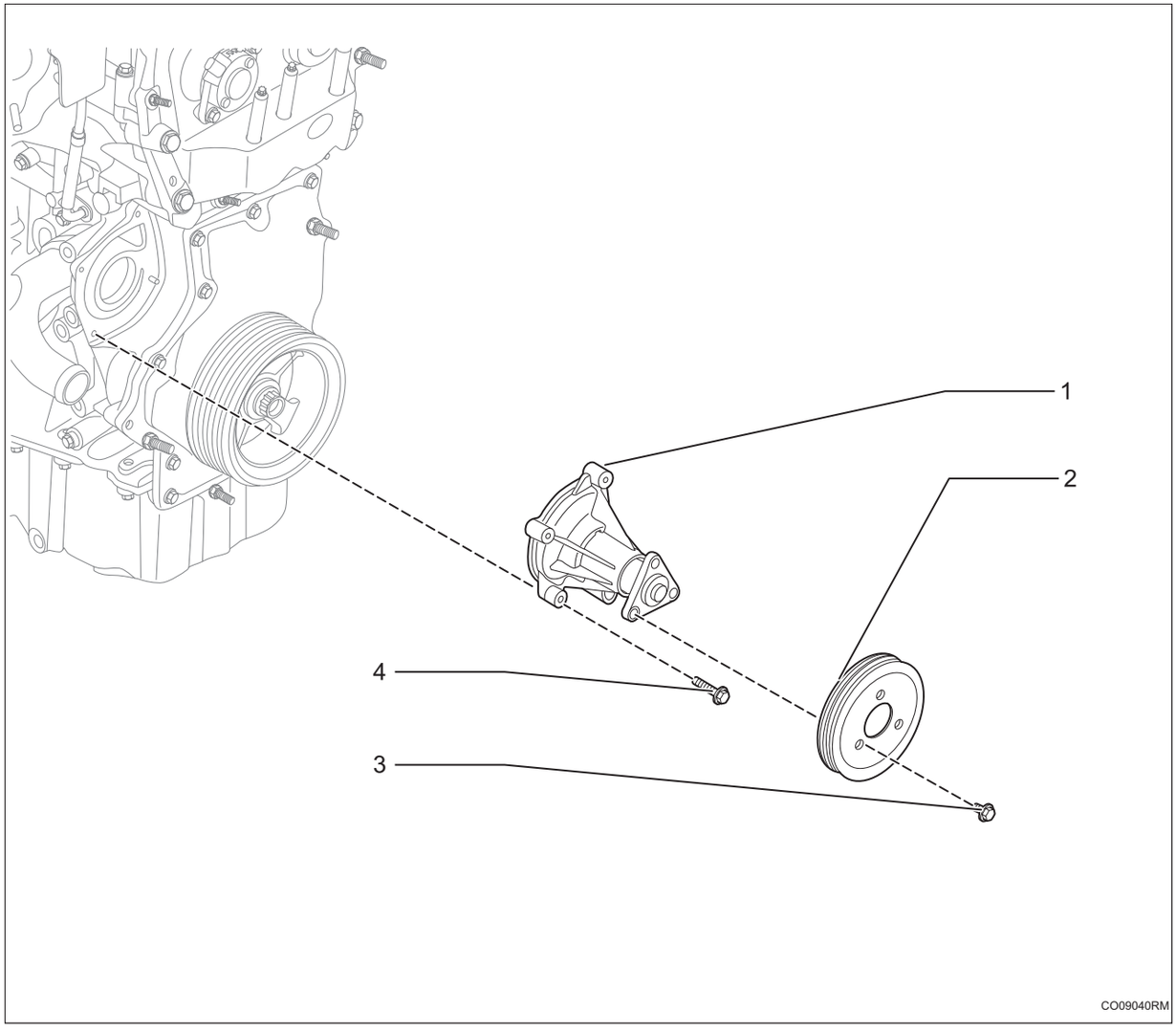
   Caution:

   Make sure that the seal ring is installed in the correct position, otherwise the oil may leak.

   Do not twist the seal ring.

Coolant pump assembly

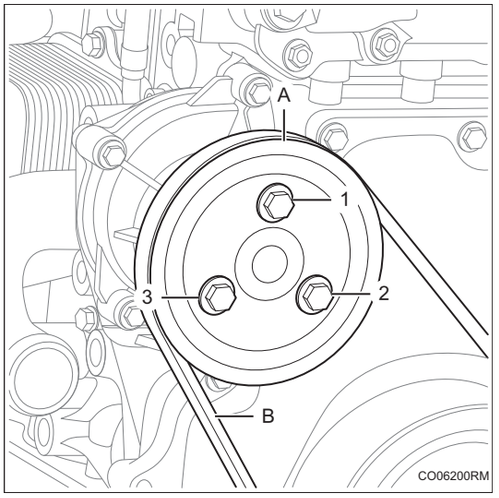
Parts



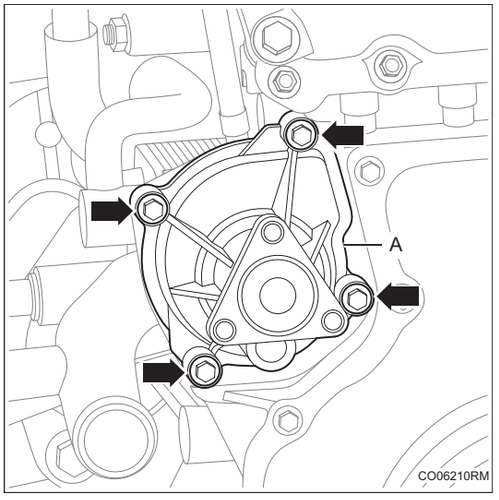
1. **Coolant pump assembly**
2. **Coolant pump pulley**
3. **Hexagon flange bolt**
   - X3
   - Torque: 18~22 N · m
4. **Hexagon flange bolt**
   - X4
   - Torque: 8~12 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove engine bottom guard plate (See page ET-34)**
3. **Drain coolant (See page CO-2)**
4. **Remove coolant pump assembly**



(a) Remove the bolt -1-3-, and remove the coolant pump pulley-A- and belt-B-.



(b) Remove the bolt -arrow-, and remove the coolant pump assembly -A-.

Installation

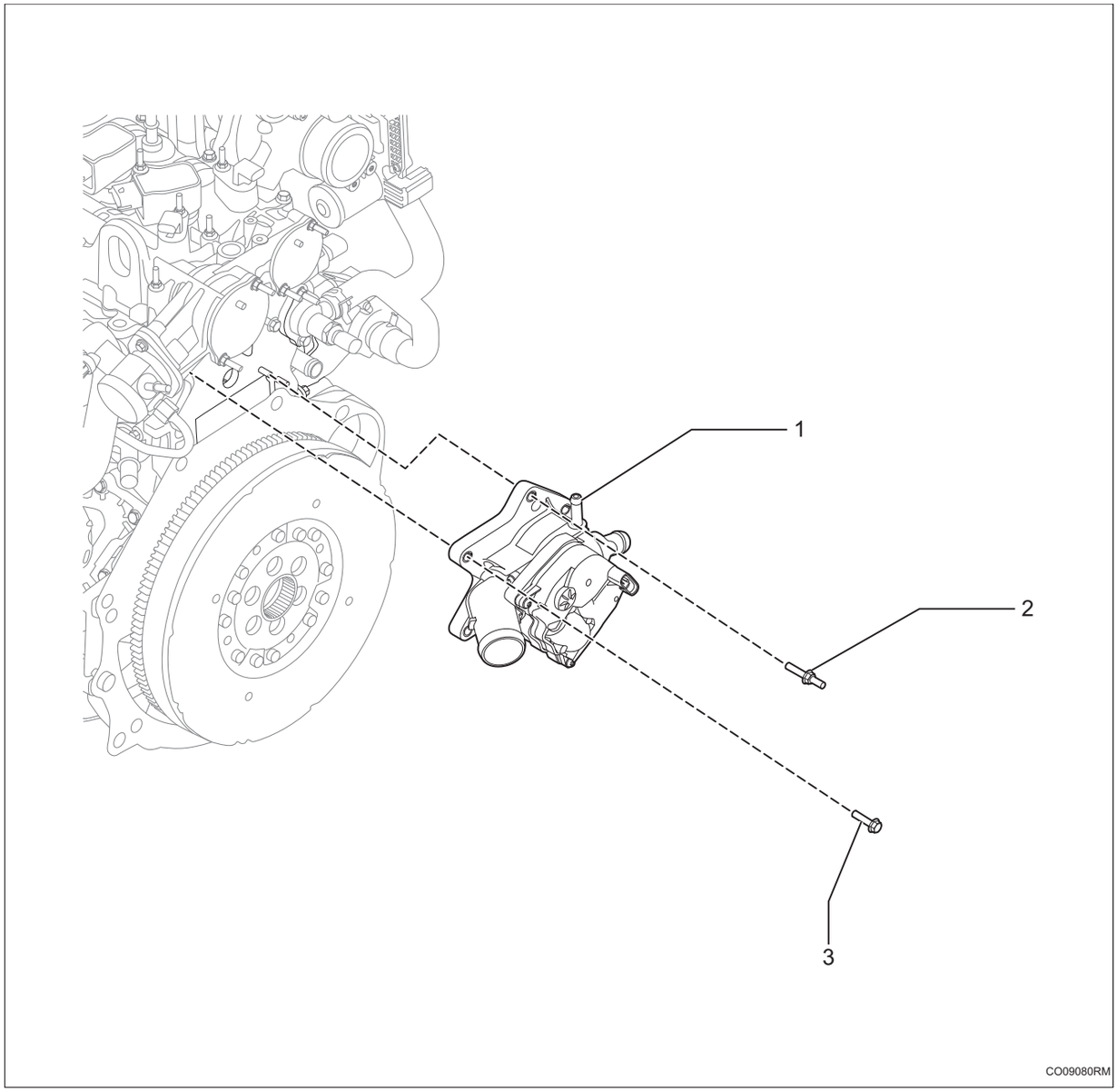
1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

   Caution:

   Renew the coolant pump shim.

Thermal management module assembly

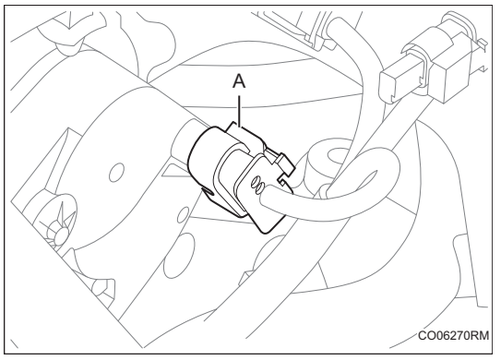
Parts



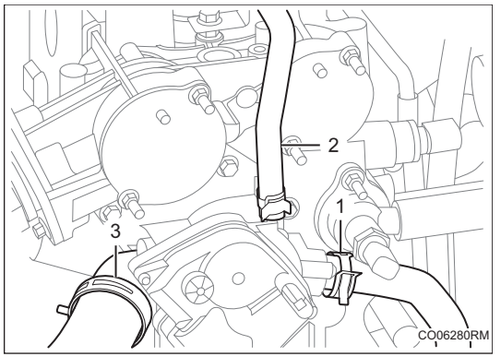
1. **Thermal management module assembly**
2. **Stud**
   - Torque: 8~12 N · m
3. **Hexagon flange bolt**
   - X4
   - Torque: 8~12 N · m

Removal

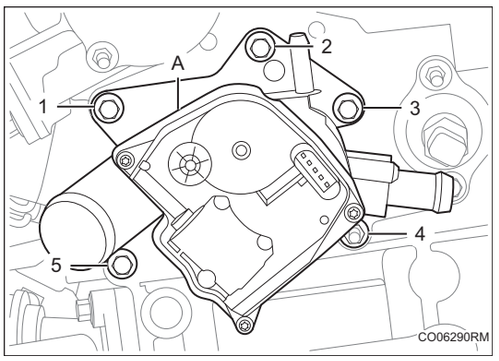
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Drain coolant (See page CO-2)**
3. **Remove thermal management module assembly**



(a) Disconnect the harness connector-A-.



(b) Disconnect the thermal management module assembly connecting water pipe -1-3-.



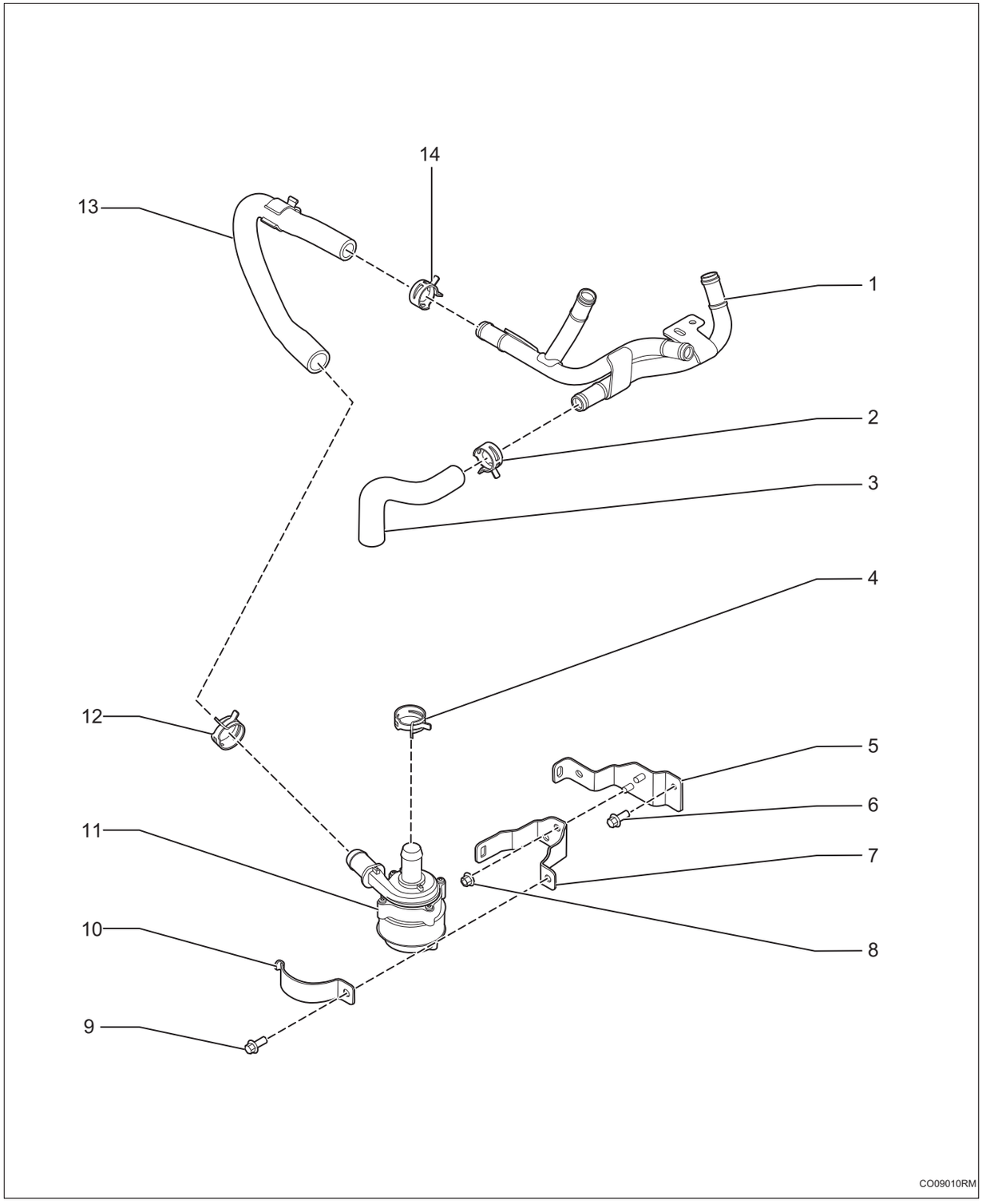
(c) Remove bolt -1-5- and remove thermal management module assembly-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Electric coolant pump assembly

Parts

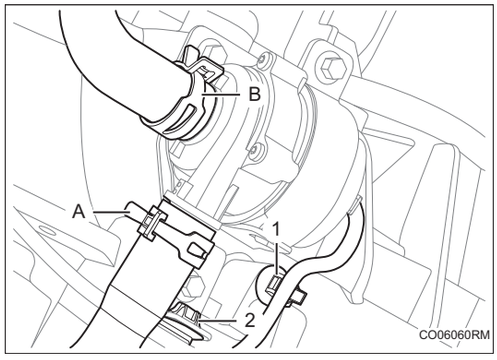


1. **Heater air outlet metal pipe assembly**
2. **Steel band spring hose clamp**

3. **Heater water pump inlet pipe**
4. **Steel band spring hose clamp**
5. **Install bracket assembly - electric coolant pump**
6. **Hexagon flange bolt**
   - X2
   - Torque: 8~12 N · m
7. **Bracket assembly- electric coolant pump, rear**
8. **Hexagon flange nut**
   - X2
   - Torque: 8~12 N · m
9. **Hexagon flange bolt**
   - Torque: 8~12 N · m
10. **Bracket-electric coolant pump, front**
11. **Electric coolant pump assembly**
12. **Steel band spring hose clamp**
13. **Heater water pump outlet pipe**
14. **Steel band spring hose clamp**

Removal

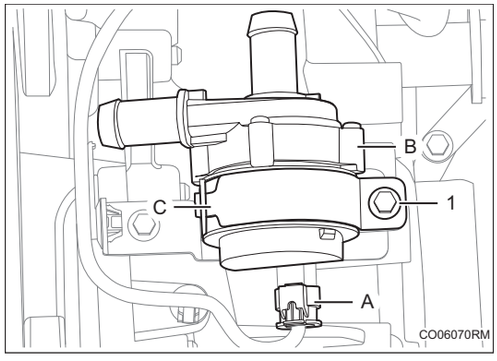
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove engine bottom guard plate (See page ET-34)**
3. **Drain coolant (See page CO-2)**
4. **Remove the electric coolant pump assembly (only for HEV models)**



(a) Detach electric coolant pump assembly connecting hose -A-B-.

(b) Detach the harness fixing clips -1-2-.

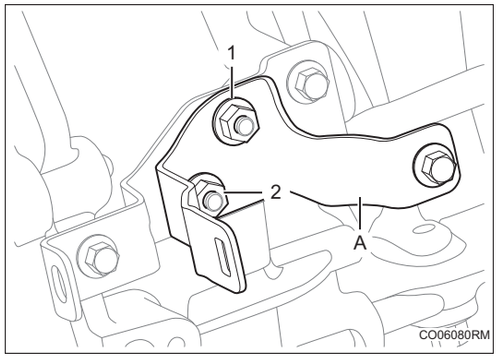
(c) Disconnect the harness connector-A-.



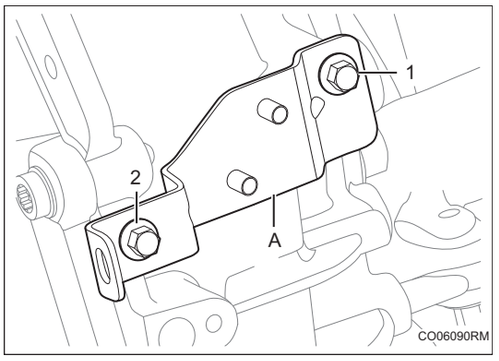
(d) Remove bolt -1- and remove electric coolant pump front bracket-C-.

(e) Remove the electric coolant pump assembly -B-.

5. **Remove electric coolant pump rear bracket (only for HEV models)**



(a) Remove nut -1-2-, and remove electric coolant pump rear bracket-A-.



6. Remove electric coolant pump installation bracket assembly

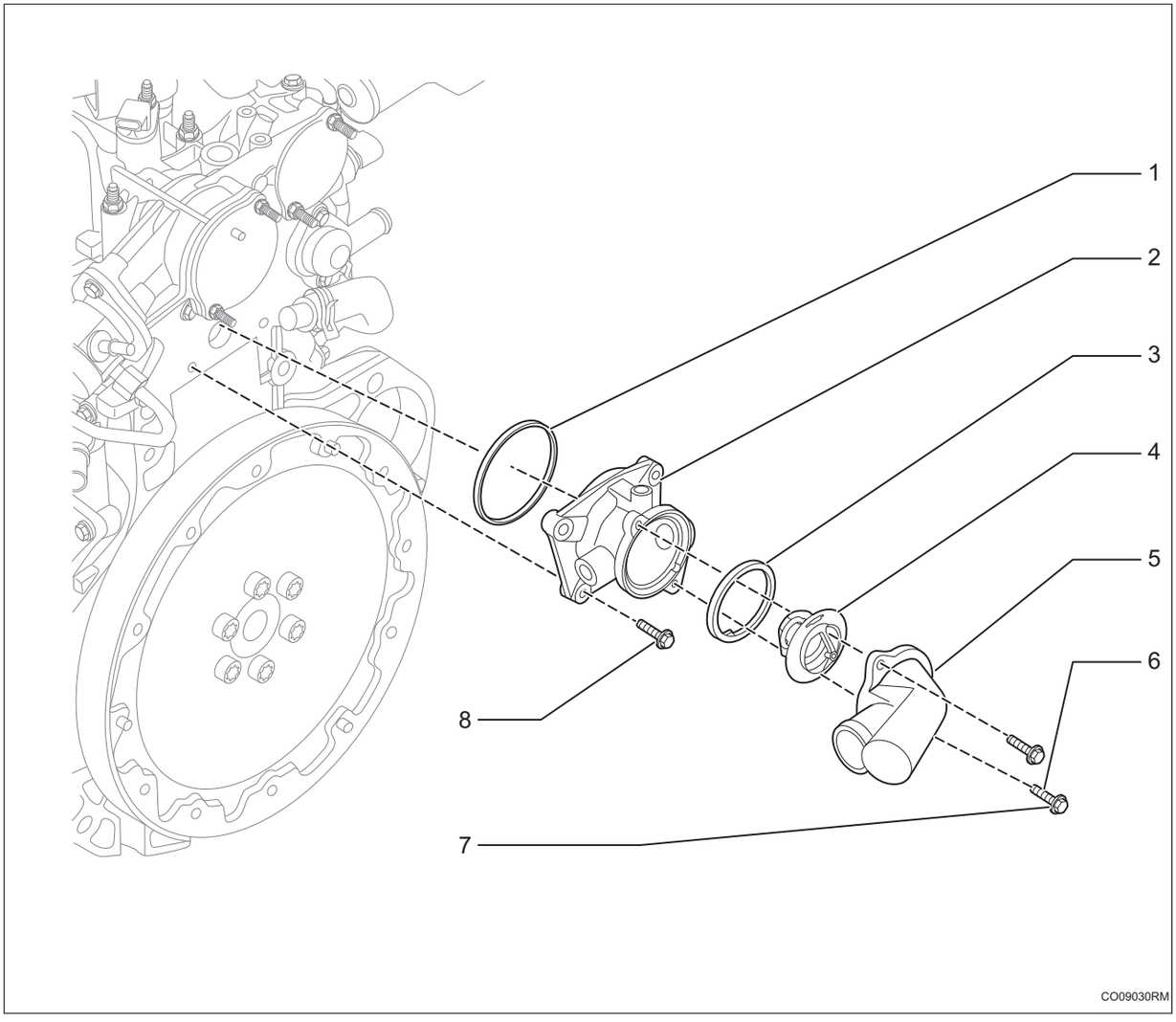
(a) Remove bolt -1-2- and remove electric coolant pump mounting bracket assembly-A-.

Installation

1. The installation procedure is the reverse of removal procedure.

Thermostat assembly

Parts

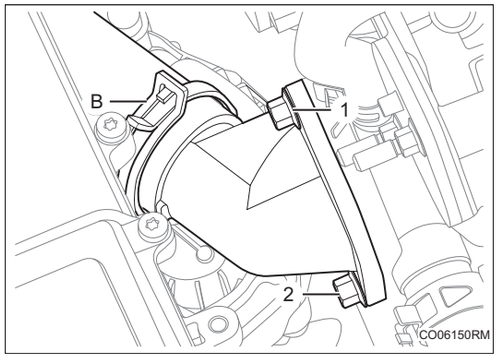


1. **Seal ring**
   - Disposable part.
2. **Engine water outlet pipe**
3. **Thermostat seal ring**
   - Disposable part.
4. **Thermostat assembly**
5. **Thermostat cover**
   - When facing the engine water outlet pipe assembly, keep the thermostat cover water pipe facing the left.
6. **Hexagon flange bolt**
   - X2
   - Torque: 8~12 N · m

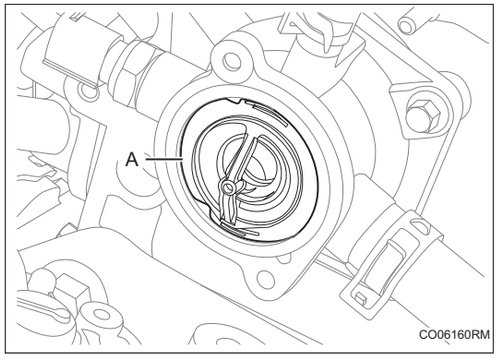
7. **Hexagon flange bolt**
   - X2
   - Torque: 8~12 N · m
8. **Hexagon flange bolt**
   - X4
   - Torque: 8~12 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Drain coolant (See page CO-2)**
3. **Remove coolant temperature sensor assembly (See page CO-6)**
4. **Remove the thermostat assembly (only for HEV models)**

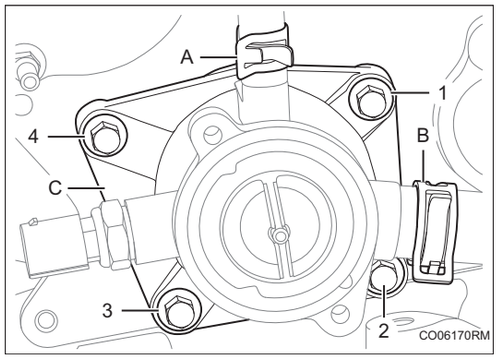


(a) Disconnect the thermostat cover connecting water pipe -B- and remove the bolts -1-2-.



(b) Remove the thermostat assembly-A-.

5. **Remove engine water outlet pipe assembly**



(a) Disconnect the engine water outlet pipe assembly connecting water pipe(a) Disconnect the engine water outlet pipe assembly connecting water pipe -A-B-.

(b) Remove bolts -1-4- and remove engine water outlet pipe assembly-C-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

CO

Cooling system 2.0 T and 1.8 T

Coolant CO-1
On-board inspection CO-1
Replace CO-2
Coolant temperature sensor assembly CO-5
Parts CO-5
Removal CO-6
Installation CO-6
Metal coolant pipe CO-7
Parts CO-7
Parts CO-9
Parts CO-11
Removal CO-13
Installation CO-14
Radiator assembly CO-15
Parts CO-15
Removal CO-17
Installation CO-19
Coolant pump assembly CO-20
Parts CO-20
Removal CO-22
Installation CO-22
Oil cooler assembly CO-23
Parts CO-23
Removal CO-24
Installation CO-24
Thermal management module assembly CO-25
Parts CO-25
Removal CO-26
Installation CO-26
Expansion tank CO-27
Parts CO-27
Removal CO-29
Installation CO-29
Additional coolant pump assembly CO-30
Parts CO-30
Removal CO-31
Installation CO-31

CO

Coolant

On-board inspection

Caution:

When working close to the electric cooling fan or radiator grille, make sure that the ignition switch is in the OFF position. When the ignition switch is in the ON (IG) position, if the engine coolant temperature becomes high or the A/C is turned ON, the electric cooling fan may start to run automatically.

1. Check whether the coolant leaks

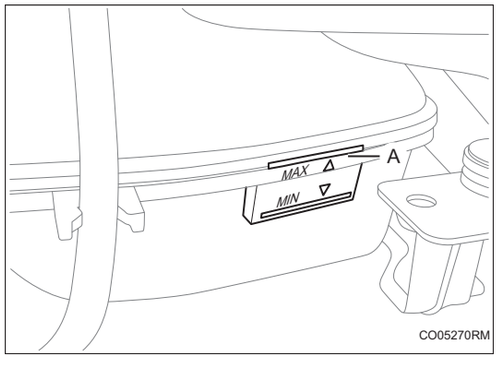
Hint:

To avoid scalding, do not remove the expansion tank pressure cap while the engine and radiator assembly are still hot. Thermal expansion can cause hot engine coolant and steam to escape from the expansion tank.

(a) Fill the expansion tank with engine coolant, and then connect the reservoir pressure cap tester SST (39GV210540B).

(b) Pump to 200 kPa, and then check and confirm that the pressure does not decrease. If the pressure drops, check the hose, radiator assembly and coolant pump assembly for leaks. If there is no trace of coolant leakage outside the engine, check the heater core, cylinder block and cylinder head.

2. Check reservoir coolant level



(a) When the engine is in cold state, the coolant level shall be between the MAX and MIN scale marks.

Hint:

If the engine coolant level is lower than the MIN mark line, check whether the coolant is leaking, and add the special coolant to the MAX mark line -A-.

3. Check the coolant quality

(a) Remove the expansion tank pressure cap.

Hint:

To avoid scalding, do not remove the expansion tank pressure cap while the engine and radiator assembly are still hot. Thermal expansion can cause hot engine coolant and steam to escape from the expansion tank.

(b) Check for excessive rust or scale around the expansion tank pressure cap and expansion tank inlet. There should be no oil in the engine coolant.

Hint:

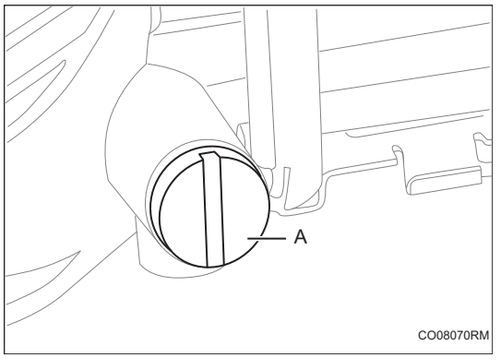
If too dirty, change the engine coolant.

(c) Use the coolant tester to check the freezing point of the coolant. If it is not within the specified range, change the coolant.

Replace

1. **Remove engine bottom guard plate (See page ET-34)**

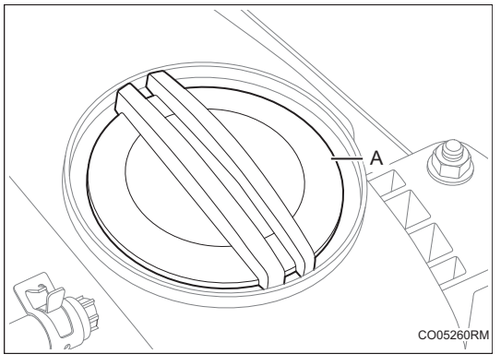
2. **Drain engine coolant**



(a) Detach the radiator coolant drain plug -A- to drain the engine coolant.

Hint:

Collect the coolant in a container for scrapping according to the local regulations.

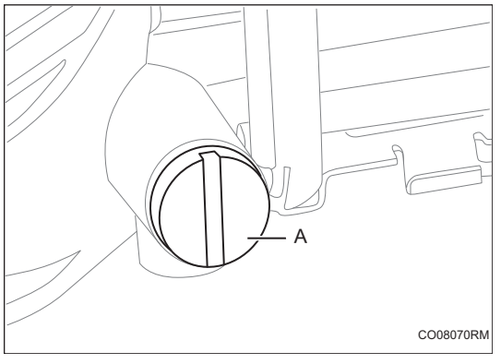


(b) Remove the expansion tank pressure cap-A-.

Hint:

- Do not remove the expansion tank pressure cap when the engine and radiator have not cooled down.
- Pressurized hot engine coolant and steam may be released and cause severe scalding.

3. **Fill engine coolant**



(a) Install the radiator lower coolant drain plug-A-.

(b) Add special coolant to the expansion tank filler.

Caution:

Do not change engine coolant with water.

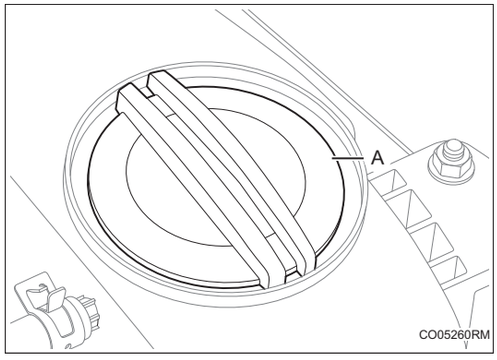
Standard capacity	Coolant grade
8.2±0.2 L	(G30-91) Long-life coolant

(c) Press the radiator coolant inlet hose and water outlet hose several times by hand to check the coolant level.

Caution:

If the coolant level is too low, add coolant.

(d) Install expansion tank pressure cap -A-, to make the engine fully warm up.



(e) Bleed the cooling system.

Hint:

- Turn off the A/C switch before starting the engine.
- Adjust the temperature of the A/C to MAX (HOT).
- Set the A/C blower to Lo.

(f) Press the radiator coolant inlet hose and water outlet hose several times by hand to empty the air in the system.

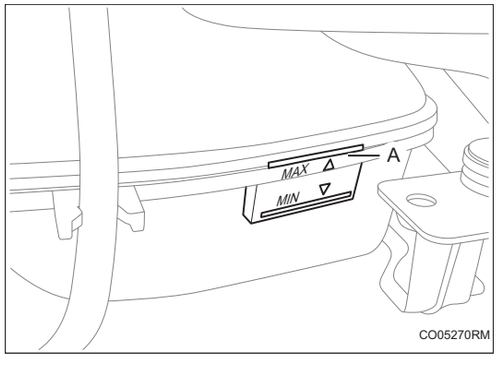
Hint:

- Wear protective gloves when pressing the radiator hose.
- When the radiator hose is hot, be careful to keep away from the radiator fan.

(g) After the engine has cooled down, check and confirm that the coolant level is between the MAX and the MIN scale marks -A-.

Hint:

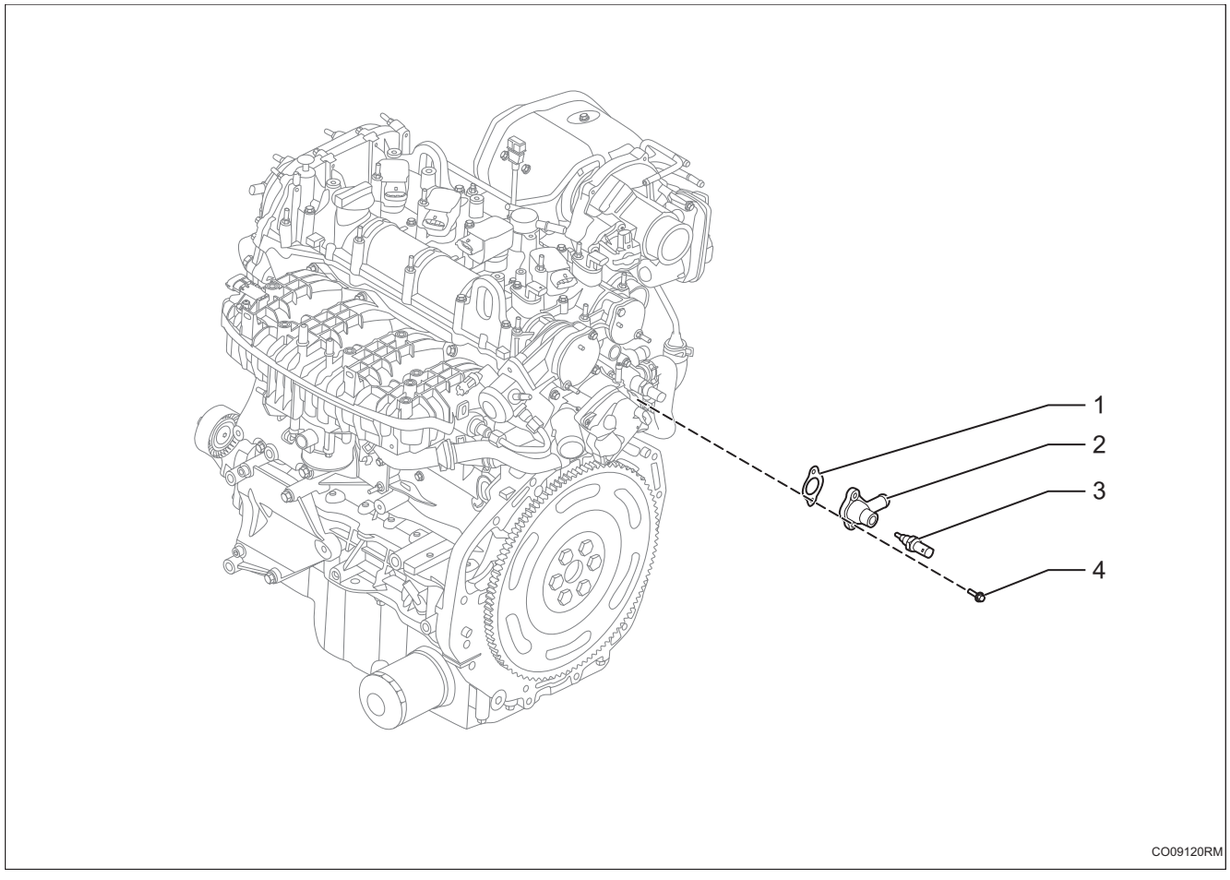
If the coolant level is low, add coolant to the expansion tank to the MAX line.



4. Check whether the coolant leaks

Coolant temperature sensor assembly

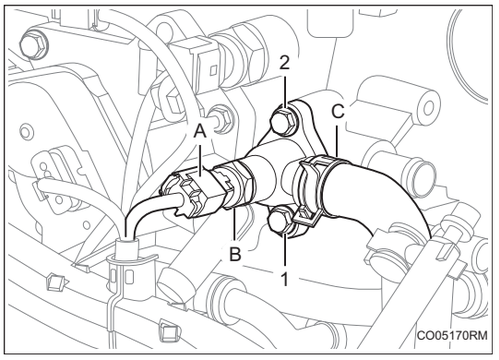
Parts



1. **Coolant pump inlet pipe seat gasket**
   - (Disposable part)
2. **Coolant pump inlet pipe seat**
3. **Coolant temperature sensor assembly**
   - Torque: 16~20 N · m
4. **Hexagon flange bolt**
   - X2
   - Torque: 8~12 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove coolant temperature sensor assembly**



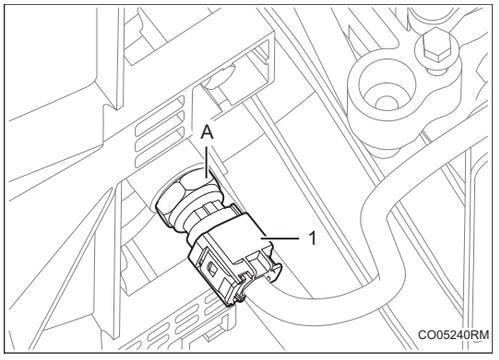
(a) Disconnect coolant temperature sensor assembly-A-.

(b) Remove coolant temperature sensor assembly-B-.

(c) Disconnect the coolant pump inlet pipe seat connecting water pipe -C-.

(d) Remove bolt -1-2-, and remove coolant pump inlet pipe seat.

3. **Remove radiator coolant temperature sensor**



(a) Disconnect the radiator coolant temperature sensor -1-.

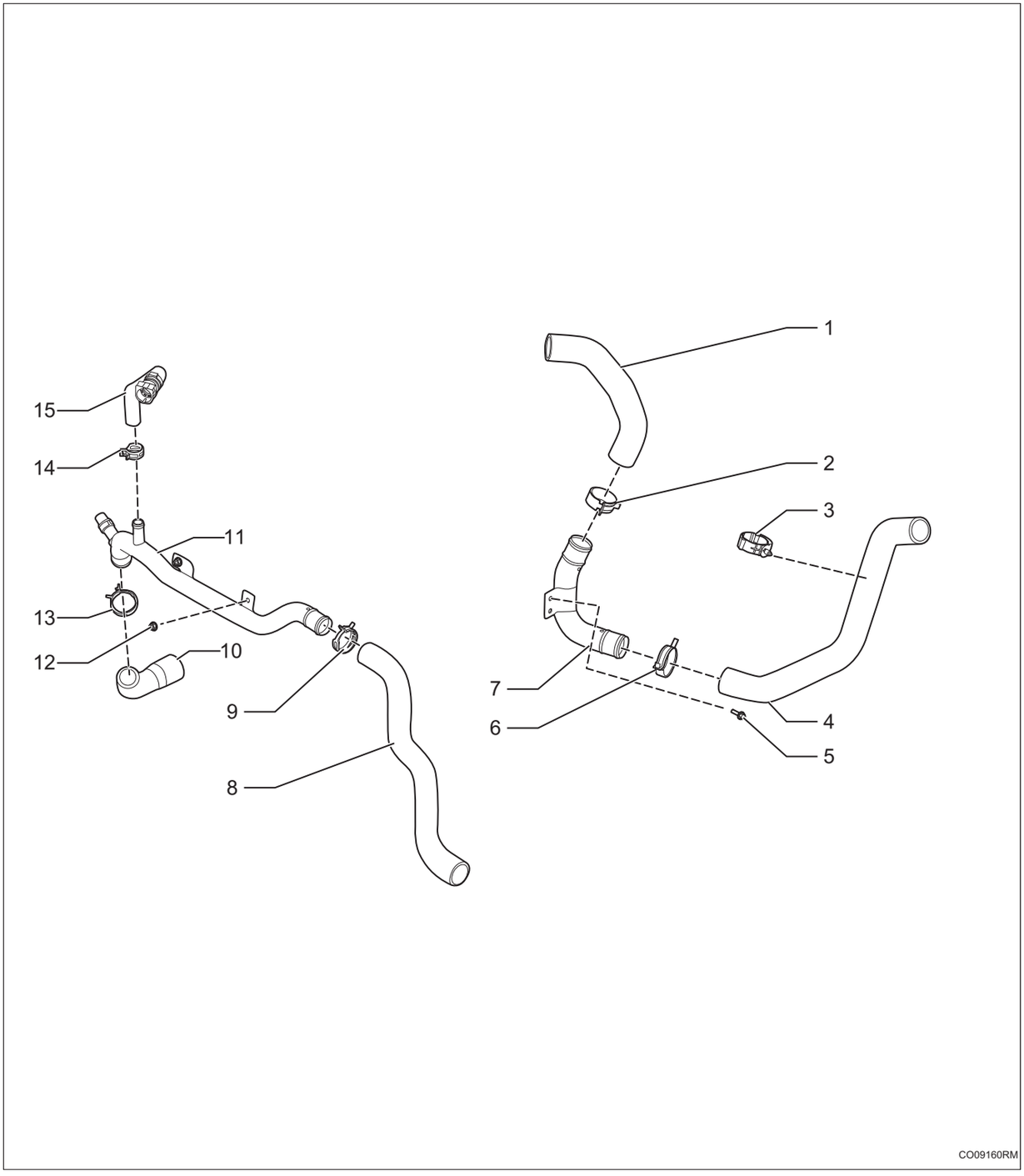
(b) Remove the radiator coolant temperature sensor-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Metal coolant pipe

Parts

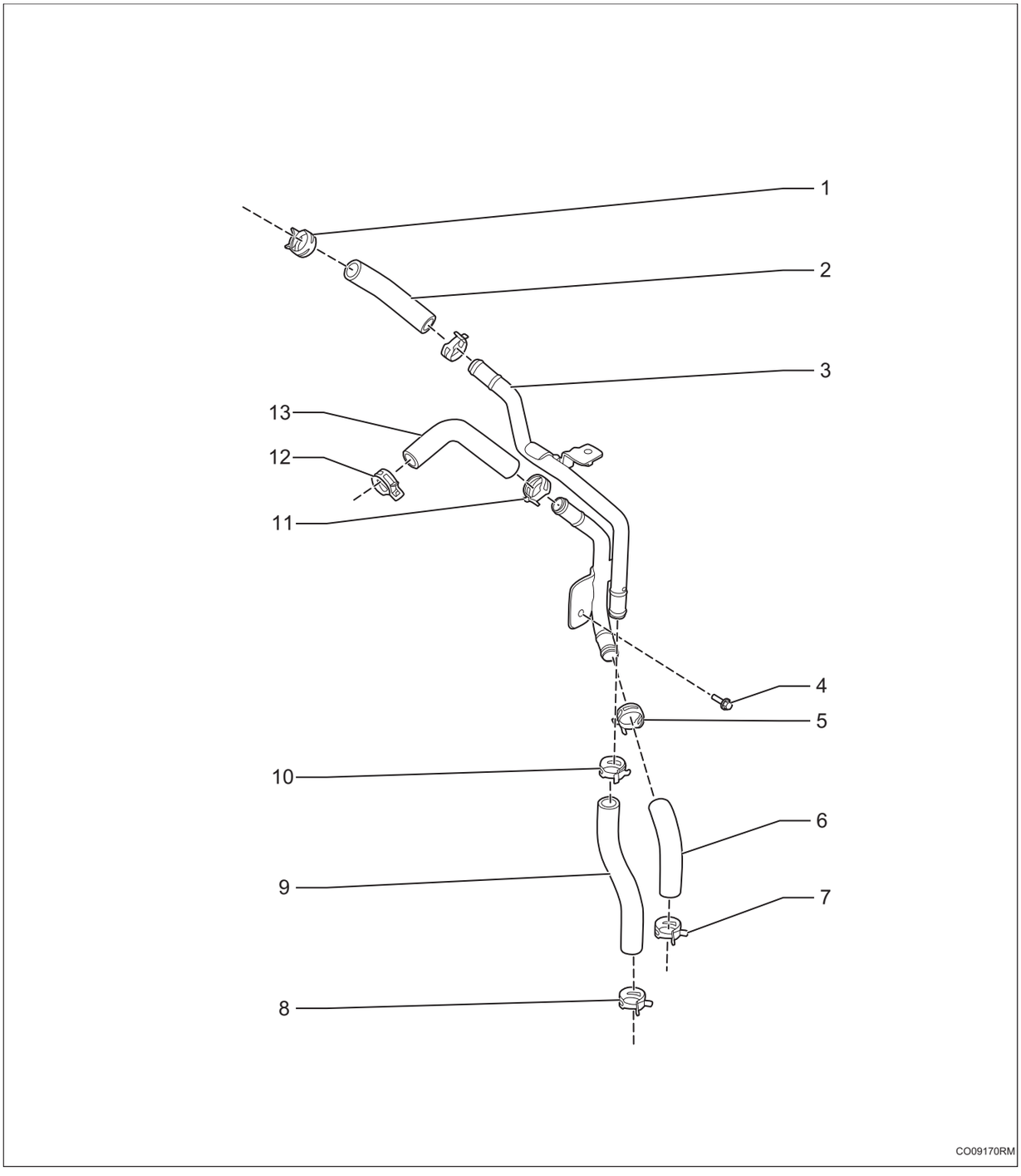


1. **Radiator coolant inlet hose II**
2. **Steel band spring hose clamp**
3. **Pipe clamp - single pipe clamp**
4. **Radiator coolant inlet hose I**
5. **Hexagon flange bolt**

- X2
- Torque: 8~12 N · m

6. **Steel band spring hose clamp**
7. **Radiator coolant inlet metal pipe assembly**
8. **Radiator water outlet hose**
9. **Steel band spring hose clamp**
10. **Engine water inlet hose**
11. **Radiator water outlet steel pipe assembly**
12. **Hexagon flange nut**
    - X2
    - Torque: 8~12 N · m
13. **Steel band spring hose clamp**
14. **Steel band spring hose clamp**
15. **Expansion tank water inlet hose**

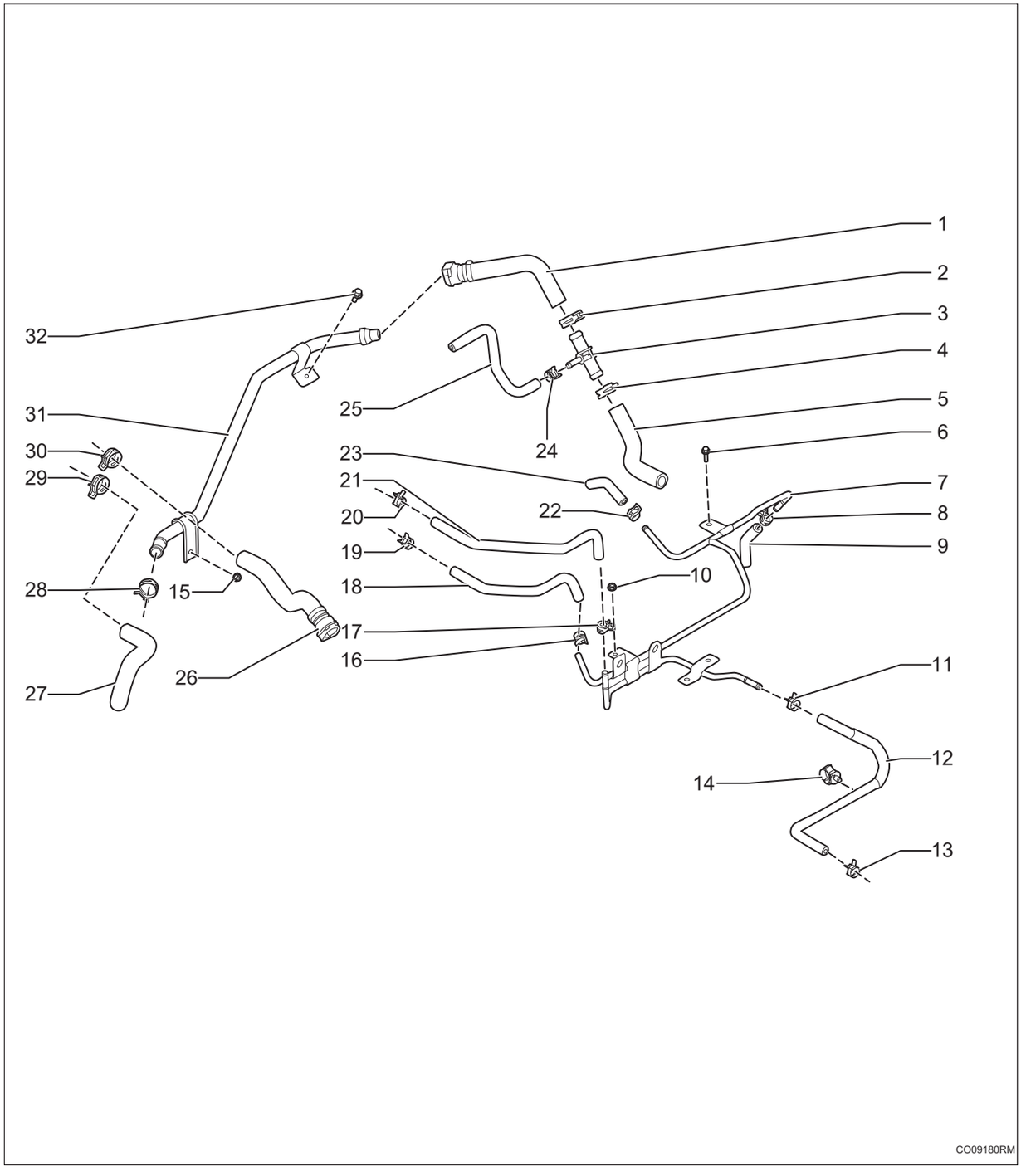
Parts



1. **Steel band spring hose clamp**
2. **Metal pipe water outlet hose**
3. **Transmission oil cooler metal pipe assembly**
4. **Hexagon flange bolt**
   - Torque: 8~12 N · m
5. **Steel band spring hose clamp**

6. **Transmission oil cooler water inlet hose**
7. **Steel band spring hose clamp**
8. **Steel band spring hose clamp**
9. **Transmission oil cooler water outlet hose**
10. **Steel band spring hose clamp**
11. **Steel band spring hose clamp**
12. **Steel band spring hose clamp**
13. **Metal pipe water inlet hose**

Parts



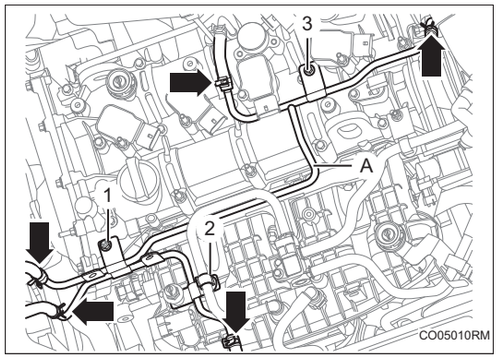
1. **Heater water inlet pipe II assembly**
2. **Steel band spring hose clamp**
3. **Tee**
4. **Steel band spring hose clamp**
5. **Heater water inlet pipe III**
6. **Hexagon flange bolt**

- Torque: 8~12 N · m

7. **Upper air return pipe assembly**
8. **Steel band spring hose clamp**
9. **Engine water outlet air return hose**
10. **Hexagon flange nut**
    - Torque: 8~12 N · m
11. **Steel band spring hose clamp**
12. **Radiator air return pipe**
13. **Steel band spring hose clamp**
14. **Pipe clamp - single pipe clamp**
15. **Hexagon flange nut**
    - Torque: 8~12 N · m
16. **Steel band spring hose clamp**
17. **Steel band spring hose clamp**
18. **Expansion tank water inlet hose II**
19. **Steel band spring hose clamp**
20. **Steel band spring hose clamp**
21. **Expansion tank water inlet hose I assembly**
22. **Steel band spring hose clamp**
23. **Cylinder head air return hose**
24. **Steel band spring hose clamp**
25. **Turbocharger water outlet hose**
26. **Heater water outlet pipe assembly**
27. **Heater water outlet pipe assembly**
28. **Turbocharger water outlet hose**
29. **Turbocharger water outlet hose**
30. **Turbocharger water outlet hose**
31. **Heater water inlet metal pipe assembly**
32. **Hexagon flange bolt**
    - Torque: 8~12 N · m

Removal

1. **Drain coolant (See page CO-2)**
2. **Remove the upper air return pipe assembly**

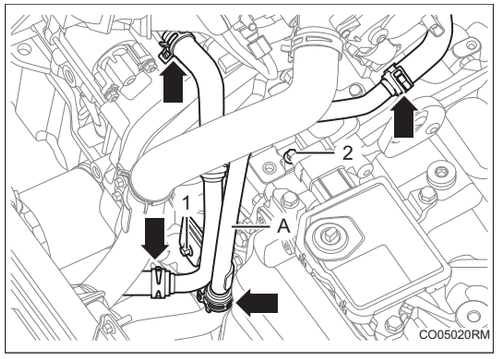


(a) Disconnect the coolant pipe as arrowed.

(b) Detach desorption pipe assembly fixing clamp -2-.

(c) Remove nut -1- and bolt -3-, and engine trim cover stay bar.

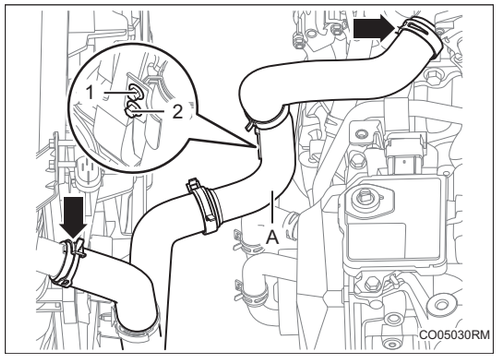
3. **Remove transmission oil cooler metal pipe assembly**



(a) Disconnect the connecting water pipe of the transmission oil cooler metal pipe assembly -arrow-.

(b) Remove bolts -1-2-, and remove transmission oil cooler metal pipe assembly-A-.

4. **Remove radiator coolant inlet metal pipe assembly**



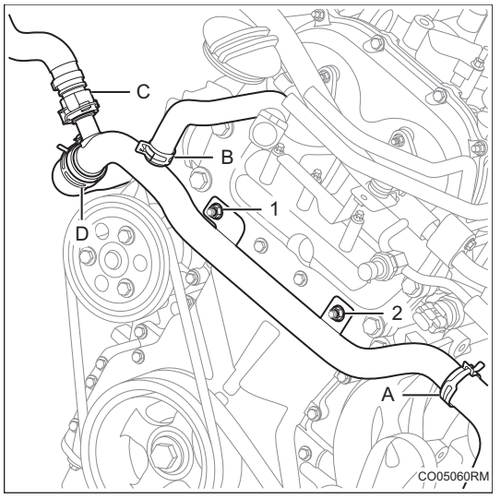
(a) Disconnect the radiator coolant inlet metal pipe assembly connecting water pipe -arrow-.

(b) Remove bolts -1-2-, and remove radiator coolant inlet metal pipe assembly-A-.

CO

5. Remove powertrain right suspension assembly (See page EM-8)

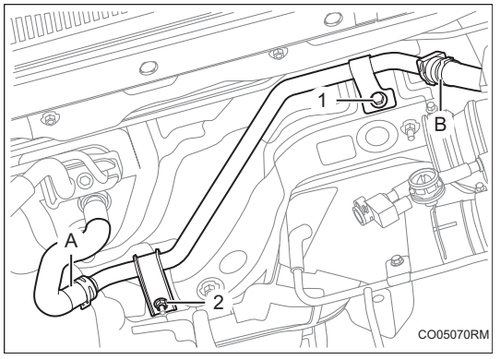
6. Remove radiator water outlet steel pipe assembly



(a) Disconnect the radiator water outlet steel pipe assembly connecting water pipe -A-D-.

(b) Remove bolts -1-2-, and remove radiator coolant outlet steel pipe assembly.

7. Remove heater water inlet metal pipe assembly



(a) Disconnect the heater water inlet metal pipe assembly connecting water pipe -A-B-.

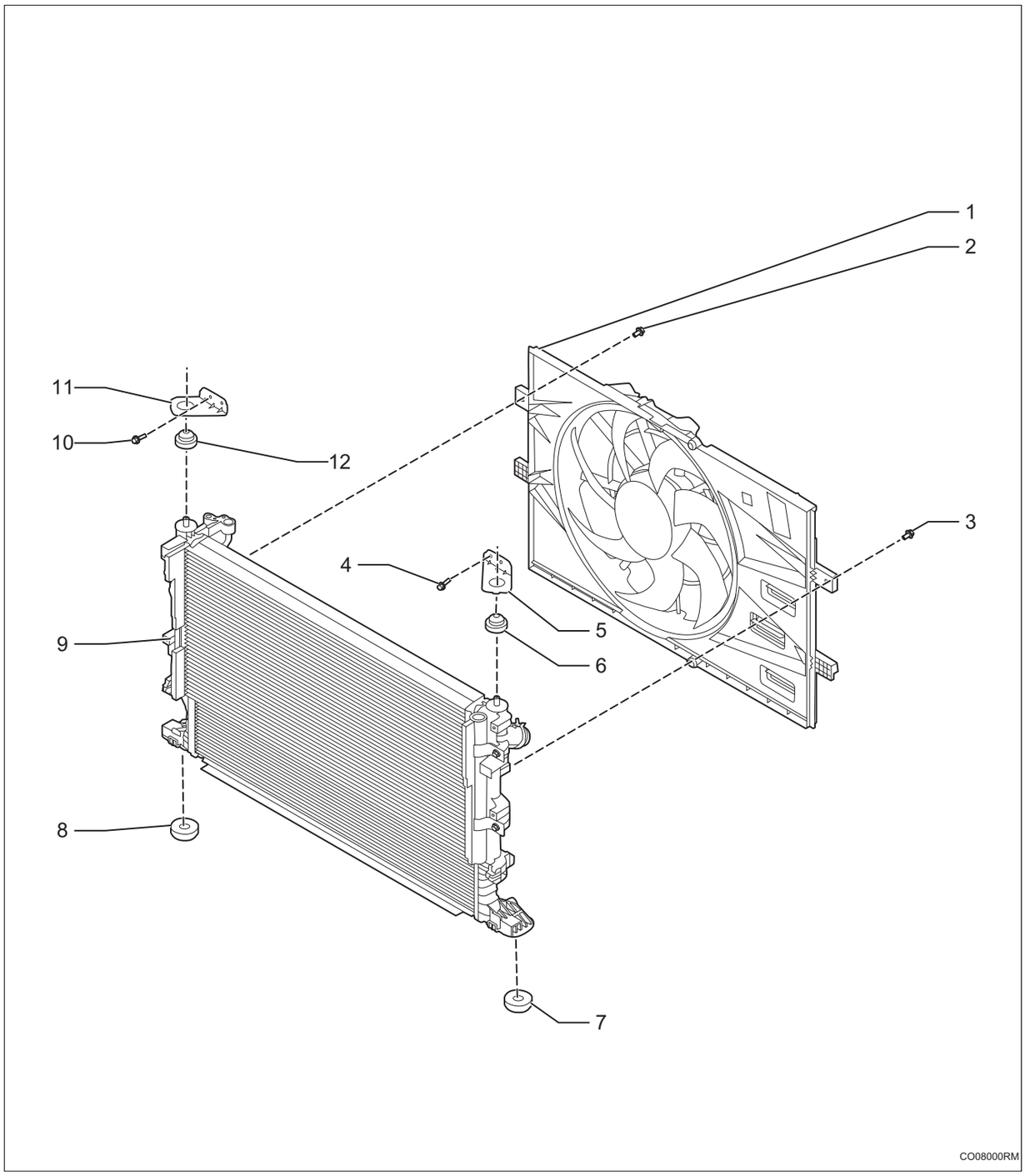
(b) Remove bolt -1- and nut -2-, and remove the heater water inlet metal pipe assembly.

Installation

1. The installation procedure is the reverse of removal procedure.

Radiator assembly

Parts

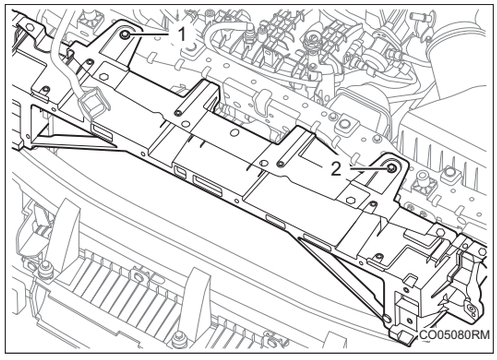


1. **Electronic fan assembly**
2. **Hexagon flange bolt**
   - Torque: 4~6 N · m
3. **Hexagon flange bolt**
   - Torque: 4~6 N · m

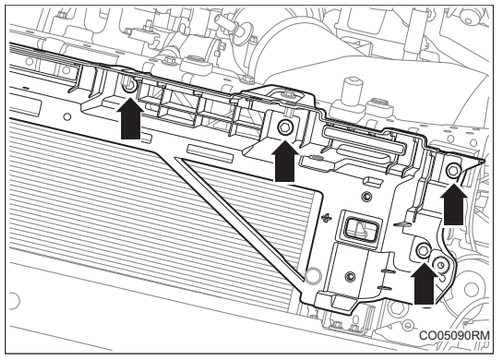
4. **Hexagon flange bolt**
   - X2
   - Torque: 8~10 N · m
5. **Radiator left suspension bracket**
6. **Radiator upper suspension**
7. **Radiator lower suspension**
8. **Radiator lower suspension**
9. **Radiator assembly**
10. **Hexagon flange bolt**
    - X2
    - Torque: 8~10 N · m
11. **Radiator right suspension bracket**
12. **Radiator upper suspension**

Removal

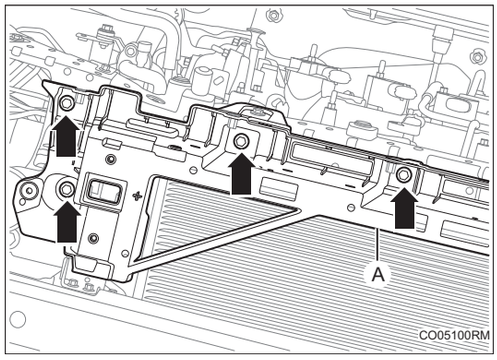
1. **Remove front bumper cover (See page ET-7)**
2. **Drain coolant (See page CO-2)**
3. **Remove condenser assembly (See page AC-135)**
4. **Remove intercooler assembly (See page IT-15)**
5. **Remove coolant temperature sensor assembly (See page CO-6)**
6. **Remove front bumper upper bracket I**



(a) Remove the fixing bolt -1-2- of the front bumper upper bracket I.



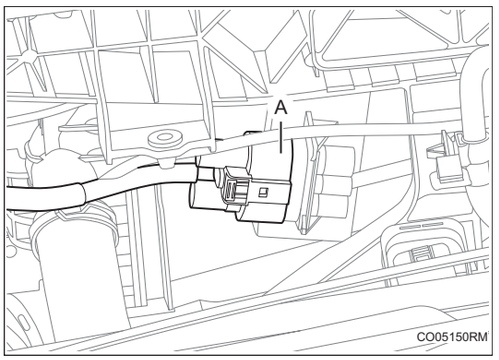
(b) Remove the left fixing bolt of the front bumper upper bracket I-arrow-.



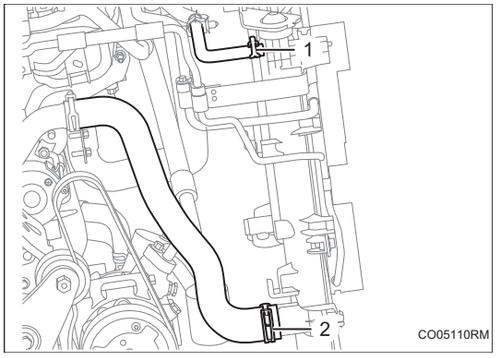
(c) Remove bolt as arrowed and remove the front bumper upper bracket I-A-.

7. **Remove radiator assembly**

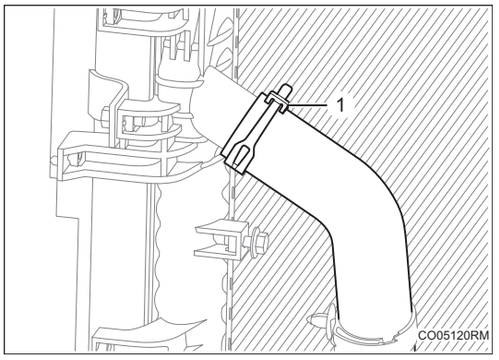
CO



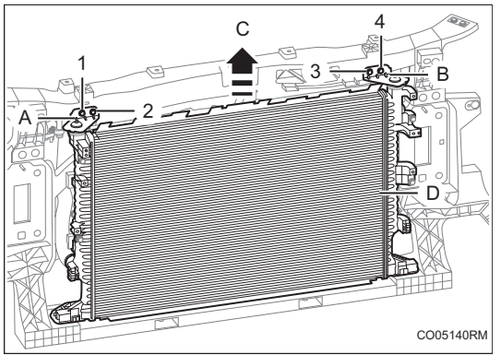
(a) Disconnect the electronic fan assembly harness connector-A-.



(b) Disconnect the radiator assembly connecting coolant pipe -1-2-.

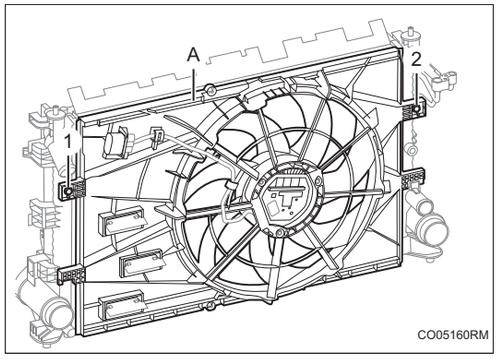


(c) Disconnect radiator assembly connecting coolant pipe -1-.



(d) Remove bolt -1-4-, and remove radiator mounting bracket-A-B-.

(e) Take out the radiator and electronic fan assembly-D- in the direction of arrow C.



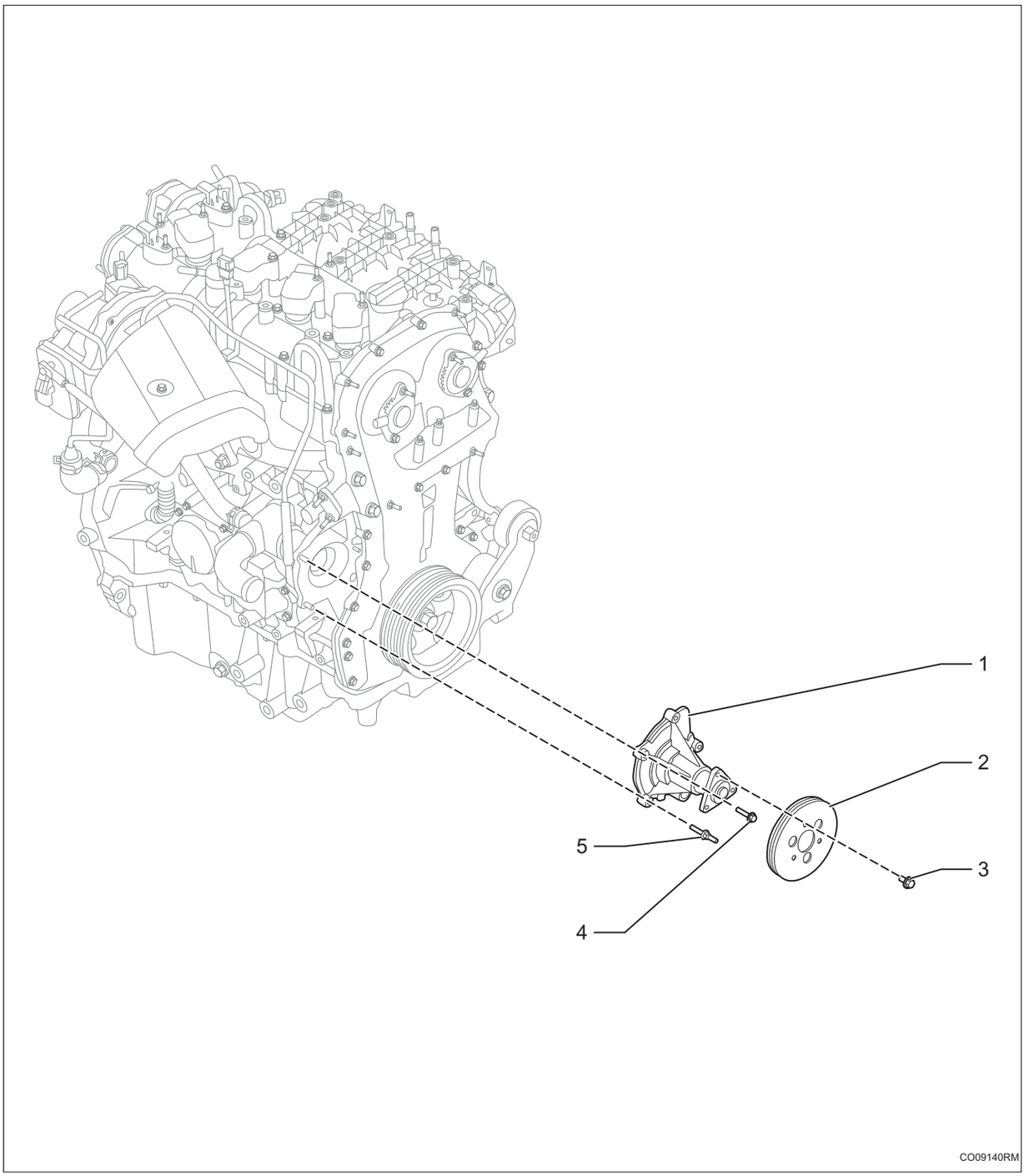
(f) Remove bolt -1-2- and remove electronic fan assembly-A-.

Installation

1. The installation procedure is the reverse of removal procedure.

Coolant pump assembly

Parts



1. **Coolant pump assembly**
2. **Coolant pump pulley**
3. **Hexagon flange bolt**
   - X3
   - Torque: 18~22 N · m

4. Hexagon flange bolt

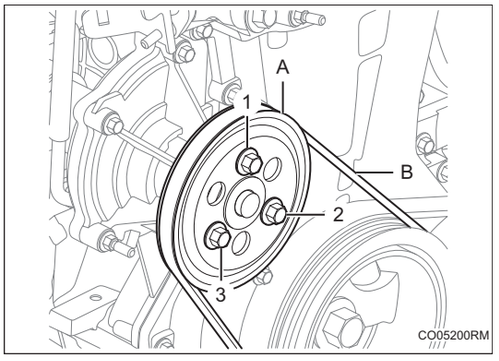
- X4
- Torque: 8~12 N · m

5. Stud

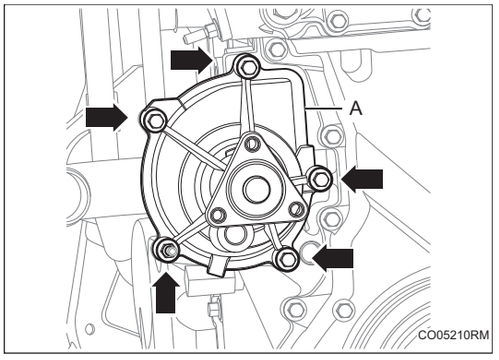
- Torque: 8~12 N · m

Removal

1. **Drain coolant (See page CO-2)**
2. **Remove coolant pump assembly**



(a) Remove the bolt -1-3-, and remove the coolant pump pulley-A- and belt-B-.



(b) Remove the bolt -arrow-, and remove the coolant pump assembly -A-.

Installation

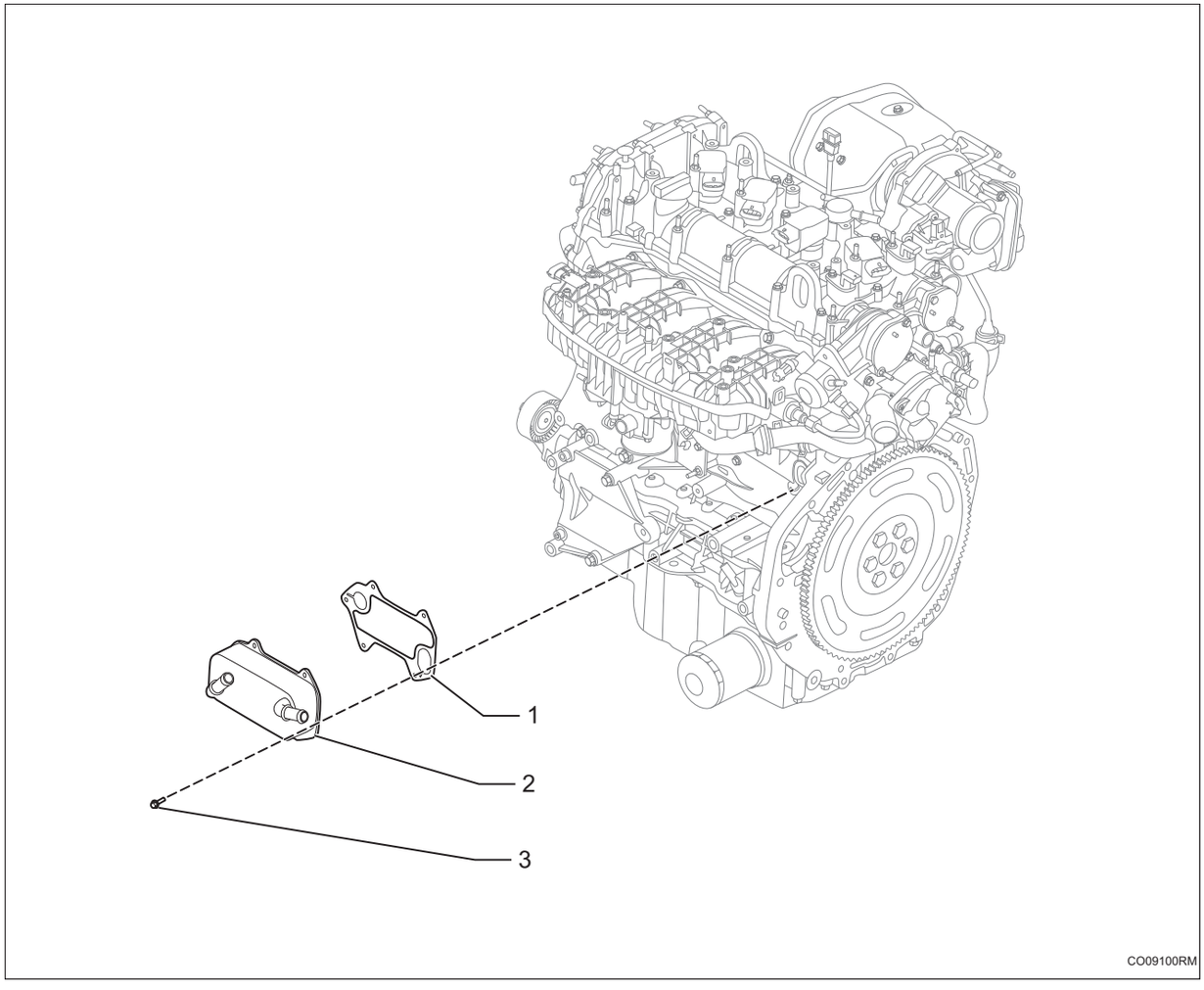
1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

   Caution:

   Renew the coolant pump shim.

Oil cooler assembly

Parts



1. Oil cooler gasket assembly

- (Disposable part)
- Apply lubricating oil on both sides of the oil cooler gasket assembly before installation

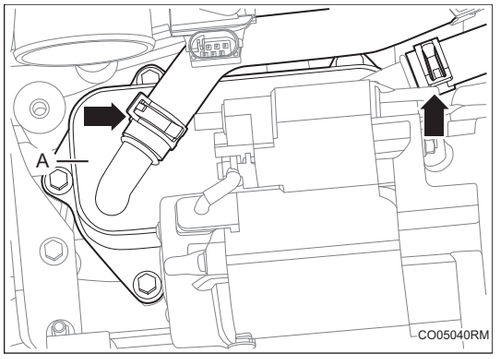
2. Oil cooler assembly

3. Hexagon flange bolt

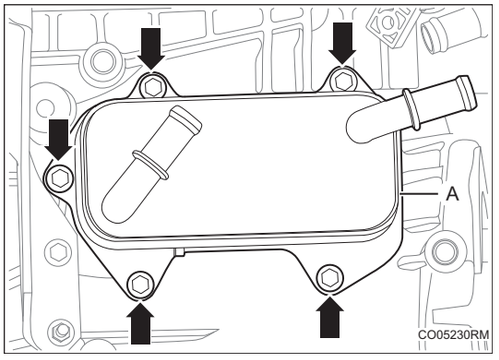
- X5
- Torque: 8~12 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove engine bottom guard plate assembly (See page ET-34)**
3. **Remove catalytic converter weldment (See page EX-4)**
4. **Drain coolant (See page CO-2)**
5. **Remove the starter (See page ST-3)**
6. **Remove oil cooler assembly**



(a) Disconnect the connecting water pipe as arrowed of oil cooler assembly -A-.



(b) Remove bolts -1-5-, and remove oil cooler assembly-A-.

Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

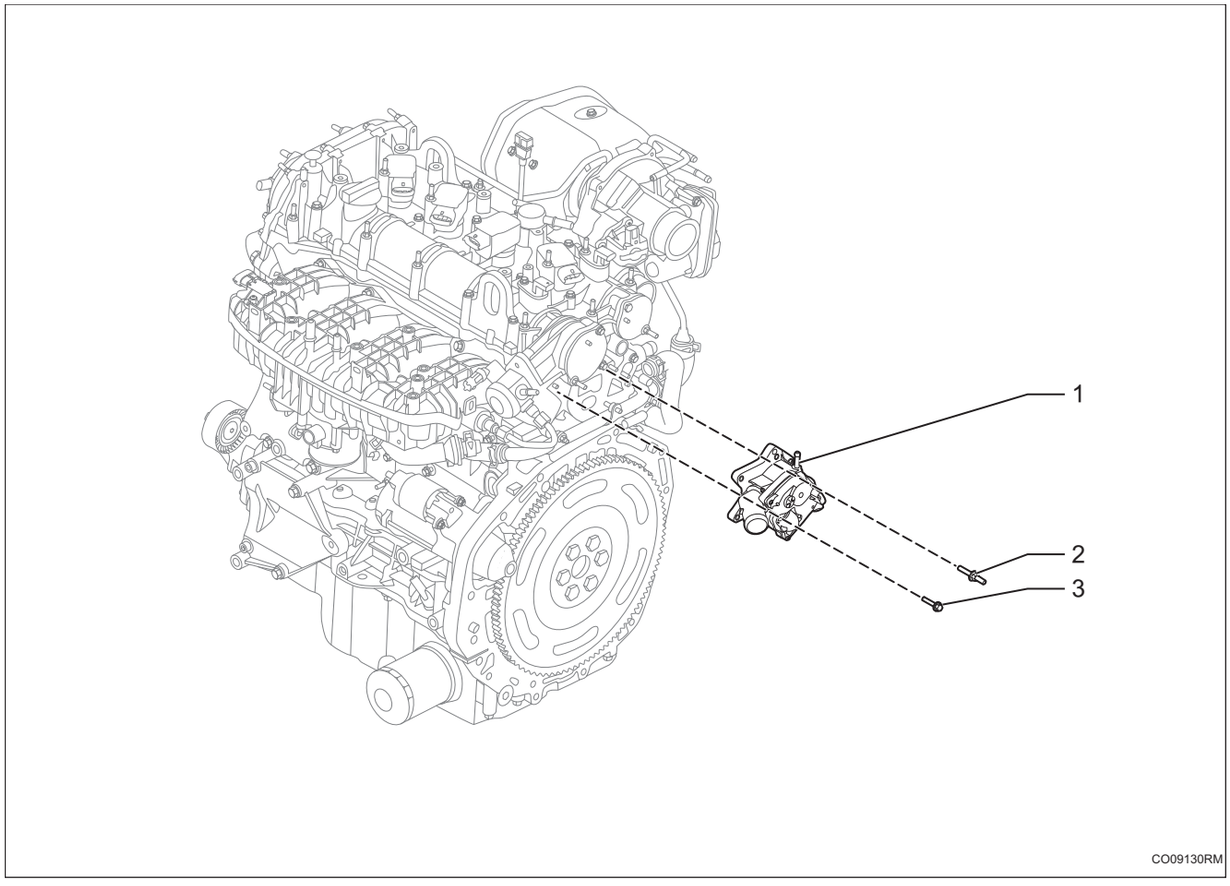
   Caution:

   Make sure that the seal ring is installed in the correct position, otherwise the oil may leak.

   Do not twist the seal ring.

Thermal management module assembly

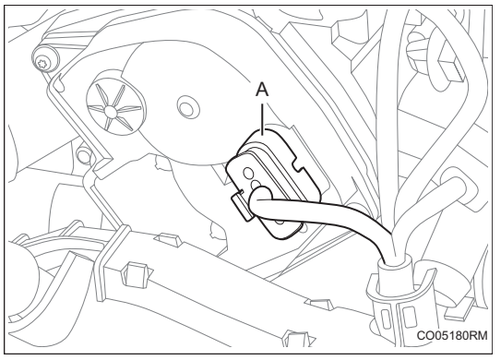
Parts



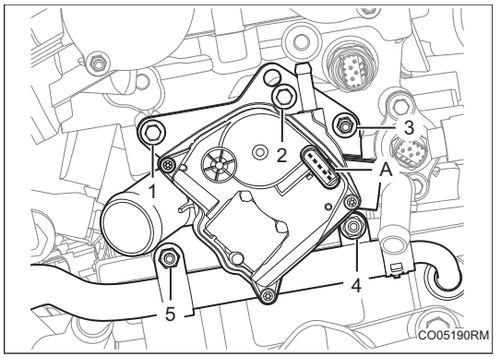
1. **Thermal management module**
2. **Stud**
   - X2
   - Torque: 8~12 N · m
3. **Hexagon flange nut**
   - X3
   - Torque: 8~12 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Drain coolant (See page CO-2)**
3. **Remove thermal management module assembly**



(a) Disconnect the harness connector-A-.



(b) Remove the bolt -1-3-.

(c) Remove the nuts -4-5-, detach the breather pipe and remove the bolts -4-5- again.

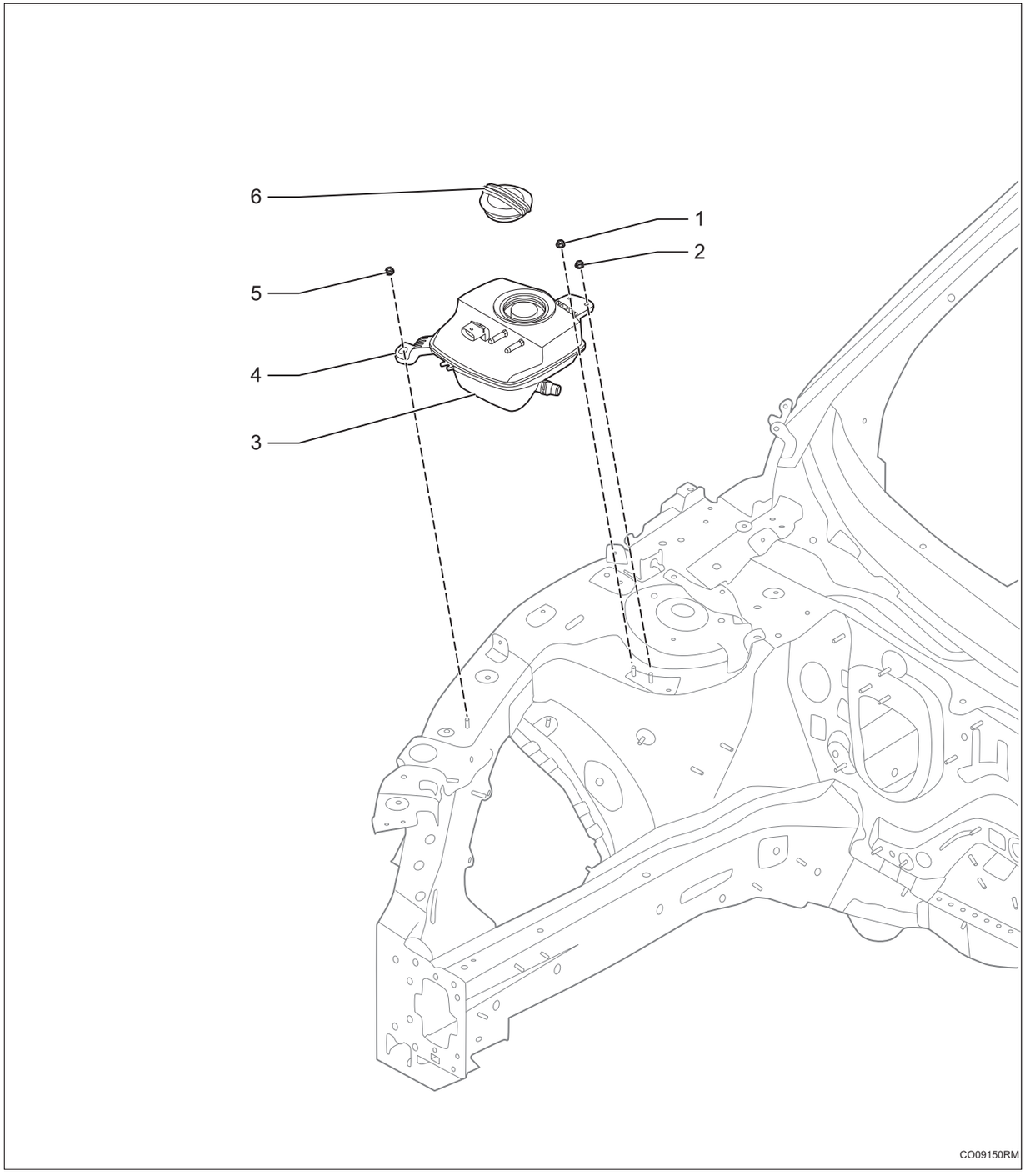
(d) Remove thermal management module assembly-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Expansion tank

Parts

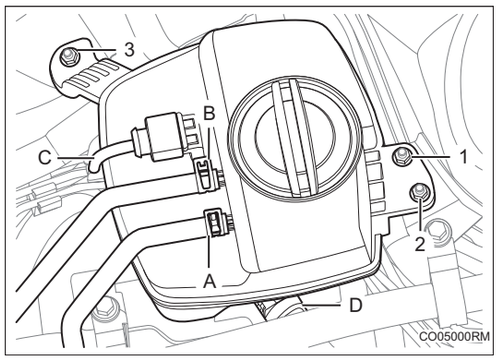


1. **Hexagon flange nut**
   - Torque: 4~6 N · m
2. **Hexagon flange nut**
   - Torque: 4~6 N · m
3. **Expansion tank assembly**

4. **Hexagon flange nut**
   - Torque: 4~6 N · m
5. **Pressure cap assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove expansion tank**



   (a) Detach expansion tank connecting hose -A-B- and -D-.

   (b) Disconnect the harness connector-C-.

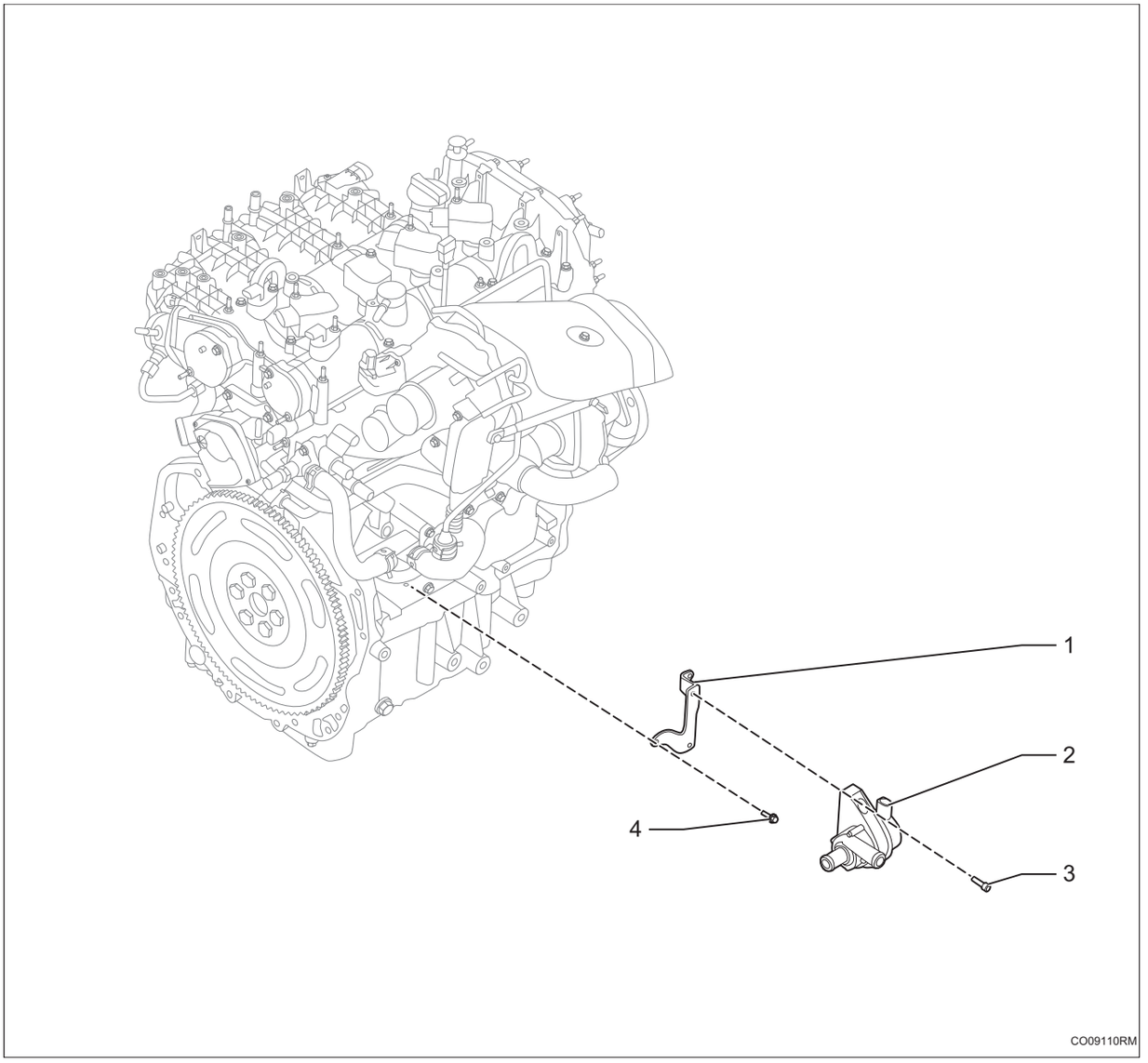
   (c) Remove the nut -1-3-, and remove the expansion tank.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Additional coolant pump assembly

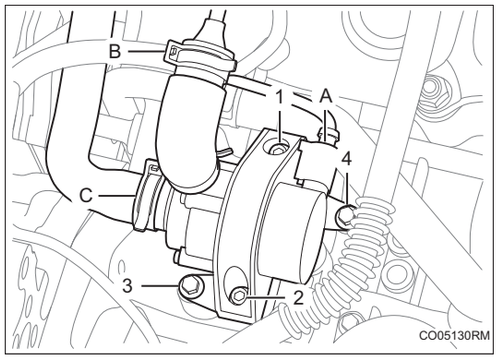
Parts



1. **Additional coolant pump bracket**
2. **Additional coolant pump assembly**
3. **Hexagon socket head cap screw**
   - X2
   - Torque: 6~10 N · m
4. **Hexagon flange bolt**
   - X2
   - Torque: 8~12 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Drain coolant (See page CO-2)**
3. **Remove additional coolant pump assembly**



(a) Disconnect the harness connector-A-.

(b) Detach additional coolant pump connecting hose -B-C-.

(c) Remove bolt -1-2-, and remove additional coolant pump assembly.

(d) Remove bolt -3-4-, and remove additional coolant pump bracket.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Low-temperature cooling system

Coolant CO-1
On-board inspection CO-1
Replace CO-1
Low-temperature coolant temperature sensor assembly CO-3
Parts CO-3
Removal CO-4
Installation CO-4
Low-temperature radiator CO-5
Parts CO-5
Removal CO-6
Installation CO-6
Low-temperature radiator water inlet pipe assembly CO-7
Parts CO-7
Removal CO-9
Installation CO-9
Coolant pipe under floor CO-10
Parts CO-10
Removal CO-12
Installation CO-13
Electric coolant pump assembly CO-14
Parts CO-14
Removal CO-15
Installation CO-15
Motor rear metal pipe assembly CO-16
Parts CO-16
Removal CO-18
Installation CO-18
Expansion tank CO-19
Parts CO-19
Removal CO-20
Installation CO-20
Metal water pipe I assembly CO-21
Parts CO-21
Removal CO-23
Installation CO-23

Coolant

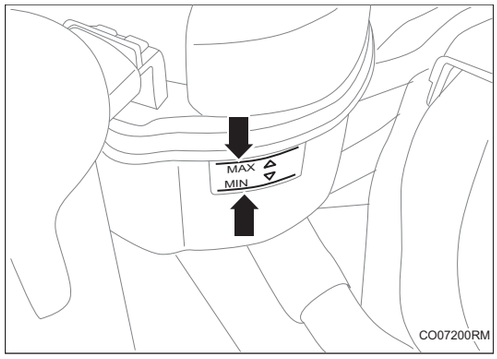
On-board inspection

1. Check whether the coolant leaks

Hint:

To avoid scalding, do not remove the expansion tank pressure cap while the coolant and radiator assembly are still hot. Thermal expansion will lead to hot coolant to overflow from the evaporator expansion tank.

2. Check reservoir coolant level



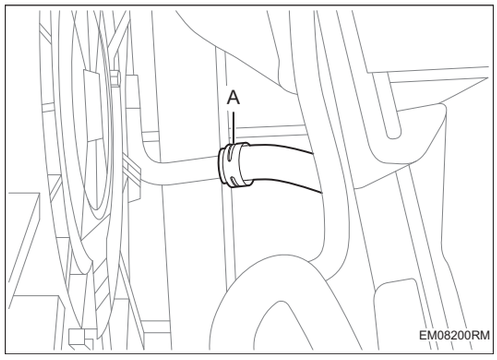
(a) In cold state, the coolant level shall be between the MAX and MIN scale marks.

Hint:

If the coolant level is lower than the MIN mark, check whether the coolant is leaking, and add the special coolant to the MAX mark line.

Replace

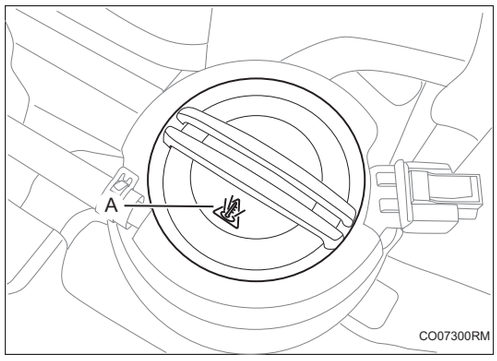
1. Drain the motor system coolant



(a) Detach the low-temperature radiator lower coolant pipe -A-, and use an air pump to inflate the pipe to drain the motor system coolant.

Hint:

Collect the coolant in a container for scrapping according to the local regulations.

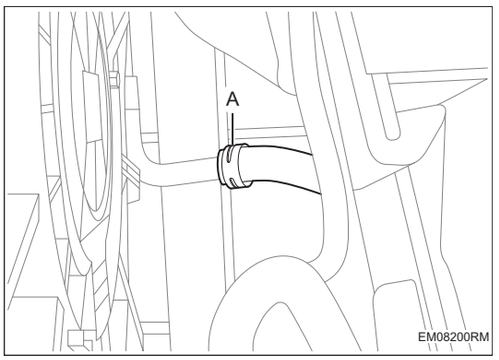


(b) Remove the expansion tank pressure cap-A-.

Hint:

- Do not remove the expansion tank pressure cap when it has not cooled down.
- Pressurized hot coolant and steam may be released and cause severe scalding.

2. Add coolant

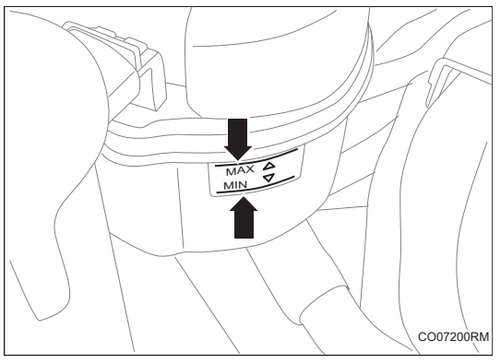


(a) Connect low-temperature radiator lower coolant pipe -1-.

(b) Add special coolant to the expansion tank filler.

Standard capacity	Coolant grade
5.6±0.2 (L)	(G30-91) Long-life coolant

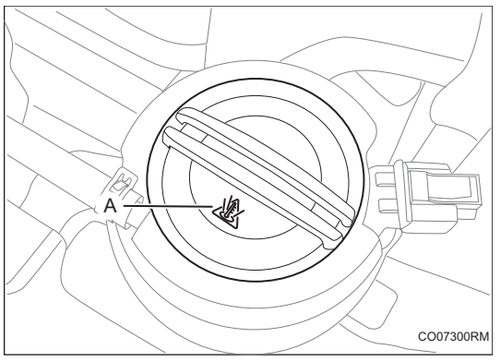
(c) Connect the HQ-VDS and turn on the motor system filling mode. The motor coolant pump will rotate for 10 minutes. As the coolant level drops, it is necessary to replenish the coolant in time to ensure filling up.



(d) Check and confirm that the coolant level is between the MAX and MIN scale marks.

Hint:

If the coolant level is low, add coolant to the expansion tank to the MAX line.

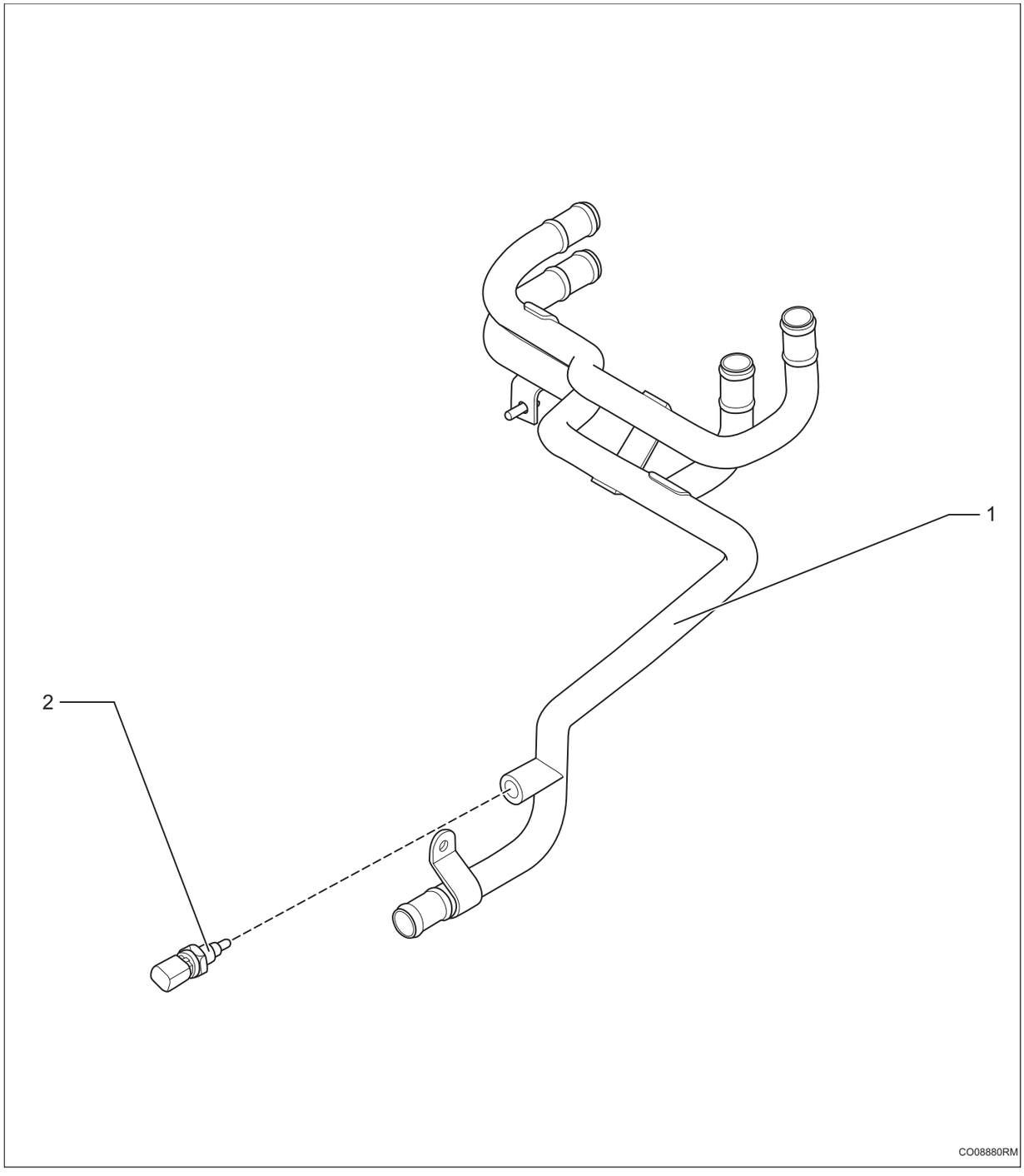


(e) Install expansion tank pressure cap -A-.

3. Check whether the coolant leaks

Low-temperature coolant temperature sensor assembly

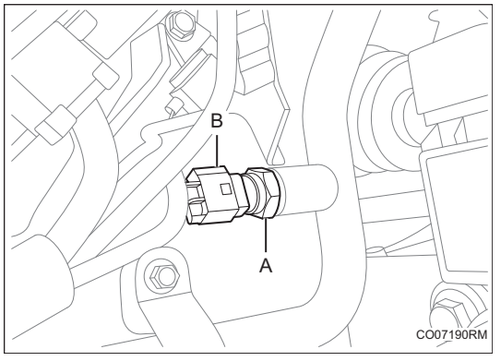
Parts



1. **Motor rear metal pipe assembly**
2. **Coolant temperature sensor assembly**
   - Torque: 16~20 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove engine bottom guard plate (See page ET-34)**
3. **Remove coolant temperature sensor assembly**



(a) Disconnect the coolant temperature sensor assembly harness connector-B-.

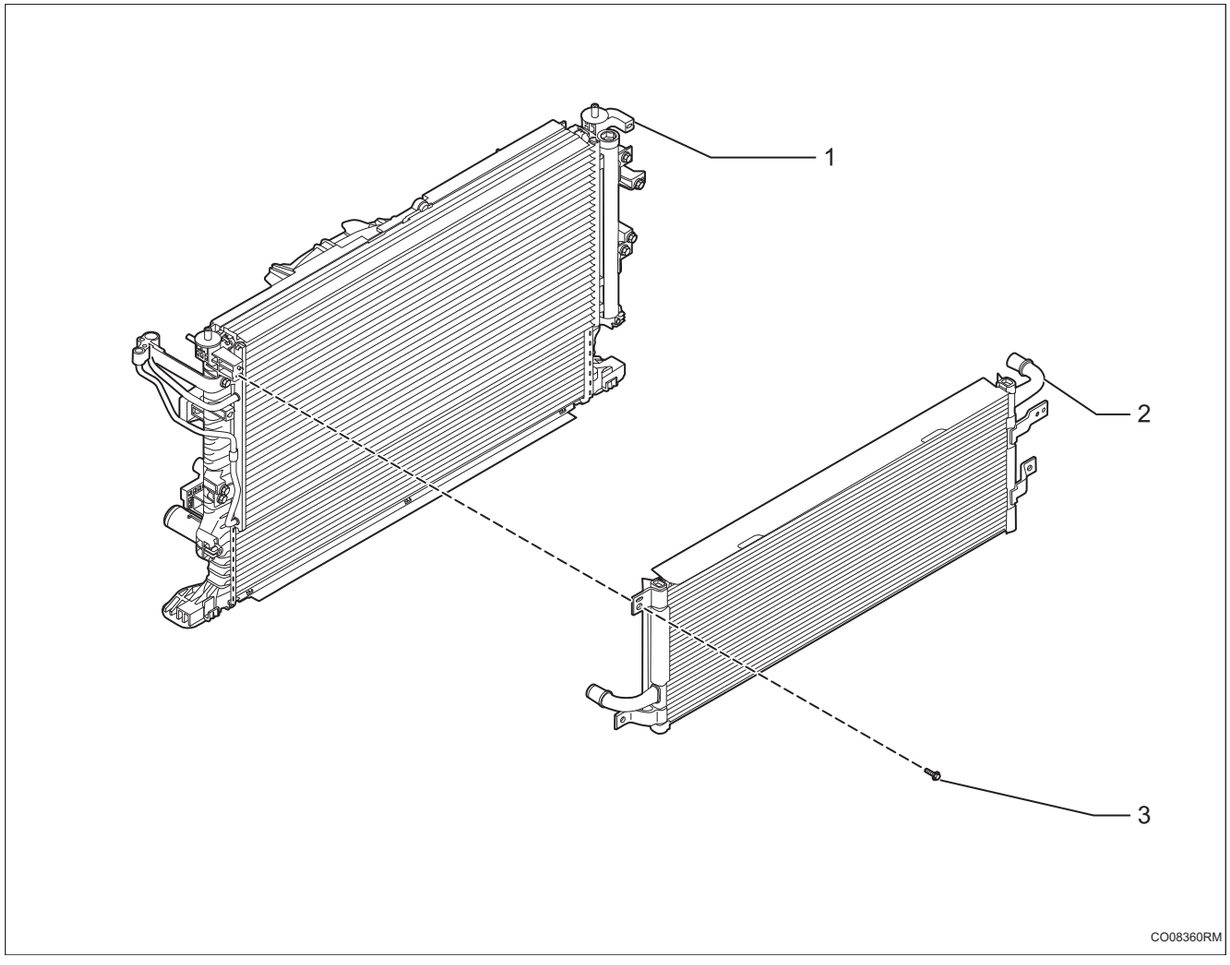
(b) Remove coolant temperature sensor assembly-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Low-temperature radiator

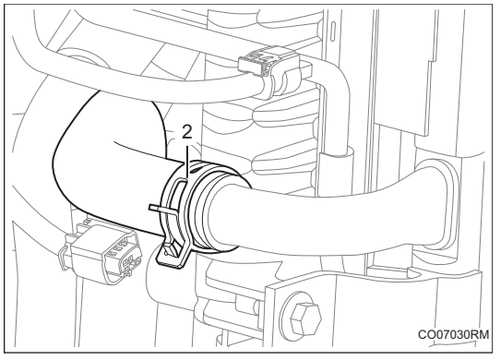
Parts



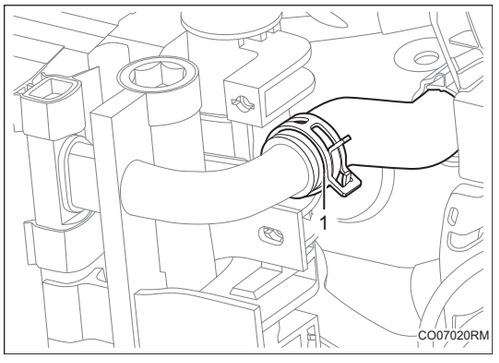
1. **Radiator assembly**
2. **Low-temperature radiator assembly**
3. **Hexagon flange bolt**
   - X4
   - Torque: 4~6 N · m

Removal

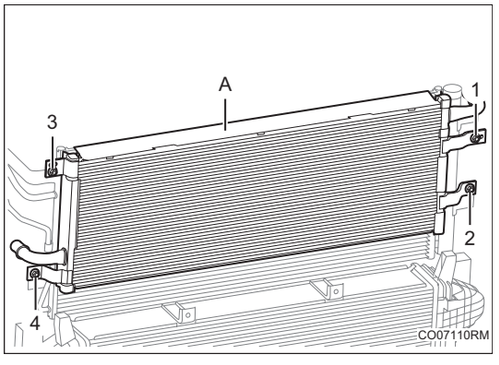
1. **Remove front bumper cover (See page ET-7)**
2. **Remove engine bottom guard plate (See page ET-34)**
3. **Drain coolant (See page CO-1)**
4. **Remove low-temperature radiator**



(a) Disconnect the low-temperature radiator coolant inlet hose -2-.



(b) Disconnect the low-temperature radiator water outlet hose -1-.



(c) Remove bolt -1-4- and remove low-temperature radiator-A-.

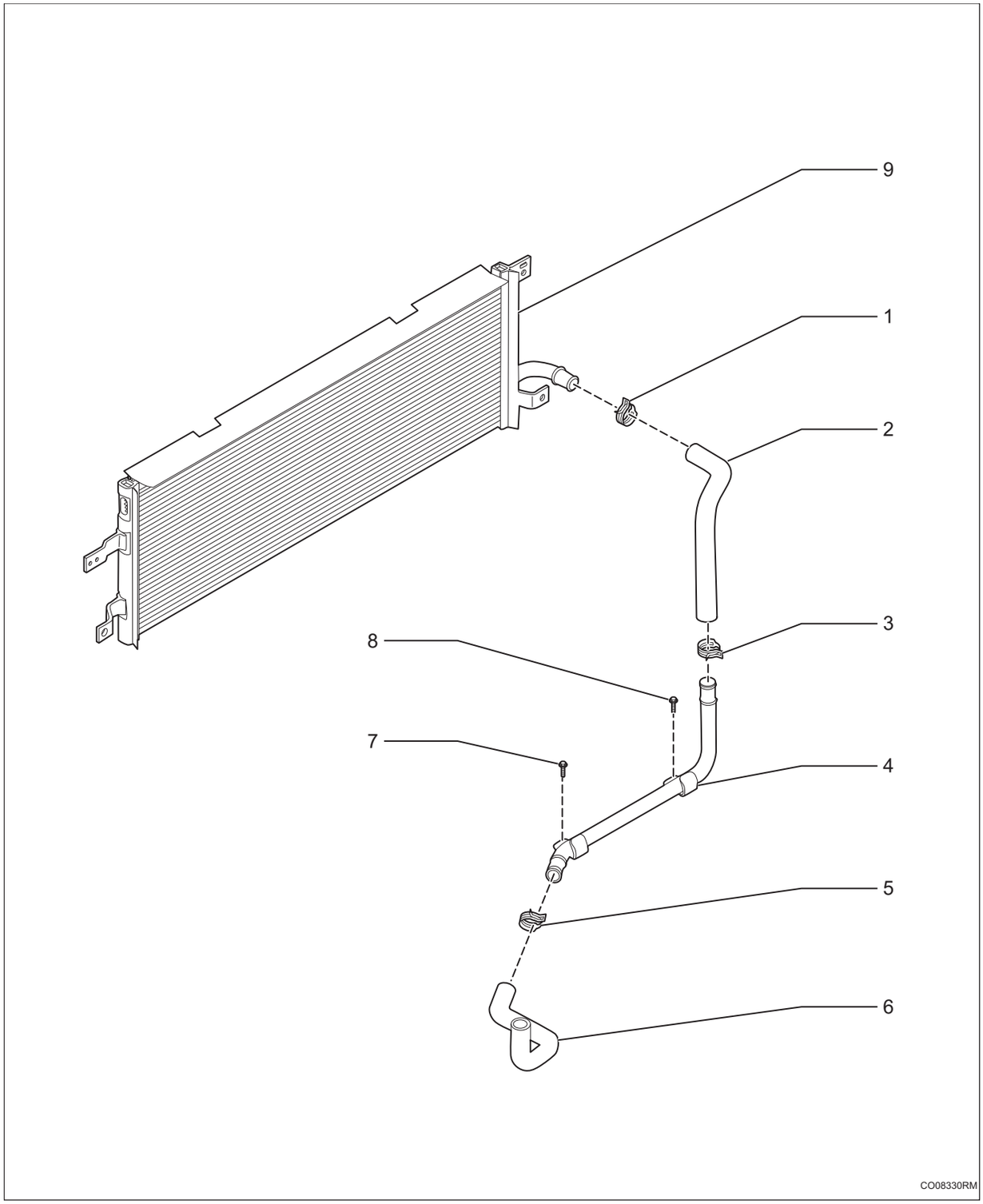
CO

Installation

1. **The installation procedure is the reverse of removal procedure.**

Low-temperature radiator water inlet pipe assembly

Parts

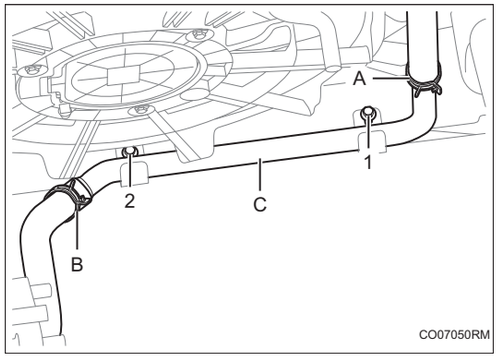


1. Steel band hose clamp

2. **Low-temperature radiator coolant inlet hose**
3. **Steel band hose clamp**
4. **Metal water pipe II assembly**
5. **Steel band hose clamp**
6. **Connecting pipe I**
7. **Hexagon flange bolt**
   - Torque: 8~12 N · m
8. **Hexagon flange bolt**
   - Torque: 8~12 N · m
9. **Low-temperature radiator**

Removal

1. **Remove engine bottom guard plate (See page ET-34)**
2. **Drain coolant (See page CO-1)**
3. **Remove low-temperature radiator water inlet pipe assembly**



(a) Detach water pipe -A-B-.

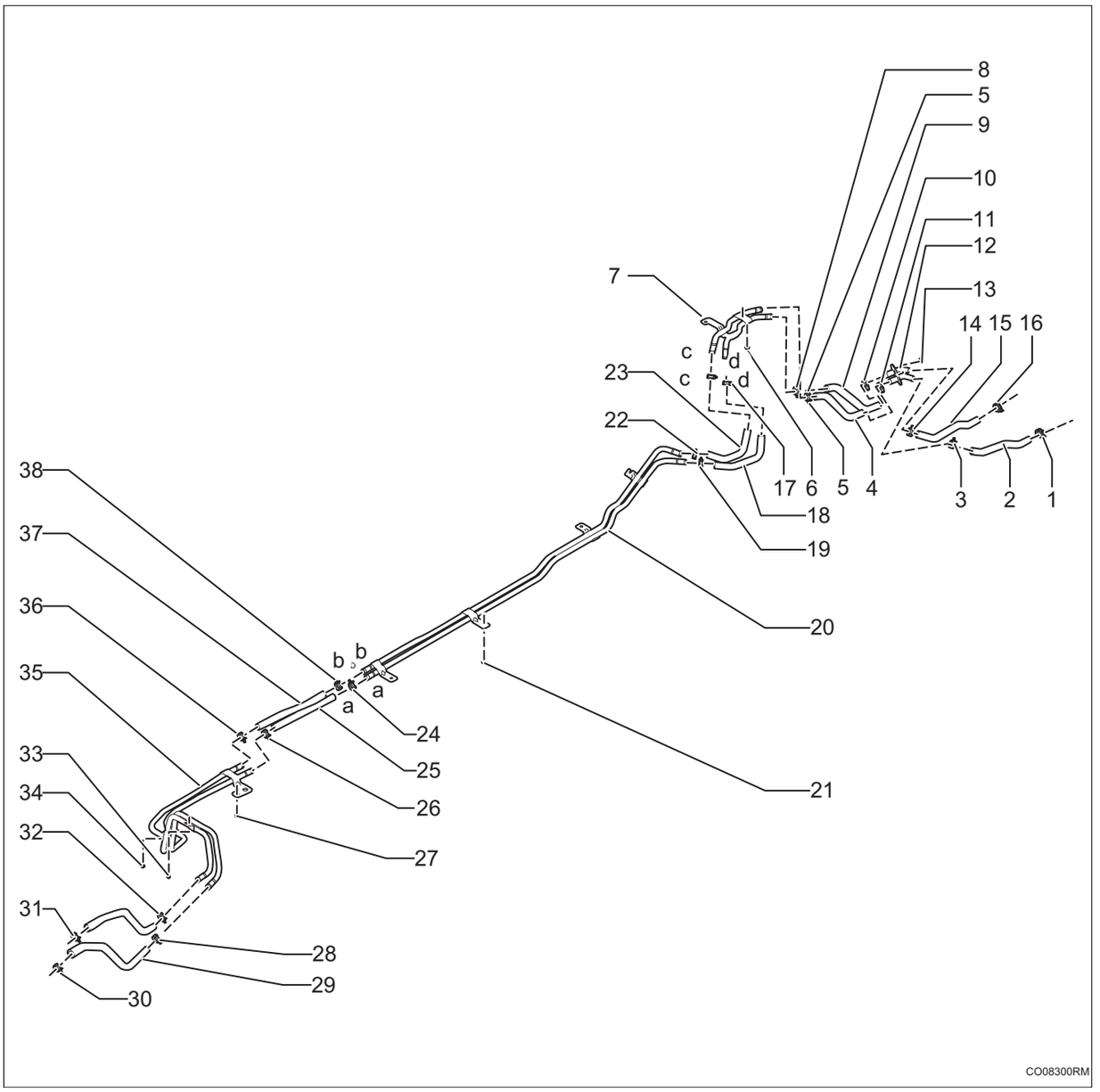
(b) Remove bolts -1-2-, and remove low-temperature radiator coolant inlet pipe assembly-C-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Coolant pipe under floor

Parts

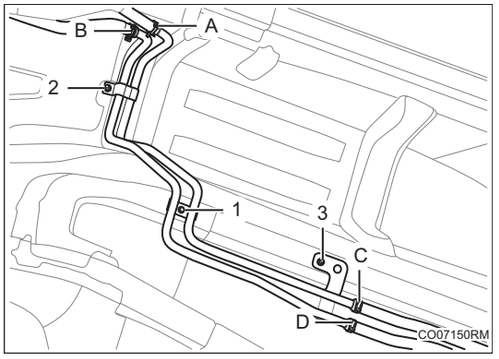


1. **Steel band hose clamp**
2. **DCDC water outlet hose behind adapter**
3. **Steel band hose clamp**
4. **Underfloor metal pipe assembly I**
5. **Steel band hose clamp**
6. **Hexagon flange nut**
   - Torque: 8~12 N · m
7. **Rear floor lower metal pipe assembly**
8. **Steel band hose clamp**

9. **Adapter front DCDC water inlet hose assembly**
10. **Steel band hose clamp**
11. **Steel band hose clamp**
12. **Joint assembly-floor adapter**
13. **Hexagon flange nut**
    - Torque: 8~12 N · m
14. **Steel band hose clamp**
15. **DCDC water inlet hose behind adapter**
16. **Steel band hose clamp**
17. **Steel band hose clamp**
    - X2
18. **DCDC water outlet hose under rear floor**
19. **Steel band hose clamp**
20. **Body metal pipe assembly II**
21. **Hexagon flange nut**
    - X4
    - Torque: 8~12 N · m
22. **Steel band hose clamp**
23. **DCDC water inlet hose under rear floor**
24. **Steel band hose clamp**
25. **DCDC water inlet hose under front floor**
26. **Steel band hose clamp**
27. **Hexagon flange nut**
    - Torque: 8~12 N · m
28. **Steel band hose clamp**
29. **DCDC water outlet hose assembly**
30. **Steel band hose clamp**
31. **Steel band hose clamp**
32. **Steel band hose clamp**
33. **Hexagon flange bolt**
    - Torque: 8~12 N · m
34. **Hexagon flange nut**
    - Torque: 8~12 N · m
35. **Body metal pipe assembly I**
36. **Steel band hose clamp**
37. **Front floor lower DCDC water outlet hose**
38. **Steel band hose clamp**

Removal

1. **Remove engine bottom guard plate (See page ET-34)**
2. **Drain coolant (See page CO-1)**
3. **Remove floor left bottom guard plate I (See page ET-34)**
4. **Remove the body metal pipe assembly I**

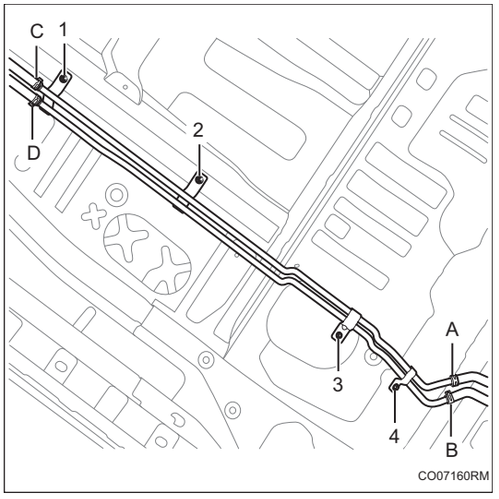


(a) Detach the steel band hose clamp -A-D-, and detach the DCDC inlet and water outlet hose assembly.

(b) Remove the nut -2-3- and the bolt -1-.

(c) Remove the body metal pipe assembly I.

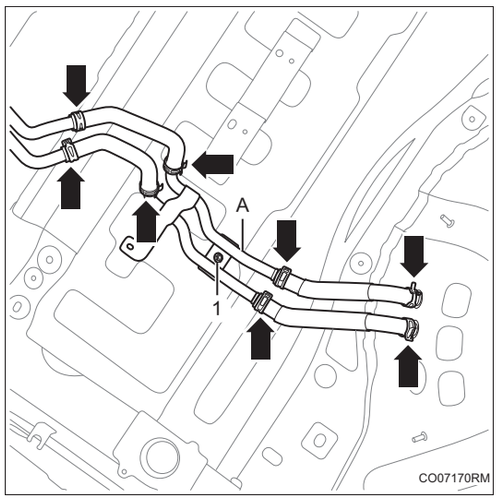
5. **Remove body metal pipe assembly II**



(a) Detach the steel band hose clamp -A-D-, and detach the DCDC inlet and water outlet hose assembly.

(b) Remove nuts -1-4-and remove body metal pipe assembly I.

6. **Remove rear floor lower metal pipe assembly**



(a) Detach the steel band hose clamp as arrowed, and detach the DCDC inlet and water outlet hose assembly.

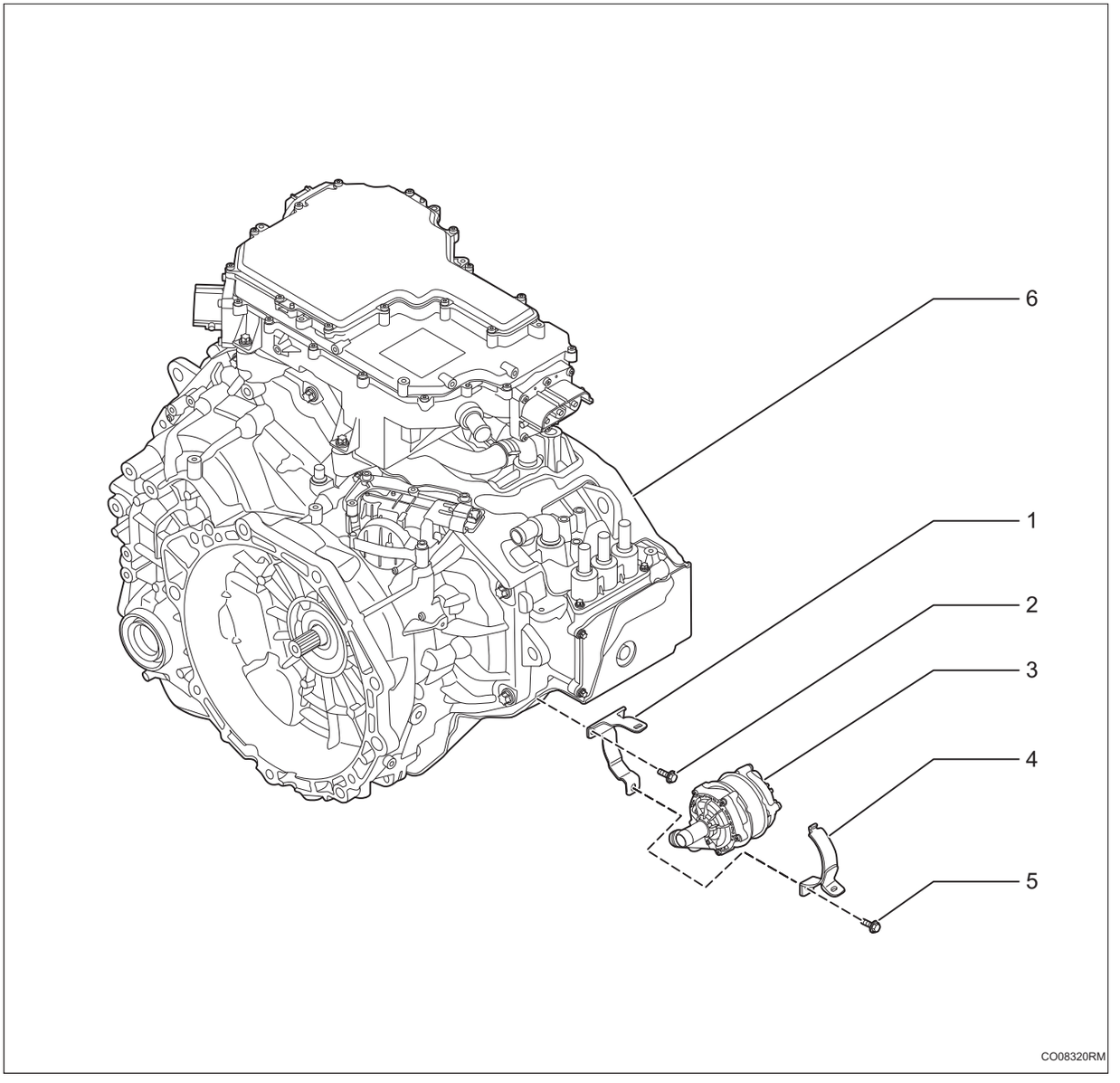
(b) Remove nut -1-, and remove rear floor lower metal pipe assembly-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Electric coolant pump assembly

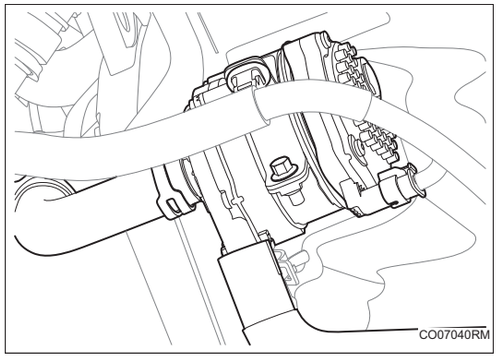
Parts



1. **Bracket assembly -under coolant pump**
2. **Hexagon flange bolt**
   - X2
   - Torque: 8~12 N · m
3. **Electric coolant pump assembly**
4. **Bracket- coolant pump**
5. **Hexagon flange bolt**
   - Torque: 8~12 N · m
6. **Electric drive system assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove engine bottom guard plate (See page ET-34)**
3. **Drain coolant (See page CO-1)**
4. **Remove electric coolant pump assembly**



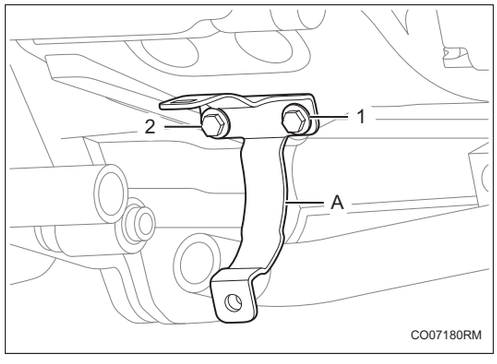
(a) Disconnect the harness connector-A- and detach harness fixing clip-B-.

(b) Detach electric coolant pump assembly connecting hose -2-3-.

(c) Remove the fixing bolt -1- of the electric coolant pump bracket

(d) Remove the electric coolant pump assembly -C-.

5. **Remove electric coolant pump bracket**



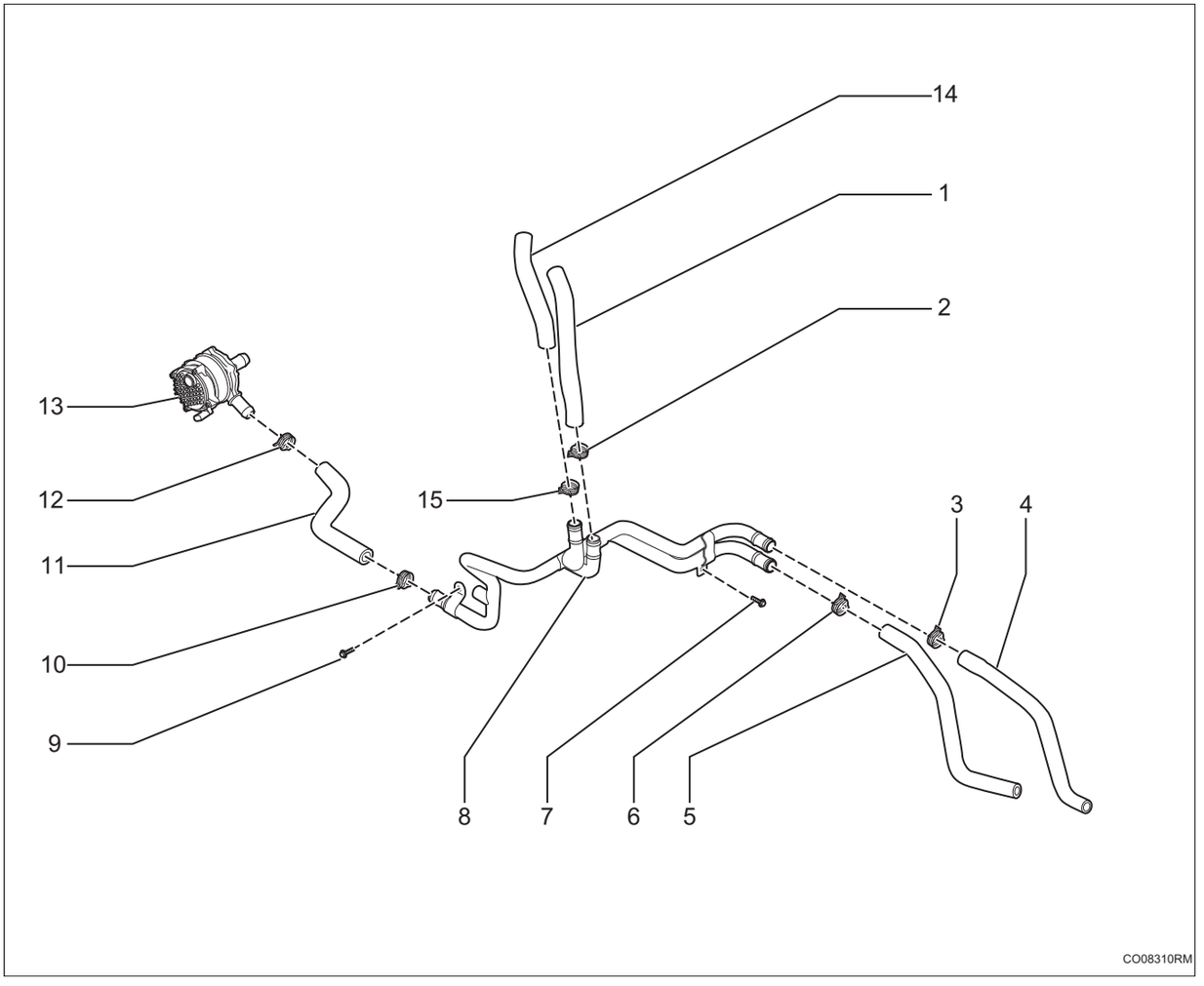
(a) Remove the fixing bolt -1-2- of the electric coolant pump bracket -A-

Installation

1. **The installation procedure is the reverse of removal procedure.**

Motor rear metal pipe assembly

Parts

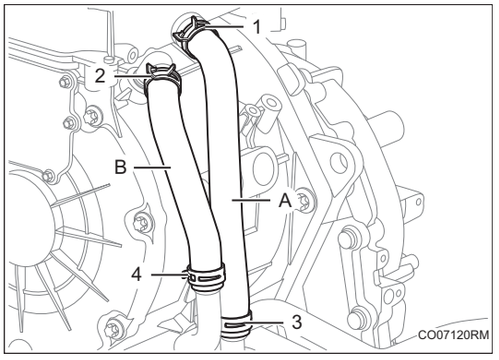


1. **Inverter water inlet hose**
2. **Steel band spring hose clamp**
3. **DCDC water outlet hose assembly**
4. **DCDC water inlet hose assembly**
5. **DCDC water outlet hose assembly**
6. **Steel band spring hose clamp**
7. **Hexagon flange bolt**
   - Torque: 8~12 N · m
8. **Metal pipe assembly**
9. **Hexagon flange bolt**
   - Torque: 8~12 N · m
10. **Steel band spring hose clamp**
11. **Electric coolant pump water outlet hose**

12. **Steel band spring hose clamp**
13. **Electric coolant pump**
14. **Motor water inlet hose**
15. **Steel band spring hose clamp**

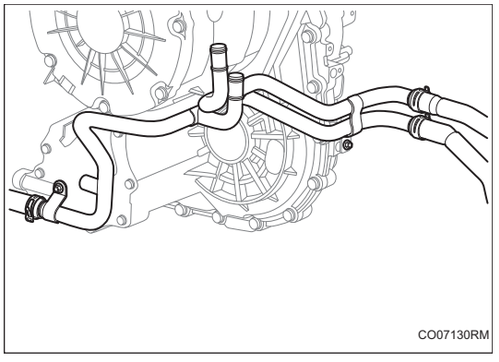
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove engine bottom guard plate (See page ET-34)**
3. **Drain coolant (See page CO-1)**
4. **Remove coolant temperature sensor assembly (See page CO-4)**
5. **Remove motor rear metal pipe assembly**



(a) Detach steel band hose clamp -2-4- and motor water inlet hose -B-.

(b) Detach steel band hose clamps -1-3- and motor A water outlet hose -A-.



(c) Detach motor rear metal pipe assembly connecting hose -A-C-.

(d) Remove the bolt -1-2-.

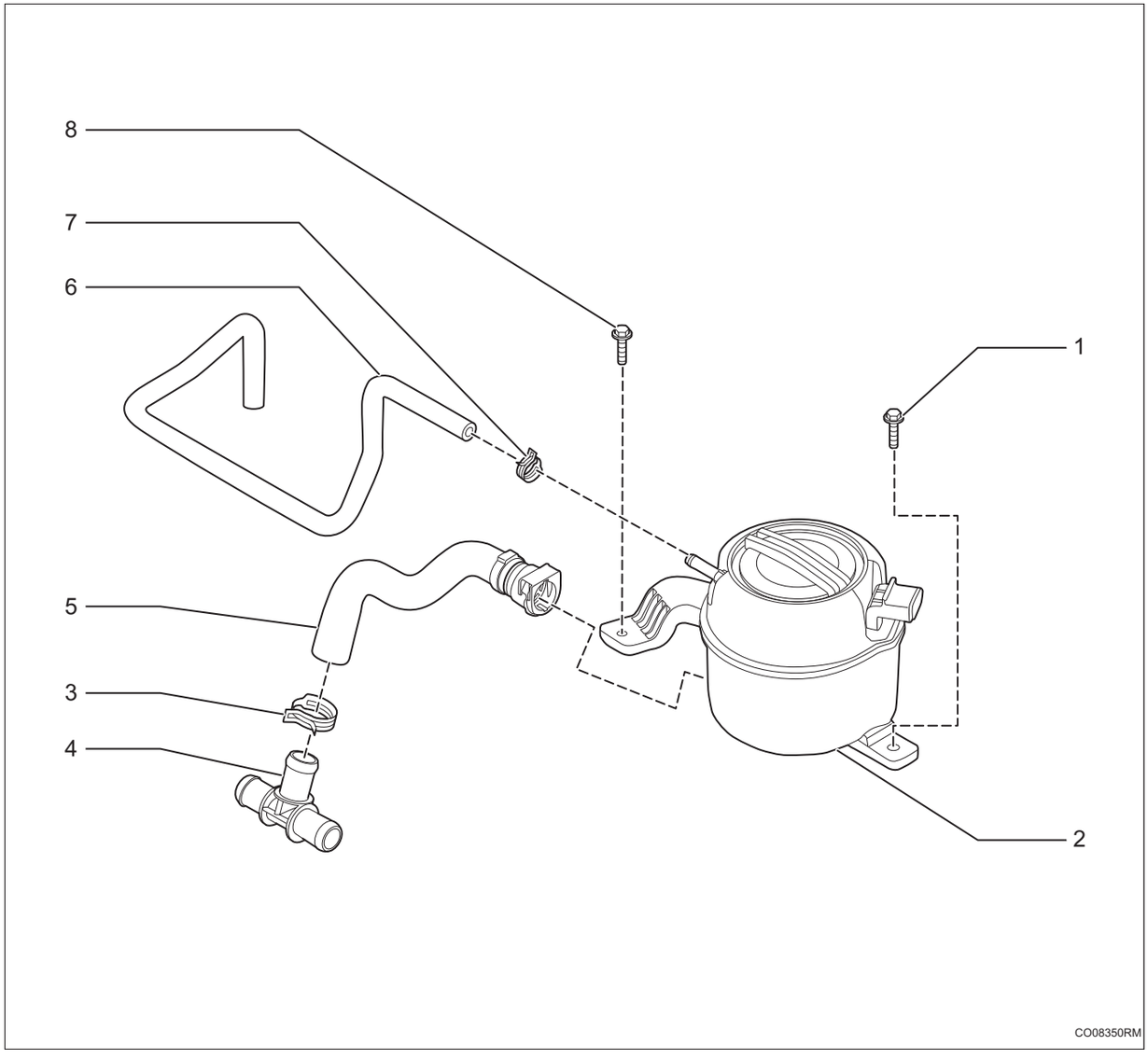
(e) Remove the motor rear metal pipe assembly-D-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Expansion tank

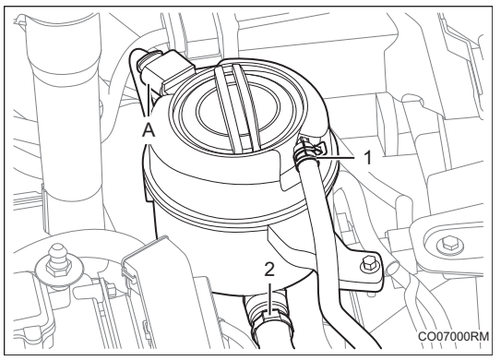
Parts



1. **Hexagon flange bolt**
   - Torque: 4~6 N · m
2. **Expansion tank assembly**
3. **Steel band spring hose clamp**
4. **Tee**
5. **Expansion tank water outlet hose I**
6. **Motor return air hose II assembly**
7. **Steel band spring hose clamp**
8. **Hexagon flange bolt**
   - Torque: 4~6 N · m

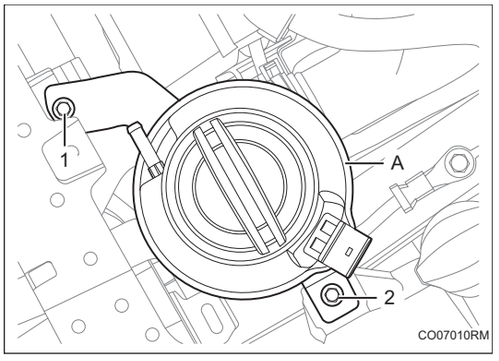
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove expansion tank**



(a) Detach expansion tank connecting hose -1- and quick-release water pipe-2-.

(b) Disconnect the harness connector-A-.



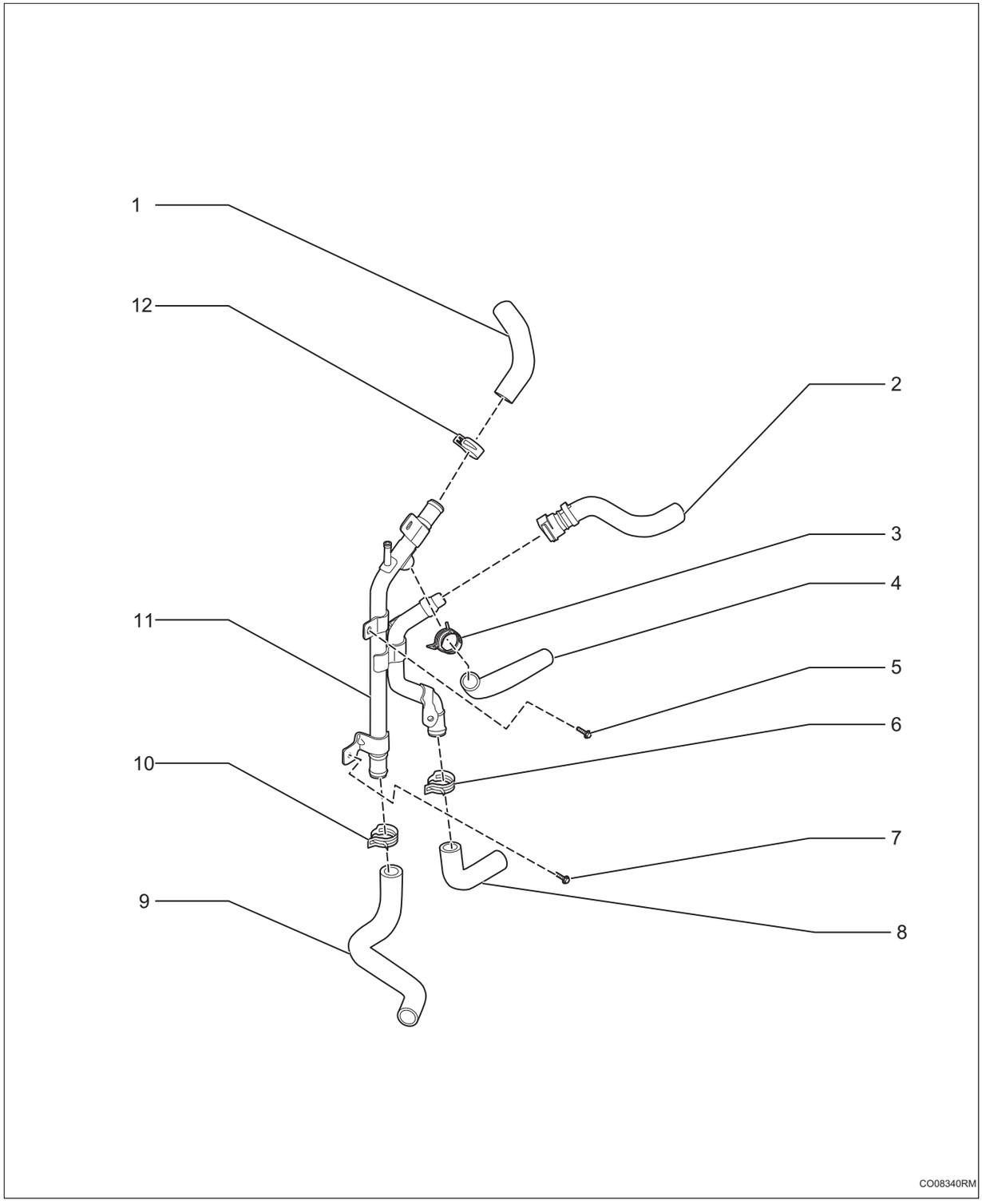
(c) Remove bolt -1-2- and remove expansion tank-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Metal water pipe I assembly

Parts

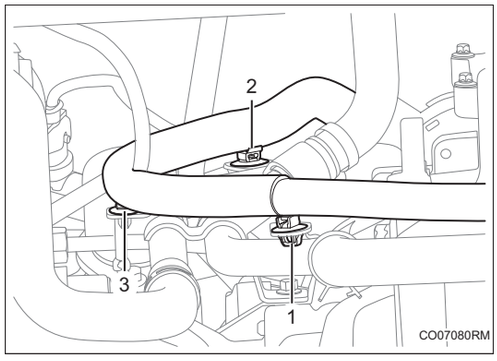


1. **Inverter water outlet hose**
2. **Expansion tank water outlet hose II**

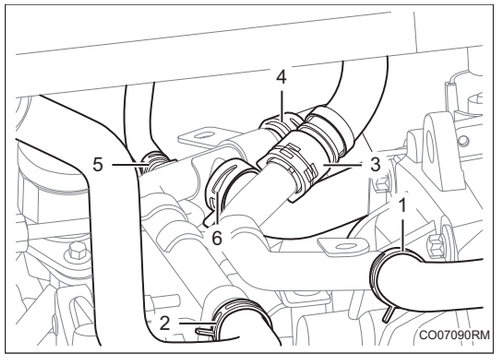
3. **Steel band hose clamp**
4. **Motor water outlet hose**
5. **Hexagon flange bolt**
   - Torque: 8~12 N · m
6. **Steel band hose clamp**
7. **Hexagon flange bolt**
   - Torque: 8~12 N · m
8. **Electric coolant pump water inlet hose**
9. **Connecting pipe I**
10. **Steel band hose clamp**
11. **Metal water pipe I assembly**
12. **Steel band hose clamp**

Removal

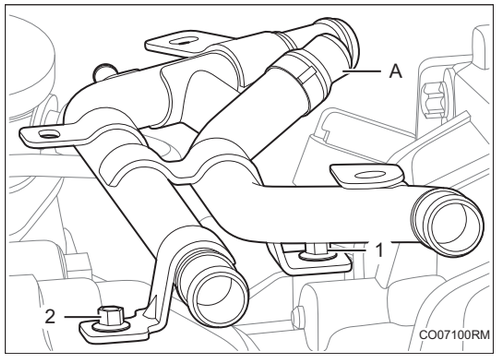
1. **Drain coolant (See page CO-1)**
2. **Remove metal water pipe I assembly**



(a) Disconnect the harness fixing clip -1-3-.



(b) Detach metal water pipe I assembly connecting hose -1-6-.



(c) Remove the bolt -1-2-.

(d) Remove the metal water pipe I assembly-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Emission control system

On-board inspection EC-1

Activated carbon canister assembly EC-2

Parts EC-2

Removal EC-4

Installation EC-4

Crankcase ventilation pipe EC-5

Parts EC-5

Removal EC-7

Installation EC-8

EVAP fuel leakage diagnosis module assembly EC-9

Parts EC-9

Removal EC-11

Installation EC-11

Desorption pipe and venturi valve & pressure sensor assembly EC-12

Part (only for 1.5 T models) EC-12

Part (only for 2.0 T and 1.8 T models) EC-14

Part (only for HEV models) EC-16

Removal EC-18

Installation EC-23

On-board inspection

1. Visually check hoses, connectors and heat insulation pads

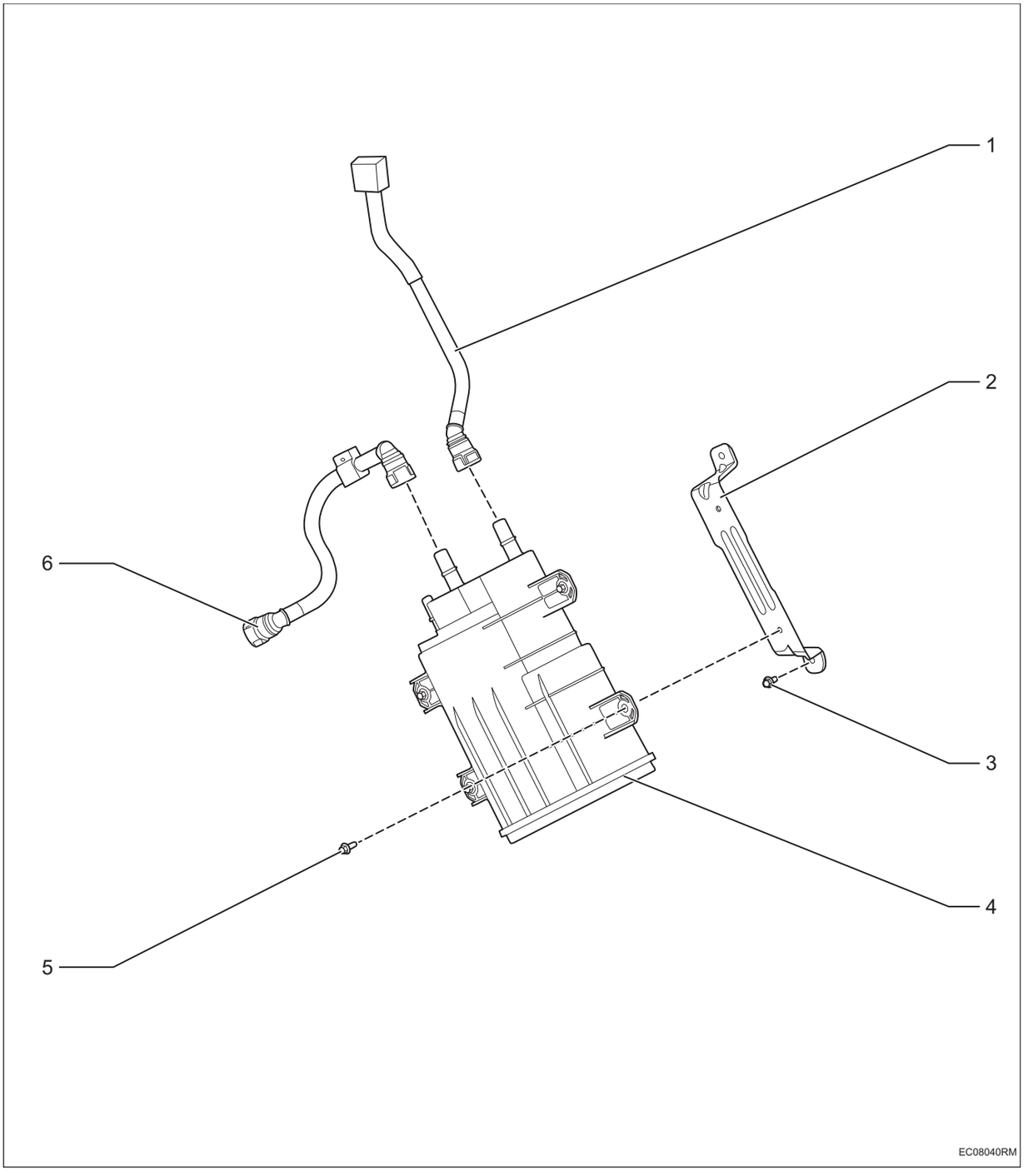
(a) Check for cracks, leaks or damage.

Hint:

Failure of the engine oil dipstick, fuel filler cap, PCV hose and other components may result in engine abnormalities.

Activated carbon canister assembly

Parts



1. **Vent pipe assembly I**
2. **Activated canister bracket assembly**
3. **Hexagon flange bolt**

- X2
- Torque: 8~12 N · m

4. Activated canister

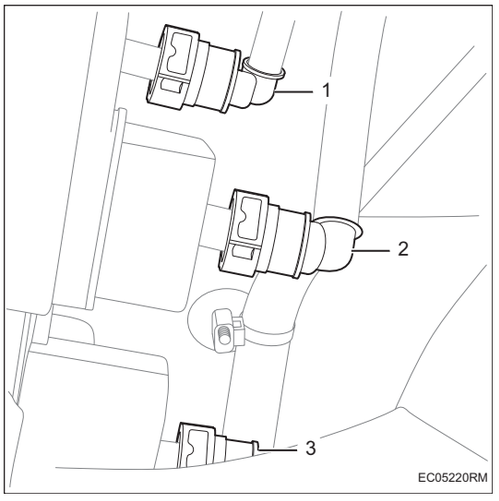
5. Hexagon flange bolt

- X4
- Torque: 8~12 N · m

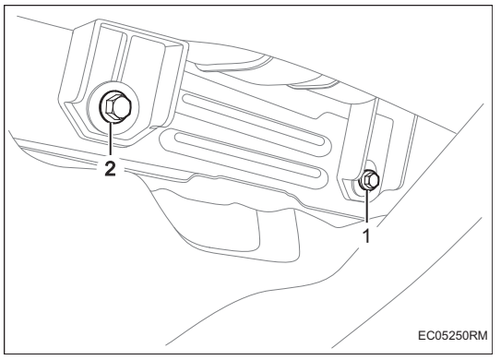
6. Adsorbent tube assembly I

Removal

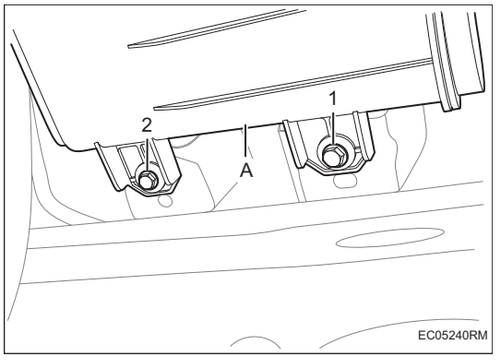
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove activated carbon canister assembly**



(a) Disconnect the activated carbon canister assembly connecting pipeline -1-3-.



(b) Remove the fixing bolts -1-2- of the activated carbon canister assembly.



(c) Remove bolt -1-2- and remove activated carbon canister assembly-A-.

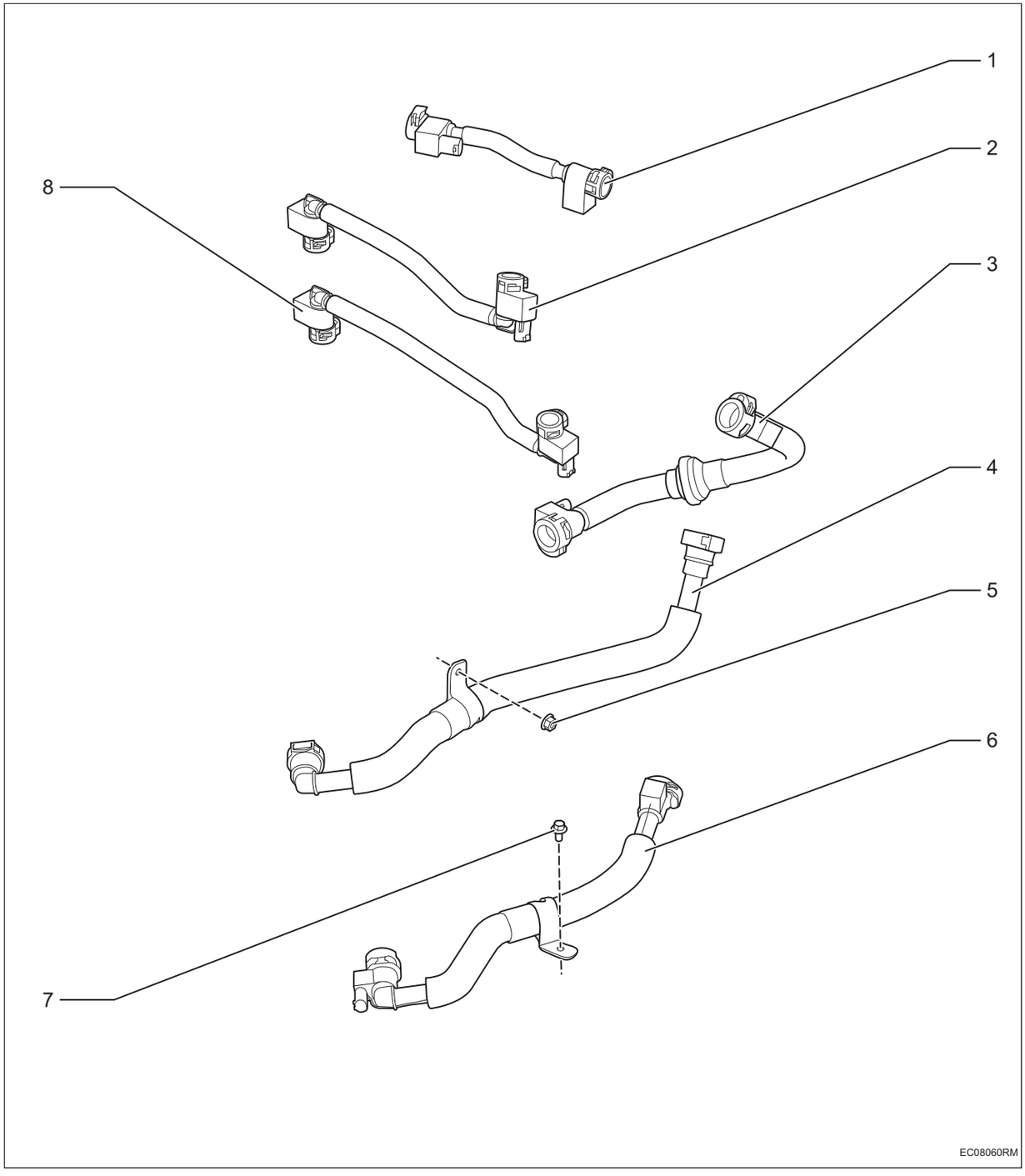
EC

Installation

1. **The installation procedure is the reverse of removal procedure.**

Crankcase ventilation pipe

Parts



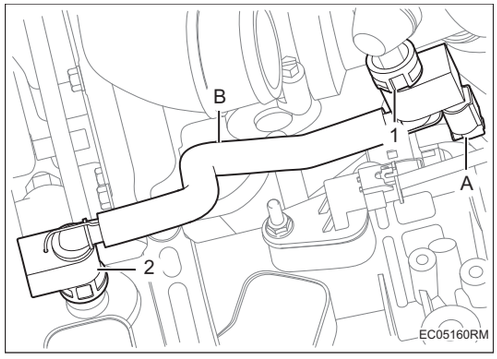
1. **Cover side ventilation pipe assembly (only for 1.5 T model)**
2. **Cover side ventilation pipe assembly (only for HEV models)**
3. **Crankcase ventilation pipe assembly (only for 1.5 T and 2.0 T models)**
4. **Cover side ventilation pipe assembly (only for 1.5T model)**
5. **Hexagon flange nut**

- Torque: 8~12 N · m

6. **Cover side ventilation pipe assembly (only for HEV models)**
7. **Hexagon flange bolt**
   - Torque: 8~12 N · m
8. **Cover side ventilation pipe assembly (only for 2.0 T model)**

Removal

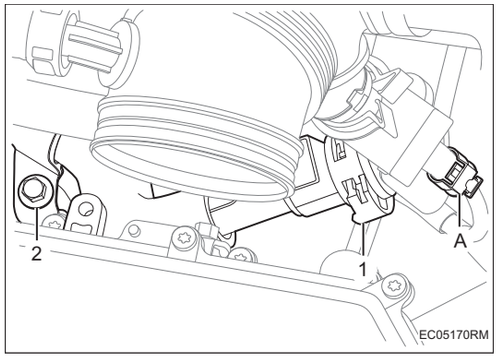
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove cover side ventilation pipe assembly (only for 1.5 T and HEV models)**



(a) Disconnect the harness connector-A-.

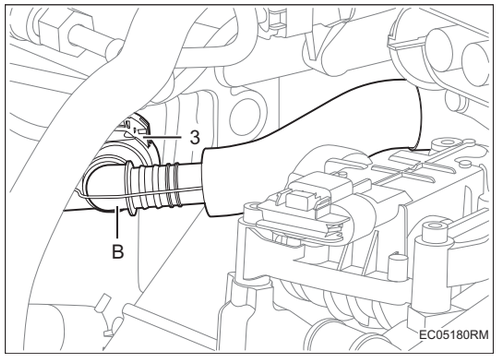
(b) Detach cover side ventilation pipe assembly -1-2- and remove cover side ventilation pipe assembly-B-.

3. **Remove crankcase ventilation pipe assembly (only for HEV models)**



(a) Disconnect the harness connector-A-.

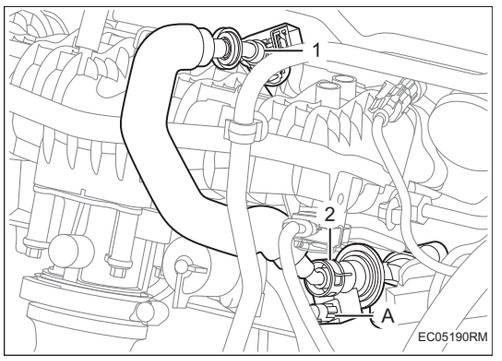
(b) Detach crankcase ventilation pipe assembly -1- and remove fixing bolt -2-.



(c) Detach the crankcase ventilation pipe assembly -3- and disconnect the harness connector-B-.

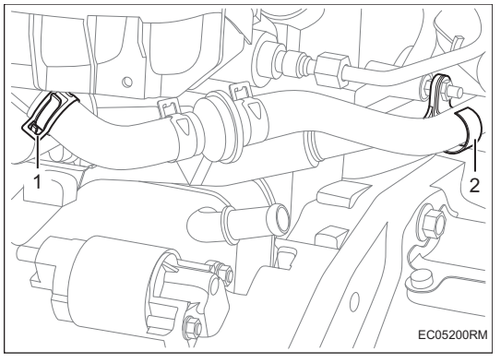
(d) Remove the crankcase ventilation pipe assembly.

EC

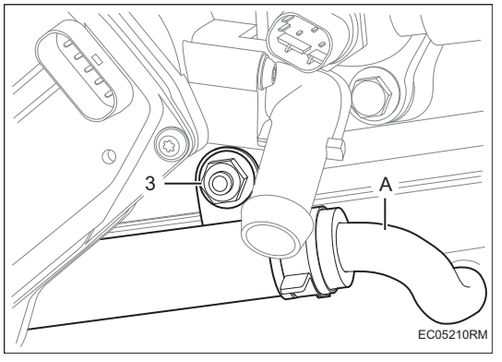


(e) Detach the manifold side vent pipe assembly -1-2-, and disconnect the harness connector-A-.

4. Remove crankcase ventilation pipe assembly (only for 2.0 T and 1.8 T models)



(a) Detach the crankcase ventilation pipe assembly -1-, and remove the fixing nut -2-.



(b) Remove the nut -3- and detach the crankcase ventilation pipe assembly-A-.

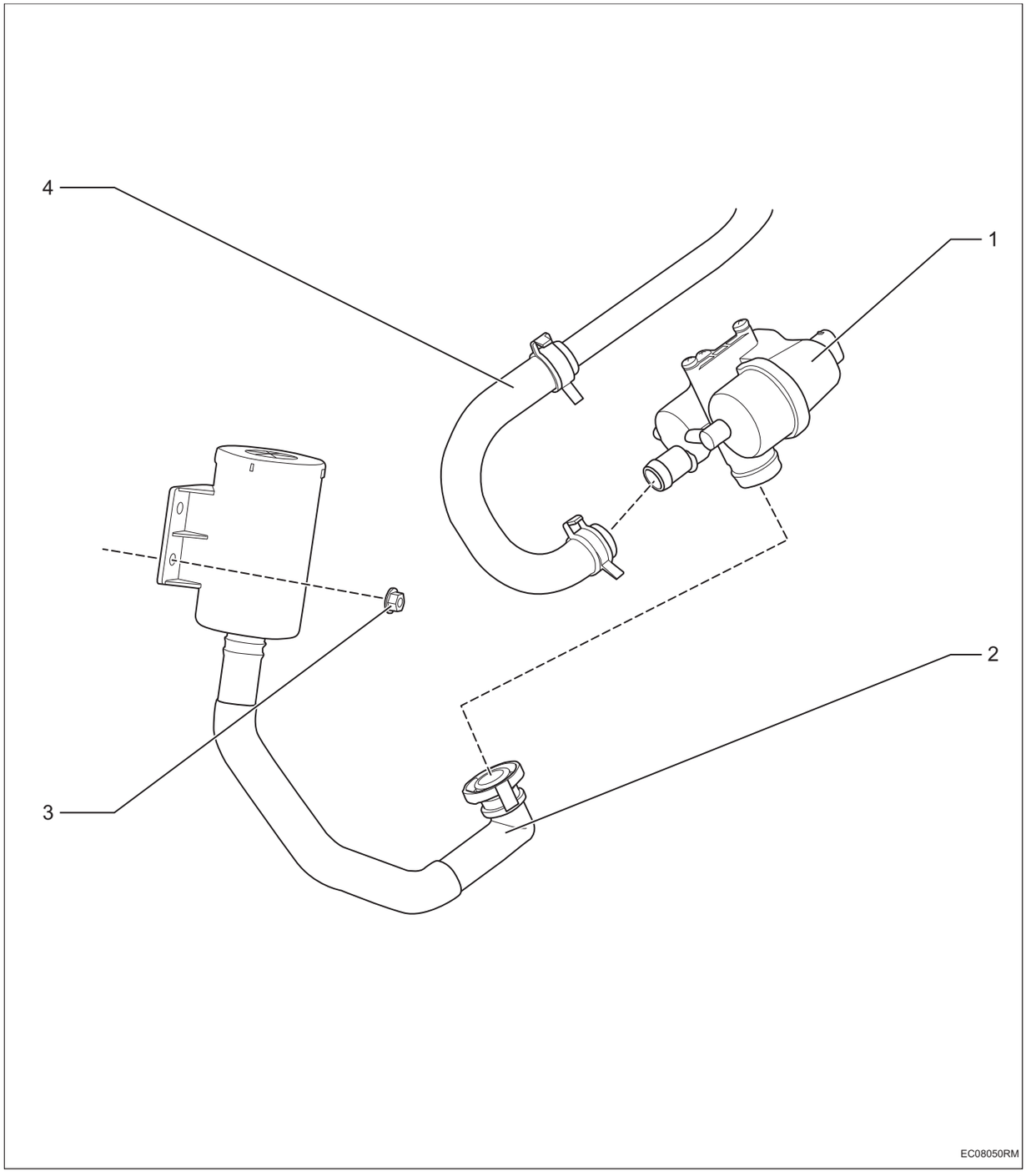
EC

Installation

1. The installation procedure is the reverse of removal procedure.

EVAP fuel leakage diagnosis module assembly

Parts



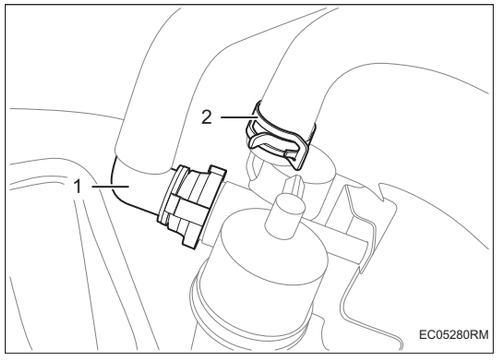
1. **EVAP fuel leakage diagnosis module**
2. **Vent pipe with ash filter assembly**
3. **Hexagon flange nut**

- X2
- Torque: 8~12 N · m

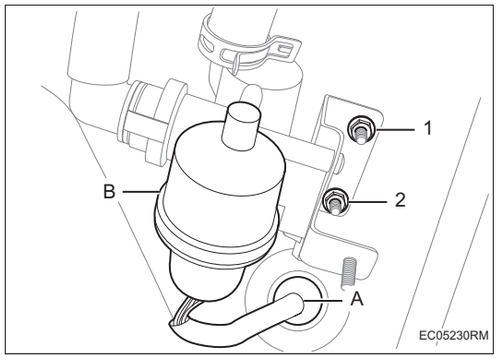
4. Vent pipe assembly I

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove left rear wheel guard (See page ET-39)**
3. **Remove the EVAP fuel leakage diagnosis module assembly**



(a) Detach vent pipe assembly I -2-and canister air cleaner -1-.

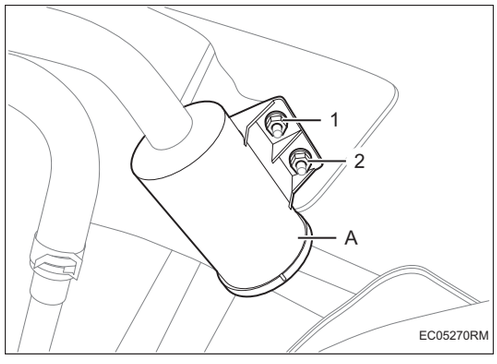


(b) Disconnect the harness connector-A-.

(c) Remove the nut -1-2-.

(d) Remove the EVAP fuel leakage diagnosis module assembly -B-.

4. **Remove canister air cleaner assembly**



(a) Remove nut -1-2-, and remove canister air cleaner assembly-A-.

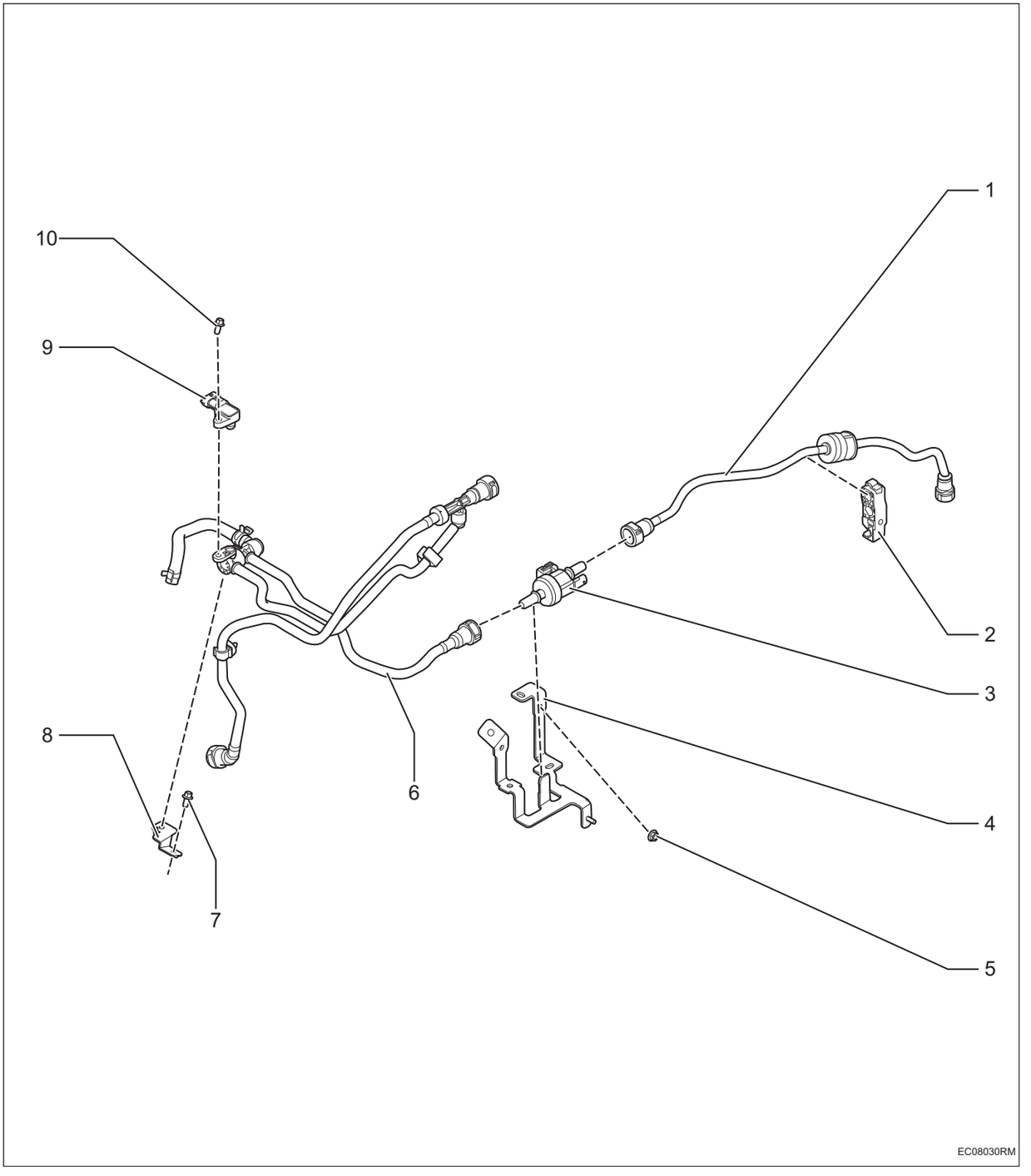
Installation

1. **The installation procedure is the reverse of removal procedure.**

EC

Desorption pipe and venturi valve & pressure sensor assembly

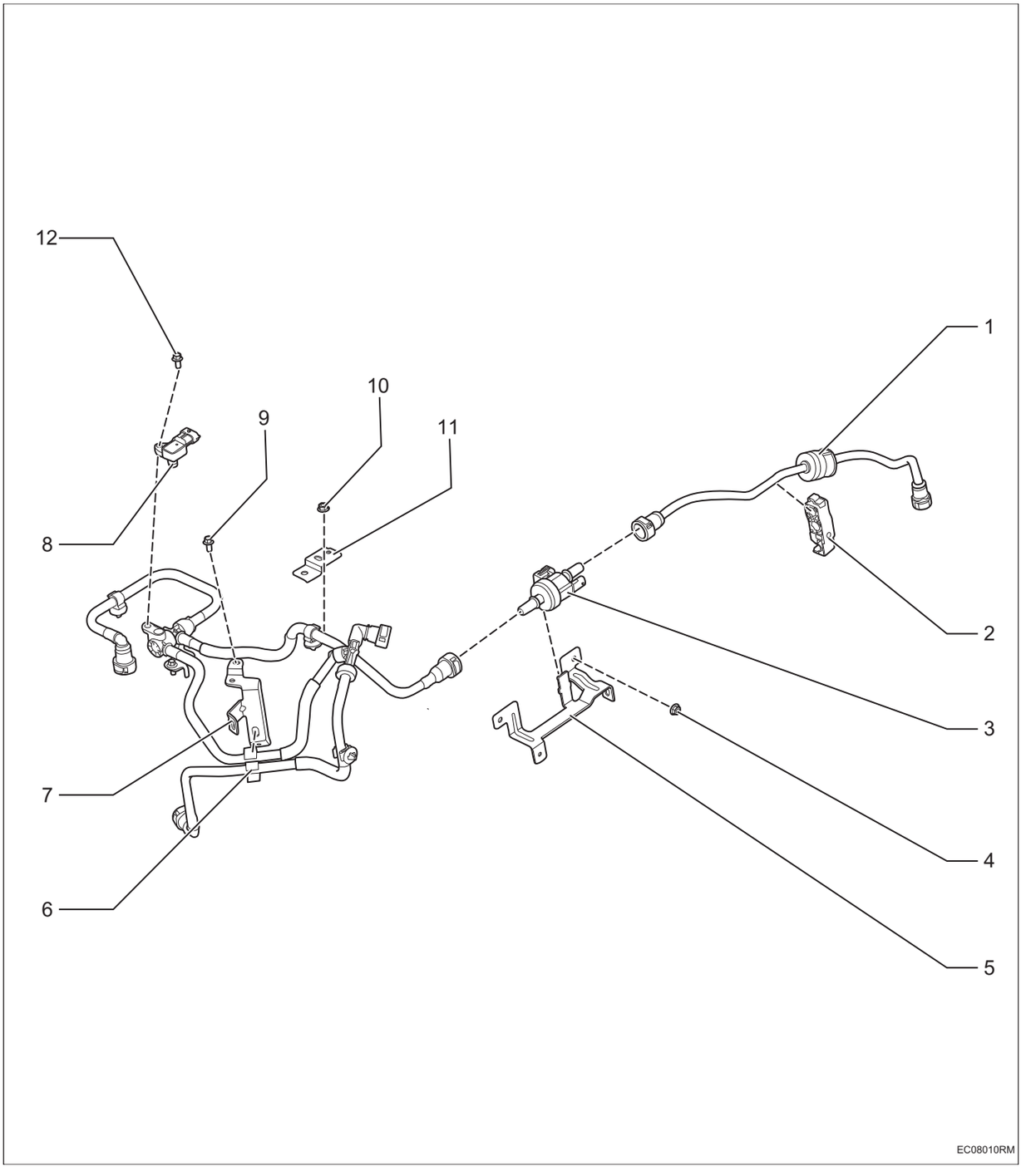
Part (only for 1.5 T models)



1. **Desorption pipe assembly II**
2. **Three-pipe clamp**

3. **Activated canister solenoid valve**
4. **Activated canister solenoid valve bracket**
5. **Hexagon flange nut**
   - X2
   - Torque: 6~8 N · m
6. **Desorption pipe and venturi valve & pressure sensor assembly**
7. **Hexagon flange bolt**
   - Torque: 6~8 N · m
8. **Evaporation pipe bracket assembly I**
9. **Pressure sensor assembly**
10. **Hexagon flange bolt**
    - Torque: 2.7~3.7 N · m

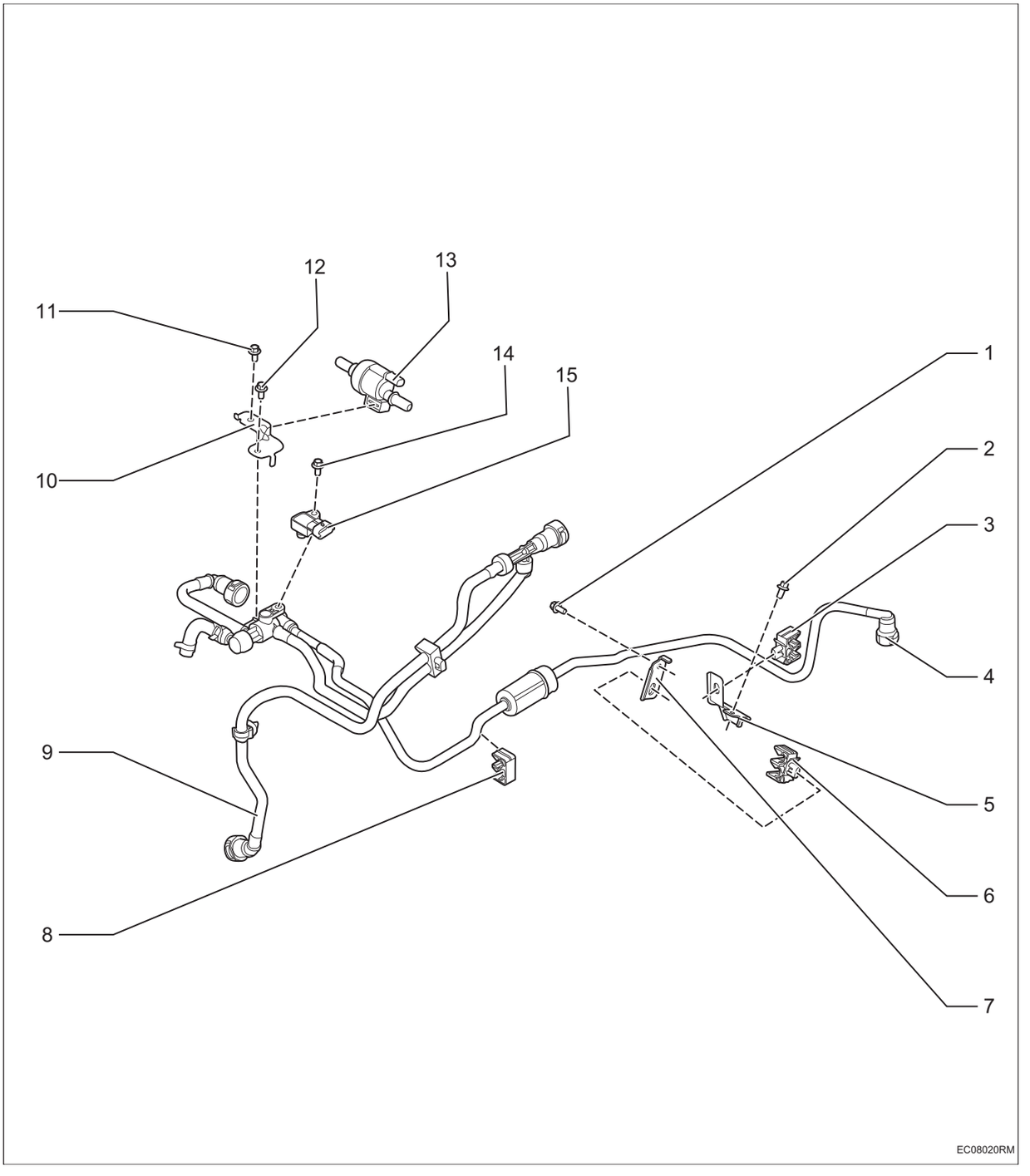
Part (only for 2.0 T and 1.8 T models)



1. **Desorption pipe assembly II**
2. **Three-pipe clamp**
3. **Activated canister solenoid valve**
4. **Hexagon flange nut**
   - X2
   - Torque: 6~8 N · m

5. **Activated canister solenoid valve bracket**
6. **Desorption pipe and venturi valve & pressure sensor assembly**
7. **Evaporation pipe bracket II**
8. **Pressure sensor assembly**
9. **Hexagon flange bolt**
   - Torque: 6~8 N · m
10. **Hexagon flange nut**
    - Torque: 5~8 N · m
11. **Evaporation pipe bracket I**
12. **Hexagon flange bolt**
    - Torque: 2.5~3.5 N · m

Part (only for HEV models)

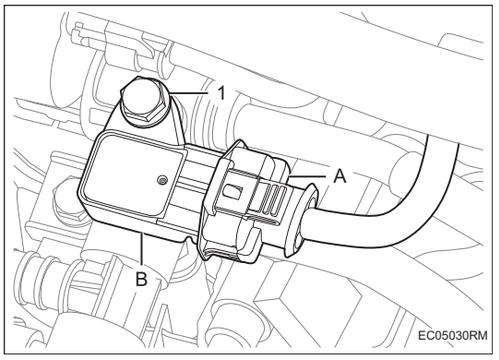


1. **Hexagon flange bolt**
   - Torque: 6~8 N · m
2. **Hexagon flange bolt**
   - Torque: 6~8 N · m
3. **Dual pipe clamp I**
4. **Desorption pipe assembly II**

5. **Evaporation pipe bracket I**
6. **Dual pipe clamp I**
7. **Evaporation pipe bracket II**
8. **Dual pipe clamp II**
9. **Desorption pipe and venturi valve & pressure sensor assembly**
10. **Activated canister solenoid valve bracket**
11. **Hexagon flange bolt**
    - Torque: 6~8 N · m
12. **Hexagon flange bolt**
    - Torque: 5~8 N · m
13. **Activated canister solenoid valve**
14. **Hexagon flange bolt**
    - Torque: 2.5~3.5 N · m
15. **Intake pressure temperature sensor**

Removal

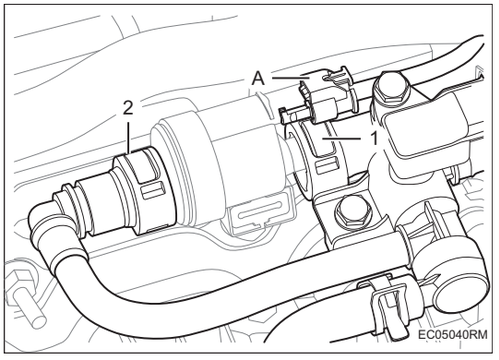
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove desorption pressure sensor assembly**



(a) Disconnect the harness connector-A-.

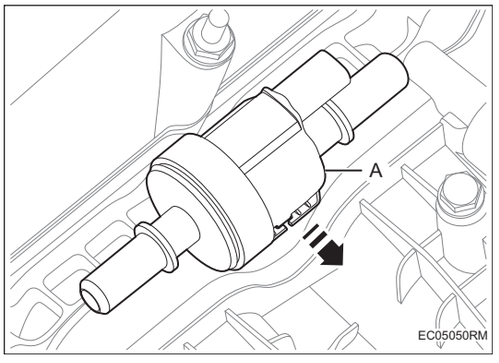
(b) Remove bolt -1- and remove desorption pressure sensor assembly-B-.

3. **Remove canister solenoid valve (only for HEV models)**



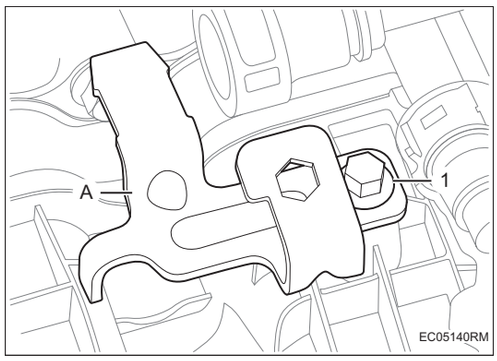
(a) Disconnect the harness connector-A-.

(b) Disconnect the desorption pipes -1-2-.



(c) Remove the canister solenoid valve-A- as arrowed.

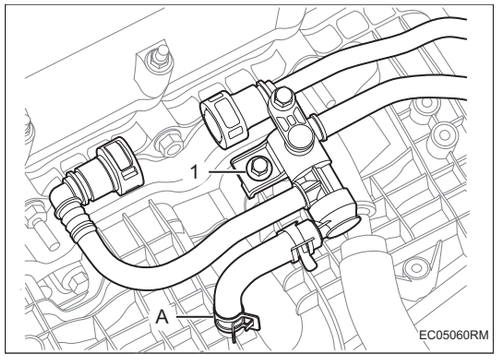
EC



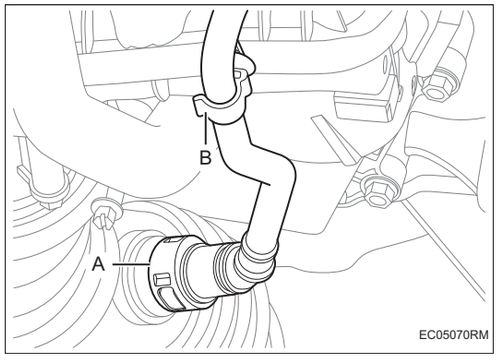
(d) Remove bolt -1- and remove canister solenoid valve bracket-A-.

4. Remove air cleaner assembly (only for HEV models) (See page IT-10)

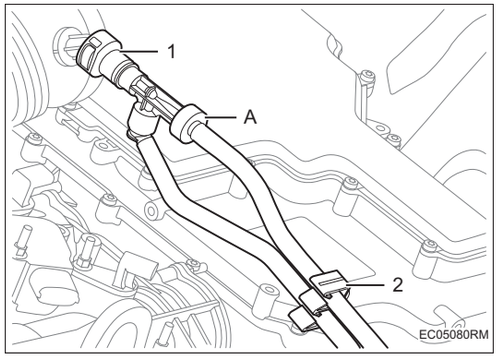
5. Desorption pipe and venturi valve assembly (only for HEV models)



(a) Disconnect the pipe and venturi valve assembly-A-, and remove bolt -1-.



(b) Disconnect the pipe and venturi valve assembly-A-, and detach its fixing clip-B-.



(c) Disconnect the pipe and venturi valve assembly from the intake elbow -1-.

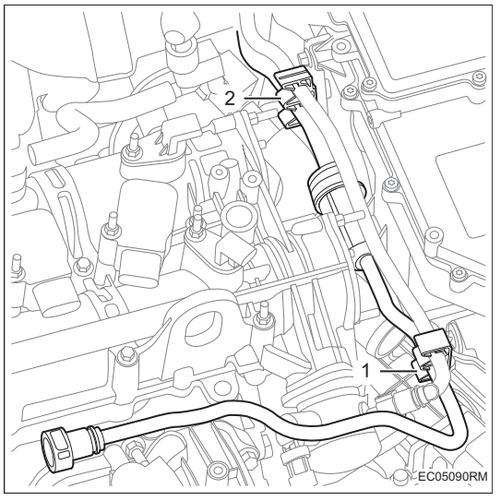
(d) Detach the fixing clip -2- of pipe and venturi valve assembly, and remove the desorption pipe and venturi valve assembly -1-.

EC

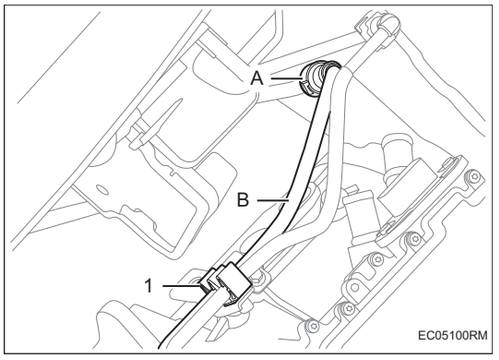
6. Remove split fluid reservoir assembly (only for HEV models) (See page BR-27)

7. Remove the desorption pipe assembly II (only for HEV models)

(a) Detach desorption pipe assembly II fixing clip -1-2-.



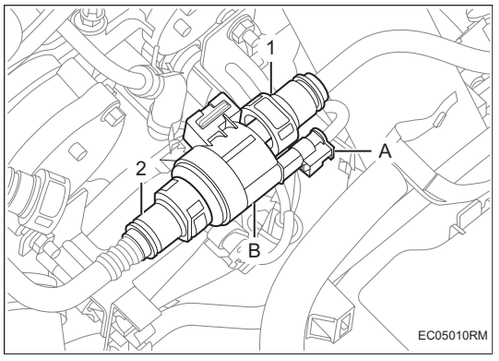
(b) Disconnect the desorption pipe assembly II -A- and detach fixing clip -1-.



(c) Remove the desorption pipe assembly II-B-.

8. Remove canister solenoid valve (only for 2.0 T and 1.8 T models)

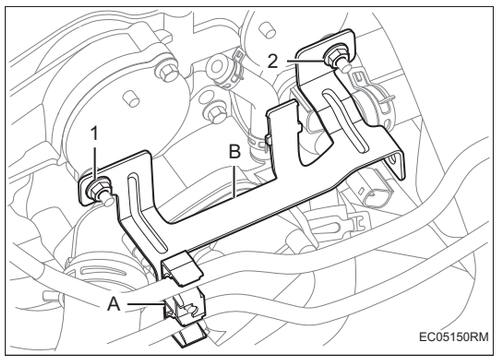
(a) Disconnect the harness connector-A-.



(b) Disconnect the desorption pipes -1-2-.

(c) Pull up and remove the canister solenoid valve -B-.

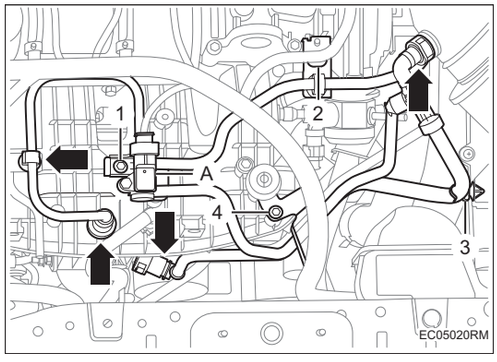
EC



(d) Remove the nuts -1-2- and detach the release pipe and the venturi valve assembly clamp -A-.

(e) Remove canister solenoid valve bracket -B-.

9. Desorption pipe and venturi valve assembly (only for 2.0 T and 1.8 T models)

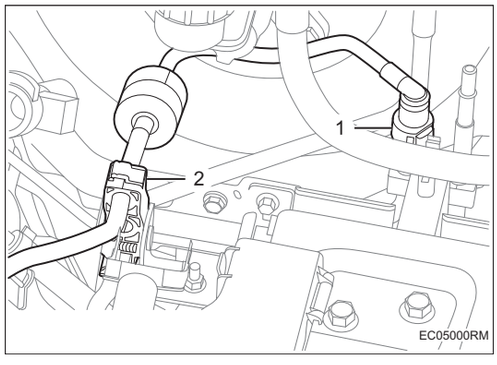


(a) Detach the desorption pipe, venturi valve assembly and clip -arrow-, and remove the bolt -1- and -4-.

(b) Detach the pipe and venturi valve assembly fixing clips -2-3-, and disconnect the desorption pressure sensor assembly harness connector -A-.

10. Remove battery assembly (See page CH-20)

11. Remove desorption pipe assembly II (only for 2.0 T and 1.8 T models)

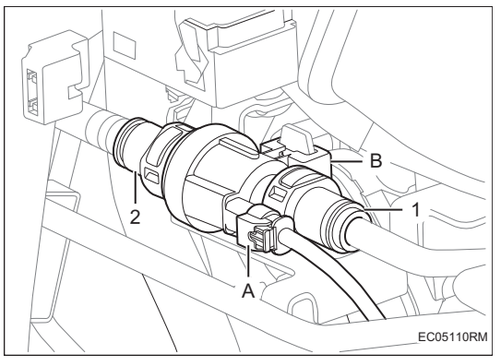


(a) Detach desorption pipe assembly II fixing clip -2-.

(b) Disconnect the desorption pipe assembly II -1-, and remove the desorption pipe assembly II.

12. Remove canister solenoid valve (only for 1.5 T model)

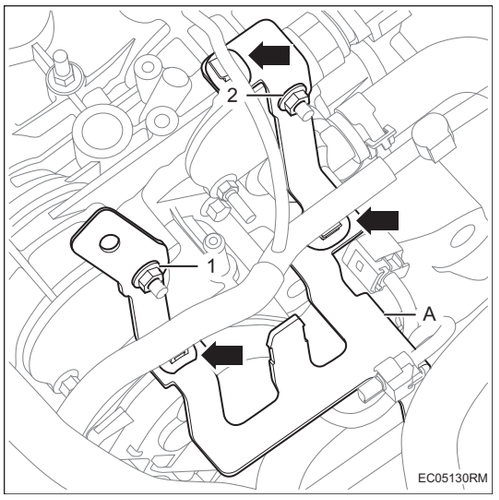
EC



(a) Disconnect the harness connector-A-.

(b) Disconnect the desorption pipes -1-2-.

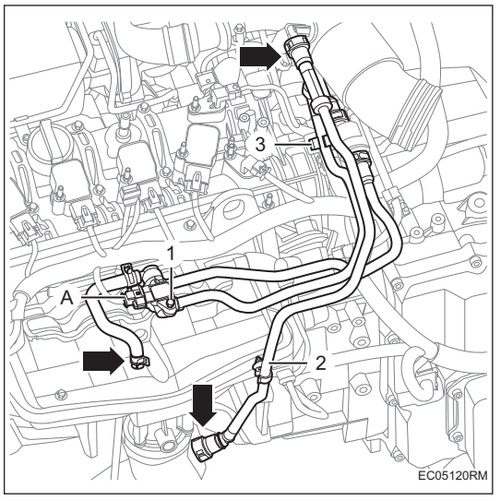
(c) Pull up and remove the canister solenoid valve -B-.



(d) Remove the nuts -1-2-, and detach the harness fixing clip -arrow-.

(e) Remove canister solenoid valve bracket -A-.

13. Desorption pipe and venturi valve assembly (only for 1.5 T models)

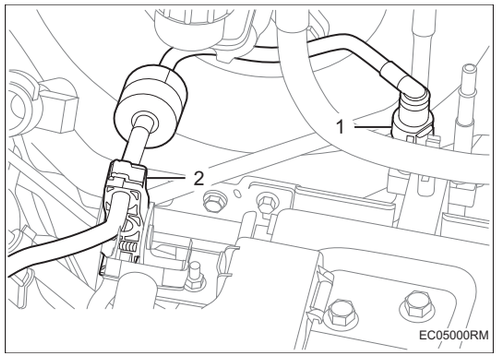


(a) Detach the pipe and venturi valve assembly as arrowed, and remove bolt -1-.

(b) Detach the pipe and venturi valve assembly fixing clips -2-3-, and disconnect the desorption pressure sensor assembly harness connector -A-.

14. Remove battery assembly (See page CH-20)

15. Remove the desorption pipe assembly II (only for 1.5 T models)



(a) Detach desorption pipe assembly II fixing clip -2-.

(b) Disconnect the desorption pipe assembly II -1-, and remove the desorption pipe assembly II.

Installation

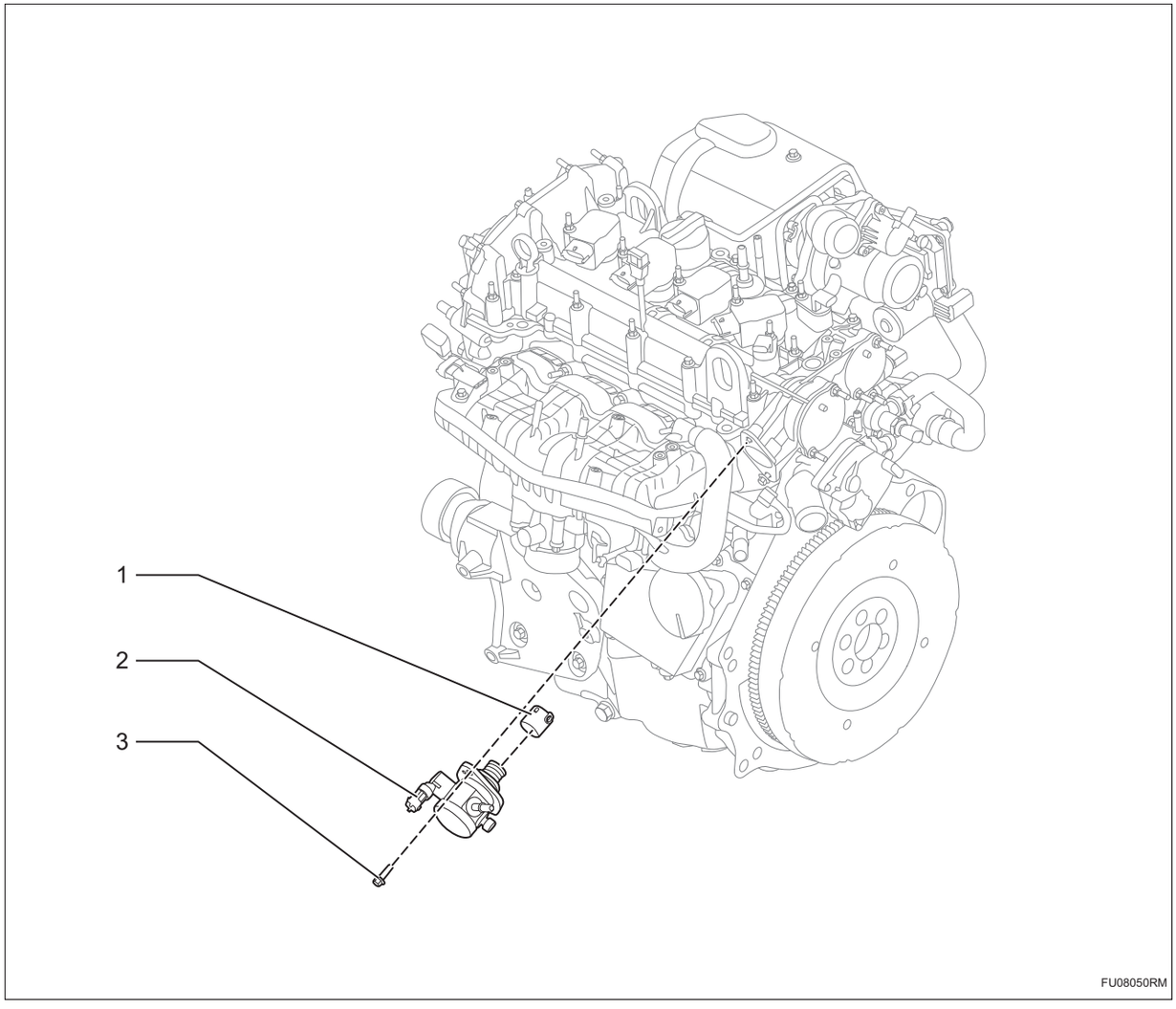
1. The installation procedure is the reverse of removal procedure.

Fuel system

High-pressure fuel pump FU-1
Parts FU-1
Removal FU-2
Installation FU-2
Fuel rail FU-4
Parts FU-4
Removal FU-5
Installation FU-5
Fuel pump with fuel level sensor assembly FU-6
Parts FU-6
Removal FU-7
Check FU-8
Installation FU-9
Fuel tank FU-10
Part (only for HEV models) FU-10
Parts FU-12
Removal FU-14
Installation FU-16
Fuel filler pipe assembly FU-18
Parts FU-18
Removal FU-20
Installation FU-20

High-pressure fuel pump

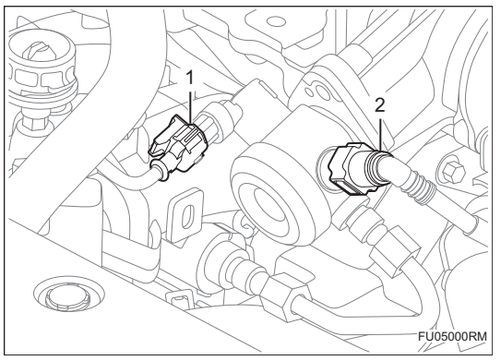
Parts



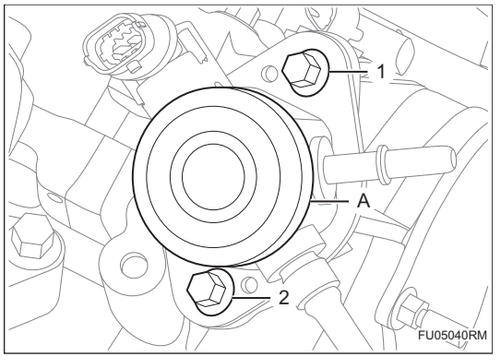
1. **Tappet assembly**
2. **High-pressure fuel pump assembly**
   - High-pressure oil pipe connection nut torque: 30~34 N · m
3. **Hexagon flange nut**
   - X2
   - Torque: 18~22 N · m

Removal

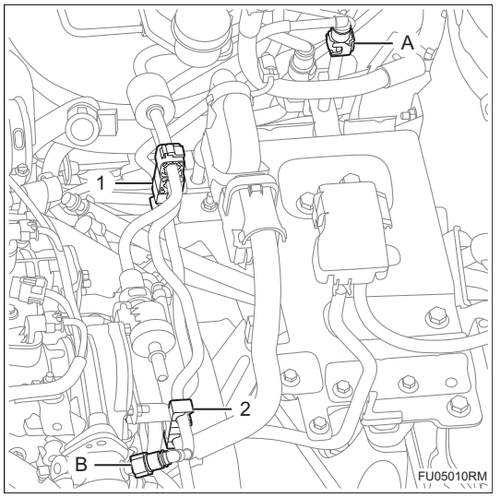
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the high-pressure fuel pump**
   (a) Disconnect the harness connector -1-



   (b) Detach fuel pipe -2-.
   (c) Remove bolt -1-2- and remove high-pressure fuel pump-A-.



3. **Remove engine compartment fuel pipe assembly I**
   (a) Detach the engine compartment fuel pipe assembly I -A-B- and detach the clip -1-2-.



Installation

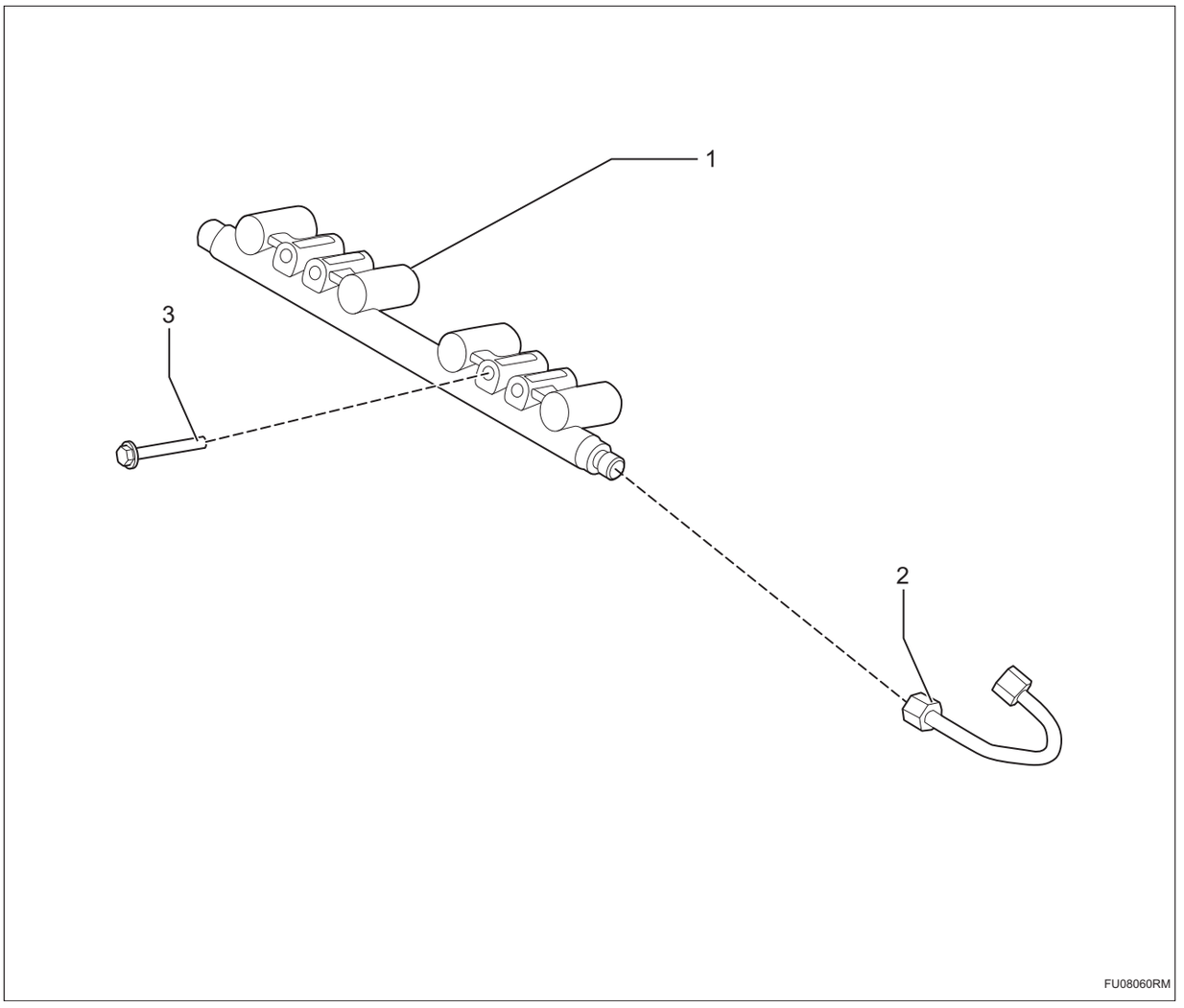
1. **The installation procedure is the reverse of removal procedure.**

Hint:

After replacing the fuel filter assembly, please press the ignition switch several times before starting to ensure sufficient fuel supply in the fuel system.

Fuel rail

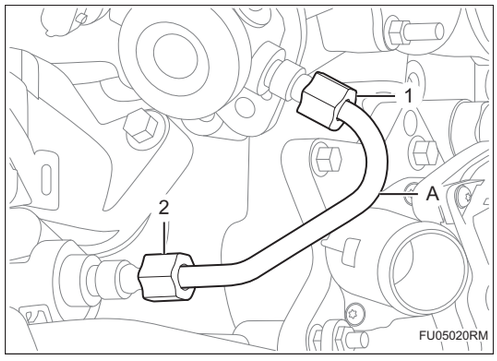
Parts



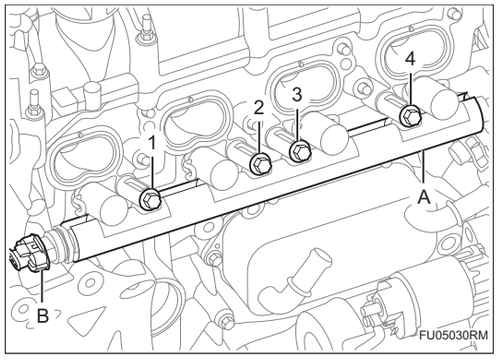
1. **High-pressure fuel rail and fuel injector assembly**
   - The fuel injector seal ring and elastic seal ring cannot be used again after removal, and the O-ring and retaining ring need to be replaced.
2. **High-pressure fuel pipe assembly**
   - Torque: 23~27 N · m
3. **Hexagon flange bolt**
   - X4
   - Torque: 23~27 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the intake manifold (See page IT-4)**
3. **Remove fuel rail**



(a) Detach the nuts -1-2- and remove the high pressure fuel pipe -A-.



(b) Disconnect the harness connector-B-.

(c) Remove bolt -1-4- and remove fuel rail-A-.

4. **Remove nozzle**

(a) Detach the fixing clip of the fuel injector.

(b) Remove the fuel injector -1-4-.

Hint:

Do not damage the nozzle seal ring during removal.

FU

Installation

1. **The installation procedure is the reverse of removal procedure.**

Caution:

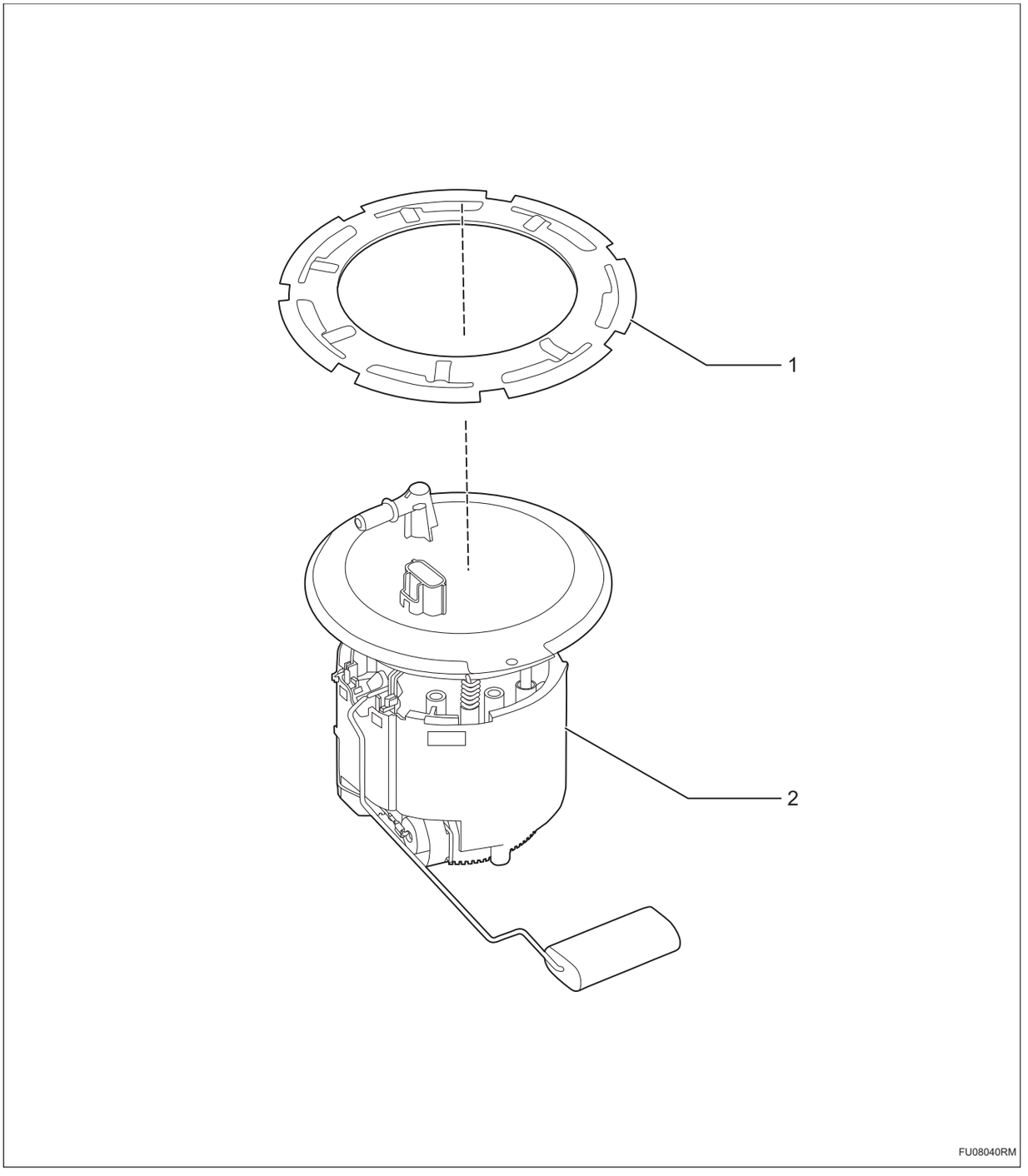
The seal ring is damaged. Please replace it with a new one.

Hint:

Apply lubricating oil to the seal ring before installing the fuel injector.

Fuel pump with fuel level sensor assembly

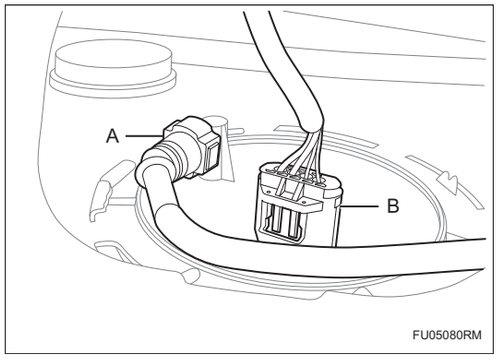
Parts



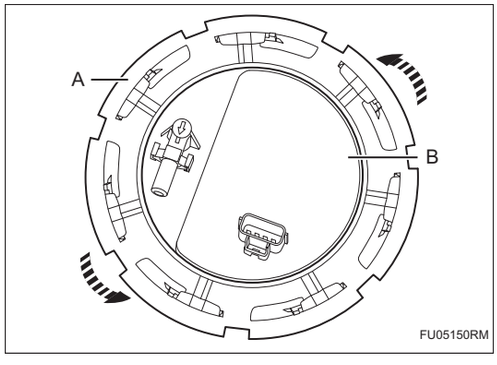
1. **Fuel pump fixing cover**
2. **Fuel pump with fuel level sensor assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove rear seat cushion assembly (See page SE-98)**
3. **Remove rear seat back assembly (only for HEV models) (See page SE-98)**
4. **Remove fuel tank access cover (See page FU-14)**
5. **Remove fuel pump with fuel level sensor assembly**



(a) Disconnect the fuel tank assembly harness connector -B- and the pipe -A-.

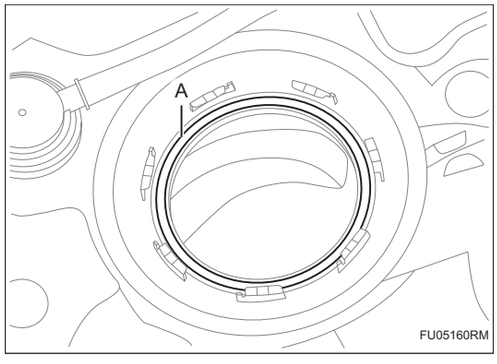


(b) Rotate in the direction of -arrow-and remove the fuel pump fixing cover -A-.

(c) Remove the fuel pump with fuel level sensor assembly -B-.

Caution:

Lift the fuel pump with fuel level sensor assembly up carefully to avoid damaging the level sensor float.



(d) Remove fuel pump port seal ring-A-.

Check

1. Check fuel pump assembly

(a) Check resistance.

(1) Measure the resistance according to the values in the table below.

Standard resistance:

Detector connection	Conditions	Specified state
Fuel pump assembly connector 1 #-fuel pump assembly connector 2#	Always connected	About 1 Ω

If the results do not meet the requirements, replace the fuel pump.

(b) Check the working condition of fuel pump.

(1) The battery positive (+) lead is connected to connector terminal 1 and the negative (-) lead is connected to terminal 2. Check that the fuel pump works.

If the fuel pump does not work, replace the fuel pump.

Notice:

- To avoid coil burnout, this test must be performed within 5 seconds.
- Keep the fuel pump away from the battery as far as possible.
- Always energize and de-energize the battery side instead of the fuel pump side.

2. Use the multimeter to connect the sensor terminal and toggle the float at the same time to read the resistance:

Detector connection	Fuel gauge indication	Float center height (mm)	Resistance (Ω)
Fuel pump with fuel level sensor 1# - Fuel pump with fuel level sensor 2#	E STOP	9.2±2	267±3
	Empty	23.7±2	256±3
	1/4	71.3±2	208±3
	3/8	79.8±2	184±3
	1/2	91.3±2	161±3
	5/8	101.8±2	138±3
	3/4	112.8±2	114.5±2
	7/8	123.7±2	91.5±2
	Full	135.7±2	68±2
	F STOP	156.2±2	38±2

If the resistance value does not match, replace the fuel level sensor.

3. **Use the multimeter to connect the sensor terminal and toggle the float at the same time to read the resistance: (only for HEV models)**

Detector connection	Fuel gauge indication	Float center height (mm)	Resistance (Ω)
Fuel pump with fuel level sensor 1# - Fuel pump with fuel level sensor 2#	E STOP	10±2	271±3
	Empty	20.7±2	249.4±3
	1/4	41.3±2	203±3
	3/8	51.3±2	180±3
	1/2	61.8±2	156.5±3
	5/8	71.8±2	113.5±3
	3/4	85.8±2	110.5±2
	7/8	102.2±2	87.5±2
	Full	119.7±2	64±2
	F STOP	140.3±2	40±2

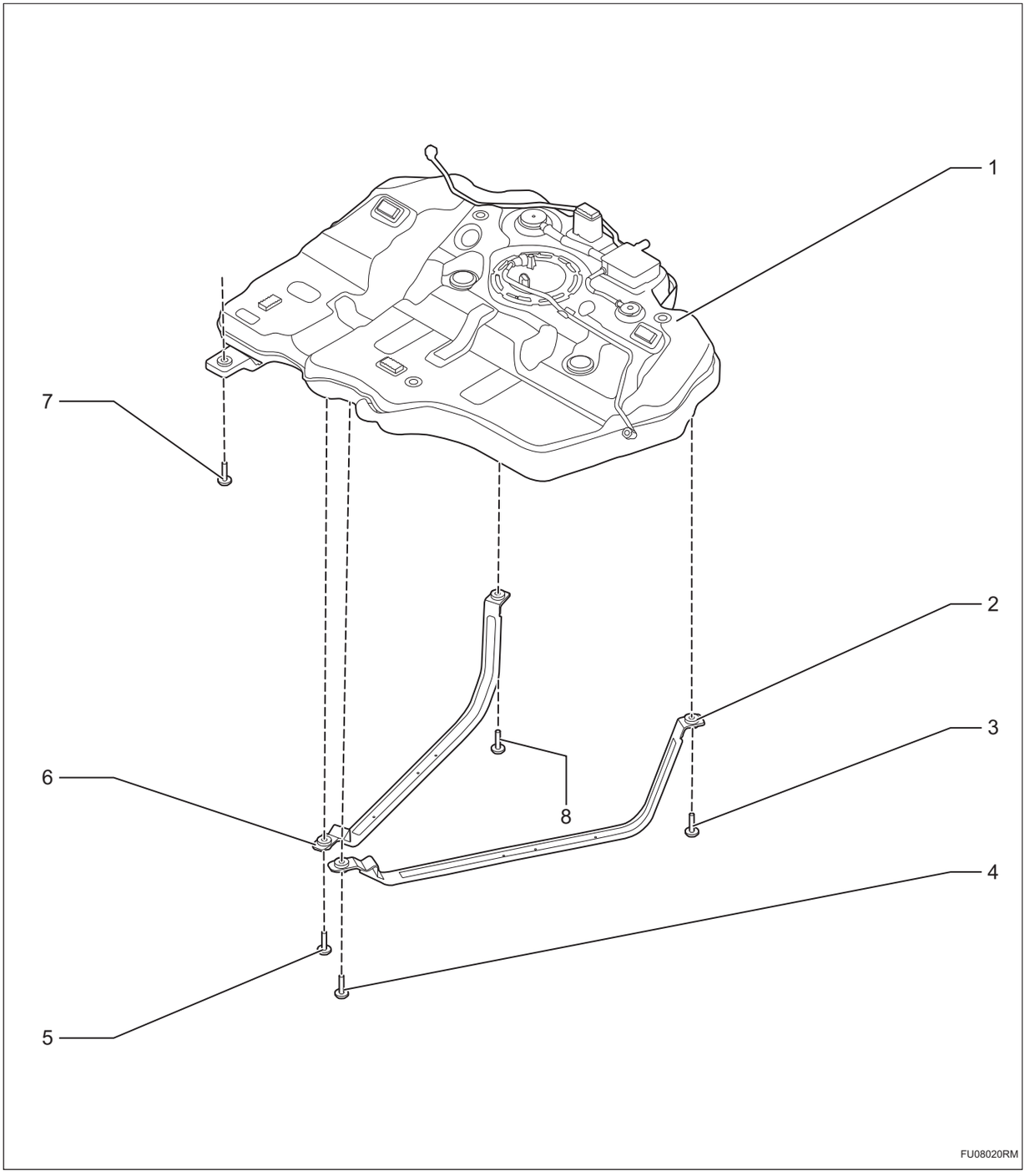
If the resistance value does not match, replace the fuel level sensor.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Fuel tank

Part (only for HEV models)

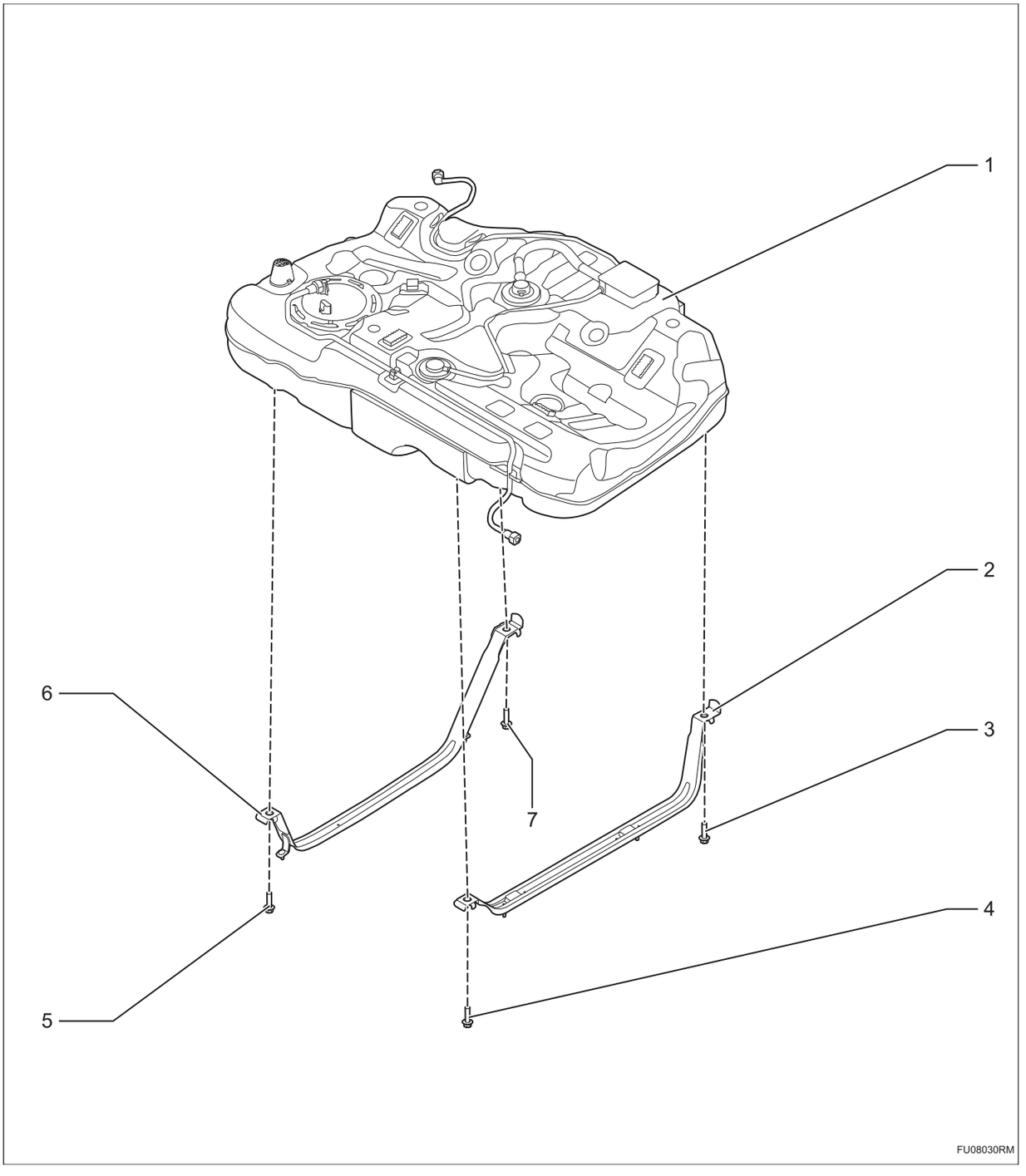


1. **Plastic fuel tank assembly**
2. **Fuel tank left strap assembly**
3. **Hexagon flange bolt**
   - Torque: 40~50 N · m
4. **Hexagon flange bolt**

- Torque: 40~50 N · m

5. **Hexagon flange bolt**
   - Torque: 40~50 N · m
6. **Fuel tank right strap assembly**
7. **Hexagon flange bolt**
   - Torque: 40~50 N · m
8. **Hexagon flange bolt**
   - Torque: 40~50 N · m

Parts



1. **Plastic fuel tank assembly**
2. **Fuel tank left strap assembly**
3. **Hexagon flange bolt**
   - Torque: 47~57 N · m
4. **Hexagon flange bolt**
   - Torque: 47~57 N · m

5. **Hexagon flange bolt**
   - Torque: 47~57 N · m
6. **Fuel tank right strap assembly**
7. **Hexagon flange bolt**
   - Torque: 47~57 N · m

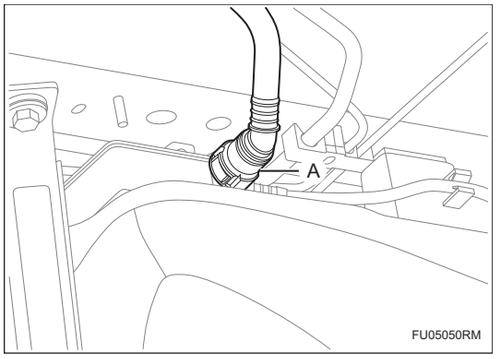
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove rear seat cushion assembly (See page SE-98)**
3. **Remove rear seat back assembly (only for HEV models) (See page SE-98)**
4. **Remove fuel tank assembly**

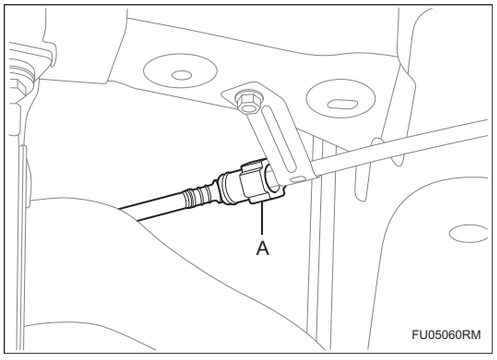
   Hint:

   Drain the fuel before removal.

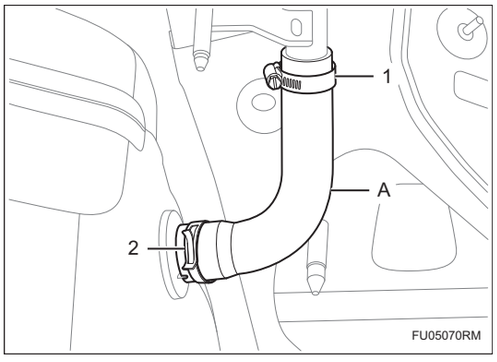
   (a) Disconnect the adsorption tube assembly I-A-.



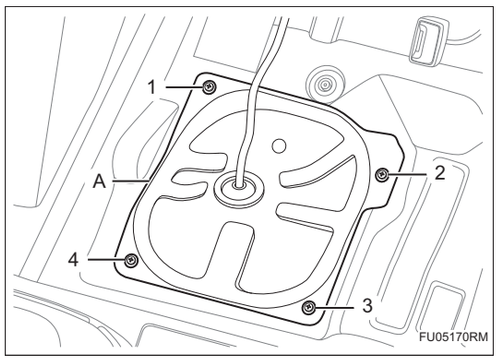
   (b) Disconnect the guide pipe-A of fuel filler pipe assembly.



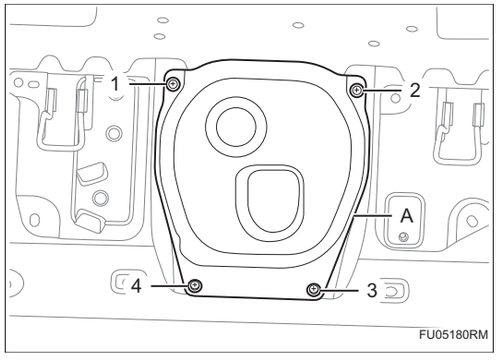
   (c) Detach the worm drive hose clamp -3-and detach the intercooler to the throttle valve pipeline assembly-A-.



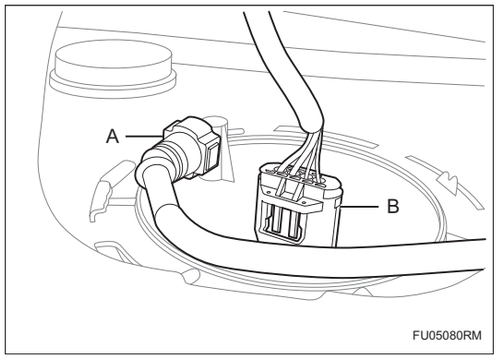
FU



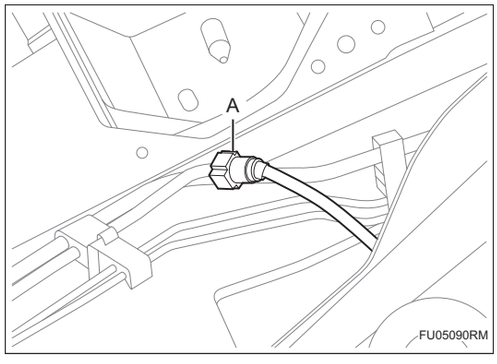
(d) Remove screw -1-4- and remove fuel tank access cover-A-.



(e) Remove screw -1-4- and remove fuel tank access cover-A-. (Only for HEV models)

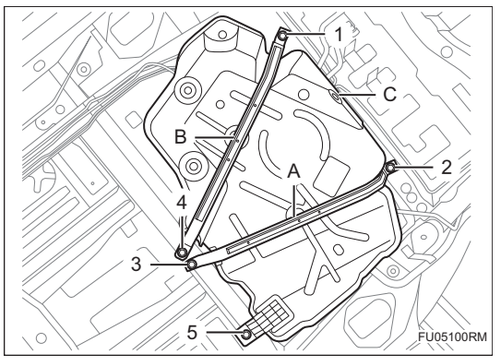


(f) Disconnect the fuel tank assembly harness connector -B- and the pipe -A-.



(g) Disconnect the pipe-A-.

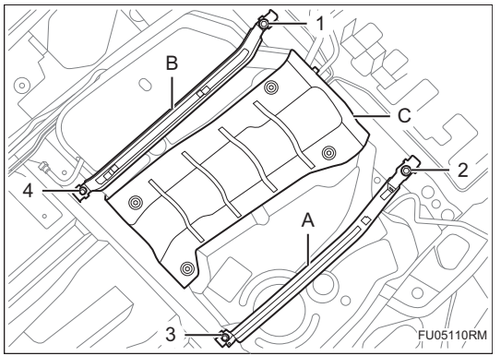
(h) Lift the pallet jack to a suitable height below the fuel tank assembly.



(i) Remove the bolt -5-. (Only for HEV models)

(j) Remove bolt -1-4-, and remove fuel tank left and right strap assemblies-A-B-. (Only for HEV models)

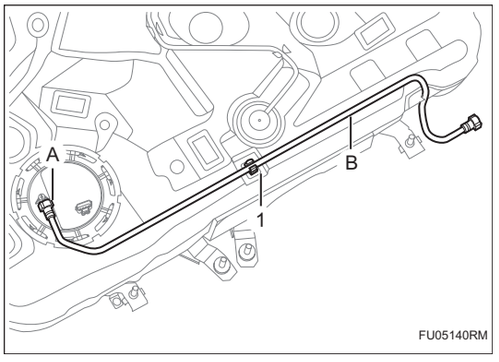
(k) Lower the pallet jack slowly and remove the fuel tank assembly-C-.



(l) Remove bolt -1-4-, and remove fuel tank left and right strap assemblies-A-B-.

(m) Lower the pallet jack slowly and remove the fuel tank assembly-C-.

5. Remove fuel pipe



(a) Disconnect the tubing -A- and detach the pipe clamp -1-.

(b) Remove the fuel pipe -B-.

6. Remove fuel pump with fuel level sensor assembly (See page FU-7)

Installation

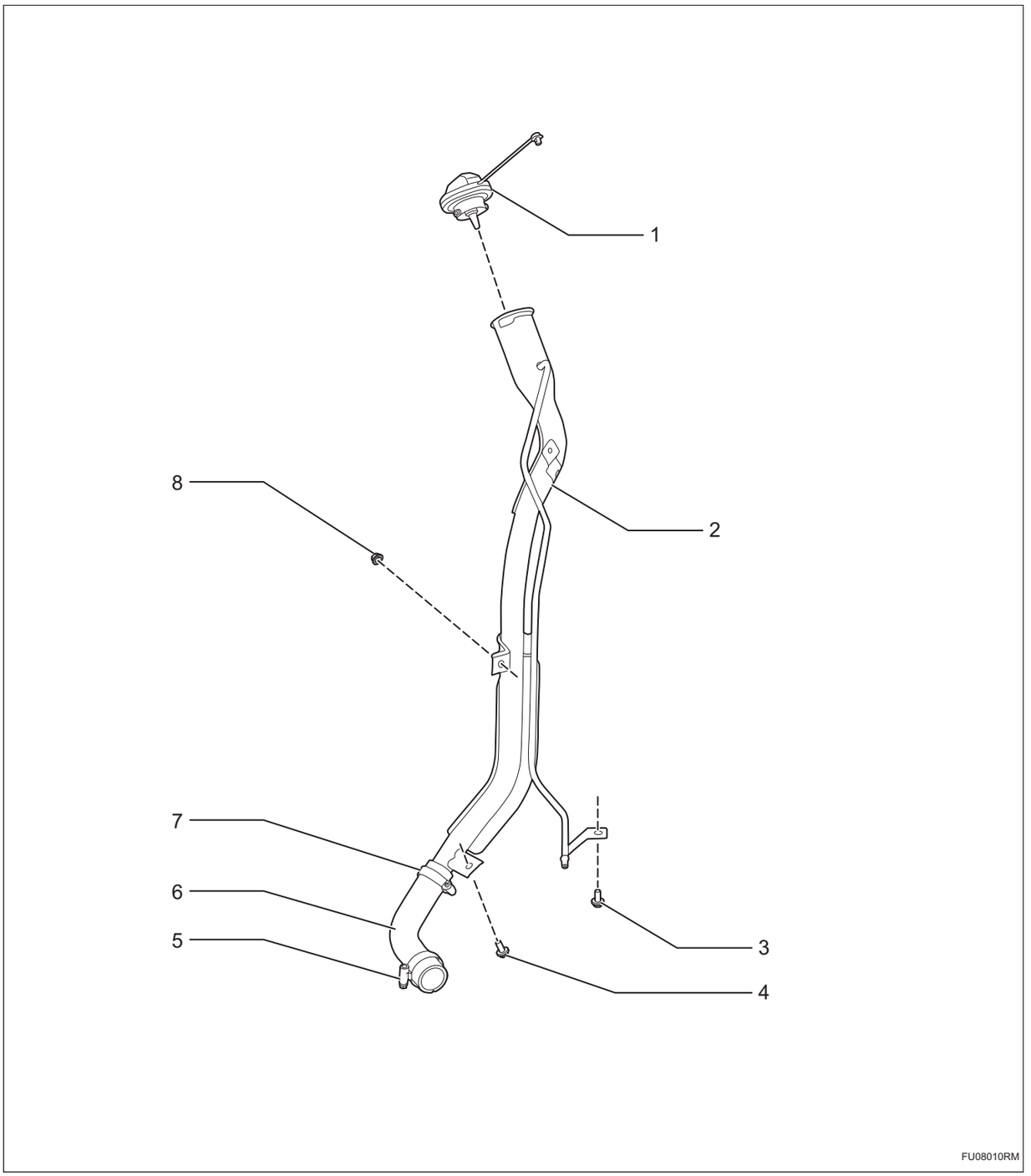
1. The installation procedure is the reverse of removal procedure.

Hint:

Do not start the fuel pump when the fuel tank is empty.

Fuel filler pipe assembly

Parts



1. **Fuel tank cap assembly**
2. **Fuel filler pipe assembly**
3. **Hexagon flange bolt**
   - Torque: 8~12 N · m
4. **Hexagon flange bolt**

- X2
- Torque: 8~12 N · m

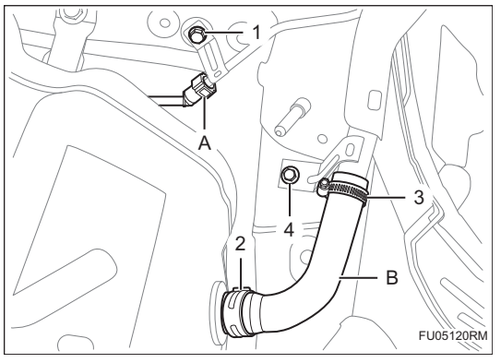
5. **Worm drive hose clamp**
6. **Fuel filler connecting hose**
7. **Worm drive hose clamp**
8. **Hexagon flange nut**
   - Torque: 8~12 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove right rear wheel guard (See page ET-39)**
3. **Remove the fuel filler pipe assembly**

   Hint:

   Drain the fuel before removal.

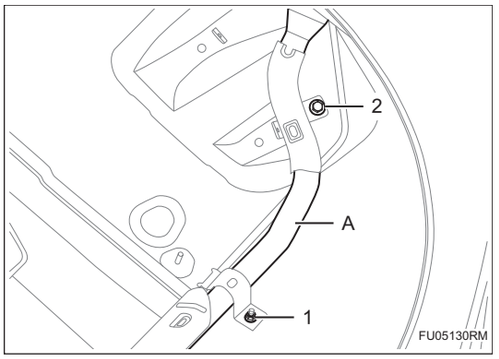


   (a) Detach the worm drive hose clamp -3-and detach the intercooler to the throttle valve pipeline assembly-A-.

   (b) Disconnect the fuel filler pipe assembly connection air pipe -A-.

   (c) Remove the bolt -1-4-.

   (d) Remove the nut -1- and the bolt -2-.



   (e) Remove fuel filler pipe assembly-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

   Hint:

   Do not start the fuel pump when the fuel tank is empty.

Charging system

Service switch CH-1
Safe power-off operation CH-1
Recover high-voltage loop CH-2
Dual USB charging port assembly CH-4
Parts CH-4
Removal CH-5
Installation CH-5
Alternator CH-6
Parts CH-6
Removal CH-8
Installation CH-9
Cigarette lighter CH-10
Parts CH-10
Removal CH-11
Installation CH-11
DCDC assembly CH-12
Parts CH-12
Removal CH-12
Installation CH-13
On-board wireless charger assembly CH-14
Parts CH-14
Removal CH-16
Installation CH-16
Battery assembly CH-17
Parts CH-17
Part (only for HEV models) CH-19
Removal CH-20
Installation CH-22

Service switch

Safe power-off operation

Caution:

before carrying out the following work, please carefully read the precautions for high voltage related operation (check and maintenance of high voltage system), and operate in strict accordance with the provisions in the precautions!

Caution:

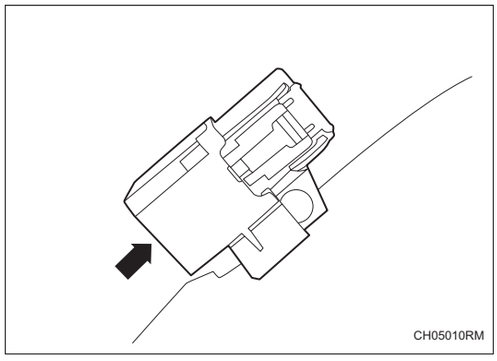
- Failure to properly disconnect the high-voltage loop prior to removal operations on the vehicle may result in serious electric shock accidents or even death.
- Even after the high-voltage loop is disconnected, the high-voltage battery still has high-voltage. Do not touch the high voltage battery housing and its inside with bare hands.

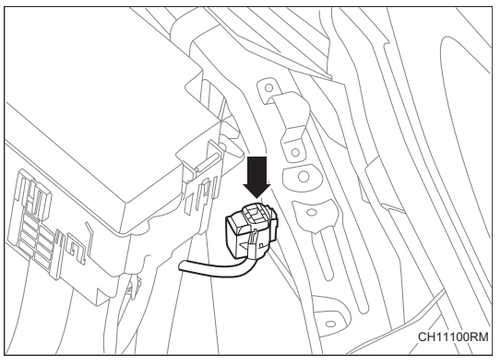
Warning:

- ***If the vehicle is connected to the charging gun, unplug the charging gun first.***
- ***The high-voltage capacitors in high-voltage components such as MCU and DC/DC retain some electrical energy after the high voltage system is powered off. The residual electrical energy will be reduced to below 60 VDC within 2 minutes and will be completely released within 5 minutes.***
- ***Place the vehicle power supply in OFF mode.***
- ***After unlocking the service switch, placing the vehicle power supply in the ON mode position may cause a malfunction.***

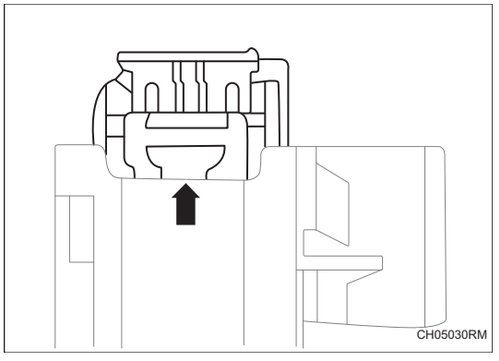
1. Safe power-off operation

(a) The service switch is installed in the left front corner of the cabin.

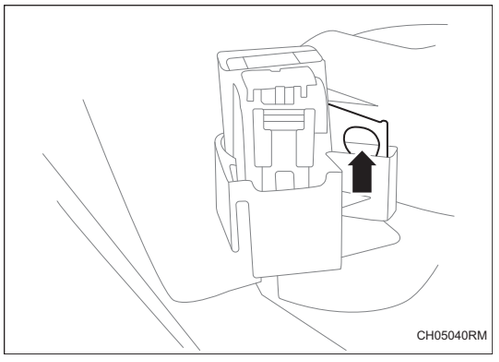




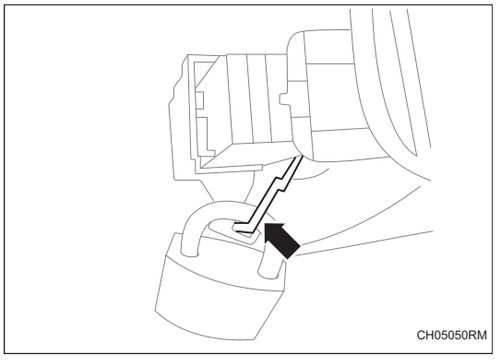
(b) Lift the locking clip up.



(c) Lift the safety lock clip up.



(d) Lift the safety lock clip to the limit position of the locking ring.



(e) Lock the locking ring of safety lock clip with a safety lock.

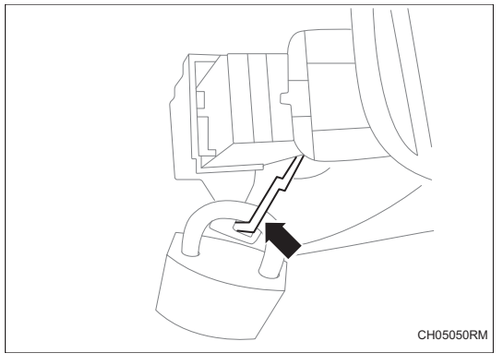
(f) At this time, the high voltage system is safely powered off.

Recover high-voltage loop

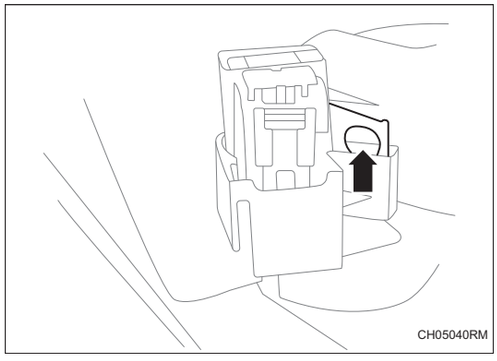
Caution:

Before carrying out the following work, please carefully read the precautions of high-voltage related operations (high voltage system check and maintenance) and strictly follow the regulations in the precautions!

1. Recover high-voltage loop



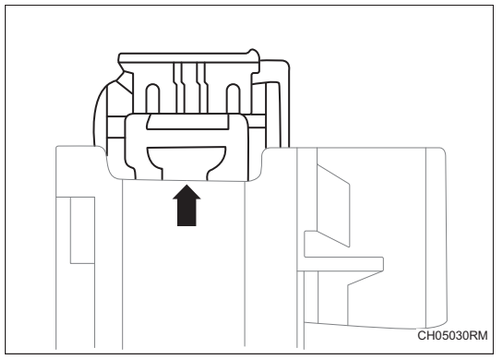
(a) Unlock the safety lock.



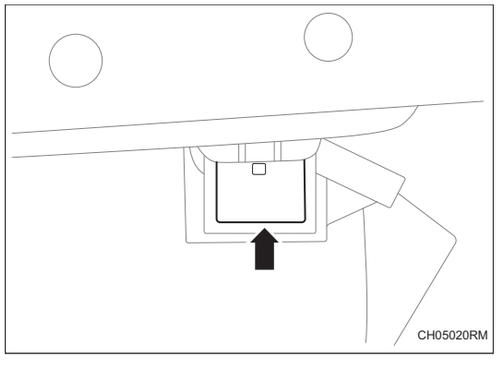
(b) Unlock the locking clip of the safety lock.

Hint:

Let the safety lock clip slide smoothly to the locking position.



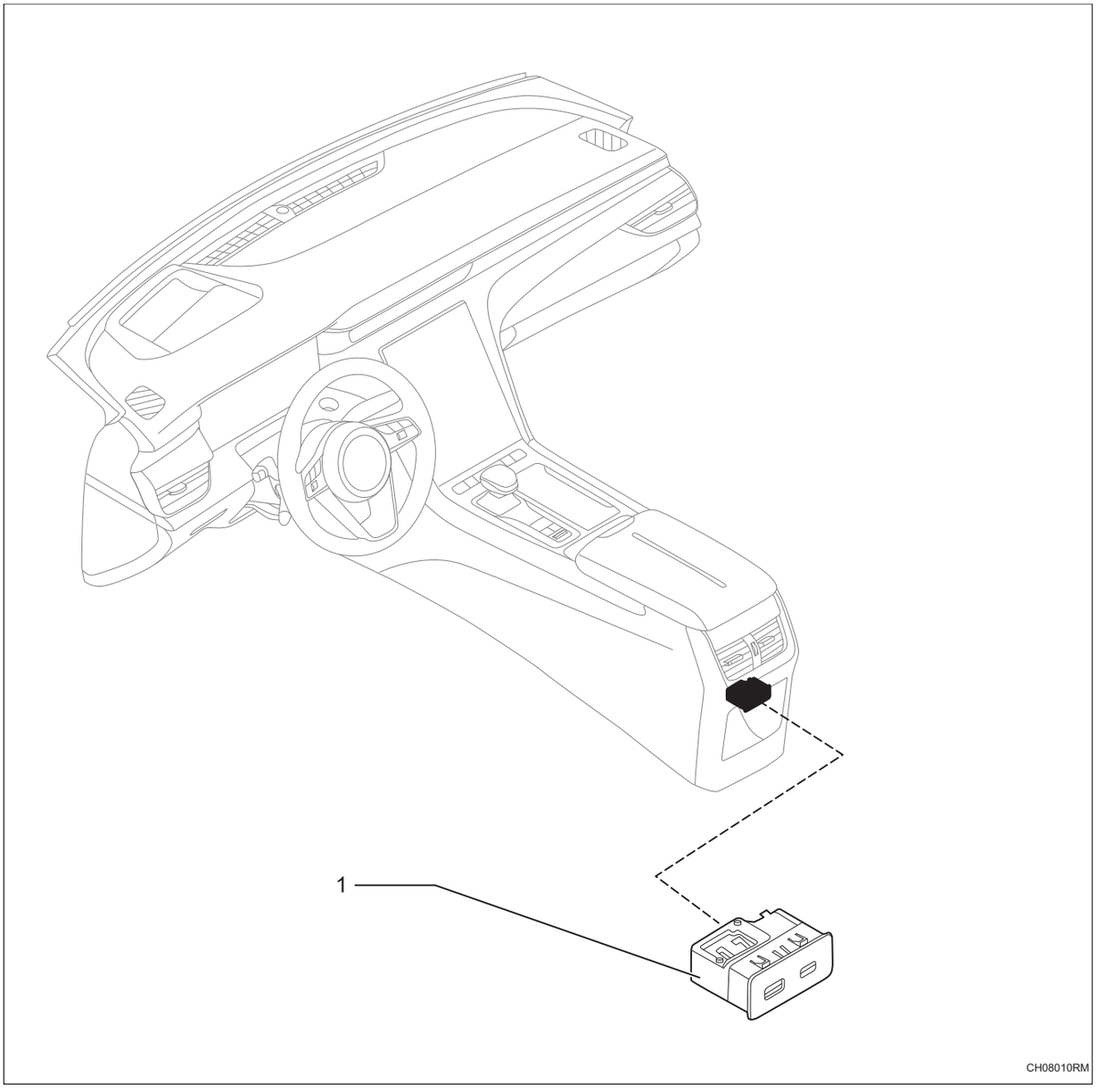
(c) Slide the safety lock clip down to the locking position.



(d) Lock the lock clip downward.

Dual USB charging port assembly

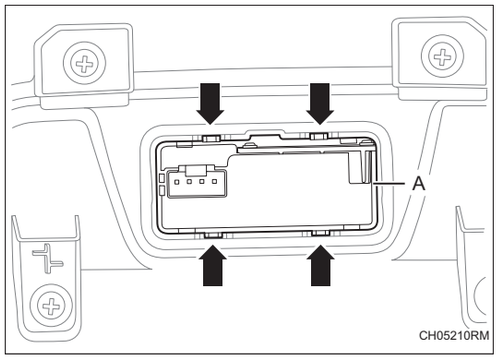
Parts



1. **Remove dual USB charging port assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the rear end plate (See page IP-17)**
3. **Remove the dual USB charging port assembly**



(a) Disconnect the harness connector-A-.

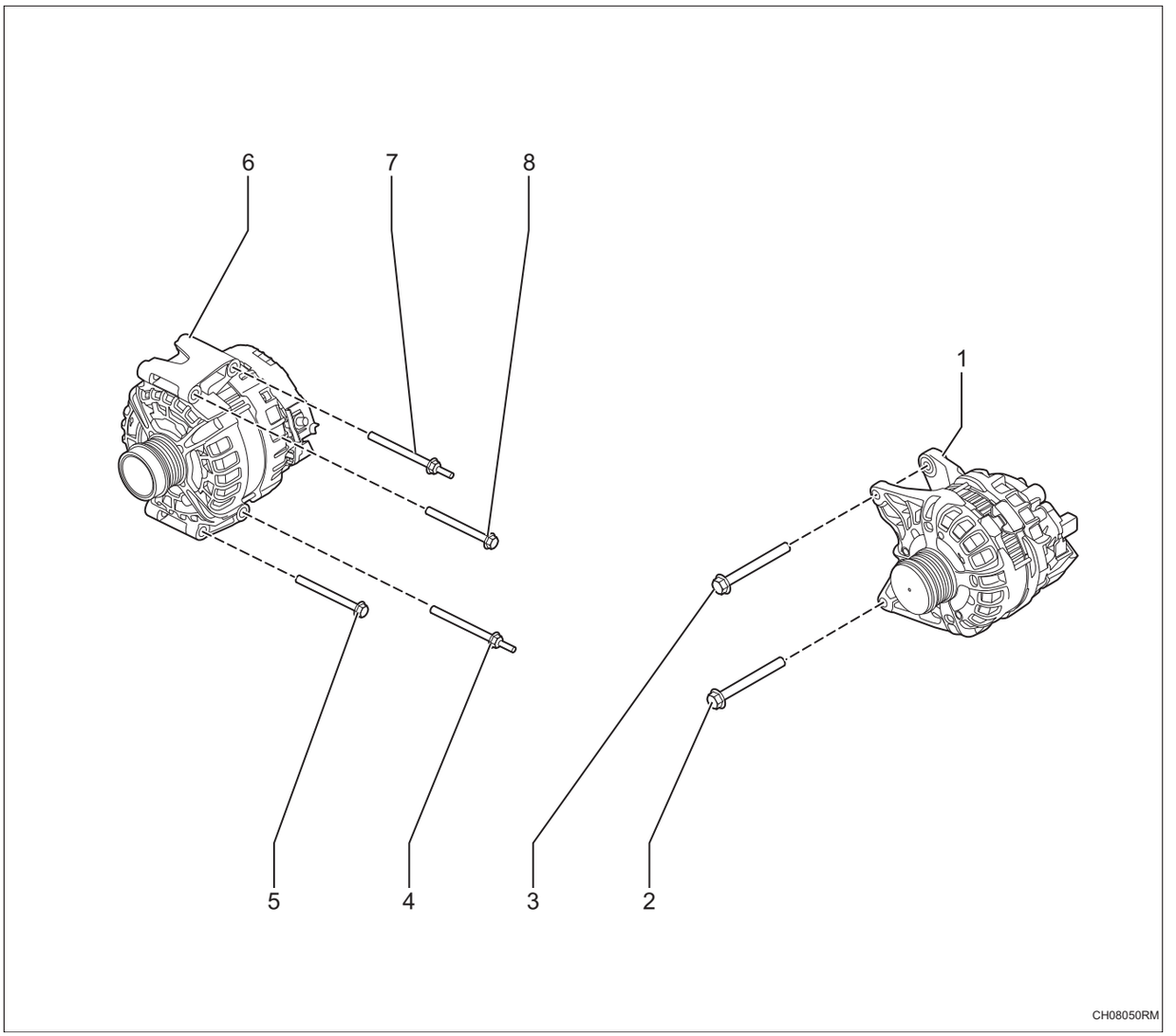
(b) Press the -arrow- claw and remove the dual USB charging port assembly -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Alternator

Parts



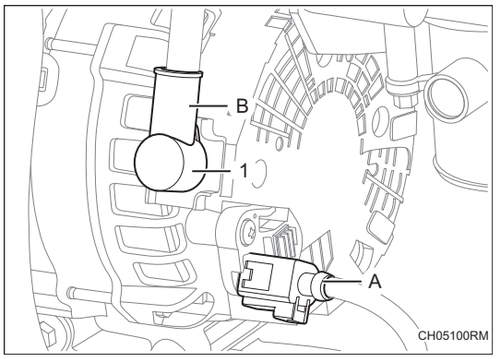
1. **Alternator assembly (only for 1.5 T models)**
2. **Hexagon flange bolt**
   - Torque: 37 ~ 49 N · m
3. **Hexagon flange bolt**
   - Torque: 37 ~ 49 N · m
4. **Hexagon flange bolt**
   - Torque: 22 ~ 28 N · m
5. **Hexagon flange bolt**
   - Torque: 22 ~ 28 N · m
6. **Alternator assembly (only for 2.0 T and 1.8 T models)**
7. **Stud**

- Torque: 22 ~ 28 N · m

8. **Hexagon flange bolt**
   - Torque: 22 ~ 28 N · m

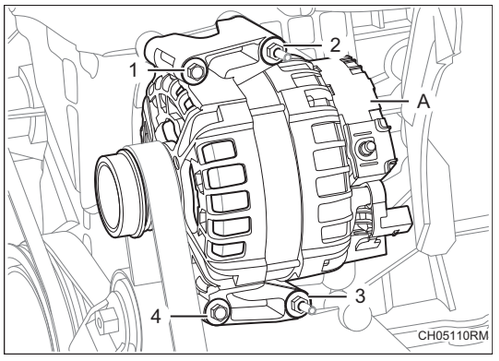
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the V-ribbed belt (See page EM-4)**
3. **Remove alternator assembly (only for 2.0 T and 1.8 T models)**



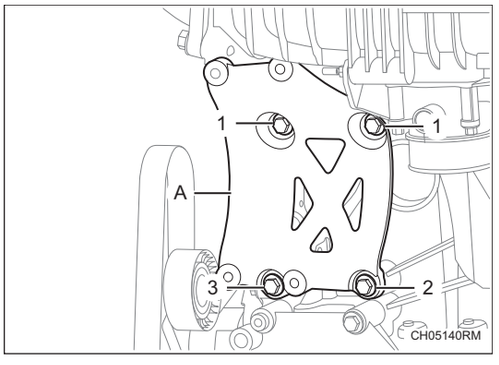
(a) Disconnect the harness connector-A-.

(b) Detach positive harness protective cover-B-, and remove nut - 1-.



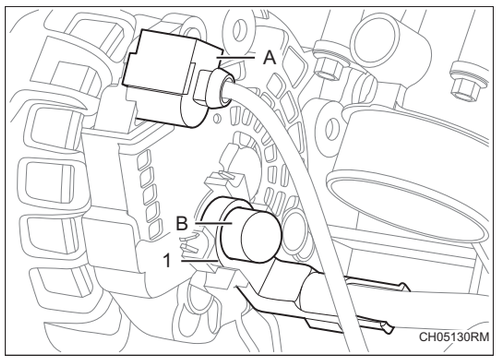
(c) Remove the bolt -1-4- and the alternator assembly -A-.

4. **Remove alternator bracket (only for 2.0 T and 1.8 T models)**



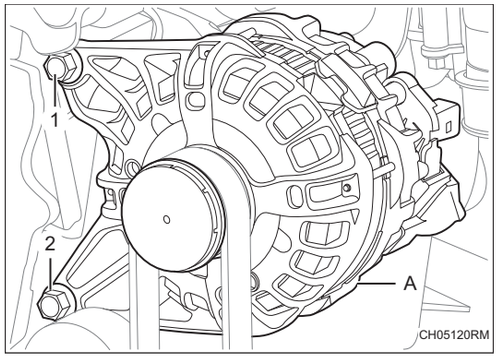
(a) Remove the bolt -1-4- and the alternator bracket-A-.

5. **Remove alternator assembly (only for 1.5 T models)**



(a) Disconnect the harness connector-A-.

(b) Detach positive harness protective cover-B-, and remove nut - 1-.



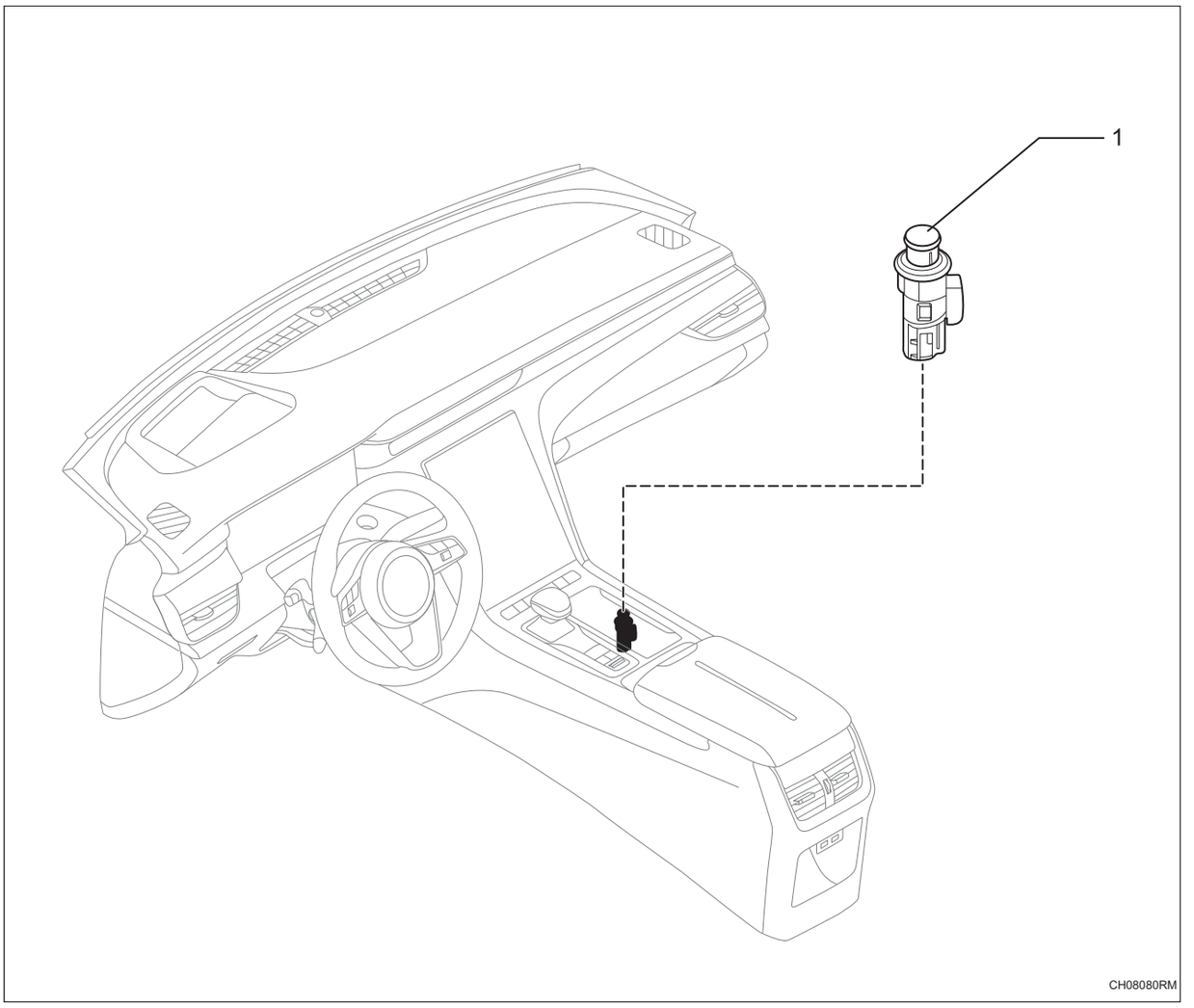
(c) Remove the bolt -1-2- and the alternator assembly -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Cigarette lighter

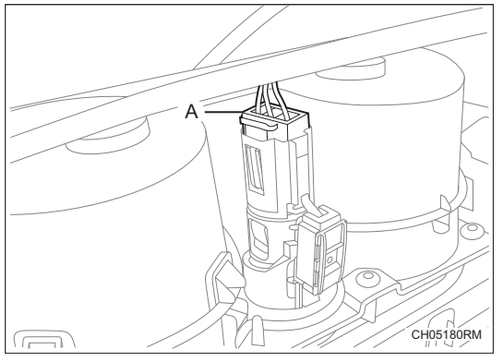
Parts



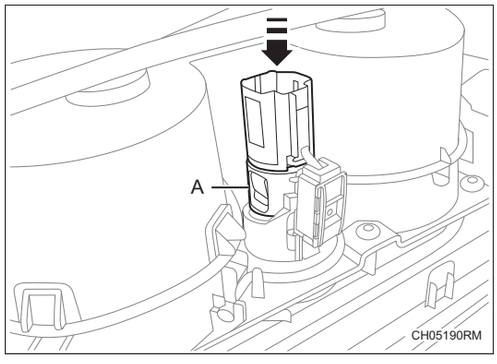
1. Cigarette lighter assembly

Removal

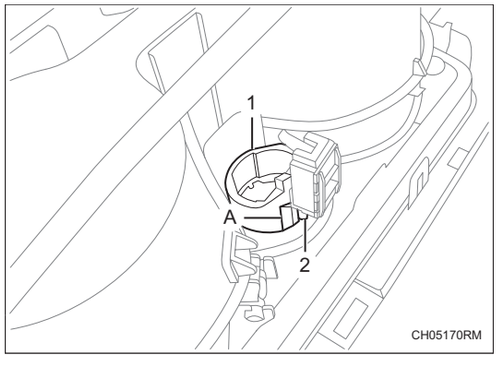
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the upper cover plate assembly (See page IP-17)**
3. **Remove cigarette lighter**



(a) Disconnect the harness connector-A-.



(b) Press cigarette lighter -A- in the direction of -arrow-.



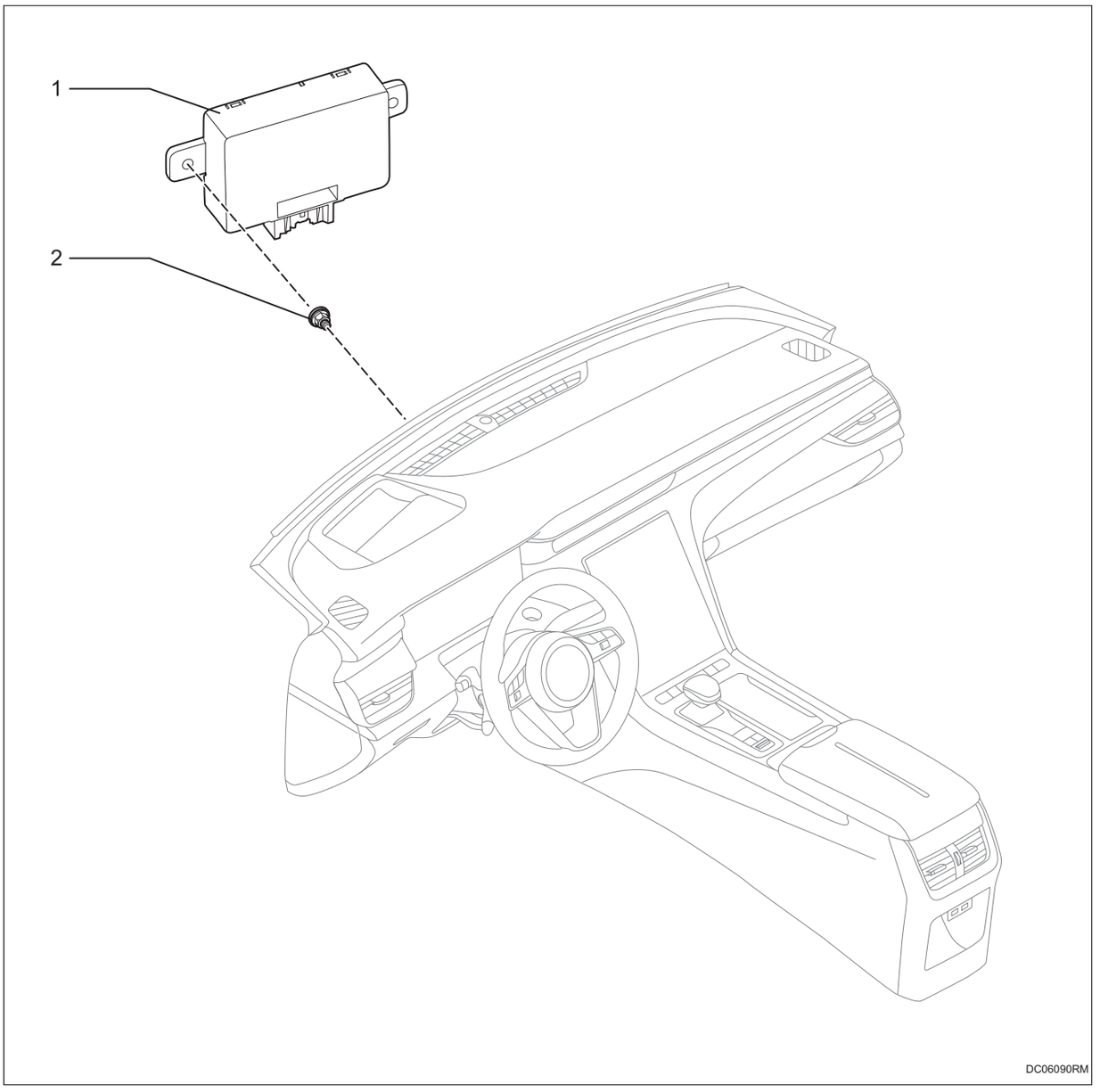
(c) Detach the claw -1-2-, and remove the lighting ring-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

DCDC assembly

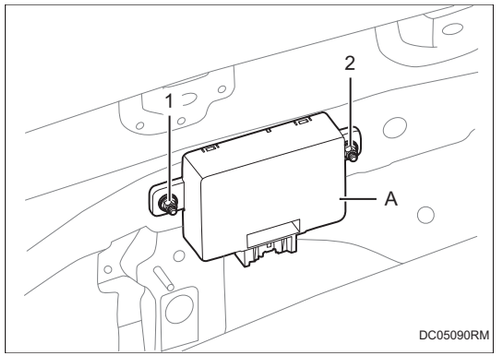
Parts



1. **DCDC assembly**
2. **Hexagon flange nut**
   - X2
   - Torque: 5~6 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove front HVAC assembly (See page AC-143)**



3. Remove DCDC assembly (only for 1.5 T and 2.0 T models)

(a) Disconnect the harness connector.

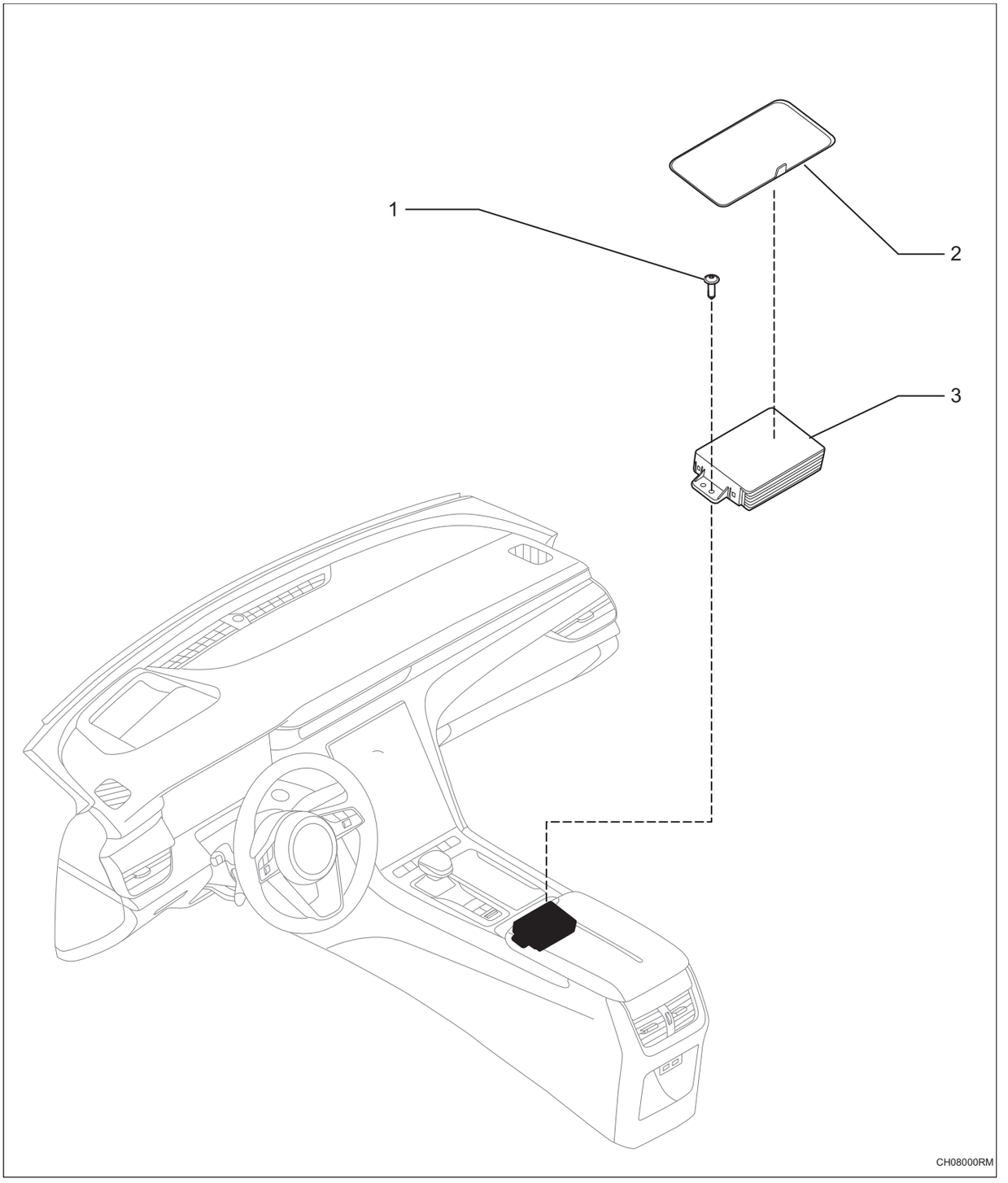
(b) Removal the nuts -1-2-, and remove the DCDC assembly-A-.

Installation

1. The installation procedure is the reverse of removal procedure.

On-board wireless charger assembly

Parts



1. Hexagon socket pattern pan head flange tapping screw

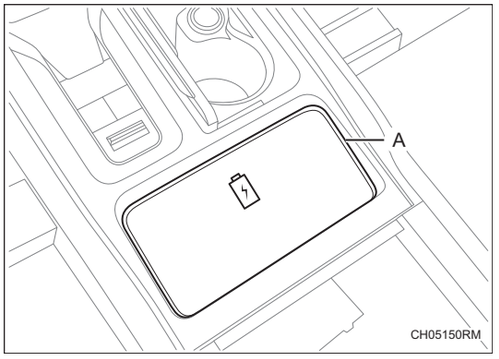
- X2

- Torque: 2~3 N · m

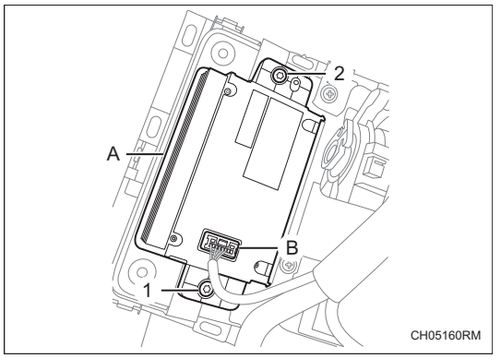
2. **Anti-slip pad**
3. **On-board wireless charger assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the upper cover plate assembly (See page IP-17)**
3. **Remove on-board wireless charger assembly**



(a) Remove the anti-skid pad -A-.



(b) Disconnect the harness connector-B-.

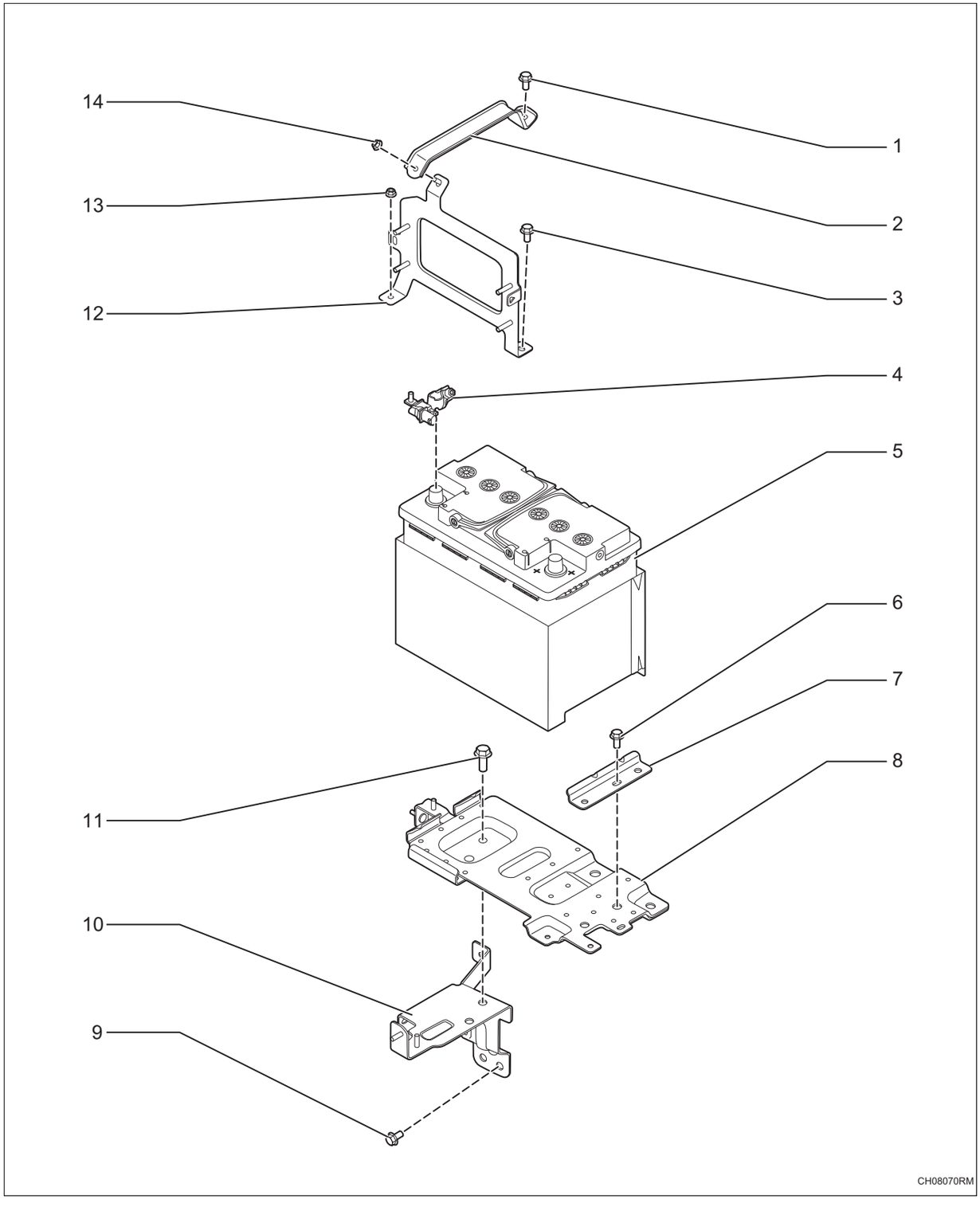
(c) Remove the bolt -1-2- and the on-board wireless charger assembly -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Battery assembly

Parts

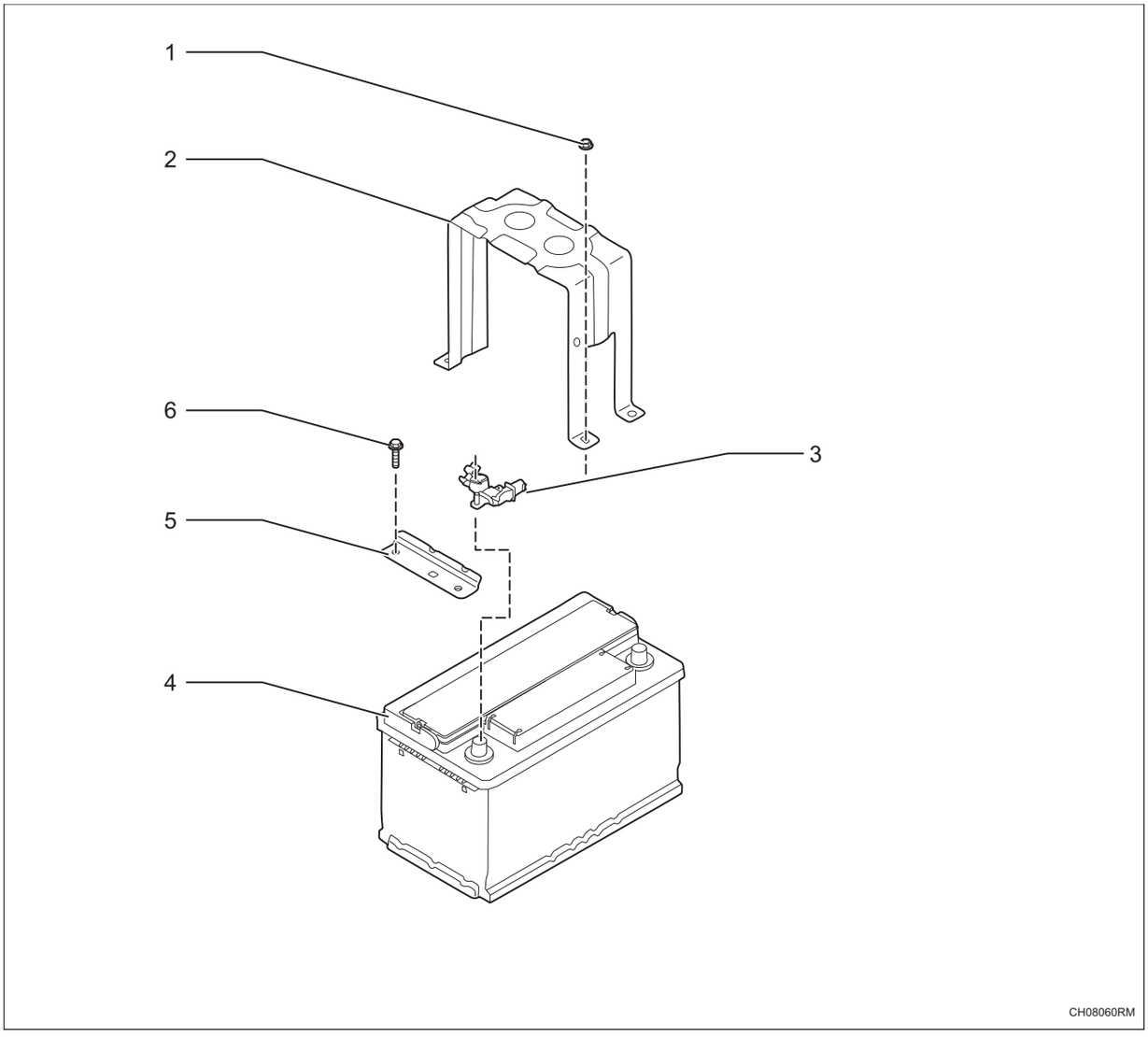


1. Hexagon flange bolt

- Torque: 21.6~30.4 N · m

2. **ECM fixing bracket II**
3. **Hexagon flange bolt**
   - Torque: 8 ~ 12 N · m
4. **EBS assembly**
   - Torque: 5 ~ 7 N · m
5. **Battery assembly**
   - Battery voltage (12 V) 70 Ah maintenance-free battery
6. **Hexagon flange bolt**
   - X2
   - Torque: 21.6~30.4 N · m
7. **Battery platen III**
8. **Battery fixing seat**
9. **Hexagon flange nut**
   - X2
   - Torque: 40 ~ 50 N · m
10. **Battery bracket I**
11. **Hexagon flange nut**
    - X3
    - Torque: 40 ~ 50 N · m
12. **ECM fixing bracket I**
13. **Hexagon flange nut**
    - Torque: 8 ~ 12 N · m
14. **Hexagon flange nut**
    - Torque: 8 ~ 12 N · m

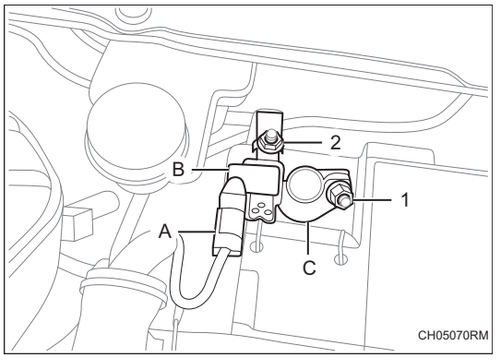
Part (only for HEV models)



1. **Hexagon flange bolt**
   - X4
   - Torque: 6 ~ 8 N · m
2. **High voltage harness mounting cover**
3. **EBS assembly**
   - Torque: 5 ~ 7 N · m
4. **Battery assembly**
   - Battery voltage (12 V) 80 Ah maintenance-free battery
5. **Battery platen III**
6. **Hexagon flange bolt**
   - X3
   - Torque: 21.6~30.4 N · m

Removal

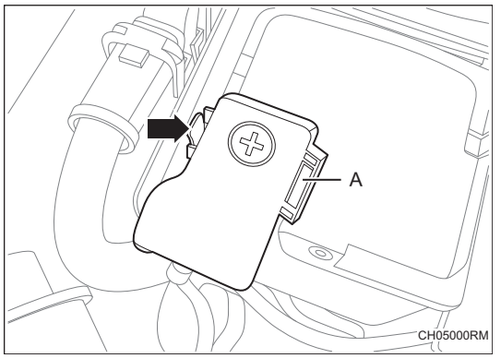
1. **Remove the ECM bracket (See page ES-451)**
2. **Remove the battery**



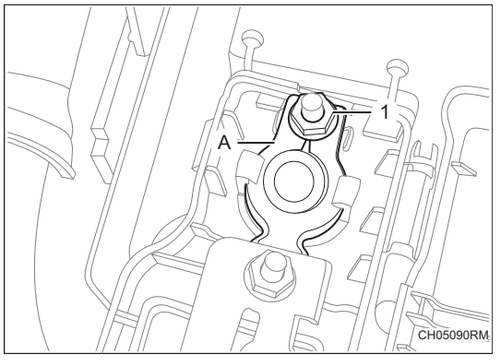
(a) Disconnect the harness connector-A-.

(b) Release nut -1-, and disconnect battery negative terminal -C- .

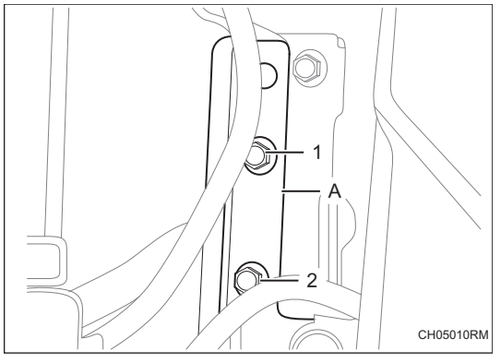
(c) Remove the nut -2- and the EBS-B-.



(d) Press the claw -arrow- to open the battery protective cover- A-.



(e) Release nut -1-, and disconnect battery positive terminal -A-.



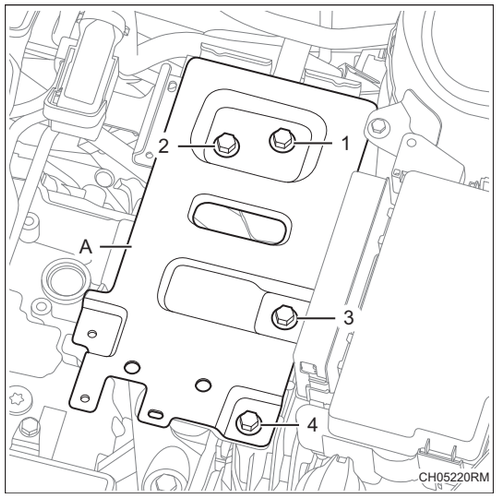
(f) Remove the bolt -1-2- and the battery platen -A-.

CH

(g) Remove the battery.

3. Remove battery mount assembly

(a) Remove the bolt -1-4- and the battery mount assembly -A-.

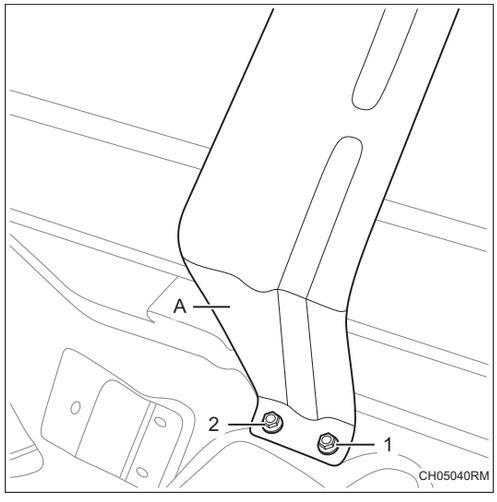


4. Remove trunk carpet (only for HEVs).

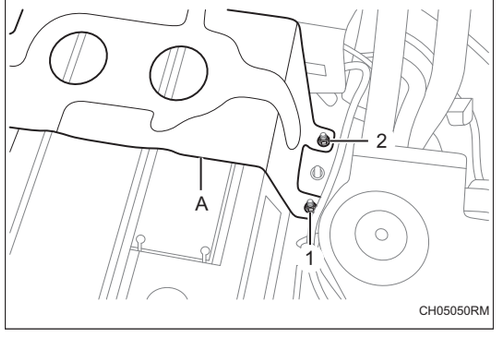
5. Remove woofer assembly (only for HEV models) (See page AV-53)

6. Remove high voltage harness mounting cover (only for HEV model)

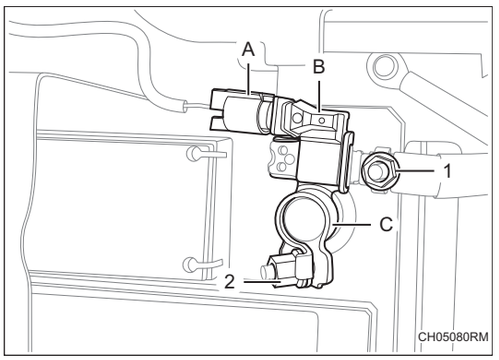
(a) Fixing nut -2- and bolt -1- of high voltage harness mounting cover -A-.



(b) Remove nut -2- and bolt -1-, and remove the high voltage harness mounting cover -A.



7. Remove battery (only for HEVs)

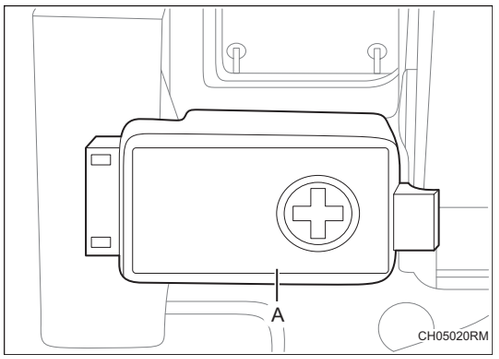


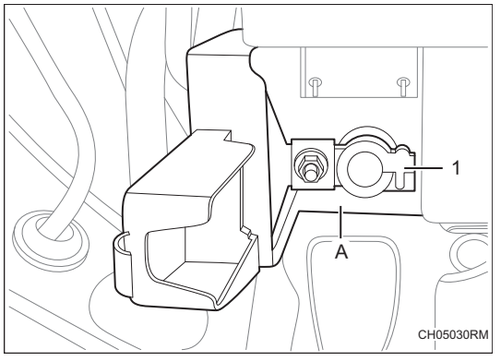
(a) Disconnect the harness connector-A-.

(b) Release nut -2-, and disconnect battery negative terminal -C- .

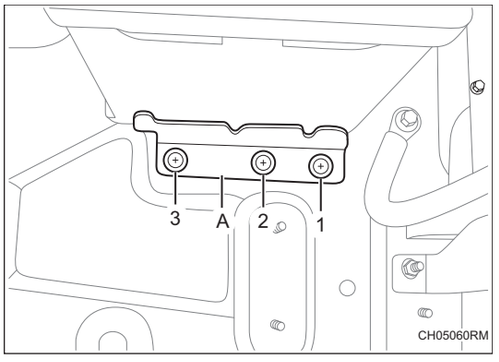
(c) Remove the nut -1- and the EBS-B-.

(d) Open the battery protective cover-A-.





(e) Release nut -1-, and disconnect battery positive terminal -A-.



(f) Remove the bolt -1-3- and the battery platen -A-.

CH

Installation

1. **The installation procedure is the reverse of removal procedure.**

8G45B transmission control system

TCU AX-1
Precautions AX-1
Location of parts AX-3
System diagram AX-5
System description AX-6
Symptom chart AX-7
ECU terminal AX-18
Road test AX-19
Mechanical system test AX-21
Line pressure test AX-23
Initialization AX-23
Fail-safe protection AX-25
DTC chart AX-26
P060145 ..... AX-32
P060346 ..... AX-32
P060444 ..... AX-32
P070200 ..... AX-33
P070500 ..... AX-34
P280000 ..... AX-34
P070600 ..... AX-34
P280100 ..... AX-34
P070900 ..... AX-34
P280400 ..... AX-34
P280500 ..... AX-34
P071300 ..... AX-36
P071200 ..... AX-36
P071000 ..... AX-36
P071123 ..... AX-36
P071100 ..... AX-36
P071700 ..... AX-39
P071500 ..... AX-39
P071600 ..... AX-39
P071800 ..... AX-39
P072200 ..... AX-42
P072000 ..... AX-42
P072100 ..... AX-42
P072300 ..... AX-42
P088200 ..... AX-45
P088300 ..... AX-45

P096300 .....AX-48
P096200 .....AX-48
P096000 .....AX-48
P096100 .....AX-48
P097100 .....AX-52
P097000 .....AX-52
P097400 .....AX-55
P097300 .....AX-55
P097700 .....AX-59
P097600 .....AX-59
P096700 .....AX-63
P096600 .....AX-63
P098000 .....AX-67
P097900 .....AX-67
P1C1000 .....AX-67
P097800 .....AX-67
P098300 .....AX-71
P098200 .....AX-71
P1C1100 .....AX-71
P098100 .....AX-71
P098600 .....AX-75
P098500 .....AX-75
P1C1200 .....AX-75
P098400 .....AX-75
P099000 .....AX-79
P098900 .....AX-79
P098800 .....AX-79
P099A00 .....AX-79
P099900 .....AX-83
P099800 .....AX-83
P1C1300 .....AX-83
P099700 .....AX-83
P0B0A00 .....AX-87
P0B0B00 .....AX-87
P170A00 .....AX-87
P272100 .....AX-90
P272000 .....AX-90
P273000 .....AX-94
P272900 .....AX-94
P273900 .....AX-98
P273800 .....AX-98
P276300 .....AX-101
P276400 .....AX-101

P276100 ..... AX-101
P276200 ..... AX-101
P279900 ..... AX-105
P279800 ..... AX-105
P280600 ..... AX-108
P281500 ..... AX-109
P281400 ..... AX-109
P281200 ..... AX-109
P281000 ..... AX-109
P1CA000 ..... AX-113
P1CA100 ..... AX-113
P1CA200 ..... AX-113
P1CA300 ..... AX-113
P1CA400 ..... AX-113
P1CA500 ..... AX-113
P1CA600 ..... AX-113
P1CB800 ..... AX-113
P1CBA00 ..... AX-113
P075C00 ..... AX-117
P076200 ..... AX-117
P076700 ..... AX-117
P077200 ..... AX-117
P076F00 ..... AX-119
P072900 ..... AX-122
P073000 ..... AX-122
P073100 ..... AX-122
P073200 ..... AX-122
P073300 ..... AX-122
P073400 ..... AX-122
P073500 ..... AX-122
P073600 ..... AX-122
P074100 ..... AX-126
P074200 ..... AX-129
P075600 ..... AX-132
P075700 ..... AX-132
P094200 ..... AX-134
P270800 ..... AX-137
P280900 ..... AX-139
U000188 ..... AX-141
U010087 ..... AX-141
U010387 ..... AX-141
U014687 ..... AX-141
U015187 ..... AX-141

U023587 ..... AX-141
U040180 ..... AX-141
U040181 ..... AX-141
U040182 ..... AX-141
U040183 ..... AX-141
U040184 ..... AX-141
U040185 ..... AX-141
U040186 ..... AX-141
U040187 ..... AX-141
U040188 ..... AX-141
U040189 ..... AX-141
U04018A AX-141
U04018B AX-141
U04018C AX-141
U04018D AX-141
U04018E AX-141
U04018F AX-141
U0401F0 ..... AX-141
U0401F2 ..... AX-141
U0401F3 ..... AX-141
U040480 ..... AX-141
U040481 ..... AX-141
U040482 ..... AX-142
U040483 ..... AX-142
U040484 ..... AX-142
U040485 ..... AX-142
U040486 ..... AX-142
U040487 ..... AX-142
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U040489 ..... AX-142
U041580 ..... AX-142
U041581 ..... AX-142
U041582 ..... AX-142
U041583 ..... AX-142
U041585 ..... AX-142
U041586 ..... AX-142
U041587 ..... AX-142
U041588 ..... AX-142
U041589 ..... AX-142
U04158A AX-142
U04158B AX-142
U04158C AX-142
U04158D AX-142

U0415F0 ..... AX-142
U0415F1 ..... AX-142
U0415F2 ..... AX-142
U0415F3 ..... AX-142
U0415F4 ..... AX-142
U0415F6 ..... AX-142
U042280 ..... AX-143
U042286 ..... AX-143
U042386 ..... AX-143
U043382 ..... AX-143
U043383 ..... AX-143
U043982 ..... AX-143
U043983 ..... AX-143
U044784 ..... AX-143
U045282 ..... AX-143
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U045286 ..... AX-143
U054482 ..... AX-143
U054483 ..... AX-143
U112187 ..... AX-143
U113887 ..... AX-143
U114080 ..... AX-143
U114087 ..... AX-143
U114687 ..... AX-143
U115587 ..... AX-143
U119987 ..... AX-143
U124387 ..... AX-143
U0401F1 ..... AX-143
ATF AX-147
Drain AX-147
Add AX-148
AT AX-152
Parts AX-152
Removal AX-153
Installation AX-154
AT assembly unit AX-155
Parts AX-155
Removal AX-158
Installation AX-166

TCU

Precautions

Notice:

The initialization is required for some systems after the battery negative terminal cable is disconnected and reconnected.

Notice:

after replacing the AT assembly, engine assembly or transmission control unit, perform memory reset (AT initialization) .

Hint:

A memory reset operation cannot be completed by simply disconnecting the battery (-) terminal cable.

1. **ENGINE START/STOP button (ignition switch) representation:**

   Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

Notice:

the following basic matters must be followed during the installation and removal of the transmission.

2. **Precautions when handling electronic parts**

   (a) When replacing the electronic parts, be sure to place the ignition switch in the OFF position and disconnect the battery negative (-) terminal cable before servicing the system.

   (b) When disconnecting the connector, pull out the connector after unlocking.

   Notice:

   Do not pull the harness.

   (c) When connecting the connector, push the connector until it is fully locked. Tip:

   Hint:

   Check and confirm a click is heard.

   (d) Do not hit the electronic parts. If the part is dropped or impacted, renew it.

3. **Prevent contamination with foreign matters**

(a) Ensure that dust, sand, etc. are completely removed when removing the relevant parts from the transmission.

(b) Wrap the removed parts with plastic bags to prevent dust.

(c) Carry out maintenance procedures with bare hands or plastic gloves, and do not use work gloves or rags.

4. Prevent damage to parts

(a) When disassembling the contact surface of the box, knock it with a plastic hammer to separate it.

Notice:

It is strictly forbidden to use screwdrivers and other tools to pry open the contact surface.

(b) Do not pull out the solenoid valve or spool valve with excessive force.

(c) Install the parts, and check and confirm that the harness, etc. are not stuck.

5. Clean the parts

(a) Thoroughly clean all parts, blow dry with gas and apply the specified oil.

(b) Do not clean aluminum parts and rubber parts with alkaline chemicals.

(c) Do not clean the rubber parts with wash oil (white gasoline).

6. Precautions when handling ATF

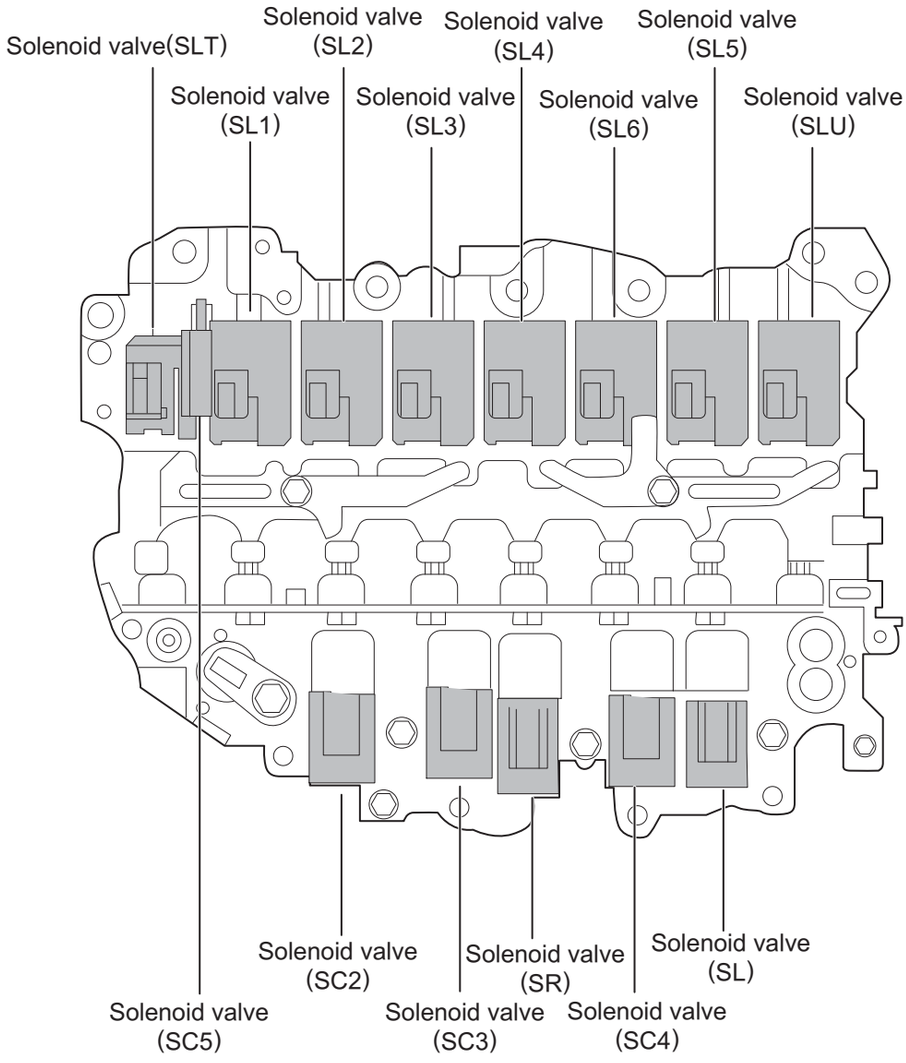
(a) Do not drain the high-temperature ATF (repair after the ATF cools down).

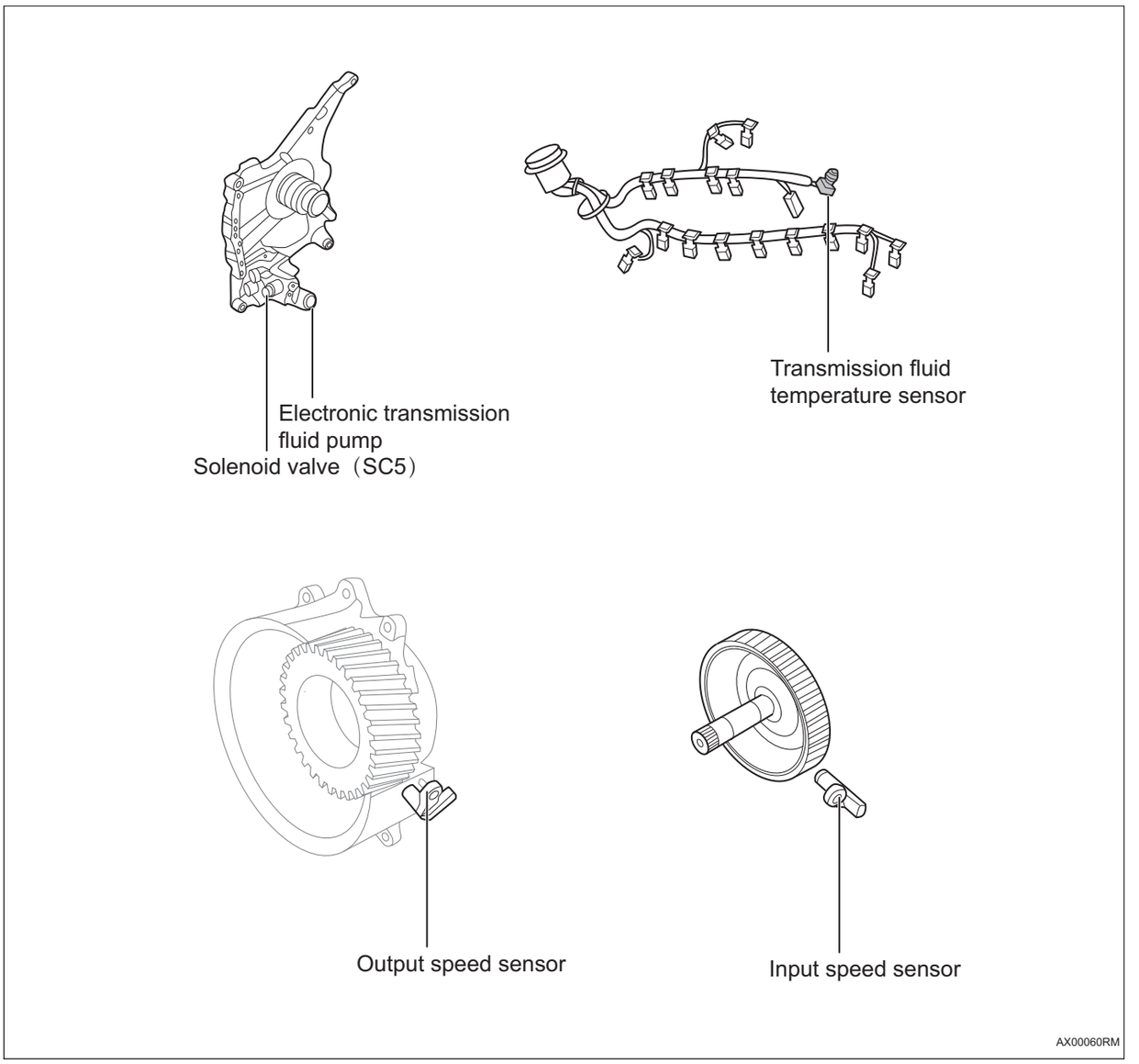
(b) When the ATF splashes onto the floor, wipe it off immediately, as the floor may become slippery and dangerous.

(c) Be sure to use AW-1 type of ATF.

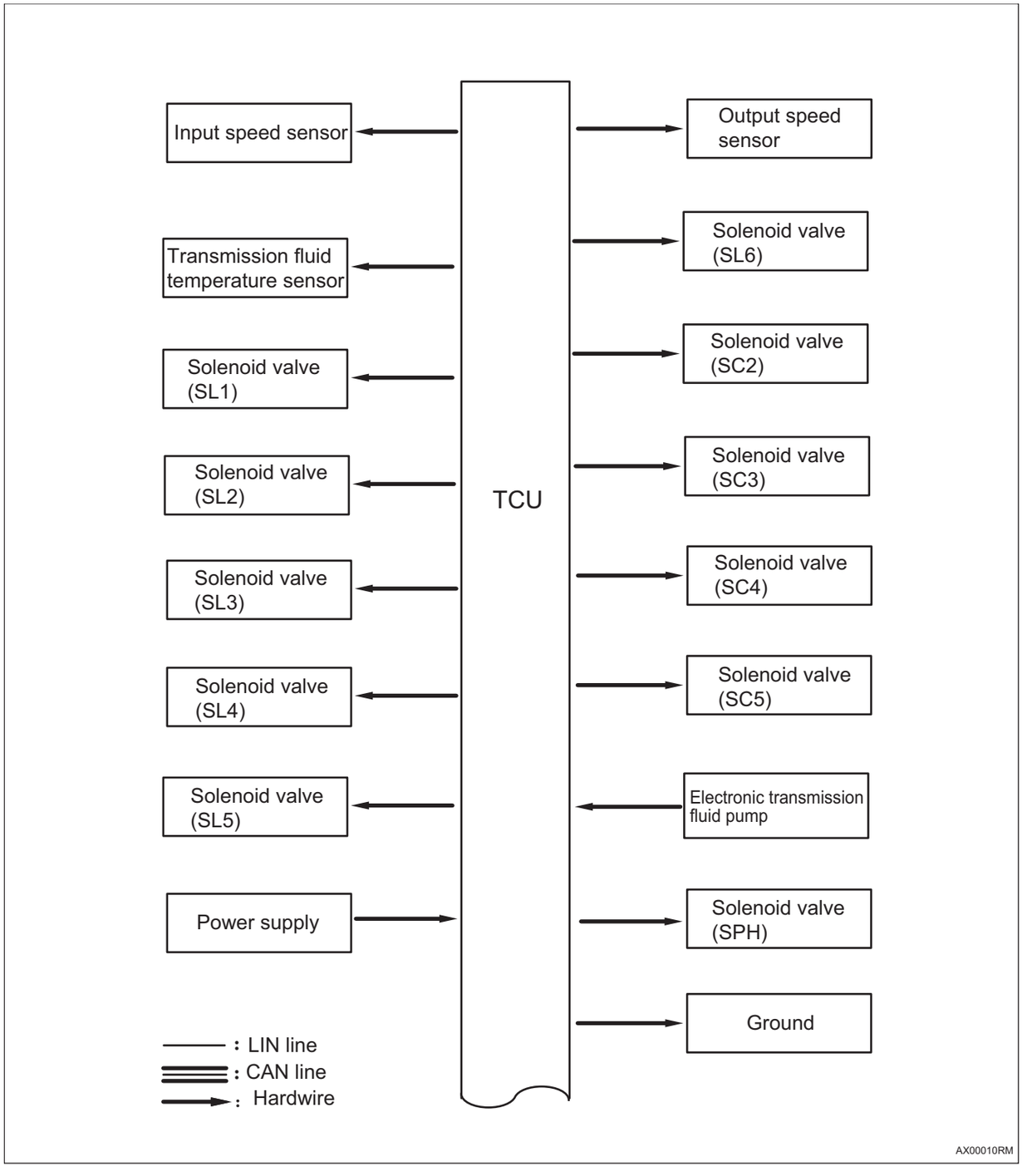
(d) Transmission fluid capacity: 6.3 L.

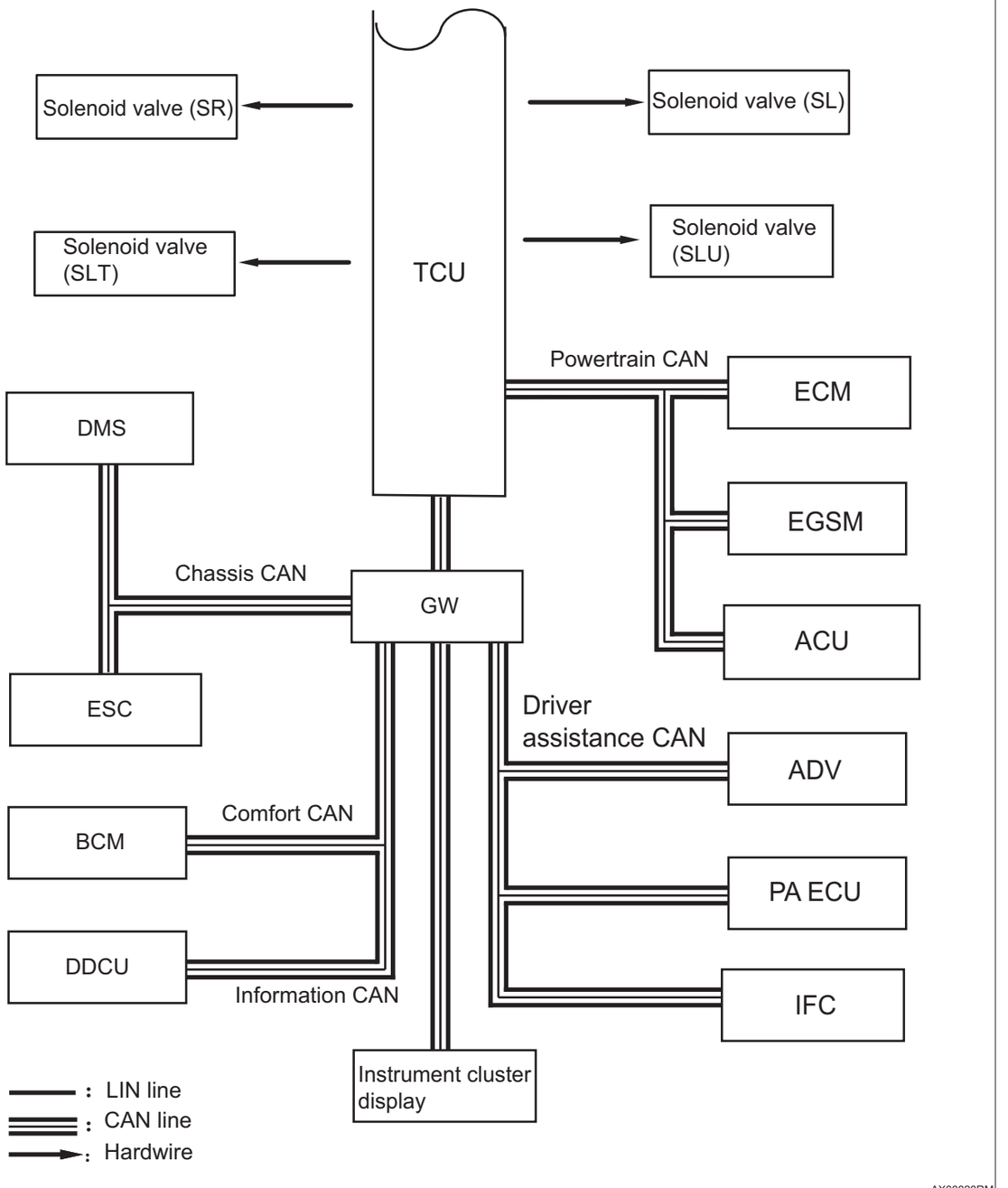
Location of parts




Electronic transmission
fluid pump
Solenoid valve（SC5）
Transmission fluid
temperature sensor
Output speed sensor
Input speed sensor
AX00060RM

System diagram





AX

System description

The TCU detects the electrical signals of the engine and driving status, and controls the shift point according to the driver's habits and road conditions. As a result, fuel efficiency and transmission performance are improved.

In addition, the TCU has the following functions:

- Diagnostic function.
- Fail-safe protection function in case of failure.

Symptom chart

Fault		Possible location
No movement or stall	No movement in D position	• Battery • SC2 solenoid valve • SC3 solenoid valve • SC4 solenoid valve • SL solenoid valve • SL1 solenoid valve • SL2 solenoid valve • SL3 solenoid valve • SL4 solenoid valve • SL5 solenoid valve • SL6 solenoid valve • SLT solenoid valve • SLU solenoid valve • TCU • CAN communication error • Torque converter • Oil seal • O-ring • FIPG • Valve body • Internal parts of AT • ATF (deterioration, water ingress, low level)

Fault		Possible location
No movement or stall	No movement in R position	• Battery • SC2 solenoid valve • SC3 solenoid valve • SC4 solenoid valve • SL solenoid valve • SL3 solenoid valve • SL4 solenoid valve • SL5 solenoid valve • SL6 solenoid valve • SLT solenoid valve • SLU solenoid valve • TCU • CAN communication error • Torque converter • Oil seal • O-ring • FIPG • Valve body • Internal parts of AT • ATF (deterioration, water ingress, low level)
No movement or stall	Stall	• Engine • SC4 solenoid valve • SL solenoid valve • SR solenoid valve • SL1 solenoid valve • SL2 solenoid valve • SL3 solenoid valve • SL4 solenoid valve • SL5 solenoid valve • SL6 solenoid valve • SLT solenoid valve • SLU solenoid valve • TCU • CAN communication error • Torque converter • Oil seal • O-ring • FIPG • Valve body • Internal parts of AT • ATF (deterioration, water ingress, low level)

Fault		Possible location
Time lag	N → D	• Transmission fluid temperature sensor • Output speed sensor • Input speed sensor • SL1 solenoid valve • SL2 solenoid valve • SL3 solenoid valve • SL4 solenoid valve • SL6 solenoid valve • SLT solenoid valve • Transmission fluid temperature sensor • Line pressure control valve (SLT) • C1 pressure control valve (SL1) • C2 pressure control valve (SL2) • TCU • CAN communication error • Oil seal • O-ring • FIPG • Valve body • Internal parts of AT • ATF (deterioration, water ingress, low level)
	N → R	• Transmission fluid temperature sensor • Output speed sensor • Input speed sensor • SL3 solenoid valve • SL4 solenoid valve • SL5 solenoid valve • SL6 solenoid valve • SLT solenoid valve • Transmission fluid temperature sensor • Line pressure control valve (SLT) • C1 pressure control valve (SL1) • C2 pressure control valve (SL2) • TCU • CAN communication error • Oil seal • O-ring • FIPG • Valve body • Internal parts of AT • ATF (deterioration, water ingress, low level)
Engine start failure		• Engine • Battery • TCU

Fault		Possible location
Engine flameout	N → D or N → R	• Engine • SL solenoid valve • SL1 solenoid valve • SL2 solenoid valve • SL3 solenoid valve • SL4 solenoid valve • SL5 solenoid valve • SL6 solenoid valve • SLU solenoid valve • TCU • Torque converter • Valve body
	Deceleration	• Engine • SL solenoid valve • SLU solenoid valve • TCU • Torque converter • Valve body
Poor acceleration		• Engine • Battery • Transmission fluid temperature sensor • SC2 solenoid valve • SC3 solenoid valve • SC4 solenoid valve • SR solenoid valve • SL solenoid valve • SL1 solenoid valve • SL2 solenoid valve • SL3 solenoid valve • SL4 solenoid valve • SL5 solenoid valve • SL6 solenoid valve • SLU solenoid valve • SLT solenoid valve • TCU • Torque converter • Valve body • Internal parts of AT • ATF (deterioration, water ingress, low level)

Fault		Possible location
Upshift or downshift failure	First gear → second gear, second gear → first gear	• Engine • Battery • Output speed sensor • Input speed sensor • SC2 solenoid valve • SC3 solenoid valve • SL1 solenoid valve • SL5 solenoid valve • SLT solenoid valve • TCU • Valve body • Internal parts of AT • ATF (deterioration, water ingress, low level)
	Second gear → third gear, third gear → second gear	• Engine • Battery • Output speed sensor • Input speed sensor • SC2 solenoid valve • SC3 solenoid valve • SL1 solenoid valve • SL3 solenoid valve • SL5 solenoid valve • SLT solenoid valve • TCU • Valve body • Internal parts of AT • ATF (deterioration, water ingress, low level)
	Third gear → fourth gear, fourth gear → third gear	• Engine • Battery • Output speed sensor • Input speed sensor • SC2 solenoid valve • SC3 solenoid valve • SL1 solenoid valve • SL3 solenoid valve • SL4 solenoid valve • SLT solenoid valve • TCU • Valve body • Internal parts of AT • ATF (deterioration, water ingress, low level)

Fault		Possible location
Upshift or downshift failure	Fourth gear → fifth gear, fifth gear → fourth gear	• Engine • Battery • Output speed sensor • Input speed sensor • SC2 solenoid valve • SC3 solenoid valve • SL1 solenoid valve • SL2 solenoid valve • SL4 solenoid valve • SLT solenoid valve • TCU • Valve body • Internal parts of AT • ATF (deterioration, water ingress, low level)
	Fifth gear → sixth gear, sixth gear → fifth gear	• Engine • Battery • Output speed sensor • Input speed sensor • SC2 solenoid valve • SC3 solenoid valve • SL1 solenoid valve • SL2 solenoid valve • SL4 solenoid valve • SLT solenoid valve • TCU • Valve body • Internal parts of AT • ATF (deterioration, water ingress, low level)
	Sixth gear → seventh gear, seventh gear → sixth gear	• Engine • Battery • Output speed sensor • Input speed sensor • SC2 solenoid valve • SC3 solenoid valve • SL3 solenoid valve • SL2 solenoid valve • SL4 solenoid valve • SLT solenoid valve • TCU • Valve body • Internal parts of AT • ATF (deterioration, water ingress, low level)

Fault		Possible location
Upshift or downshift failure	Seventh gear → eighth gear, eighth gear → seventh gear	• Engine • Battery • Output speed sensor • Input speed sensor • SC2 solenoid valve • SC3 solenoid valve • SL3 solenoid valve • SL2 solenoid valve • SL5 solenoid valve • SLT solenoid valve • TCU • Valve body • Internal parts of AT • ATF (deterioration, water ingress, low level)
	Unlocking ON or OFF	• Engine • Battery • Transmission fluid temperature sensor • Output speed sensor • Input speed sensor • SL solenoid valve • SC2 solenoid valve • SC3 solenoid valve • SL3 solenoid valve • SL2 solenoid valve • SL5 solenoid valve • SLT solenoid valve • TCU • Valve body • Internal parts of AT • ATF (deterioration, water ingress, low level)
	No engine braking in 1st gear	• Engine • Battery • Transmission fluid temperature sensor • SC2 solenoid valve • SC3 solenoid valve • SL1 solenoid valve • SL6 solenoid valve • SLT solenoid valve • TCU • Valve body • Internal parts of AT • ATF (deterioration, water ingress, low level)
Forced downshift failure		• TCU

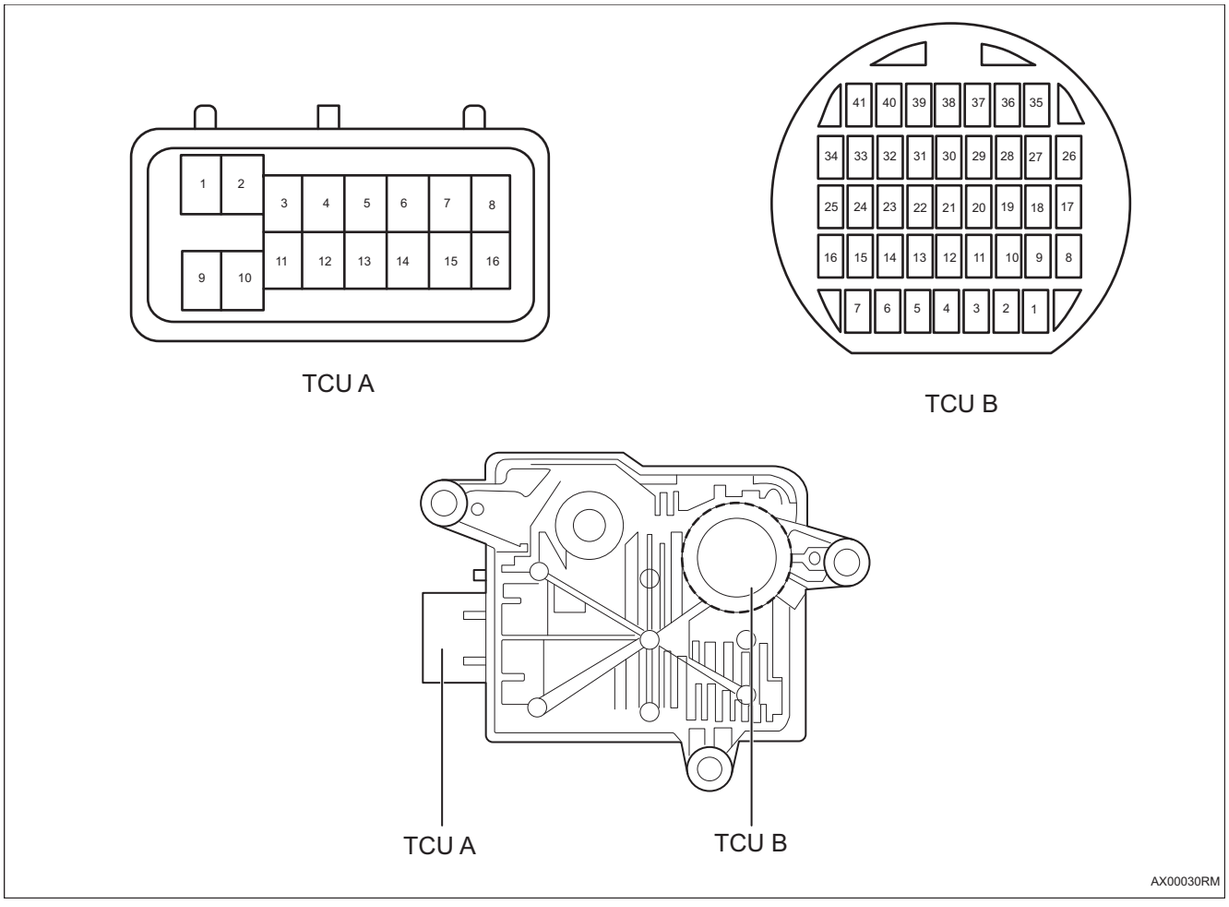
Fault		Possible location
Unstable gear shifting		• Output speed sensor • Input speed sensor • SL1 solenoid valve • SL2 solenoid valve • SL3 solenoid valve • SL4 solenoid valve • SL5 solenoid valve • SL6 solenoid valve • SLT solenoid valve • TCU
Failure to shift gears		• Battery • TCU • CAN communication error
Parking fault		• SC4 solenoid valve • SPH solenoid valve • SLT solenoid valve • TCU • CAN communication error
Idle start-stop function failure		• Battery • SC4 solenoid valve • SLU solenoid valve • Electronic transmission fluid pump • CAN communication error • Electronic transmission fluid pump control unit • TCU • Valve body • Internal parts of AT
Oil leakage	Vent hole	• Internal parts of AT
	Between engine and transmission assembly	• Engine • Torque converter • Oil seal
	Between transmission housing and transmission assembly	• FIPG
	Manual shaft oil seal	• Oil seal
	Oil pump oil seal	• Oil seal
	Oil cooler assembly	• O-ring
	O-ring	• O-ring
	Differential	• Oil seal
	Between transmission and oil sump	• Gasket

Fault		Possible location
Impact of gear shifting	N → D	• Battery • Output speed sensor • Input speed sensor • Transmission fluid temperature sensor • SL1 solenoid valve • SL2 solenoid valve • SL3 solenoid valve • SL4 solenoid valve • SL5 solenoid valve • SL6 solenoid valve • SLT solenoid valve • TCU • Valve body • Internal parts of AT • ATF (deterioration, water ingress, low level)
	N → R	• Battery • Output speed sensor • Input speed sensor • Transmission fluid temperature sensor • SL3 solenoid valve • SLT solenoid valve • TCU • Valve body • Internal parts of AT • ATF (deterioration, water ingress, low level)
	Upshift	• Battery • Output speed sensor • Input speed sensor • Transmission fluid temperature sensor • SL1 solenoid valve • SL2 solenoid valve • SL3 solenoid valve • SL4 solenoid valve • SL5 solenoid valve • SL6 solenoid valve • SLT solenoid valve • TCU • Valve body • Internal parts of AT • ATF (deterioration, water ingress, low level)

Fault		Possible location
Impact of gear shifting	Downshift	• Battery • Output speed sensor • Input speed sensor • Transmission fluid temperature sensor • SL1 solenoid valve • SL2 solenoid valve • SL3 solenoid valve • SL4 solenoid valve • SL5 solenoid valve • SL6 solenoid valve • SLT solenoid valve • TCU • Valve body • Internal parts of AT • ATF (deterioration, water ingress, low level)
	Forced downshift	• Battery • Output speed sensor • Input speed sensor • Transmission fluid temperature sensor • SL1 solenoid valve • SL2 solenoid valve • SL3 solenoid valve • SL4 solenoid valve • SL5 solenoid valve • SL6 solenoid valve • SLT solenoid valve • TCU • Valve body • Internal parts of AT • ATF (deterioration, water ingress, low level)
	Accelerator on or off (upshift or downshift failure)	• Engine

Fault		Possible location
Vibration and noise	Movement	• Engine • Installation of engine and AT • Exhaust pipe resonance • Driving shaft • Transmission and transmission system and body assembly • Suspension system failure • ATF (deterioration, water ingress, low level)
	Driving	• Installation of engine and AT • Exhaust pipe resonance • Driving shaft • Tire • Transmission and transmission system and body assembly • Suspension system failure • Internal parts of AT
	In-situ gear shifting	• Engine • Installation of engine and AT • Exhaust pipe resonance • Internal parts of AT • ATF (deterioration, water ingress, low level)
	Upshift/downshift	• Engine • Installation of engine and AT • Exhaust pipe resonance • Driving shaft • Suspension system failure • Internal parts of AT • ATF (deterioration, water ingress, low level)
	Accelerator on or off (downshift or upshift failure)	• Engine • Installation of engine and AT • Exhaust pipe resonance • Driving shaft • Tire • Suspension system failure • Internal parts of AT

ECU terminal



TCU A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Power supply (B +)	9	Ground
2	—	10	—
3	—	11	Power supply (IG)
4	—	12	—
5	—	13	—
6	CAN_L	14	CAN_H
7	—	15	—
8	—	16	—

TCU B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Solenoid valve SL2+	22	Transmission fluid temperature sensor-
2	Solenoid valve SL4+	23	—
3	Solenoid valve SL5+	24	Solenoid valve SC2
4	Solenoid valve SL6+	25	Solenoid valve SC3
5	Solenoid valve SLU+	26	—

TCU B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
6	Solenoid valve SL3+	27	—
7	Solenoid valve SLT+	28	Input speed sensor-
8	Solenoid valve SL1+	29	Input speed sensor+
9	Solenoid valve SL5–	30	Output speed sensor-
10	Solenoid valve SL4–	31	Output speed sensor+
11	Solenoid valve SL2–	32	Solenoid valve SC4
12	Solenoid valve SL1–	33	Solenoid valve SL
13	Solenoid valve SL3–	34	Solenoid valve SC5
14	Electronic transmission fluid pump-	35	—
15	Electronic transmission fluid pump+	36	—
16	Solenoid valve SPH	37	—
17	Solenoid valve SL6–	38	—
18	Solenoid valve SLU–	39	—
19	Solenoid valve SLT–	40	—
20	—	41	Solenoid valve SR
21	Transmission fluid temperature sensor +	—	—

Road test

The purpose of the road test is to obtain accurate fault symptoms and check restoration after repairing.

The road test must be carried out under the following conditions:

- Be sure to check and adjust the engine before performing these tests.
- Connect the HQ-VDS to the DLC.
- The ATF temperature is 50~80 ℃ under normal driving state.
- A/C, lights and other systems are turned off.
- Cruise control system is off.

Notice:

- When performing road test on ordinary roads, check the safety of the road first.
- Secure the HQ-VDS and have another technician operate the HQ-VDS.

Road test

Please see the table below for road test.

Item	Procedure
Shift function (D position)	In general driving, check the gear shifts from 1st to 2nd, 3rd, 4th, 5th, 6th, 7th and 8th gears. (When the vehicle speed is low, the vehicle may not shift to seventh or eighth gear).
Shift impact during driving	In general driving, check whether the upshift is smooth.
Kickdown function	Downshift is checked by kickdown in each gear position. Check the degree of shock during downshift.
Engine brake operation	Check engine brake operation during manual shift to 1st gear.
Shift point when accelerator pedal is fully depressed	Fully depress the accelerator pedal in the D position and check and confirm whether the upshift speed matches the specified shift point from 1st to 2nd gear position.
Manual shift control function	Check and confirm whether the gear-shift lever can be switched to any gear position when it is in manual mode.
Locking control function	When driving on a flat road within the locking speed range, check and verify that the engine speed does not change significantly when the accelerator pedal is gently pressed.
P position operation	When the gearshift lever is placed in the P position and the parking brake is released, check and confirm that the vehicle does not move on a slope (5% or 3 °).
Oil leakage	Check and confirm whether each part leaks oil after road test.

Mechanical system test

The road test must be carried out under the following conditions:

- Be sure to check and adjust the engine before performing these tests.
- Connect the HQ-VDS to the DLC.
- The ATF temperature is 50~80 ℃ under normal driving state.
- A/C, lights and other systems are turned off.
- Cruise control system is off.

Notice:

In order to prevent the vehicle from starting suddenly, it is important to lock it before performing a function check.

1. Time lag test

(a) Apply the parking brake and chock the wheels.

(b) Start the engine.

(c) Depress the brake pedal and idle the engine, set the gearshift lever from the N position to the D and R positions, and check with a stopwatch until the time taken by impact of gear shifting is felt.

Standard value

Position of gearshift lever	Duration (s)
N → D gear	1.0 or less
N → R gear	1.5 or less

Notice:

Carry out at least 3 tests and calculate the average value.

During continuous test, be sure to keep the test interval of 1 minute.

Judgment of test results

Test result	Possible causes
The time lag from N → D position is longer than the standard time	• Valve body failure (SL1/SC2/SC3 hydraulic system) • C1 clutch slip • •One-way clutch (F1) fault Oil pump fault • Clogged oil filter screen
The time lag from N → R position is longer than the standard time	• Valve body failure (SL3/SL6/SC2/SC3 hydraulic system) • C3 clutch slip • B2 brake slip • Oil pump fault • Clogged oil filter screen

2. Stall test

(a) Apply the parking brake and chock the wheels.

(b) Install the tachometer and start the engine.

(c) Fully depress the brake pedal with the left foot, set the gearshift lever to the D or R position, depress the accelerator pedal to the floor with the right foot, and quickly check the maximum speed.

Standard value

Engine type	Stall speed (rpm)
CA4GC20TD-33	2756 ± 150

Notice:

Since this test causes the ATF temperature to rise rapidly, do not continue the test for more than 5 seconds. Carry out at least 3 tests and calculate the average value.

Judgment of test results

Test result	Possible causes
The values for D and R positions are lower than the standard values	• •Insufficient engine power torque • Converter one-way clutch slip
The value is higher than the standard value only in the D position	• Line pressure low (line pressure control solenoid valve (SLT) fault, and main pressure regulator valve fault) • Valve body failure (SL1/SC2/SC3 hydraulic system) • C1 clutch slip • One-way clutch (F1) fault
The value is higher than the standard value only in the R position	• Line pressure low (line pressure control solenoid valve (SLT) fault, and main pressure regulator valve fault) • Valve body failure (SL3/SL6/SC2/SC3 hydraulic system) • C3 Clutch fault (slipping) • B2 brake failure (slip)
The values for D and R positions are higher than the standard values	• Line pressure low (line pressure control solenoid valve (SLT) fault, and main pressure regulator valve fault) • Oil pump fault • Clogged oil filter screen

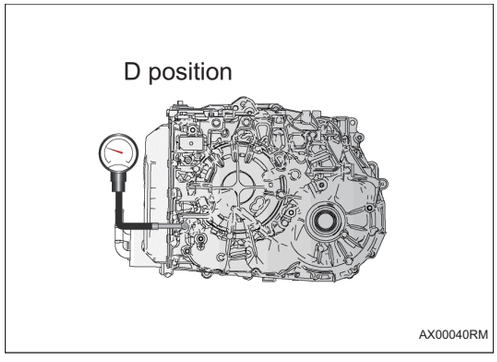
Line pressure test

1. Conduct line pressure test

(a) Apply the parking brake and chock the wheels.

(b) Fix the vehicle with a chain.

(c) Disconnect the test bolt shown in the figure and install the oil pressure gauge.



(d) Start the engine, fully depress the brake pedal with the left foot, set to D gear position, and check the oil pressure at idle speed.

Prescribed line pressure

Position of gearshift lever	Idle hydraulic (kPa)
D gear	300 - 1500

Notice:

Since this test causes the ATF temperature to rise rapidly, do not continue the test for more than 5 seconds.

Carry out at least 3 tests and calculate the average value.

Initialization

Notice:

If the AT or TCU is replaced, or the TCU software is rewritten, it is important to initialize the learning value and perform initial learning.

1. Initialization requirements

Increase the ATF temperature by idling the vehicle or driving the vehicle in urban areas. Use a special tester to check the ATF temperature and ensure that the temperature is between 15 and 110 °C. If the ATF temperature exceeds this range, operate to keep the temperature within this range.

Warning:

Do not attempt to increase the oil temperature by idling the engine.

Hint:

- If the transmission fluid temperature is not 15~110 ℃ , the initial learning cannot be performed.
- Before the initial learning, check the shift impact or speed change impact.

2. Static shift learning

When the vehicle is stationary, depress the brake pedal and place the gearshift lever in the N gear position for 3 seconds. Then, shift from N to D and keep this state for 3 seconds. Repeat the procedure 5 times. Then repeat 5 times in the same way in R position.

3. Shift control learning: perform the following procedures

(a) Perform in an environment that allows increasing the vehicle speed to 100 km/h. With the throttle opening between 25% and 35% in the D position, drive the vehicle until it reaches 90 km/h. Then slowly release the accelerator pedal and stabilize the vehicle at 100 km/h for more than 5 seconds. If it is possible to stop or slow down, the vehicle shall slow down by braking gently and stop after 30 seconds. Repeat this procedure 5 times.

(b) When the above steps cannot be carried out: With the throttle opening between 25% and 35% in the D position, drive the vehicle until it reaches 50 km/h. Then slowly release the accelerator pedal and stabilize the vehicle at 60 km/h for more than 5 seconds. If it is possible to stop or slow down, the vehicle shall slow down by braking gently and stop after 30 seconds. Repeat this procedure 5 times.

4. Check the learning results

Check and verify whether the shift shock and speed change shock are reduced compared to the previous conditions.

Fail-safe protection

1. Fail-safe protection

(a) In case of fail-safe protection, if the automatic transmission fails in any way, the TCU will output a control signal and control the vehicle to travel the shortest possible distance. If the gearshift solenoid valve fails, the TCM will locate the faulty part as accurately as possible. And make possible gear shifting operation according to the fault location.

The solenoid valve control is as follows

Solenoid valve		Gear position: ○									
		D gear									R gear
		Second gear	Engine braking in 1st gear	Second gear	Third gear	Fourth gear	Fifth gear	Sixth gear	Seventh gear	Eighth gear	
SL1	MIN	—	—	—	—	—	—	○	○	○	○
	MAX	○	○	○	○	○	○	—	—	—	○
SL2	MIN	○	○	○	○	○	—	—	—	—	○
	MAX	—	—	—	—	—	○	○	○	○	○
SL3	MIN	○	○	○	—	○	○	○	—	○	○
	MAX	—	—	—	○	—	—	—	○	—	○
SL4	MIN	○	○	○	○	—	○	—	○	○	○
	MAX	—	—	—	—	○	—	○	—	—	—
SL5	MIN	○	○	—	○	○	○	○	○	—	○
	MAX	—	—	○	—	—	—	—	—	○	○
SL6	MIN	○	—	○	○	○	○	○	○	○	—
	MAX	—	○	—	—	—	—		—	—	○
SLT	MIN	—	—	—	—	—	—	○	—	—	—
	MAX	—	—	—	—	—	—	○	—	—	○
SLU	MIN	○	○	○	○	○	○	○	○	○	○
	MAX	○	○	○	○	○	○	○	○	○	○

DTC chart

DTC	Description	Reference
P060145	Flash read-only memory internal checksum	(See page AX-32)
P060346	Non-volatile memory read/write error	(See page AX-32)
P060444	Random memory read/write error	(See page AX-32)
P070200	Linear solenoid valve drive control failure	(See page AX-33)
P070500	Position sensor main signal content error	(See page AX-34)
P280000	Position sensor sub-signal content error	(See page AX-34)
P070600	Position sensor main signal out of range, low	(See page AX-34)
P280100	Position sensor sub-signal out of range, low	(See page AX-34)
P070900	Position sensor main signal out of range, high	(See page AX-34)
P280400	Position sensor sub-signal out of range, high	(See page AX-34)
P280500	Position sensor main signal or sub-signal jamming	(See page AX-34)
P071300	Transmission fluid temperature sensor circuit shorted to power supply/open	(See page AX-36)
P071200	Transmission fluid temperature sensor circuit shorted to ground	(See page AX-36)
P071000	Transmission fluid temperature sensor out of range, high	(See page AX-36)
P071123	High transmission fluid temperature jamming	(See page AX-36)
P071100	Low transmission fluid temperature jamming	(See page AX-36)
P071700	Input speed sensor without pulse signal	(See page AX-39)
P071500	Input speed sensor electrical failure (circuit shorted to power supply)	(See page AX-39)
P071600	Input speed sensor electrical failure (circuit shorted to ground/open circuit)	(See page AX-39)
P071800	Input speed sensor out of range, high	(See page AX-39)
P072200	Output speed sensor without pulse signal	(See page AX-42)
P072000	Output speed sensor electrical failure (circuit shorted to power supply)	(See page AX-42)
P072100	Output speed sensor electrical failure (circuit shorted to ground/open circuit)	(See page AX-42)
P072300	Output speed sensor out of range, high	(See page AX-42)
P088200	Battery undervoltage	(See page AX-45)
P088300	Battery overvoltage	(See page AX-45)
P096300	Linear solenoid valve (SLT) circuit shorted to power supply	(See page AX-48)
P096200	Linear solenoid valve (SLT) circuit shorted to ground	(See page AX-48)
P096000	Linear solenoid valve (SLT) circuit open	(See page AX-48)
P096100	Linear solenoid valve feedback current jamming (SLT)	(See page AX-48)

DTC	Description	Reference
P097100	SC5 solenoid valve circuit shorted to power supply/circuit open	(See page AX-52)
P097000	SC5 solenoid valve circuit shorted to ground	(See page AX-52)
P097400	SC2 solenoid valve circuit shorted to power supply/circuit open	(See page AX-55)
P097300	SC2 solenoid valve circuit shorted to ground	(See page AX-55)
P097700	SC3 solenoid valve circuit shorted to power supply/circuit open	(See page AX-59)
P097600	SC3 solenoid valve circuit shorted to ground	(See page AX-59)
P096700	SC4 solenoid valve circuit shorted to power supply/circuit open	(See page AX-63)
P096600	SC4 solenoid valve circuit shorted to ground	(See page AX-63)
P098000	Linear solenoid valve (SL1) circuit shorted to power supply	(See page AX-67)
P097900	Linear solenoid valve (SL1) circuit shorted to ground	(See page AX-67)
P1C1000	Linear solenoid valve (SL1) circuit open	(See page AX-67)
P097800	Linear solenoid valve feedback current jamming (SL1)	(See page AX-67)
P098300	Linear solenoid valve (SL2) circuit shorted to power supply	(See page AX-71)
P098200	Linear solenoid valve (SL2) circuit shorted to ground	(See page AX-71)
P1C1100	Linear solenoid valve (SL2) circuit open	(See page AX-71)
P098100	Linear solenoid valve feedback current jamming (SL2)	(See page AX-71)
P098600	Linear solenoid valve (SL3) circuit shorted to power supply	(See page AX-75)
P098500	Linear solenoid valve (SL3) circuit shorted to ground	(See page AX-75)
P1C1200	Linear solenoid valve (SL3) circuit open	(See page AX-75)
P098400	Linear solenoid valve feedback current jamming (SL3)	(See page AX-75)
P099000	Linear solenoid valve (SL4) circuit shorted to power supply	(See page AX-79)
P098900	Linear solenoid valve (SL4) circuit shorted to ground	(See page AX-79)
P098800	Linear solenoid valve (SL4) circuit open	(See page AX-79)
P099A00	Linear solenoid valve feedback current jamming (SL4)	(See page AX-79)
P099900	Linear solenoid valve (SL5) circuit shorted to power supply	(See page AX-83)
P099800	Linear solenoid valve (SL5) circuit shorted to ground	(See page AX-83)
P1C1300	Linear solenoid valve (SL5) circuit open	(See page AX-83)
P099700	Linear solenoid valve feedback current jamming (SL5)	(See page AX-83)

DTC	Description	Reference
P0B0A00	Electronic transmission fluid pump control undervoltage	(See page AX-87)
P0B0B00	Electronic transmission fluid pump control overvoltage	(See page AX-87)
P170A00	Electronic transmission fluid pump overheating	(See page AX-87)
P272100	SR solenoid valve circuit shorted to power supply/circuit open	(See page AX-90)
P272000	SR solenoid valve circuit shorted to ground	(See page AX-90)
P273000	SL solenoid valve circuit shorted to power supply/circuit open	(See page AX-94)
P272900	SL solenoid valve circuit shorted to ground	(See page AX-94)
P273900	SPH solenoid valve circuit shorted to power supply/circuit open	(See page AX-98)
P273800	SPH solenoid valve circuit shorted to ground	(See page AX-98)
P276300	Linear solenoid valve (SLU) circuit shorted to power supply	(See page AX-101)
P276400	Linear solenoid valve (SLU) circuit shorted to ground	(See page AX-101)
P276100	Linear solenoid valve (SLU) circuit open	(See page AX-101)
P276200	Linear solenoid valve feedback current jamming (SLU)	(See page AX-101)
P279900	Electronic transmission fluid pump circuit shorted to power supply/open circuit	(See page AX-105)
P279800	Electronic transmission fluid pump circuit shorted to ground	(See page AX-105)
P280600	P gear position sensor position not learned	(See page AX-108)
P281500	Linear solenoid valve (SL6) circuit shorted to power supply	(See page AX-109)
P281400	Linear solenoid valve (SL6) circuit shorted to ground	(See page AX-109)
P281200	Linear solenoid valve (SL6) circuit open	(See page AX-109)
P281000	Linear solenoid valve feedback current jamming (SL6)	(See page AX-109)
P1CA000	2nd gear speed ratio stuck	(See page AX-113)
P1CA100	3rd gear speed ratio stuck	(See page AX-113)
P1CA200	4th gear speed ratio stuck	(See page AX-113)
P1CA300	5th gear speed ratio stuck	(See page AX-113)
P1CA400	6th gear speed ratio stuck	(See page AX-113)
P1CA500	7th gear speed ratio stuck	(See page AX-113)
P1CA600	8th gear speed ratio stuck	(See page AX-113)
P1CB800	1st gear ratio & engine brake stuck in 2nd/3rd/4th/5th gear	(See page AX-113)
P1CBA00	8th gear ratio failure	(See page AX-113)
P075C00	Abnormal gear shifting due to SL4 continuous maximum pressure output	(See page AX-117)

DTC	Description	Reference
P076200	Abnormal gear shifting due to SL1 continuous maximum pressure output	(See page AX-117)
P076700	Abnormal gear shifting due to SL2 continuous maximum pressure output	(See page AX-117)
P077200	Abnormal gear shifting due to SL3 continuous maximum pressure output	(See page AX-117)
P076F00	7th gear ratio failure	(See page AX-119)
P072900	6th gear ratio failure	(See page AX-122)
P073000	Engine braking speed ratio fault in 1st gear	(See page AX-122)
P073100	1st gear ratio failure (B1 or C2 or C4 or C3 release failure)	(See page AX-122)
P073200	2nd gear ratio failure	(See page AX-122)
P073300	3rd gear ratio failure	(See page AX-122)
P073400	4th gear ratio failure	(See page AX-122)
P073500	5th gear ratio failure	(See page AX-122)
P073600	Reverse gear ratio failure	(See page AX-122)
P074100	Locking control deactivation jamming (SLU deactivation jamming)	(See page AX-126)
P074200	Locking control activation jamming (SLU activation jamming)	(See page AX-129)
P075600	SPH solenoid valve deactivation jamming	(See page AX-132)
P075700	SPH solenoid valve activation jamming	(See page AX-132)
P094200	1st gear ratio error (C1 clutch engagement failure)	(See page AX-134)
P270800	Abnormal gear shifting due to SLB1 continuous maximum pressure output	(See page AX-137)
P280900	Abnormal gear shifting due to SLB2 continuous maximum pressure output	(See page AX-139)
U000188	Powertrain CAN bus off	(See page AX-143)
U010087	ECM node lost	(See page AX-143)
U010387	EGSM node lost	(See page AX-143)
U014687	GW node lost	(See page AX-143)
U015187	ACU node lost	(See page AX-143)
U023587	IFC node lost	(See page AX-143)
U040180	Accelerator pedal signal failure	(See page AX-143)
U040181	EMS _6 message length error	(See page AX-143)
U040182	EMS _1 message count error	(See page AX-143)
U040183	EMS _1 message checksum error	(See page AX-143)
U040184	EMS _1 message length error	(See page AX-143)
U040185	EMS _2 message count error	(See page AX-143)
U040186	Engine speed signal failure	(See page AX-143)
U040187	EMS _3 message count error	(See page AX-143)
U040188	EMS _4 message count error	(See page AX-143)

DTC	Description	Reference
U040189	EMS _2 message checksum error	(See page AX-143)
U04018A	EMS _3 message checksum error	(See page AX-143)
U04018B	EMS _4 message checksum error	(See page AX-143)
U04018C	EMS _2 message length error	(See page AX-143)
U04018D	EMS_3 message length error	(See page AX-143)
U04018E	EMS_4 message length error	(See page AX-143)
U04018F	EMS_5 message length error	(See page AX-143)
U0401F0	Brake pedal status signal failure	(See page AX-143)
U0401F2	Engine torque signal failure	(See page AX-143)
U0401F3	Engine oil temperature signal failure	(See page AX-143)
U040480	If there are problems with gearshift buttons, enter Limp Home mode 1	(See page AX-143)
U040481	If there are problems with gearshift buttons, enter Limp Home mode 2	(See page AX-143)
U040482	EGSM message count error	(See page AX-143)
U040483	EGSM message checksum error	(See page AX-143)
U040484	EGSM message length error	(See page AX-143)
U040485	P position request button signal failure	(See page AX-143)
U040486	Gearshift lever position signal failure	(See page AX-143)
U040487	Gear shifting permission signal failure	(See page AX-143)
U040488	Manual mode switch signal failure	(See page AX-143)
U040489	Manual mode gear shifting signal failure	(See page AX-143)
U041580	ESC_5 message count error	(See page AX-143)
U041581	ESC_5 message checksum error	(See page AX-143)
U041582	ABS_1 message count error	(See page AX-143)
U041583	ABS_1 message checksum error	(See page AX-143)
U041585	ABS_2 message count error	(See page AX-143)
U041586	Driving direction signal failure	(See page AX-143)
U041587	ESC_1 message count error	(See page AX-143)
U041588	ESC_2 message count error	(See page AX-143)
U041589	ABS_2 message checksum error	(See page AX-143)
U04158A	ESC_1 message checksum error	(See page AX-143)
U04158B	ESC_2 message checksum error	(See page AX-143)
U04158C	ESC_3 message count error	(See page AX-143)
U04158D	ESC_3 message checksum error	(See page AX-143)
U0415F0	ESC target gear position signal failure	(See page AX-143)
U0415F1	Left front wheel speed signal failure	(See page AX-143)
U0415F2	Right front wheel speed signal failure	(See page AX-143)
U0415F3	Left rear wheel speed signal failure	(See page AX-143)
U0415F4	Left rear wheel speed signal failure	(See page AX-143)

DTC	Description	Reference
U0415F6	Brake master cylinder pressure signal failure	(See page AX-143)
U042280	Immobilizer authentication failed or the anti-theft function not open	(See page AX-143)
U042286	Vehicle power supply mode signal failure	(See page AX-143)
U042386	Mileage signal failure	(See page AX-143)
U043382	IFC message count error	(See page AX-143)
U043383	IFC message checksum error	(See page AX-143)
U043982	DMS message count error	(See page AX-143)
U043983	DMS message checksum error	(See page AX-143)
U044784	GW message length error	(See page AX-143)
U045282	ACU message count error	(See page AX-143)
U045283	ACU message checksum error	(See page AX-143)
U045284	ACU message length error	(See page AX-143)
U045286	Seat belt status signal failure	(See page AX-143)
U054482	APA ECU message count error	(See page AX-143)
U054483	APA ECU message checksum error	(See page AX-143)
U112187	ESC message lost	(See page AX-143)
U113887	Driving mode selection control unit message lost	(See page AX-143)
U114080	Immobilizer authentication timeout or no authentication signal received	(See page AX-143)
U114087	BCM message lost	(See page AX-143)
U114687	GW message lost	(See page AX-143)
U115587	Instrument cluster control unit message lost	(See page AX-143)
U119987	Driver door module message lost	(See page AX-143)
U124387	ADV message lost	(See page AX-143)
U0401F1	Altitude coefficient signal failure	(See page AX-143)

DTC	P060145	Flash read-only memory internal checksum
DTC	P060346	Non-volatile memory read/write error
DTC	P060444	Random memory read/write error

Description

The TCU records a DTC when there is a failure inside the TCU.

DTC	DTC detection conditions	Faulty location
P060145	(a) Control unit internal fault.	• TCU
P060346	(a) Control unit internal fault.	• TCU
P060444	(a) Control unit internal fault.	• TCU

Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace TCU (See page AX-155)**

OK

3	End

DTC	P070200	Linear solenoid valve drive control failure

Description

The TCU records a DTC when there is a linear solenoid valve drive control failure.

DTC	DTC detection conditions	Faulty location
P070200	(a) Linear solenoid valve drive control failure.	• TCU

Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again and re-read the DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace TCU (See page AX-155)**

OK

3	End

DTC	P070500	Position sensor main signal content error
DTC	P280000	Position sensor sub-signal content error
DTC	P070600	Position sensor main signal out of range, low
DTC	P280100	Position sensor sub-signal out of range, low
DTC	P070900	Position sensor main signal out of range, high
DTC	P280400	Position sensor sub-signal out of range, high
DTC	P280500	Position sensor main signal or sub-signal jamming

Description

When the position sensor fails, the TCU records DTC.

DTC	DTC detection conditions	Faulty location
P070500	(a) Position sensor main signal content error.	• TCU
P280000	(a) Position sensor sub-signal content error.	• TCU
P070600	(a) Position sensor main signal out of range, low.	• TCU
P280100	(a) Position sensor sub-signal out of range, low.	• TCU
P070900	(a) Position sensor main signal out of range, high.	• TCU
P280400	(a) Position sensor sub-signal out of range, high.	• TCU
P280500	(a) Position sensor main signal or sub-signal jamming.	• TCU

Inspection procedure

AX

1	**Perform basic inspection**

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	**Read freeze frame data and clear the DTC**

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace TCU (See page AX-155)**

OK

3	**End**

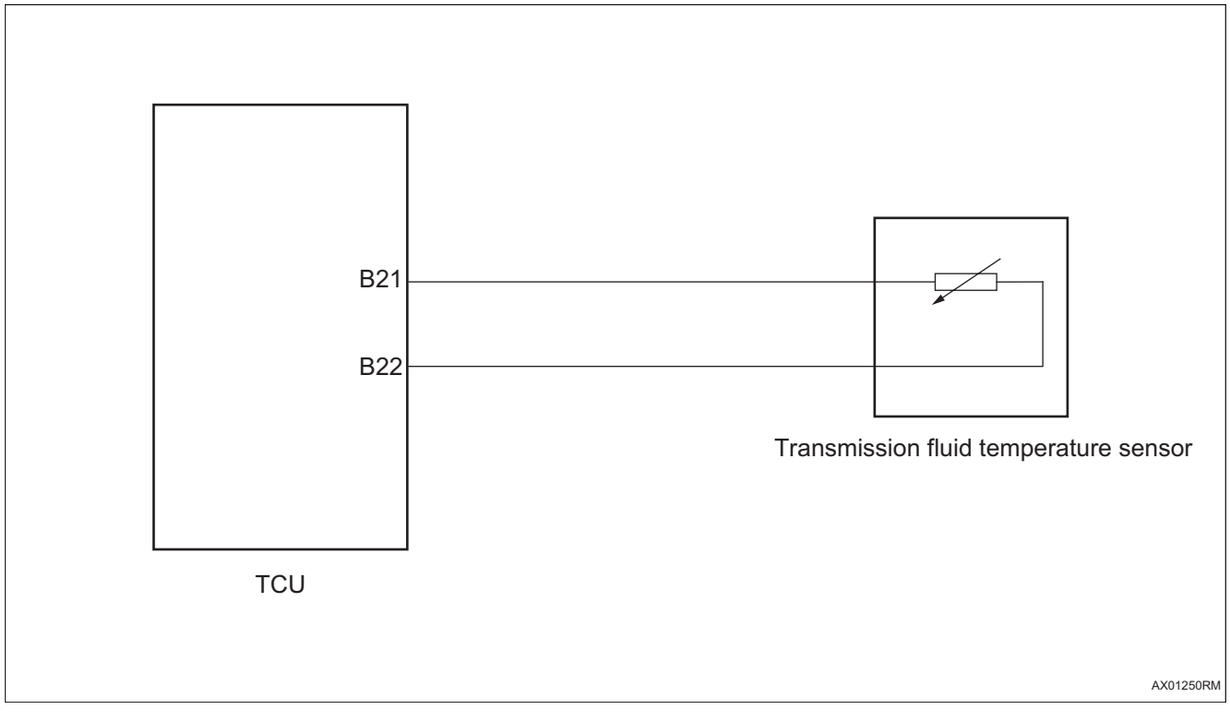
DTC	P071300	Transmission fluid temperature sensor circuit shorted to power supply/open
DTC	P071200	Transmission fluid temperature sensor circuit shorted to ground
DTC	P071000	Transmission fluid temperature sensor out of range, high
DTC	P071123	High transmission fluid temperature jamming
DTC	P071100	Low transmission fluid temperature jamming

Description

When the transmission fluid temperature sensor has open circuit or short circuit or the signal is abnormal, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P071300	(a) Transmission fluid temperature sensor circuit shorted to power supply or open circuit.	• Transmission fluid temperature sensor • Harness and connector • 4th transmission harness • TCU
P071200	(a) Transmission fluid temperature sensor circuit shorted to ground.	• Transmission fluid temperature sensor • Harness and connector • TCU
P071000	(a) Transmission fluid temperature sensor signal out of range, high.	• Transmission fluid temperature sensor • Harness and connector • TCU
P071123	(a) High transmission fluid temperature jamming.	• Transmission fluid temperature sensor • Harness and connector • TCU
P071100	(a) Low transmission fluid temperature jamming.	• Transmission fluid temperature sensor • Harness and connector • TCU

Circuit diagram



Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

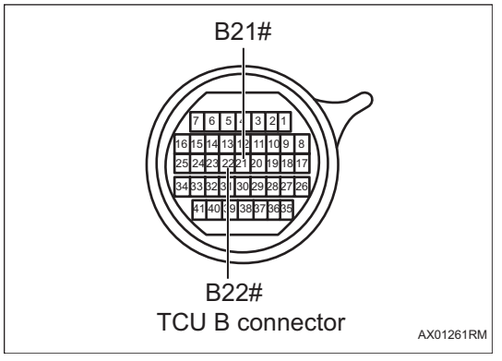
Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check the transmission fluid temperature sensor



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the TCU.

(d) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector B21# -TCU connector B22#	10 ℃	5.6 ~ 7.3Ω
TCU connector B21# -TCU connector B22#	25 ℃	3.15 ~ 3.85Ω
TCU connector B21# -TCU connector B22#	40 ℃	1.8 ~ 2.2Ω
TCU connector B21# -TCU connector B22#	60 ℃	0.9 ~ 1.1Ω
TCU connector B21# -TCU connector B22#	80 ℃	0.45 ~ 0.55Ω

NG → **Replace TCU (See page AX-155)**

OK

4	Replace TCU (See page AX-155)

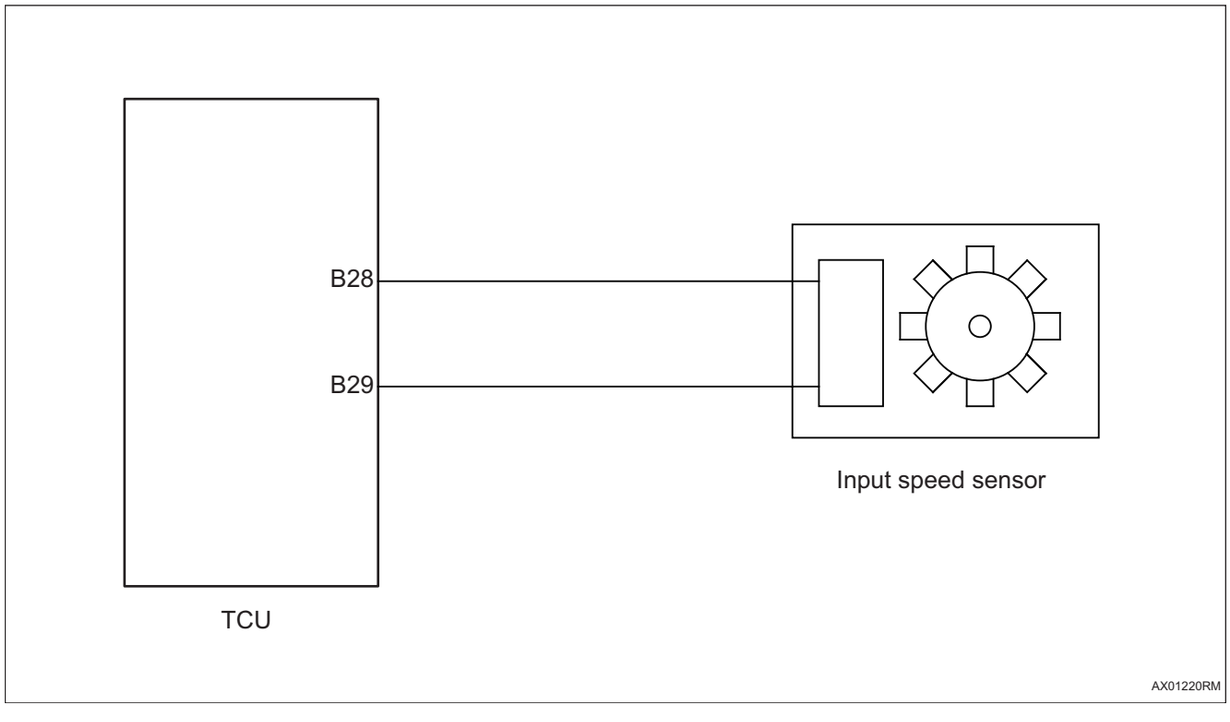
DTC	P071700	Input speed sensor without pulse signal
DTC	P071500	Input speed sensor electrical failure (circuit shorted to power supply)
DTC	P071600	Input speed sensor electrical failure (circuit shorted to ground/open circuit)
DTC	P071800	Input speed sensor out of range, high

Description

When the input speed sensor circuit is open or shorted, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P071700	(a) Input speed sensor signal missing.	• Input speed sensor • Harness and connector • TCU
P071500	(a) Input speed sensor circuit shorted to power supply.	• Input speed sensor • Harness and connector • TCU
P071600	(a) Input speed sensor circuit shorted to ground/open circuit.	• Input speed sensor • Harness and connector • TCU
P071800	(a) Input shaft speed signal out of range, high.	• Input speed sensor • Harness and connector • TCU

Circuit diagram



AX

Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

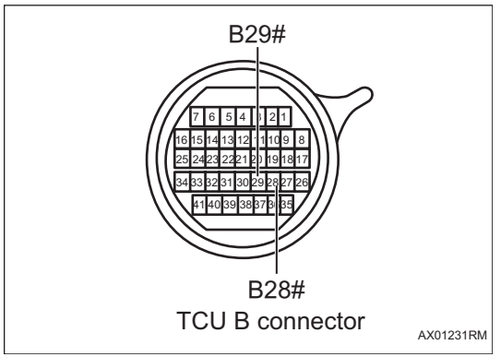
Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check harness and connector (TCU-input speed sensor)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the TCU.

(d) Check whether the harness and connector are connected tightly.

(e) Check whether the harness and connector are open-circuited or short-circuited.

(f) Measure the resistance according to the values in the table below.

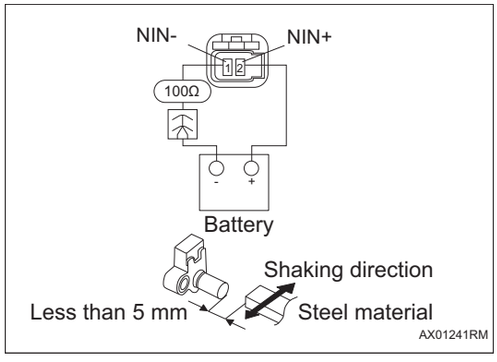
Standard value

Detector connection	Detection conditions	Specified state
TCU connector B28# - body GND	Always connected	No continuity
TCU connector B29# - body GND	Always connected	No continuity
TCU connector B28# -TCU connector B29#	Always connected	Proper continuity

NG → **Repair or replace harness and connector and input speed sensor**

OK

4 Check input speed sensor action



(a) Remove the input speed sensor

(b) Connect terminal 1 to the battery negative terminal and terminal 2 to the battery positive terminal through 100 Ω ohmmeter and ammeter; And Measure the current value when shaking the steel material (less than 5 mm) at the top of the input sensor back and forth.

Normal

Signal	Current (mA)
HIGH	12 ~ 16
LOW	4 ~ 8

NG → **Replace the input speed sensor (See page AX-155)**

OK

5 Replace TCU (See page AX-155)

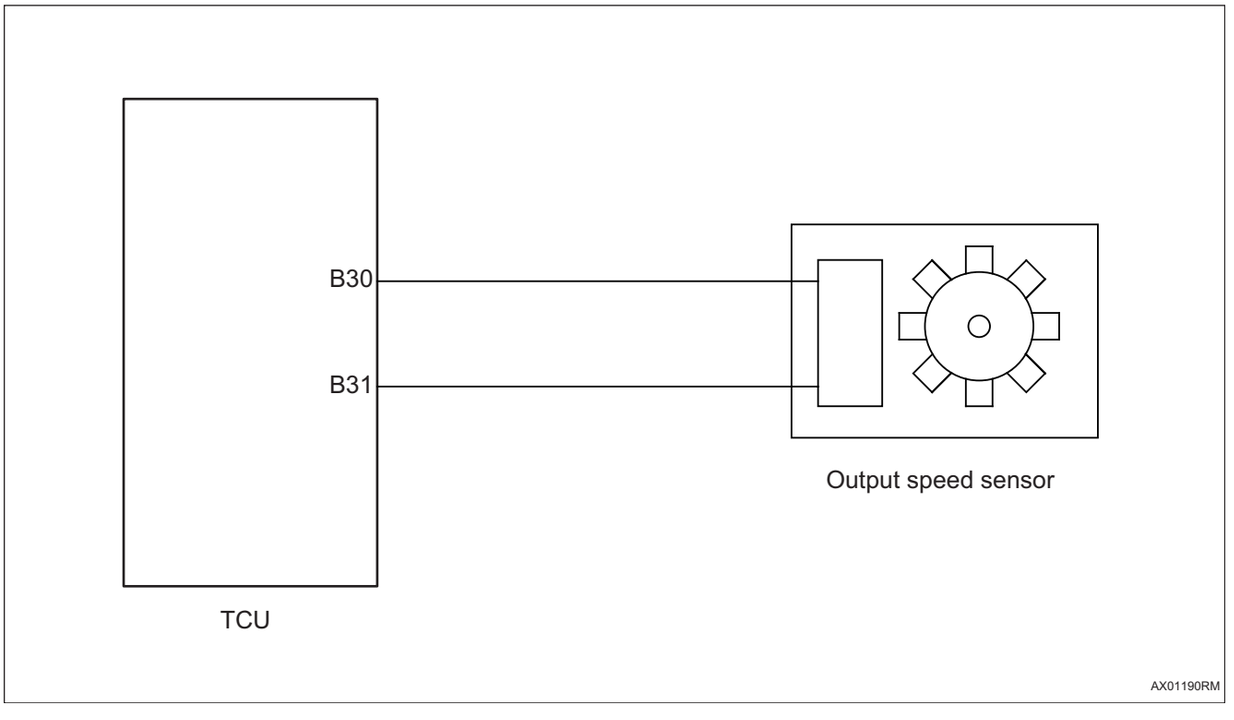
DTC	**P072200**	**Output speed sensor without pulse signal**
DTC	**P072000**	**Output speed sensor electrical failure (circuit shorted to power supply)**
DTC	**P072100**	**Output speed sensor electrical failure (circuit shorted to ground/open circuit)**
DTC	**P072300**	**Output speed sensor out of range, high**

Description

When the output speed sensor circuit is open or shorted, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P072200	(a) Output speed sensor without signal.	• Output speed sensor • Harness and connector • TCU
P072000	(a) Output speed sensor circuit shorted to power supply.	• Output speed sensor • Harness and connector • TCU
P072100	(a) Output speed sensor circuit shorted to ground/open circuit.	• Output speed sensor • Harness and connector • TCU
P072300	(a) Output shaft speed signal out of range, high.	• Output speed sensor • Harness and connector • TCU

Circuit diagram



Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again and re-read the DTC.

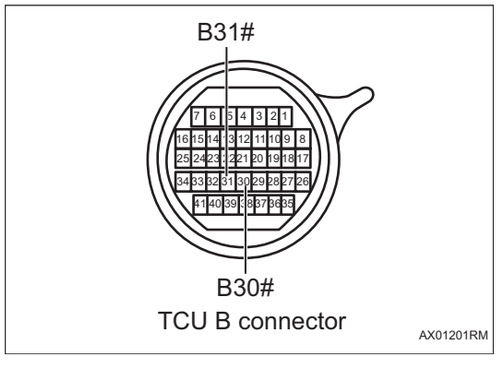
Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check harness and connector (TCU-output speed sensor)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the TCU.

(d) Check whether the harness and connector are connected tightly.

(e) Check whether the harness and connector are open-circuited or short-circuited.

(f) Measure the resistance according to the values in the table below.

Standard value

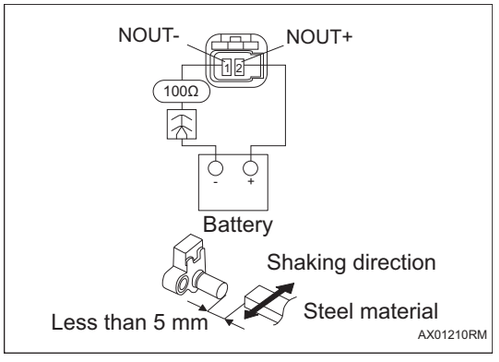
AX

Detector connection	Detection conditions	Specified state
TCU connector B30# - body GND	Always connected	No continuity
TCU connector B31# - body GND	Always connected	No continuity
TCU connector B30# -TCU connector B31#	Always connected	Proper continuity

NG → **Repair or replace harness and connector and output speed sensor**

OK

4	Check output speed sensor action



(a) Connect terminal 1 to the battery negative terminal and terminal 2 to the battery positive terminal through 100 Ω ohmmeter and ammeter; And measure the current value when shaking the steel material (less than 5 mm) at the top of the output sensor back and forth.

Normal

Signal	Current (mA)
HIGH	12 ~ 16
LOW	4 ~ 8

NG → **Replace the output speed sensor (See page AX-155)**

OK

5	Replace TCU (See page AX-155)

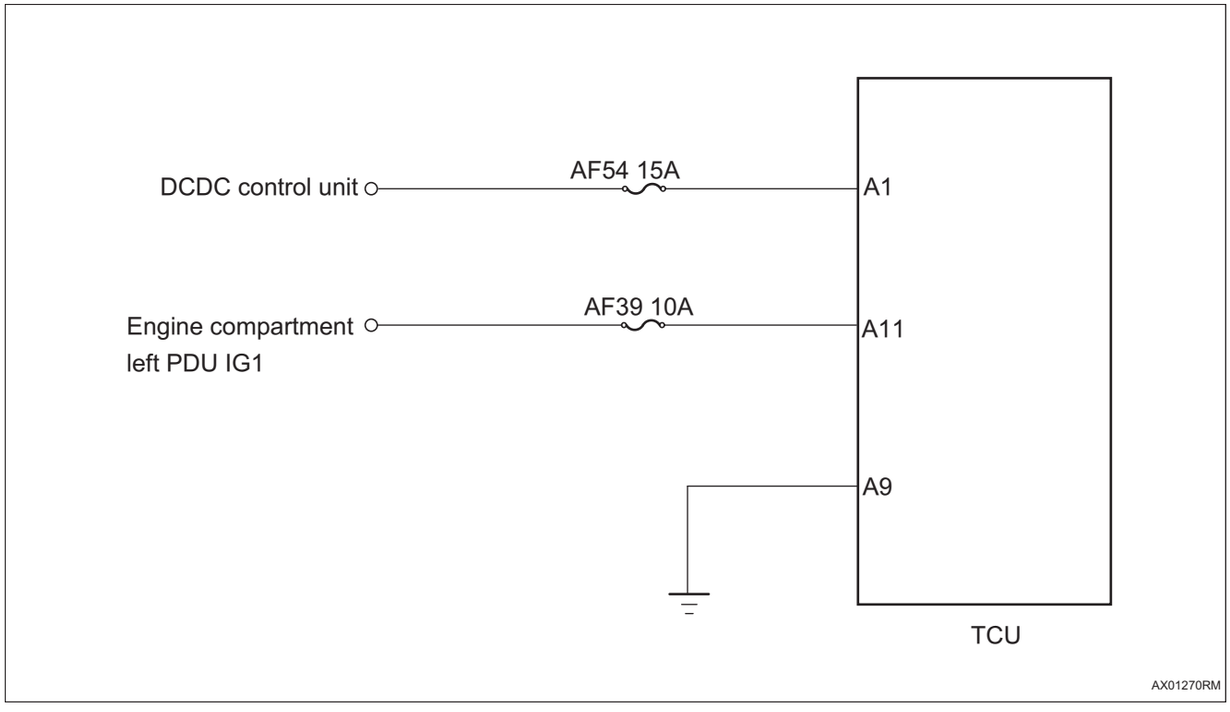
DTC	P088200	Battery undervoltage
DTC	P088300	Battery overvoltage

Description

When the TCU power supply voltage exceeds the normal range, TCU records DTC.

DTC	DTC detection conditions	Faulty location
P088200	(a) The power supply voltage is outside the normal range.	• TCU • Harness and connector • Fuse • Charging system
P088300	(a) The power supply voltage is outside the normal range.	• TCU • Harness and connector • Fuse • Charging system

Circuit diagram



AX

Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → Repair according to the fault

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again and re-read the DTC.

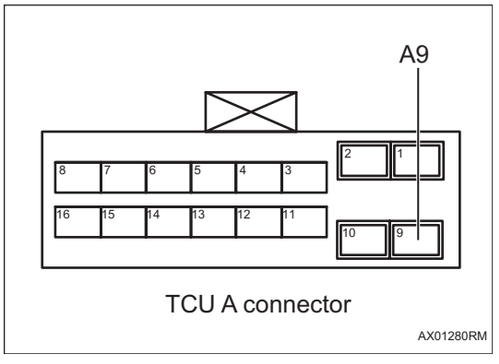
Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check TCU ground



(a) Disconnect the TCU connector.

(b) Measure the resistance according to the values in the table below.

Standard value

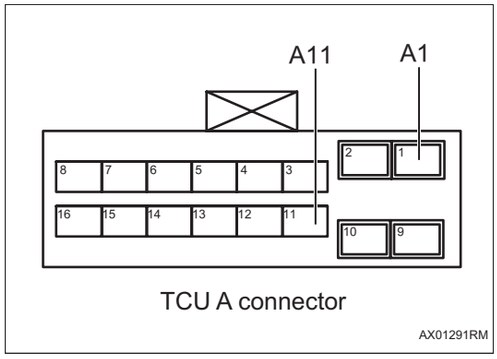
Detector connection	Detection conditions	Specified state
TCU connector A9# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

AX

OK

4	Check TCU power supply



(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector A1# -body GND	The ignition switch is set to "ON"	Battery voltage
TCU connector A11# -body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace TCU (See page AX-155)**

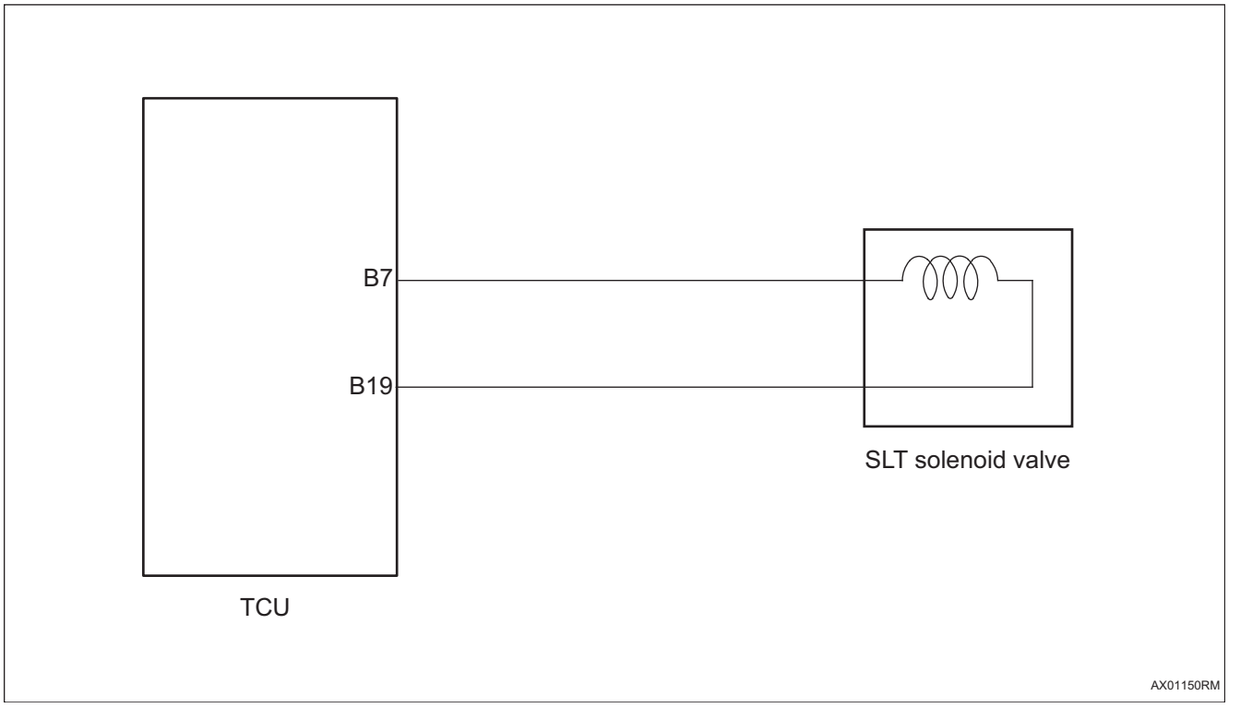
DTC	P096300	Linear solenoid valve (SLT) circuit shorted to power supply
DTC	P096200	Linear solenoid valve (SLT) circuit shorted to ground
DTC	P096000	Linear solenoid valve (SLT) circuit open
DTC	P096100	Linear solenoid valve feedback current jamming (SLT)

Description

When the linear solenoid valve (SLT) has open circuit or short circuit, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P096300	(a) Linear solenoid valve SLT circuit shorted to power supply.	• Valve body (SLT solenoid valve) • Harness and connector • TCU
P096200	(a) Linear solenoid valve SLT circuit shorted to ground.	• Valve body (SLT solenoid valve) • Harness and connector • TCU
P096000	(a) Linear solenoid valve SLT circuit open.	• Valve body (SLT solenoid valve) • Harness and connector • TCU
P096100	(a) Linear solenoid valve SLT feedback current stuck.	• Valve body (SLT solenoid valve) • Harness and connector • TCU

Circuit diagram



Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again and re-read the DTC.

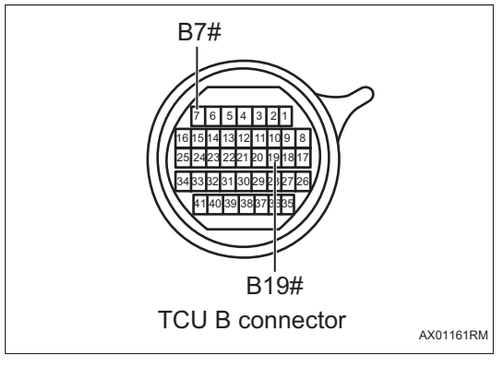
Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check harness and connector (TCU-solenoid valve)



TCU B connector

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the TCU.

(d) Check whether the harness and connector are connected tightly.

(e) Check whether the harness and connector are open-circuited or short-circuited.

(f) Measure the resistance according to the values in the table below.

Standard value

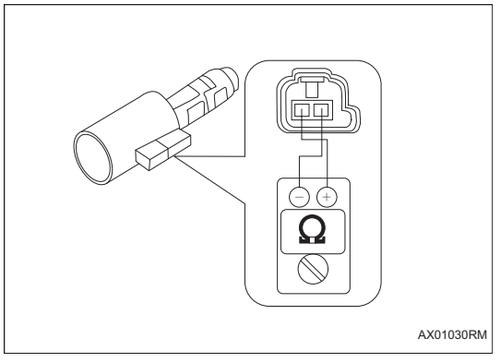
AX

Detector connection	Detection conditions	Specified state
TCU connector B7# -body GND	Always connected	No continuity
TCU connector B19# -body GND	Always connected	No continuity
TCU connector B7# -TCU connector B19#	20 ℃	5.0 ~ 5.6Ω

NG → **Repair or replace harness and connector and solenoid valve**

OK

4 Check SLT solenoid valve resistance



(a) Remove the valve body and remove the solenoid valve from the valve body.

(b) Measure the resistance according to the values in the table below.

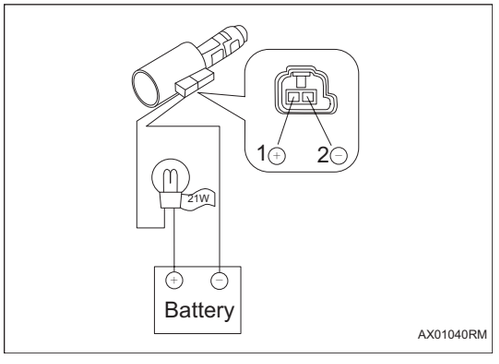
Standard value

Detection conditions	Specified state
20 ℃	5.0 ~ 5.6Ω

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

5 Check the operation of SLT solenoid valve



(a) Connect the battery positive lead to the solenoid valve terminal 1# and connect a bulb (12 V-21 W) in series, connect the battery negative terminal to the solenoid valve terminal 2#, and then confirm that the solenoid valve works.

Normal

The solenoid valve operation is normal.

NG → **Repair and replace the valve body assembly (See page AX-155)**

AX

OK

6	End

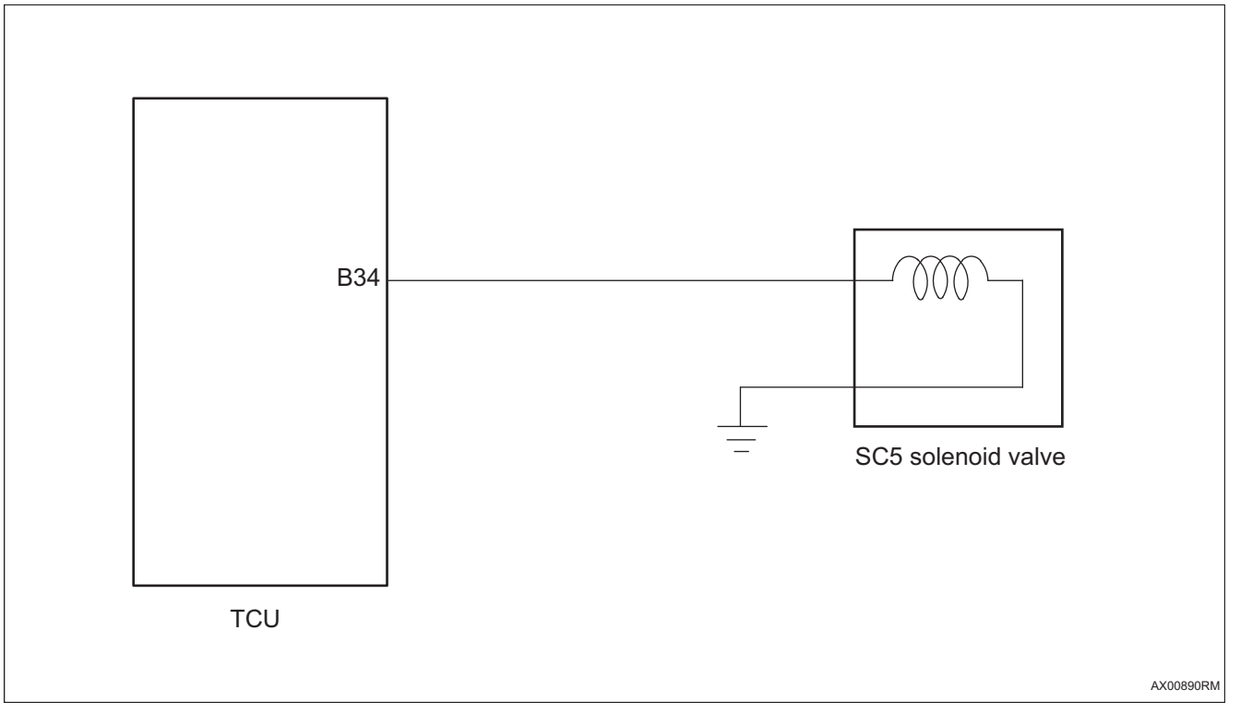
DTC	P097100	SC5 solenoid valve circuit shorted to power supply/circuit open
DTC	P097000	SC5 solenoid valve circuit shorted to ground

Description

When the SC5 solenoid valve has open circuit or short circuit, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P097100	(a) SC5 solenoid valve circuit shorted to power supply/open circuit.	• Valve body (SC5 solenoid valve) • Harness and connector • TCU
P097000	(a) SC5 solenoid valve circuit shorted to ground.	• Valve body (SC5 solenoid valve) • Harness and connector • TCU

Circuit diagram



AX

Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → Repair according to the fault

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again and re-read the DTC.

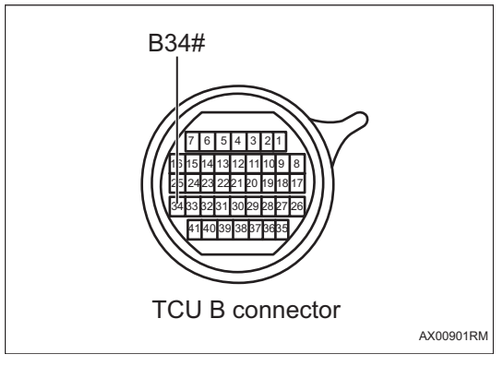
Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check harness and connector (TCU-solenoid valve)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the TCU.

(d) Check whether the harness and connector are connected tightly.

(e) Check whether the harness and connector are open-circuited or short-circuited.

(f) Measure the resistance according to the values in the table below.

Standard value

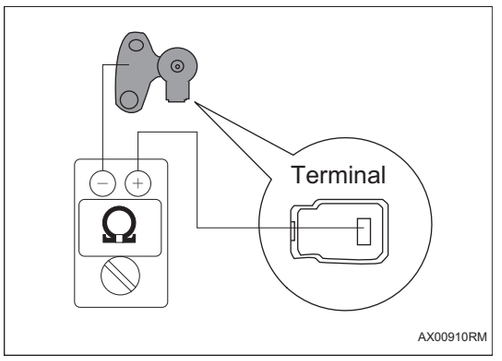
Detector connection	Detection conditions	Specified state
TCU connector B34# -body GND	20 ℃	11 ~ 15Ω

NG → **Repair or replace harness and connector and solenoid valve**

OK

4	Check SC5 solenoid valve resistance

AX



(a) Remove the valve body and remove the solenoid valve from the valve body.

(b) Measure the resistance according to the values in the table below.

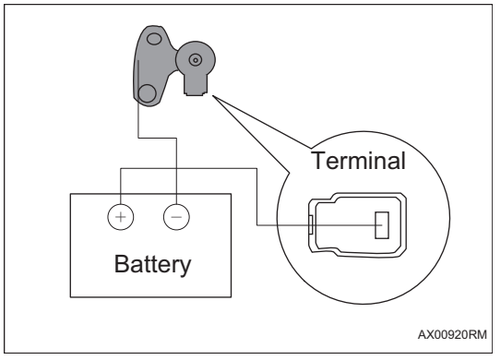
Standard value

Detection conditions	Specified state
20 ℃	11 ~ 15Ω

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

5	Check the operation of SC5 solenoid valve



(a) Connect the battery positive lead to the solenoid valve terminal, connect the negative terminal of the battery to the solenoid valve body, and then confirm that the solenoid valve works.

Normal

The solenoid valve operation is normal.

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

6	End

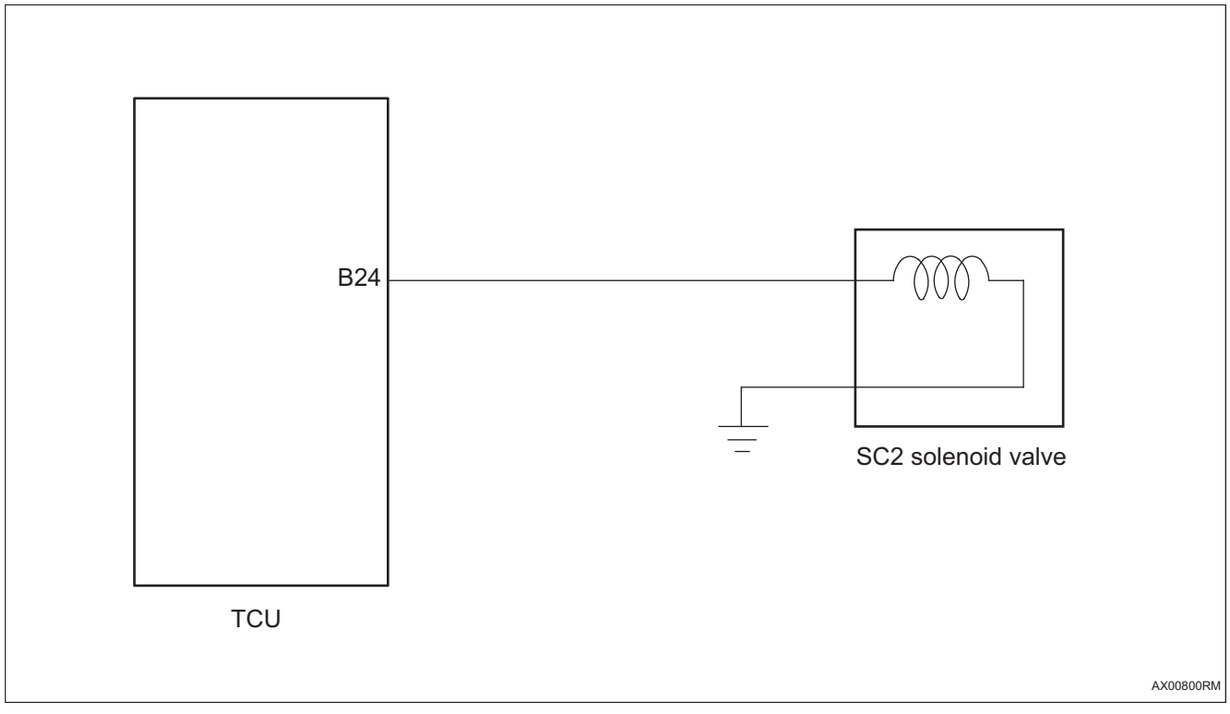
DTC	P097400	SC2 solenoid valve circuit shorted to power supply/circuit open
DTC	P097300	SC2 solenoid valve circuit shorted to ground

Description

When the SC2 solenoid valve has open circuit or short circuit, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P097400	SC2 solenoid valve circuit shorted to power supply/open circuit.	• Valve body (SC2 solenoid valve) • Harness and connector • TCU
P097300	SC2 solenoid valve circuit shorted to ground.	• Valve body (SC2 solenoid valve) • Harness and connector • TCU

Circuit diagram



AX

Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → Repair according to the fault

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again and re-read the DTC.

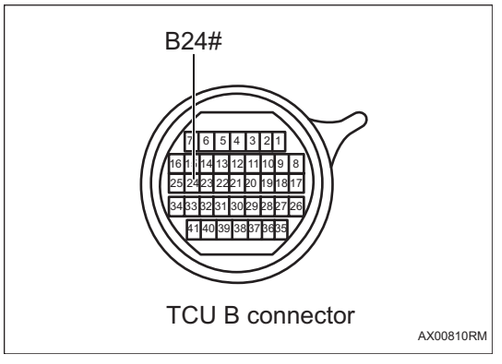
Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check harness and connector (TCU-solenoid valve)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the TCU.

(d) Check whether the harness and connector are connected tightly.

(e) Check whether the harness and connector are open-circuited or short-circuited.

(f) Measure the resistance according to the values in the table below.

Standard value

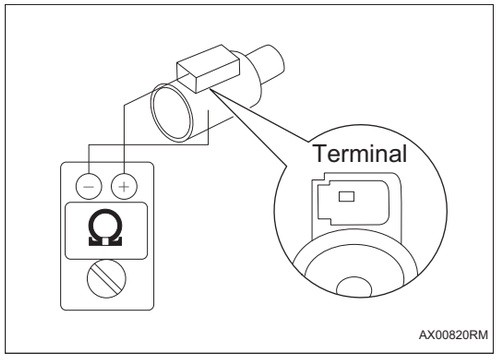
Detector connection	Detection conditions	Specified state
TCU connector B24# -body GND	20 ℃	11 ~ 15Ω

NG → **Repair or replace harness and connector and solenoid valve**

OK

4	Check SC2 solenoid valve resistance

AX



(a) Remove the valve body and remove the solenoid valve from the valve body.

(b) Measure the resistance according to the values in the table below.

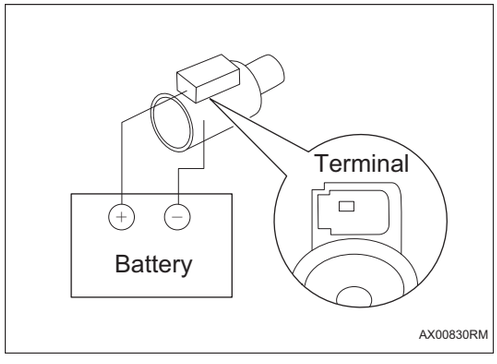
Standard value

Detection conditions	Specified state
20 ℃	11 ~ 15Ω

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

5	Check the operation of SC2 solenoid valve



(a) Connect the battery positive lead to the solenoid valve terminal, connect the negative terminal of the battery to the solenoid valve body, and then confirm that the solenoid valve works.

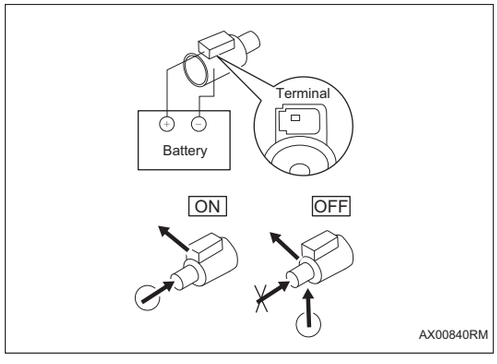
Normal

The solenoid valve operation is normal.

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

6	Check the operating status of shift solenoid valve (SR)



(a) Connect the battery positive lead to the solenoid valve terminal, connect the battery negative lead to the solenoid valve body to operate the solenoid valve, and confirm that the airflow is as shown.

AX

NG	Repair and replace the valve body assembly (See page AX-155)

OK

7	End

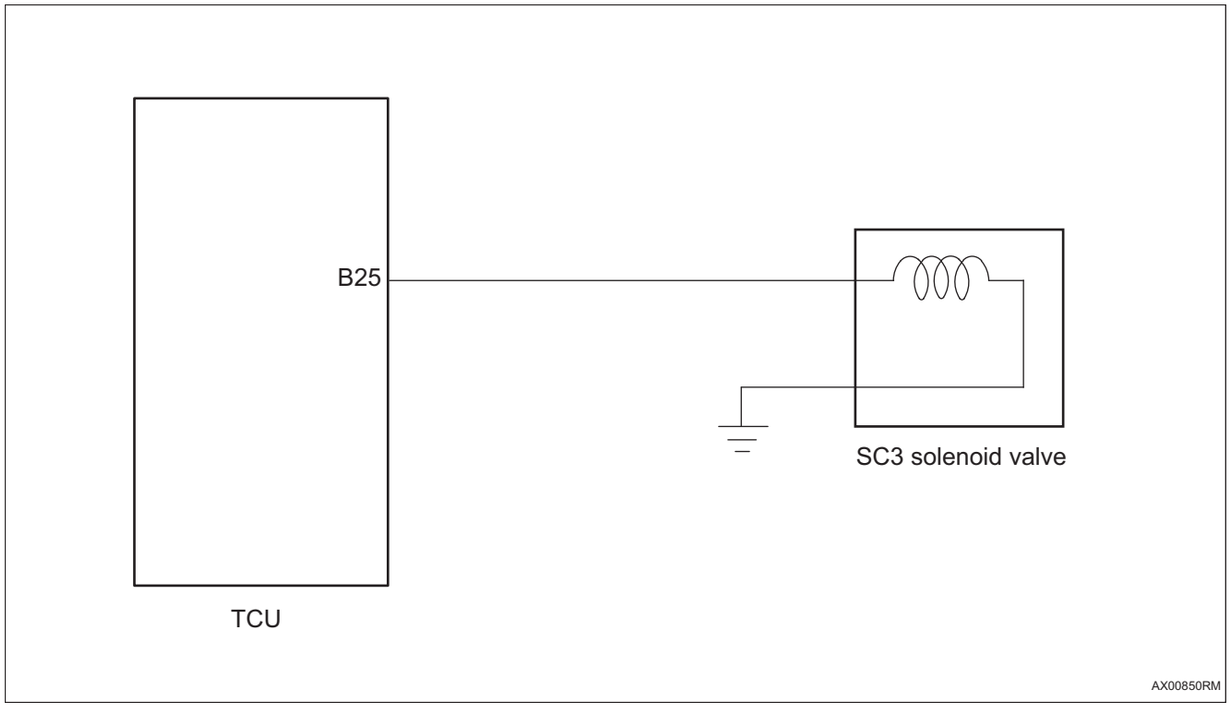
DTC	P097700	SC3 solenoid valve circuit shorted to power supply/circuit open
DTC	P097600	SC3 solenoid valve circuit shorted to ground

Description

When the SC3 solenoid valve has open circuit or short circuit, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P097700	(a) SC3 solenoid valve circuit shorted to power supply/open circuit.	• Valve body (SC3 solenoid valve) • Harness and connector • TCU
P097600	(a) SC3 solenoid valve circuit shorted to ground.	• Valve body (SC3 solenoid valve) • Harness and connector • TCU

Circuit diagram



AX

Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → Repair according to the fault

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

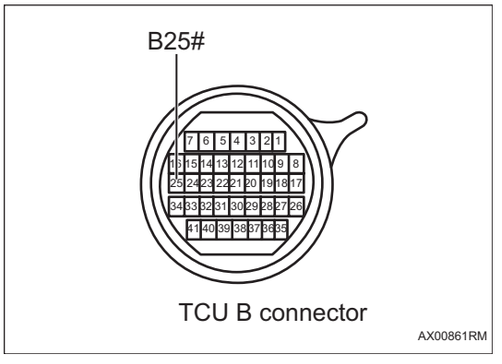
Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check harness and connector (TCU-solenoid valve)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the TCU.

(d) Check whether the harness and connector are connected tightly.

(e) Check whether the harness and connector are open-circuited or short-circuited.

(f) Measure the resistance according to the values in the table below.

Standard value

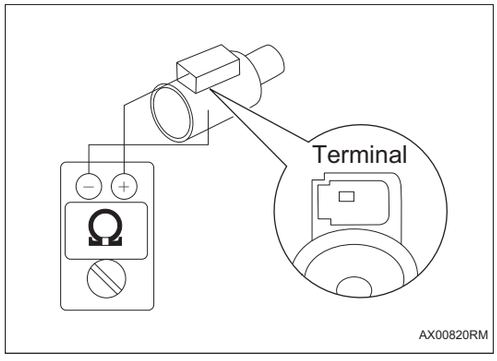
Detector connection	Detection conditions	Specified state
TCU connector B25# -body GND	20 ℃	11 ~ 15Ω

NG → **Repair or replace harness and connector and solenoid valve**

OK

4	Check SC3 solenoid valve resistance

AX



(a) Remove the valve body and remove the solenoid valve from the valve body.

(b) Measure the resistance according to the values in the table below.

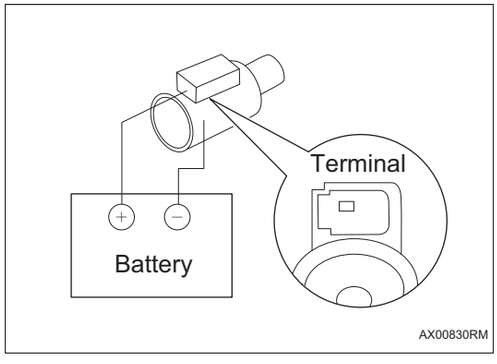
Standard value

Detection conditions	Specified state
20 ℃	11 ~ 15Ω

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

5	Check the operation of SC3 solenoid valve



(a) Connect the battery positive lead to the solenoid valve terminal, connect the negative terminal of the battery to the solenoid valve body, and then confirm that the solenoid valve works.

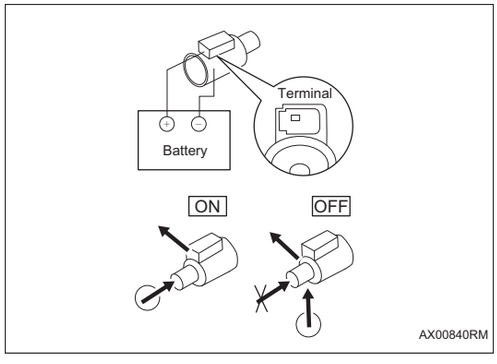
Normal

The solenoid valve operation is normal.

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

6	Check the operaing state of SC3 solenoid valve



(a) Connect the battery positive lead to the solenoid valve terminal, connect the battery negative lead to the solenoid valve body to operate the solenoid valve, and confirm that the airflow is as shown.

AX

NG	Repair and replace the valve body assembly (See page AX-155)

OK

7	End

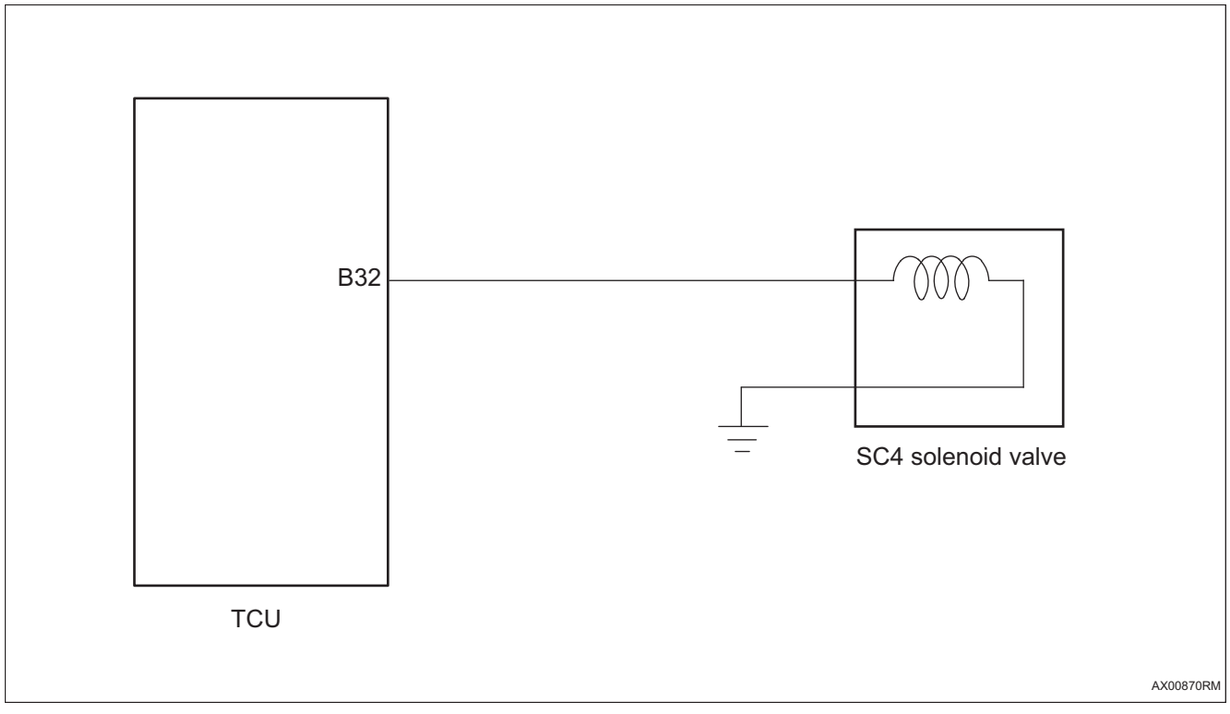
DTC	P096700	SC4 solenoid valve circuit shorted to power supply/circuit open
DTC	P096600	SC4 solenoid valve circuit shorted to ground

Description

When the SC4 solenoid valve has open circuit or short circuit, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P096700	(a) SC4 solenoid valve circuit shorted to power supply/open circuit.	• Valve body (SC4 solenoid valve) • Harness and connector • TCU
P096600	(a) SC4 solenoid valve circuit shorted to ground.	• Valve body (SC4 solenoid valve) • Harness and connector • TCU

Circuit diagram



AX

Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → Repair according to the fault

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again and re-read the DTC.

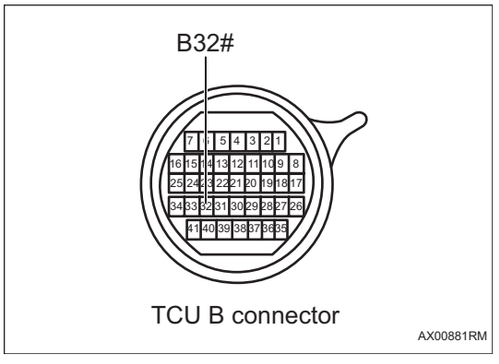
Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check harness and connector (TCU-solenoid valve)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the TCU.

(d) Check whether the harness and connector are connected tightly.

(e) Check whether the harness and connector are open-circuited or short-circuited.

(f) Measure the resistance according to the values in the table below.

Standard value

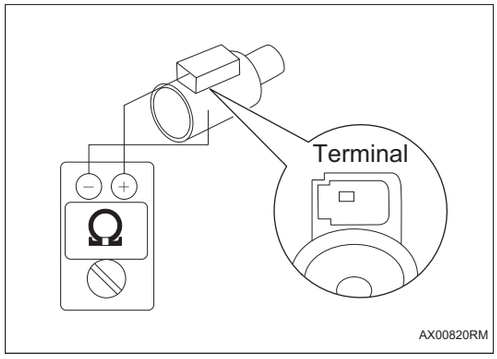
Detector connection	Detection conditions	Specified state
TCU connector B32# -body GND	20 ℃	11 ~ 15Ω

NG → **Repair or replace harness and connector and solenoid valve**

OK

4	Check SC4 solenoid valve resistance

AX



(a) Remove the valve body and remove the solenoid valve from the valve body.

(b) Measure the resistance according to the values in the table below.

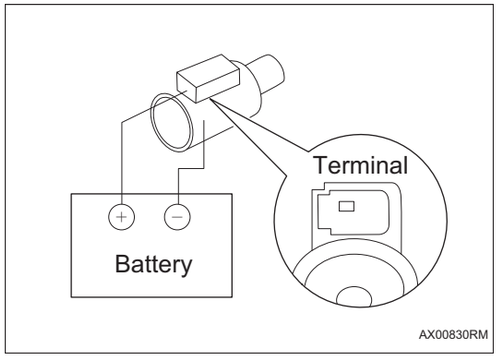
Standard value

Detection conditions	Specified state
20 ℃	11 ~ 15Ω

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

5	Check the operation of SC4 solenoid valve



(a) Connect the battery positive lead to the solenoid valve terminal, connect the negative terminal of the battery to the solenoid valve body, and then confirm that the solenoid valve works.

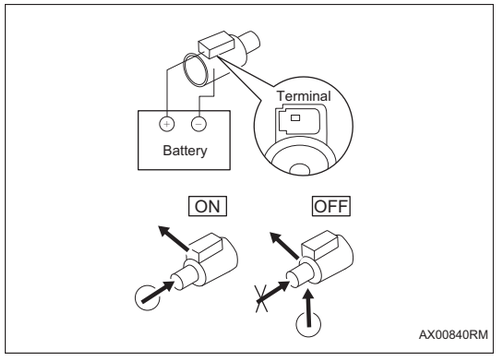
Normal

The solenoid valve operation is normal.

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

6	Check the operating state of SC4 solenoid valve



(a) Connect the battery positive lead to the solenoid valve terminal, connect the battery negative lead to the solenoid valve body to operate the solenoid valve, and confirm that the airflow is as shown.

AX

NG	Repair and replace the valve body assembly (See page AX-155)

OK

7	End

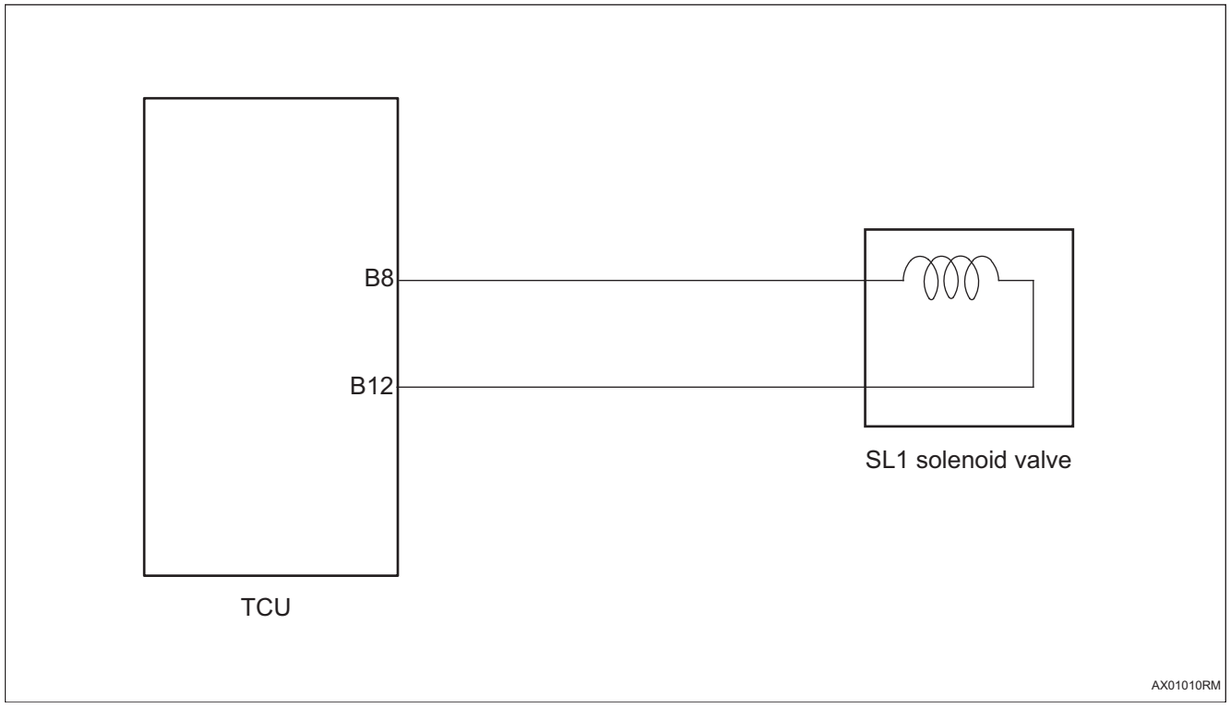
DTC	P098000	Linear solenoid valve (SL1) circuit shorted to power supply
DTC	P097900	Linear solenoid valve (SL1) circuit shorted to ground
DTC	P1C1000	Linear solenoid valve (SL1) circuit open
DTC	P097800	Linear solenoid valve feedback current jamming (SL1)

Description

When the linear solenoid valve (SL1) has open circuit or short circuit, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P098000	(a) Linear solenoid valve SL1 circuit shorted to power supply.	• Valve body (SL1 solenoid valve) • Harness and connector • TCU
P097900	(a) Linear solenoid valve SL1 circuit shorted to ground.	• Valve body (SL1 solenoid valve) • Harness and connector • TCU
P1C1000	(a) Linear solenoid valve SL1 circuit open.	• Valve body (SL1 solenoid valve) • Harness and connector • TCU
P097800	(a) Linear solenoid valve SL1 feedback current stuck.	• Valve body (SL1 solenoid valve) • Harness and connector • TCU

Circuit diagram



Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

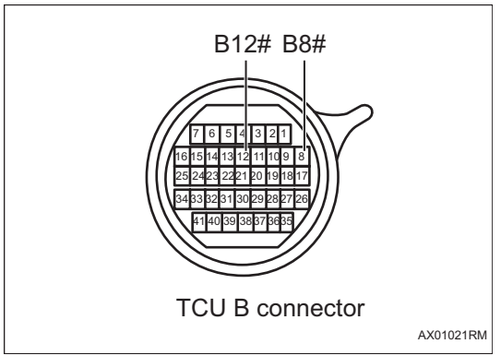
Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check harness and connector (TCU-solenoid valve)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the TCU.

(d) Check whether the harness and connector are connected tightly.

(e) Check whether the harness and connector are open-circuited or short-circuited.

(f) Measure the resistance according to the values in the table below.

Standard value

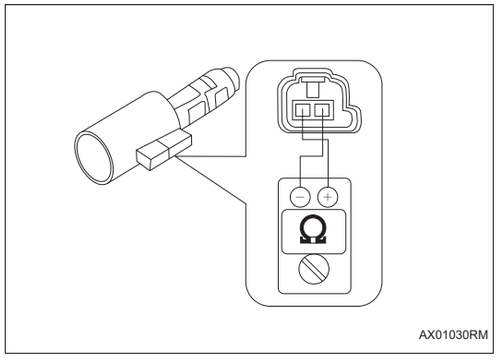
AX

Detector connection	Detection conditions	Specified state
TCU connector B8# -body GND	Always connected	No continuity
TCU connector B12# -body GND	Always connected	No continuity
TCU connector B12# -TCU connector B8#	20 ℃	5.0 ~ 5.6Ω

NG → **Repair or replace harness and connector and solenoid valve**

OK

4 Check SL1 solenoid valve resistance



(a) Remove the valve body and remove the solenoid valve from the valve body.

(b) Measure the resistance according to the values in the table below.

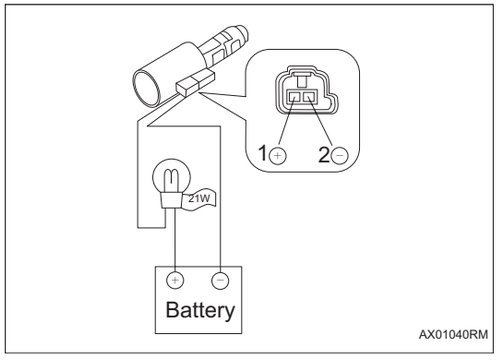
Standard value

Detection conditions	Specified state
20 ℃	5.0 ~ 5.6Ω

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

5 Check the operation of SL1 solenoid valve



(a) Connect the battery positive lead to the solenoid valve terminal 1# and connect a bulb (12 V-21 W) in series, connect the battery negative terminal to the solenoid valve terminal 2#, and then confirm that the solenoid valve works.

Normal

The solenoid valve operation is normal.

NG → **Repair and replace the valve body assembly (See page AX-155)**

AX

OK

6	End

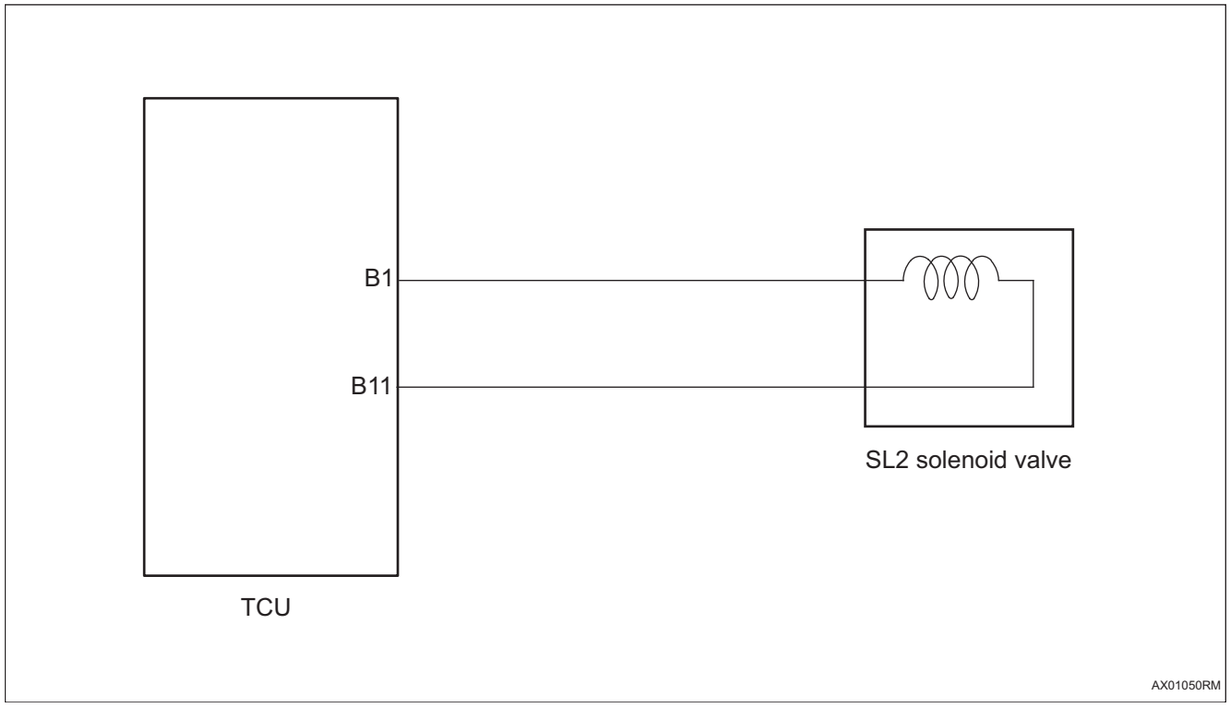
DTC	P098300	Linear solenoid valve (SL2) circuit shorted to power supply
DTC	P098200	Linear solenoid valve (SL2) circuit shorted to ground
DTC	P1C1100	Linear solenoid valve (SL2) circuit open
DTC	P098100	Linear solenoid valve feedback current jamming (SL2)

Description

When the linear solenoid valve (SL2) has open circuit or short circuit, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P098300	(a) Linear solenoid valve SL2 circuit shorted to power supply.	• Valve body (SL2 solenoid valve) • Harness and connector • TCU
P098200	(a) Linear solenoid valve SL2 circuit shorted to ground.	• Valve body (SL2 solenoid valve) • Harness and connector • TCU
P1C1100	(a) Linear solenoid valve SL2 open circuit.	• Valve body (SL2 solenoid valve) • Harness and connector • TCU
P098100	(a) Linear solenoid valve SL2 feedback current stuck.	• Valve body (SL2 solenoid valve) • Harness and connector • TCU

Circuit diagram



Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again and re-read the DTC.

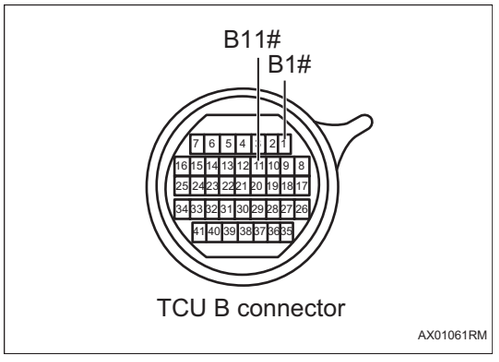
Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check harness and connector (TCU-solenoid valve)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the TCU.

(d) Check whether the harness and connector are connected tightly.

(e) Check whether the harness and connector are open-circuited or short-circuited.

(f) Measure the resistance according to the values in the table below.

Standard value

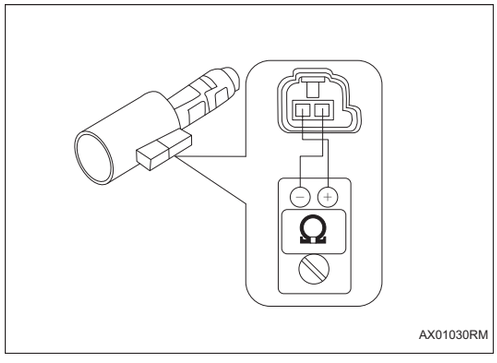
AX

Detector connection	Detection conditions	Specified state
TCU connector B1# -body GND	Always connected	No continuity
TCU connector B11# -body GND	Always connected	No continuity
TCU connector B1# -TCU connector B11#	20 ℃	5.0 ~ 5.6Ω

NG → **Repair or replace harness and connector and solenoid valve**

OK

4 Check SL2 solenoid valve resistance



(a) Remove the valve body and remove the solenoid valve from the valve body.

(b) Measure the resistance according to the values in the table below.

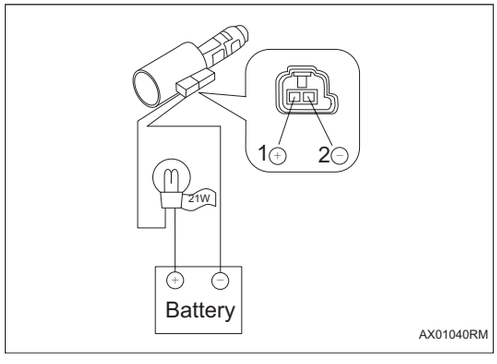
Standard value

Detection conditions	Specified state
20 ℃	5.0 ~ 5.6Ω

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

5 Check the operation of SL2 solenoid valve



(a) Connect the battery positive lead to the solenoid valve terminal 1# and connect a bulb (12 V-21 W) in series, connect the battery negative terminal to the solenoid valve terminal 2#, and then confirm that the solenoid valve works.

Normal

The solenoid valve operation is normal.

NG → **Repair and replace the valve body assembly (See page AX-155)**

AX

OK

6	End

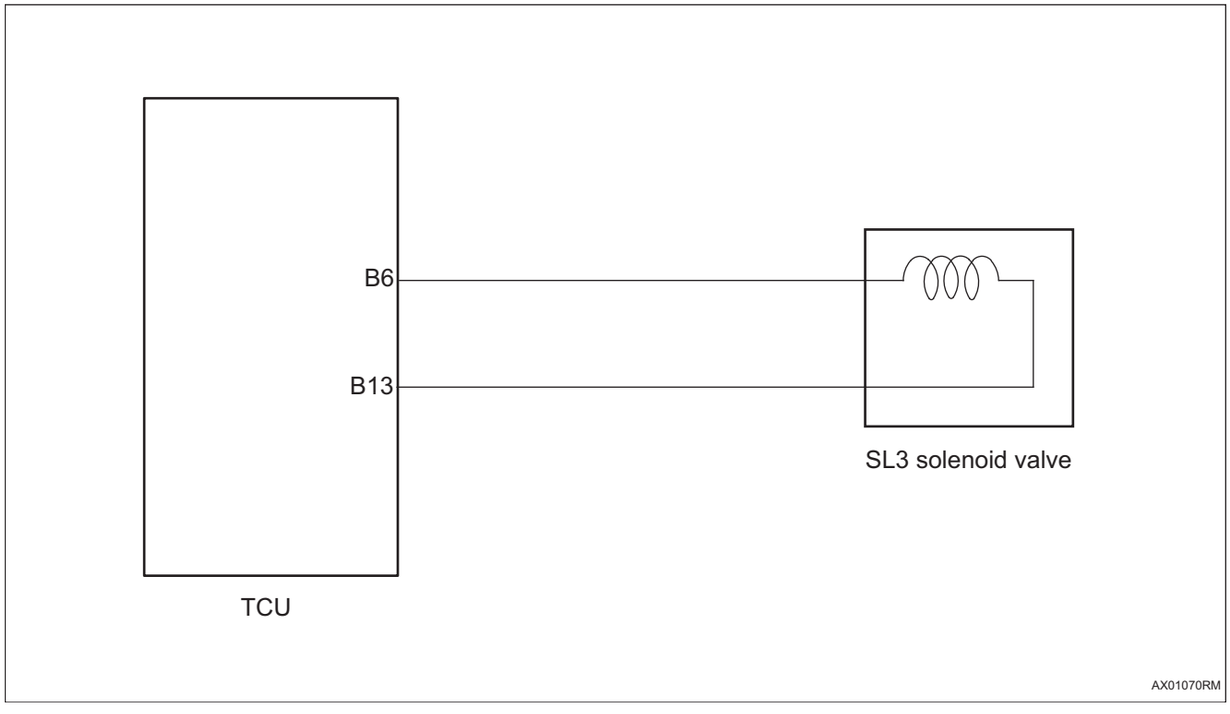
DTC	P098600	Linear solenoid valve (SL3) circuit shorted to power supply
DTC	P098500	Linear solenoid valve (SL3) circuit shorted to ground
DTC	P1C1200	Linear solenoid valve (SL3) circuit open
DTC	P098400	Linear solenoid valve feedback current jamming (SL3)

Description

When the linear solenoid valve (SL3) has open circuit or short circuit, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P098600	(a) Linear solenoid valve SL3 circuit shorted to power supply.	• Valve body (SL3 solenoid valve) • Harness and connector • TCU
P098500	(a) Linear solenoid valve SL3 circuit shorted to ground.	• Valve body (SL3 solenoid valve) • Harness and connector • TCU
P1C1200	(a) Linear solenoid valve SL3 open circuit.	• Valve body (SL3 solenoid valve) • Harness and connector • TCU
P098400	(a) Linear solenoid valve SL3 feedback current stuck.	• Valve body (SL3 solenoid valve) • Harness and connector • TCU

Circuit diagram



Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

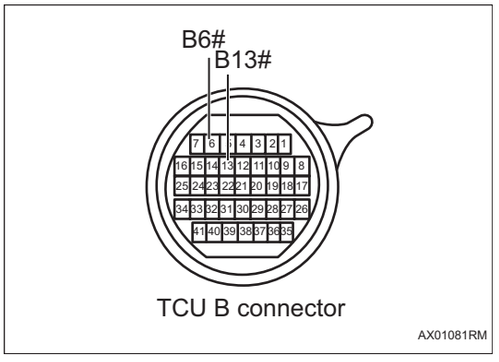
Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check harness and connector (TCU-solenoid valve)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the TCU.

(d) Check whether the harness and connector are connected tightly.

(e) Check whether the harness and connector are open-circuited or short-circuited.

(f) Measure the resistance according to the values in the table below.

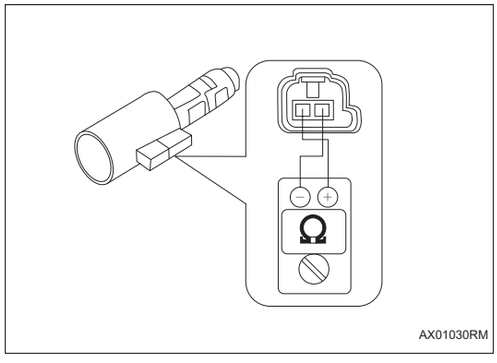
Standard value

Detector connection	Detection conditions	Specified state
TCU connector B6# -body GND	Always connected	No continuity
TCU connector B13# -body GND	Always connected	No continuity
TCU connector B6# -TCU connector B13#	20 ℃	5.0 ~ 5.6Ω

NG → **Repair or replace harness and connector and solenoid valve**

OK

4 Check SL3 solenoid valve resistance



(a) Remove the valve body and remove the solenoid valve from the valve body.

(b) Measure the resistance according to the values in the table below.

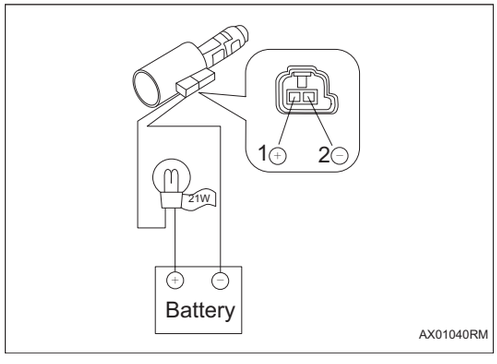
Standard value

Detection conditions	Specified state
20 ℃	5.0 ~ 5.6Ω

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

5 Check the operation of SL3 solenoid valve



(a) Connect the battery positive lead to the solenoid valve terminal 1# and connect a bulb (12 V-21 W) in series, connect the battery negative terminal to the solenoid valve terminal 2#, and then confirm that the solenoid valve works.

Normal

The solenoid valve operation is normal.

NG → **Repair and replace the valve body assembly (See page AX-155)**

AX

OK

6	End

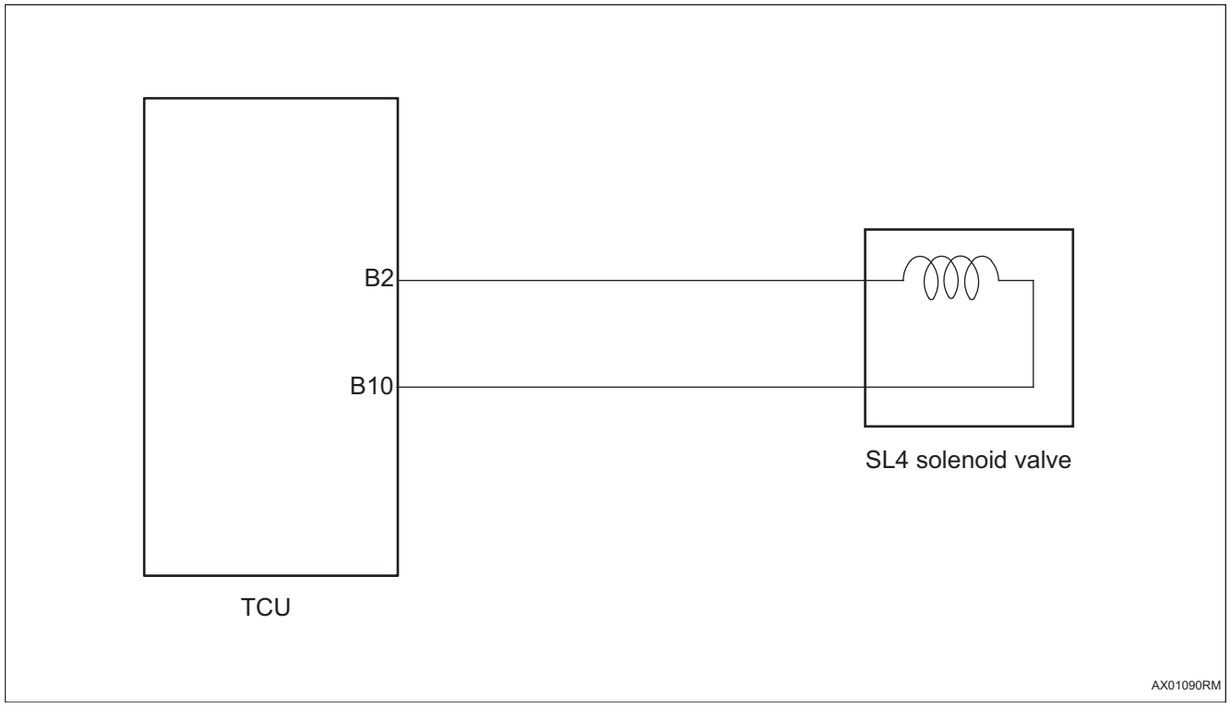
DTC	P099000	Linear solenoid valve (SL4) circuit shorted to power supply
DTC	P098900	Linear solenoid valve (SL4) circuit shorted to ground
DTC	P098800	Linear solenoid valve (SL4) circuit open
DTC	P099A00	Linear solenoid valve feedback current jamming (SL4)

Description

When the linear solenoid valve (SL4) has open circuit or short circuit, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P099000	(a) Linear solenoid valve SL4 circuit shorted to power supply.	• Valve body (SL4 solenoid valve) • Harness and connector • TCU
P098900	(a) Linear solenoid valve SL4 circuit shorted to ground.	• Valve body (SL4 solenoid valve) • Harness and connector • TCU
P098800	(a) Linear solenoid valve SL4 open circuit.	• Valve body (SL4 solenoid valve) • Harness and connector • TCU
P099A00	(a) Linear solenoid valve SL4 feedback current stuck.	• Valve body (SL4 solenoid valve) • Harness and connector • TCU

Circuit diagram



Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

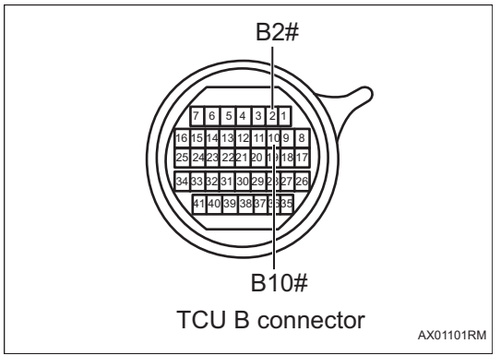
Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check harness and connector (TCU-solenoid valve)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the TCU.

(d) Check whether the harness and connector are connected tightly.

(e) Check whether the harness and connector are open-circuited or short-circuited.

(f) Measure the resistance according to the values in the table below.

Standard value

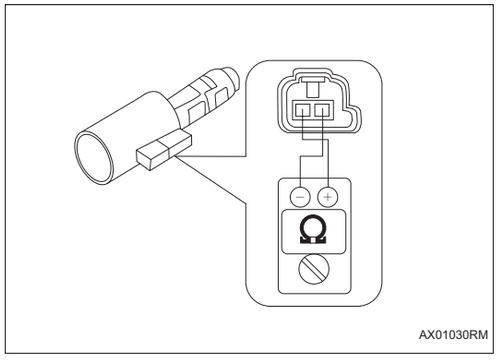
AX

Detector connection	Detection conditions	Specified state
TCU connector B2# -body GND	Always connected	No continuity
TCU connector B10# -body GND	Always connected	No continuity
TCU connector B2# -TCU connector B10#	20 ℃	5.0 ~ 5.6Ω

NG → **Repair or replace harness and connector and solenoid valve**

OK

4 Check SL4 solenoid valve resistance



(a) Remove the valve body and remove the solenoid valve from the valve body.

(b) Measure the resistance according to the values in the table below.

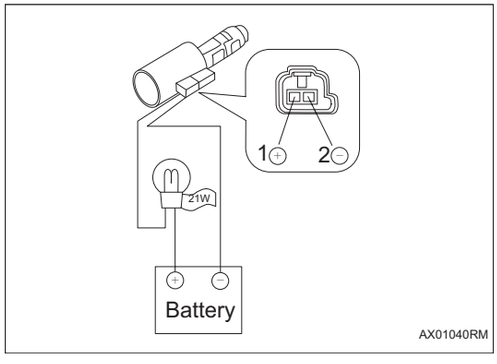
Standard value

Detection conditions	Specified state
20 ℃	5.0 ~ 5.6Ω

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

5 Check the operation of SL4 solenoid valve



(a) Connect the battery positive lead to the solenoid valve terminal 1# and connect a bulb (12 V-21 W) in series, connect the battery negative terminal to the solenoid valve terminal 2#, and then confirm that the solenoid valve works.

Normal

The solenoid valve operation is normal.

NG → **Repair and replace the valve body assembly (See page AX-155)**

AX

OK

6	End

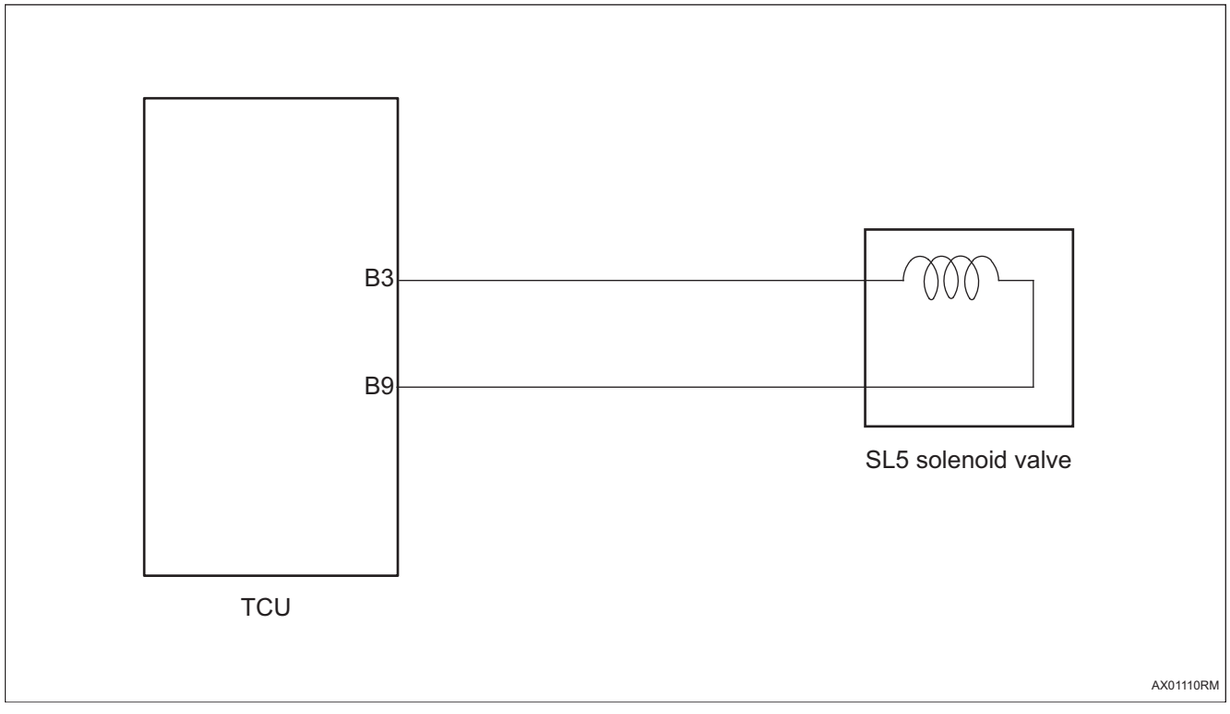
DTC	P099900	Linear solenoid valve (SL5) circuit shorted to power supply
DTC	P099800	Linear solenoid valve (SL5) circuit shorted to ground
DTC	P1C1300	Linear solenoid valve (SL5) circuit open
DTC	P099700	Linear solenoid valve feedback current jamming (SL5)

Description

When the linear solenoid valve (SL5) has open circuit or short circuit, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P099900	(a) Linear solenoid valve SL5 circuit shorted to power supply.	• Valve body (SL5 solenoid valve) • Harness and connector • TCU
P099800	(a) Linear solenoid valve SL5 circuit shorted to ground.	• Valve body (SL5 solenoid valve) • Harness and connector • TCU
P1C1300	(a) Linear solenoid valve SL5 open circuit.	• Valve body (SL5 solenoid valve) • Harness and connector • TCU
P099700	(a) Linear solenoid valve SL5 feedback current stuck.	• Valve body (SL5 solenoid valve) • Harness and connector • TCU

Circuit diagram



Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

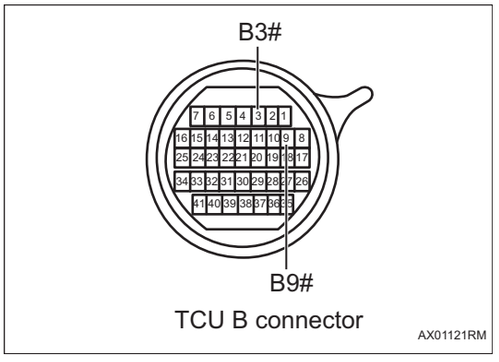
Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check harness and connector (TCU-solenoid valve)



TCU B connector

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the TCU.

(d) Check whether the harness and connector are connected tightly.

(e) Check whether the harness and connector are open-circuited or short-circuited.

(f) Measure the resistance according to the values in the table below.

Standard value

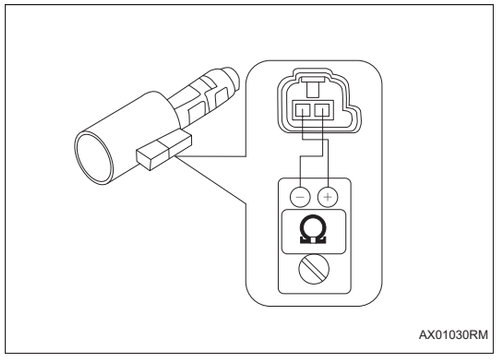
AX

Detector connection	Detection conditions	Specified state
TCU connector B3# -body GND	Always connected	No continuity
TCU connector B9# -body GND	Always connected	No continuity
TCU connector B3# -TCU connector B9#	20 ℃	5.0 ~ 5.6Ω

NG → **Repair or replace harness and connector and solenoid valve**

OK

4 Check SL5 solenoid valve resistance



(a) Remove the valve body and remove the solenoid valve from the valve body.

(b) Measure the resistance according to the values in the table below.

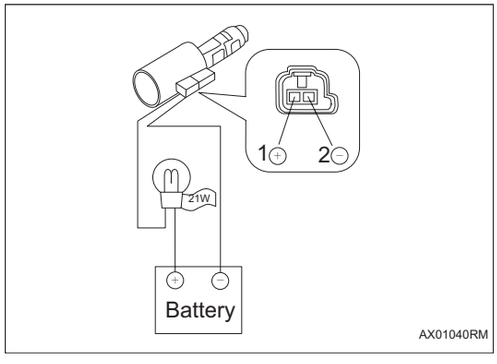
Standard value

Detection conditions	Specified state
20 ℃	5.0 ~ 5.6Ω

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

5 Check the operation of SL5 solenoid valve



(a) Connect the battery positive lead to the solenoid valve terminal 1# and connect a bulb (12 V-21 W) in series, connect the battery negative terminal to the solenoid valve terminal 2#, and then confirm that the solenoid valve works.

Normal

The solenoid valve operation is normal.

NG → **Repair and replace the valve body assembly (See page AX-155)**

AX

OK

6	End

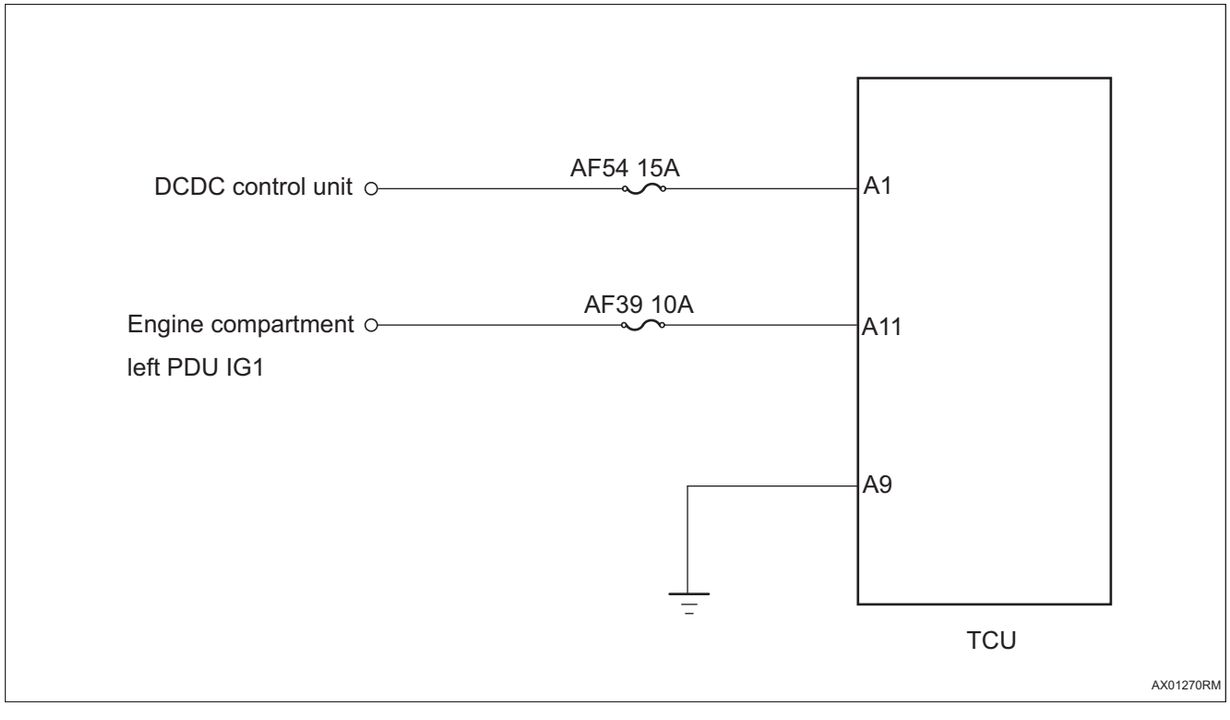
DTC	**P0B0A00**	**Electronic transmission fluid pump control undervoltage**
DTC	**P0B0B00**	**Electronic transmission fluid pump control overvoltage**
DTC	**P170A00**	**Electronic transmission fluid pump over-heating**

Description

When the electronic transmission fluid pump power supply voltage exceeds the normal range or overheats, TCU records DTC.

DTC	DTC detection conditions	Faulty location
P0B0A00	(a) Electronic transmission fluid pump control undervoltage.	• TCU • Harness and connector • Fuse • Charging system
P0B0B00	(a) Electronic transmission fluid pump control overvoltage.	• TCU • Harness and connector • Fuse • Charging system
P170A00	(a) Electronic transmission fluid pump overheating.	• TCU • Harness and connector • Fuse • Charging system

Circuit diagram



Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again and re-read the DTC.

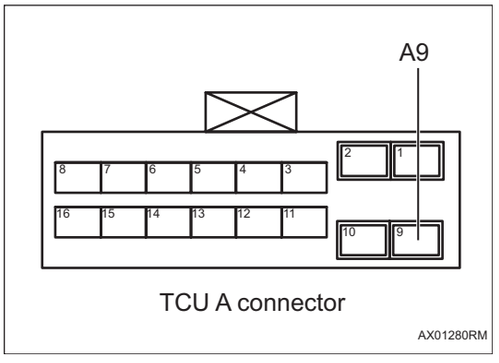
Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check TCU ground



TCU A connector

AX01280RM

(a) Disconnect the TCU connector.

(b) Measure the resistance according to the values in the table below.

Standard value

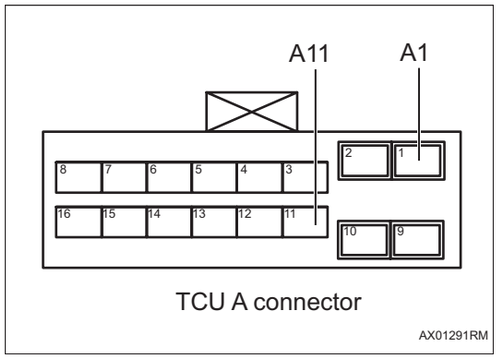
Detector connection	Detection conditions	Specified state
TCU connector A9# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

AX

OK

4	Check TCU power supply



(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector A1# -body GND	The ignition switch is set to "ON"	Battery voltage
TCU connector A11# -body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	Replace TCU (See page AX-155)

AX

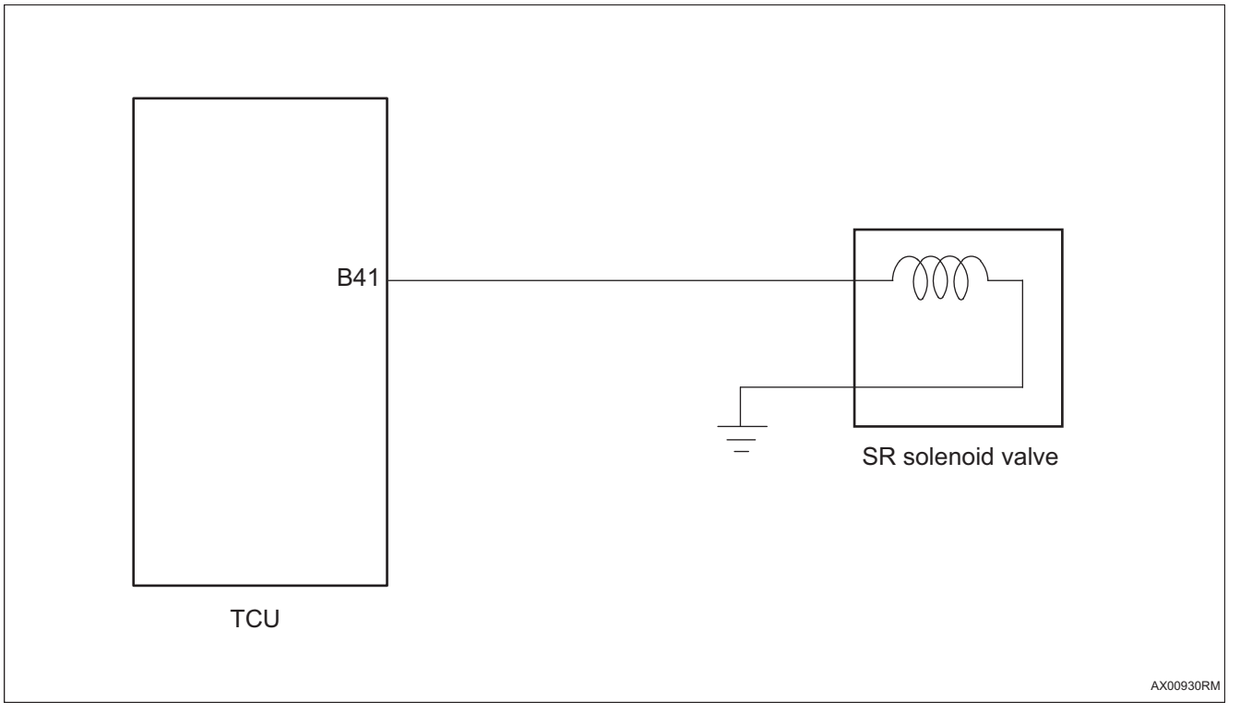
DTC	P272100	SR solenoid valve circuit shorted to power supply/circuit open
DTC	P272000	SR solenoid valve circuit shorted to ground

Description

When the SR solenoid valve has open circuit or short circuit, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P272100	(a) SR solenoid valve circuit shorted to power supply/open circuit.	• Valve body (SR solenoid valve) • Harness and connector • TCU
P272000	(a) SR solenoid valve circuit shorted to ground.	• Valve body (SR solenoid valve) • Harness and connector • TCU

Circuit diagram



AX

Inspection procedure

1	**Perform basic inspection**

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

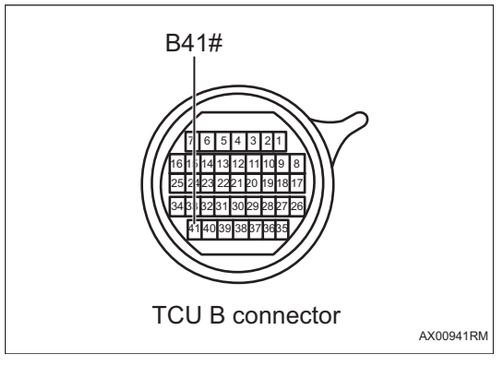
Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check harness and connector (TCU-solenoid valve)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the TCU.

(d) Check whether the harness and connector are connected tightly.

(e) Check whether the harness and connector are open-circuited or short-circuited.

(f) Measure the resistance according to the values in the table below.

Standard value

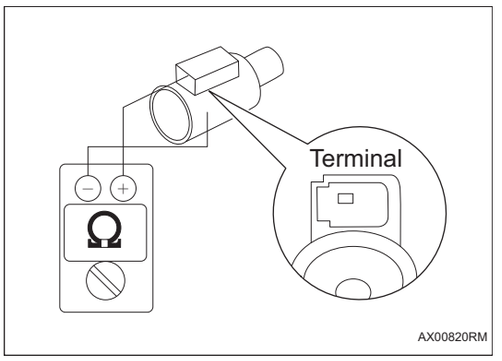
Detector connection	Detection conditions	Specified state
TCU connector B41# -body GND	20 ℃	11 ~ 15Ω

NG → **Repair or replace harness and connector and solenoid valve**

OK

4	Check SR solenoid valve resistance

AX



(a) Remove the valve body and remove the solenoid valve from the valve body.

(b) Measure the resistance according to the values in the table below.

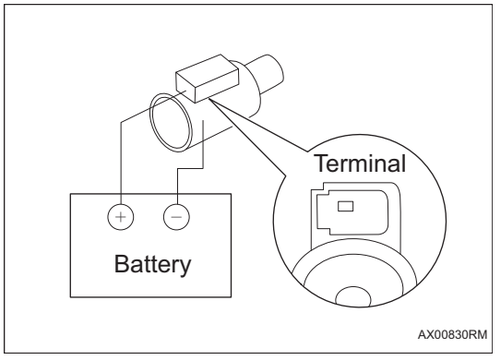
Standard value

Detection conditions	Specified state
20 ℃	11 ~ 15Ω

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

5	Check the operation of SR solenoid valve



(a) Connect the battery positive lead to the solenoid valve terminal, connect the negative terminal of the battery to the solenoid valve body, and then confirm that the solenoid valve works.

Normal

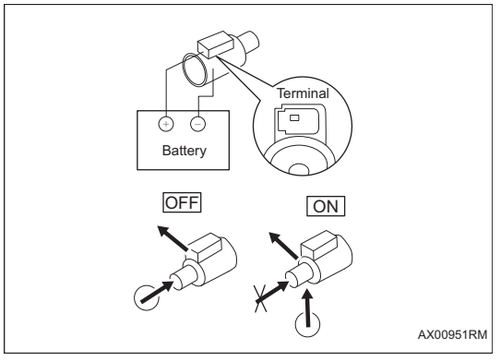
The solenoid valve operation is normal.

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

6	Check the operating state of SR solenoid valve

AX



(a) Connect the battery positive lead to the solenoid valve terminal, connect the battery negative lead to the solenoid valve body to operate the solenoid valve, and confirm that the airflow is as shown.

NG	Repair and replace the valve body assembly (See page AX-155)

OK

7	End

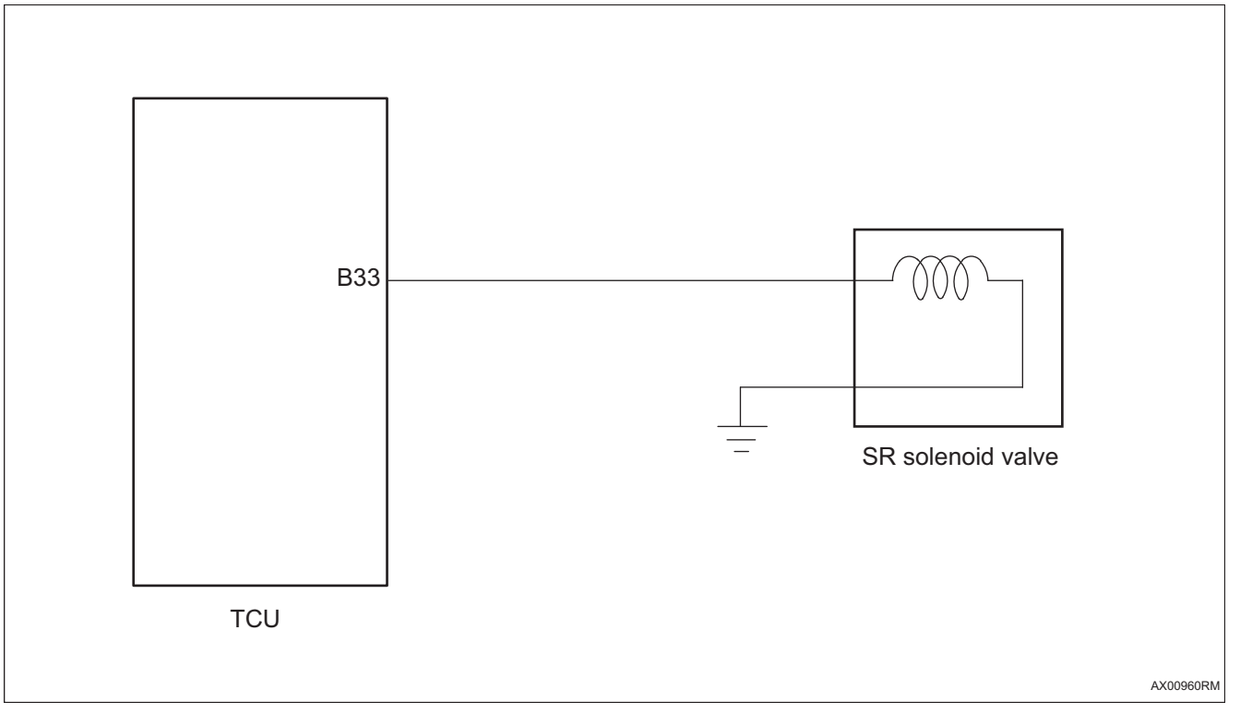
DTC	P273000	SL solenoid valve circuit shorted to power supply/circuit open
DTC	P272900	SL solenoid valve circuit shorted to ground

Description

When the SL solenoid valve has open circuit or short circuit, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P273000	(a) SL solenoid valve circuit shorted to power supply/open circuit.	• Valve body (SL solenoid valve) • Harness and connector • TCU
P272900	(a) SL solenoid valve circuit shorted to ground.	• Valve body (SL solenoid valve) • Harness and connector • TCU

Circuit diagram



AX

Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

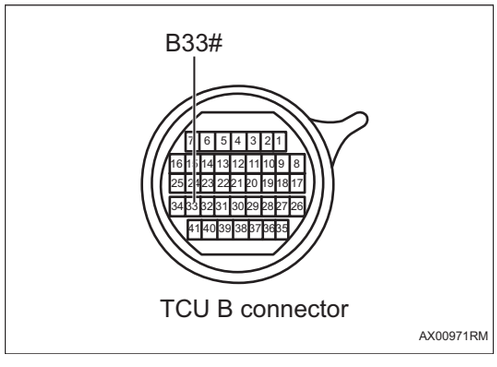
Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check harness and connector (TCU-solenoid valve)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the TCU.

(d) Check whether the harness and connector are connected tightly.

(e) Check whether the harness and connector are open-circuited or short-circuited.

(f) Measure the resistance according to the values in the table below.

Standard value

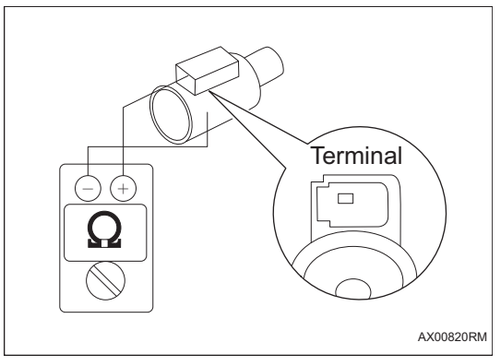
Detector connection	Detection conditions	Specified state
TCU connector B33# -body GND	20 ℃	11 ~ 15Ω

NG → **Repair or replace harness and connector and solenoid valve**

OK

4	Check SL solenoid valve resistance

AX



(a) Remove the valve body and remove the solenoid valve from the valve body.

(b) Measure the resistance according to the values in the table below.

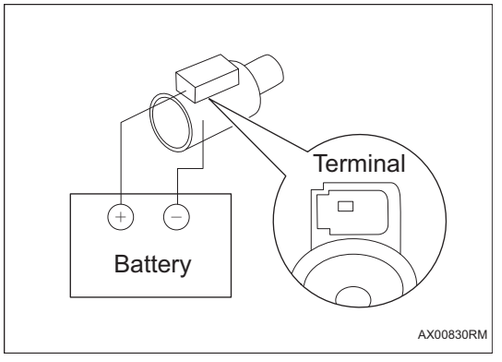
Standard value

Detection conditions	Specified state
20 ℃	11 ~ 15Ω

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

5 Check the operation of SL solenoid valve



(a) Connect the battery positive lead to the solenoid valve terminal, connect the negative terminal of the battery to the solenoid valve body, and then confirm that the solenoid valve works.

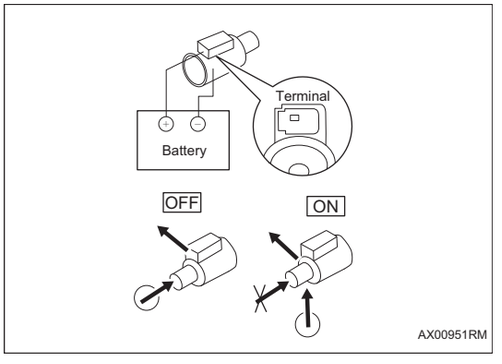
Normal

The solenoid valve operation is normal.

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

6 Check the operating state of SL solenoid valve



(a) Connect the battery positive lead to the solenoid valve terminal, connect the battery negative lead to the solenoid valve body to operate the solenoid valve, and confirm that the airflow is as shown.

AX

NG → Repair and replace the valve body assembly (See page AX-155)

OK

7	End

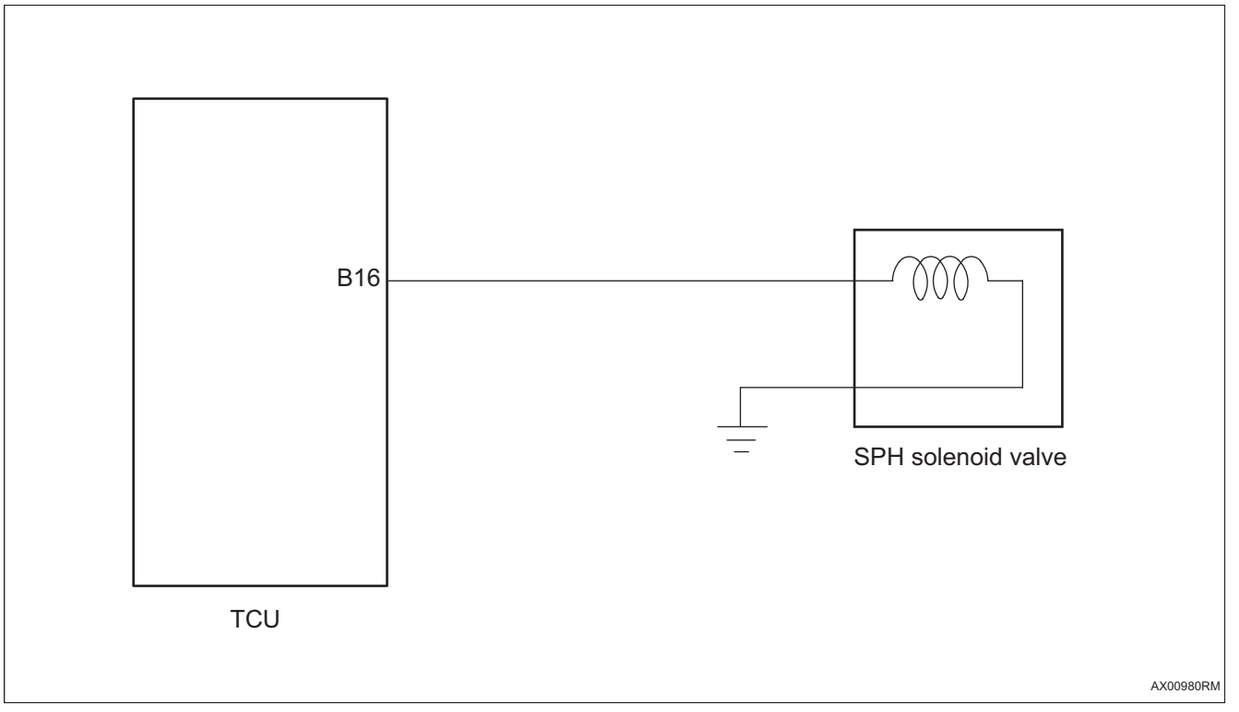
DTC	**P273900**	**SPH solenoid valve circuit shorted to power supply/circuit open**
DTC	**P273800**	**SPH solenoid valve circuit shorted to ground**

Description

When the SPH solenoid valve has open circuit or short circuit, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P273900	(a) SPH solenoid valve circuit shorted to power supply/open circuit.	• Valve body (SPH solenoid valve) • Harness and connector • TCU
P273800	(a) SPH solenoid valve circuit shorted to ground.	• Valve body (SPH solenoid valve) • Harness and connector • TCU

Circuit diagram



Inspection procedure

1	**Perform basic inspection**

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG	**Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

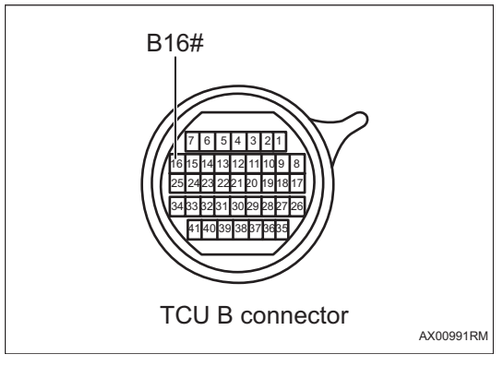
Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check harness and connector (TCU-solenoid valve)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the TCU.

(d) Check whether the harness and connector are connected tightly.

(e) Check whether the harness and connector are open-circuited or short-circuited.

(f) Measure the resistance according to the values in the table below.

Standard value

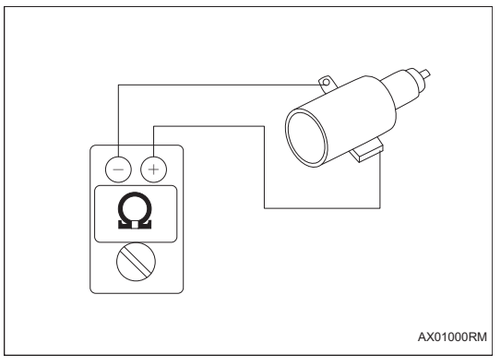
Detector connection	Detection conditions	Specified state
TCU connector B16# -body GND	20 ℃	11 ~ 13Ω

NG → **Repair or replace harness and connector and solenoid valve**

OK

4	Check SPH solenoid valve resistance

AX



(a) Remove the valve body and remove the solenoid valve from the valve body.

(b) Measure the resistance according to the values in the table below.

Standard value

Detection conditions	Specified state
20 ℃	11 ~ 13Ω

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

5	**End**

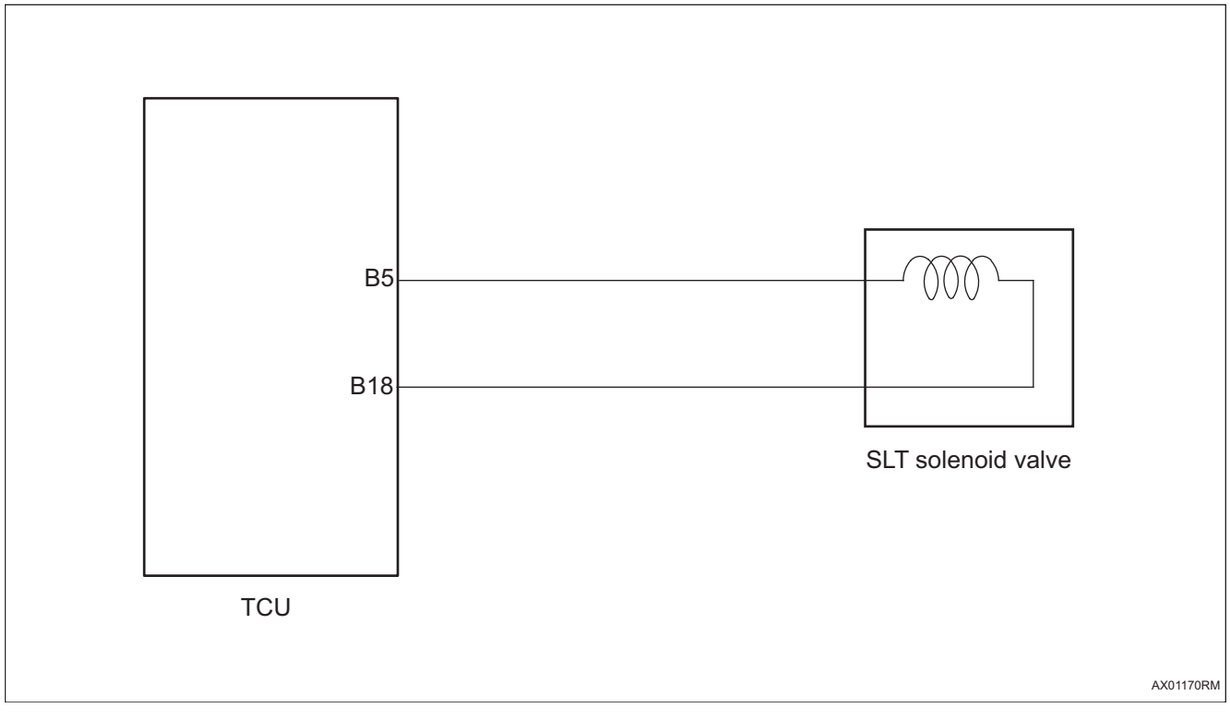
DTC	P276300	Linear solenoid valve (SLU) circuit shorted to power supply
DTC	P276400	Linear solenoid valve (SLU) circuit shorted to ground
DTC	P276100	Linear solenoid valve (SLU) circuit open
DTC	P276200	Linear solenoid valve feedback current jamming (SLU)

Description

When the linear solenoid valve (SLU) has open circuit or short circuit, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P276300	(a) Linear solenoid valve SLU circuit shorted to power supply.	• Valve body (SLU solenoid valve) • Harness and connector • TCU
P276400	(a) Linear solenoid valve SLU circuit shorted to ground.	• Valve body (SLU solenoid valve) • Harness and connector • TCU
P276100	(a) Linear solenoid valve SLU open circuit.	• Valve body (SLU solenoid valve) • Harness and connector • TCU
P276200	(a) Linear solenoid valve SLU feedback current stuck.	• Valve body (SLU solenoid valve) • Harness and connector • TCU

Circuit diagram



Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

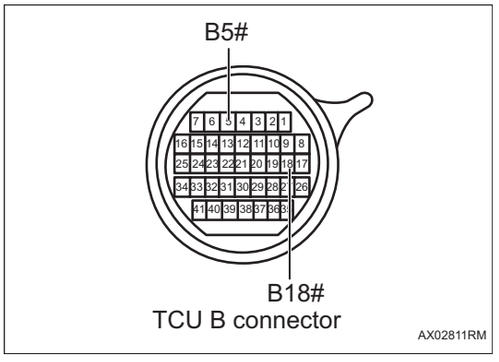
Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check harness and connector (TCU-solenoid valve)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the TCU.

(d) Check whether the harness and connector are connected tightly.

(e) Check whether the harness and connector are open-circuited or short-circuited.

(f) Measure the resistance according to the values in the table below.

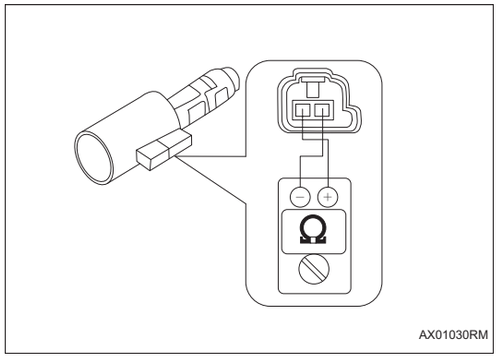
Standard value

Detector connection	Detection conditions	Specified state
TCU connector B5# -body GND	Always connected	No continuity
TCU connector B18# -body GND	Always connected	No continuity
TCU connector B5# -TCU connector B18#	20 ℃	5.0 ~ 5.6Ω

NG → **Repair or replace harness and connector and solenoid valve**

OK

4 Check SLT solenoid valve resistance



(a) Remove the valve body and remove the solenoid valve from the valve body.

(b) Measure the resistance according to the values in the table below.

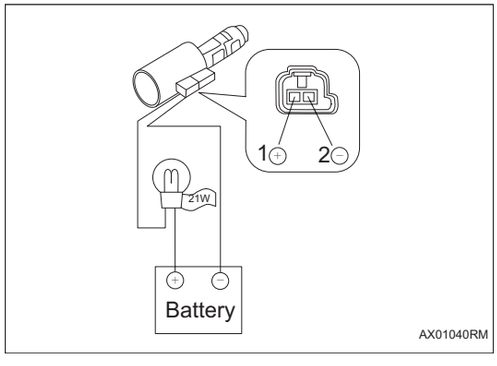
Standard value

Detection conditions	Specified state
20 ℃	5.0 ~ 5.6Ω

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

5 Check the operation of SLT solenoid valve



(a) Connect the battery positive lead to the solenoid valve terminal 1# and connect a bulb (12 V-21 W) in series, connect the battery negative terminal to the solenoid valve terminal 2#, and then confirm that the solenoid valve works.

Normal

The solenoid valve operation is normal.

NG → **Repair and replace the valve body assembly (See page AX-155)**

AX

OK

6	End

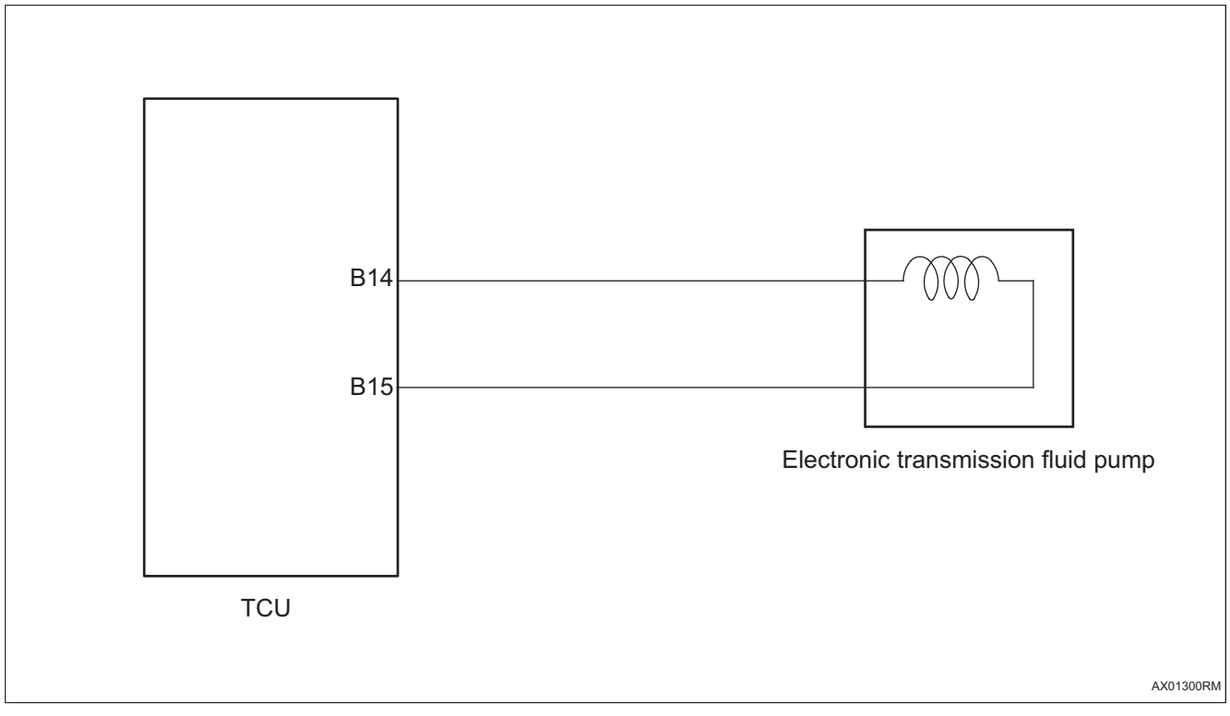
DTC	P279900	Electronic transmission fluid pump circuit shorted to power supply/open circuit
DTC	P279800	Electronic transmission fluid pump circuit shorted to ground

Description

When the electronic transmission fluid pump circuit is open or shorted, the TCU records DTC.

DTC	DTC detection conditions	Faulty location
P279900	(a) Electronic transmission fluid pump circuit shorted to power supply/open circuit.	• Electronic transmission fluid pump • Harness and connector • TCU
P279800	(a) Electronic transmission fluid pump circuit shorted to ground.	• Electronic transmission fluid pump • Harness and connector • TCU

Circuit diagram



Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → Repair according to the fault

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

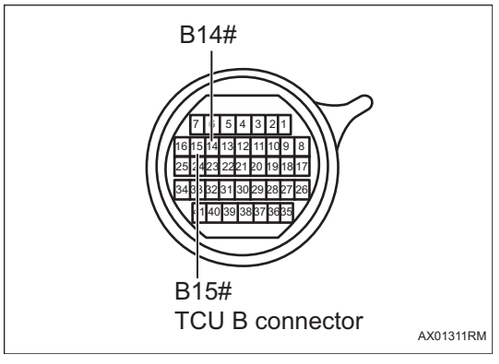
Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check harness and connector (TCU-electronic transmission fluid pump)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the TCU.

(d) Check whether the harness and connector are connected tightly.

(e) Check whether the harness and connector are open-circuited or short-circuited.

(f) Measure the resistance according to the values in the table below.

Standard value

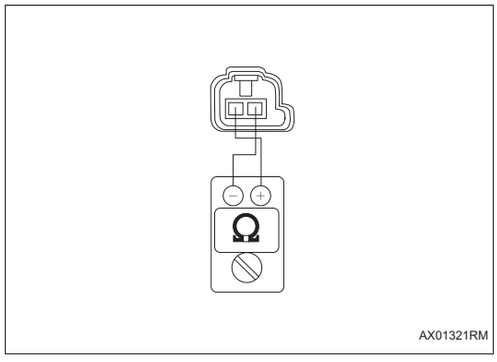
Detector connection	Detection conditions	Specified state
TCU connector B14# -body GND	Always connected	No continuity
TCU connector B15# -body GND	Always connected	No continuity
TCU connector B14# -TCU connector B15#	20 ℃	5.0 ~ 5.6Ω

NG → **Repair or replace harness and connector and solenoid valve**

AX

OK

4	Check the electronic transmission fluid pump resistance



(a) Remove the valve body and remove the electronic transmission fluid pump from the valve body.

(b) Measure the resistance according to the values in the table below.

Standard value

Detection conditions	Specified state
20 ℃	5.0 ~ 5.6Ω

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

5	Replace TCU (See page AX-155)

DTC	P280600	P gear position sensor position not learned

Description

When the P gear position sensor has no learning, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P280600	(a) P gear position sensor position is not learned.	• TCU

Inspection procedure

1	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **End**

NG

2	Implement "P" gear position learning

(a) Set to "P" gear position.

(b) Turn on ignition switch (engine off).

(c) The vehicle speed is 0 km/h.

(d) Implement "P" gear position learning

Results

Results	Go to
Learning error	Abnormal
Learning completed	Normal

NG → **Perform "P" gear position learning again (in case of 3 failures, replace transmission control unit)**

OK → **End**

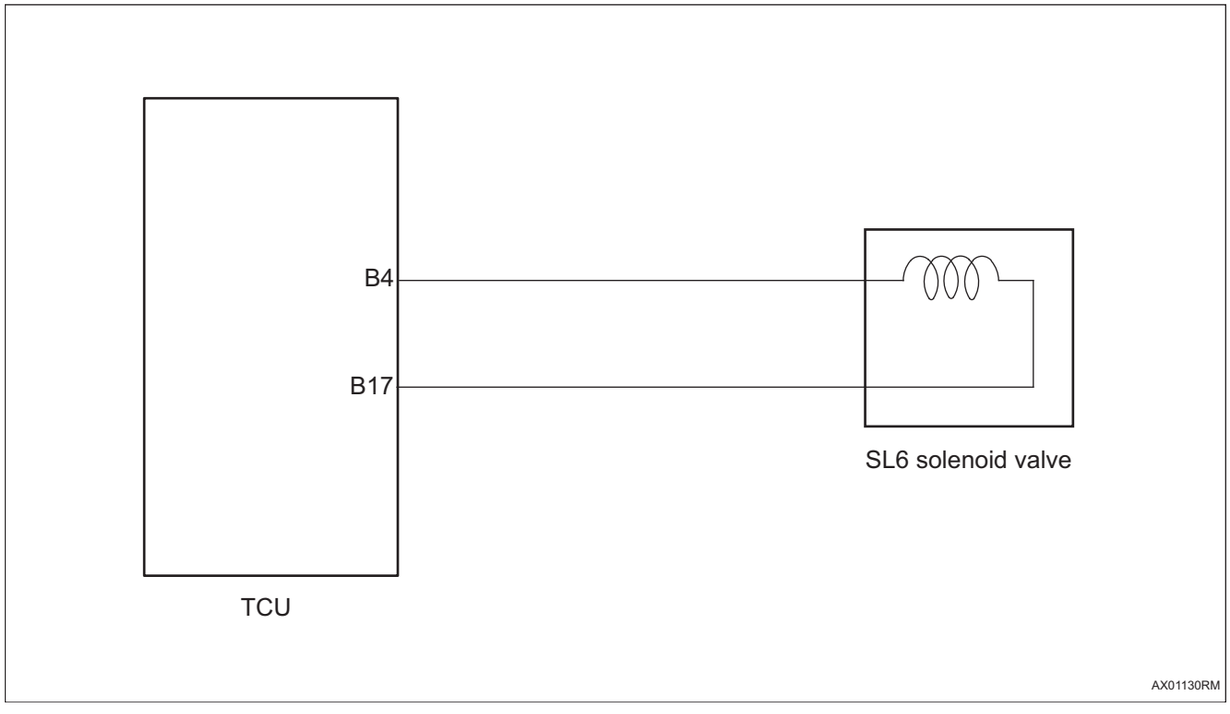
DTC	P281500	Linear solenoid valve (SL6) circuit shorted to power supply
DTC	P281400	Linear solenoid valve (SL6) circuit shorted to ground
DTC	P281200	Linear solenoid valve (SL6) circuit open
DTC	P281000	Linear solenoid valve feedback current jamming (SL6)

Description

When the linear solenoid valve (SL6) has open circuit or short circuit, the TCU records the DTC

DTC	DTC detection conditions	Faulty location
P281500	(a) Linear solenoid valve SL6 circuit shorted to power supply.	• Valve body (SL6 solenoid valve) • Harness and connector • TCU
P281400	(a) Linear solenoid valve SL6 circuit shorted to ground.	• Valve body (SL6 solenoid valve) • Harness and connector • TCU
P281200	(a) Linear solenoid valve SL6 open circuit.	• Valve body (SL6 solenoid valve) • Harness and connector • TCU
P281000	(a) Linear solenoid valve SL6 feedback current stuck.	• Valve body (SL6 solenoid valve) • Harness and connector • TCU

Circuit diagram



Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

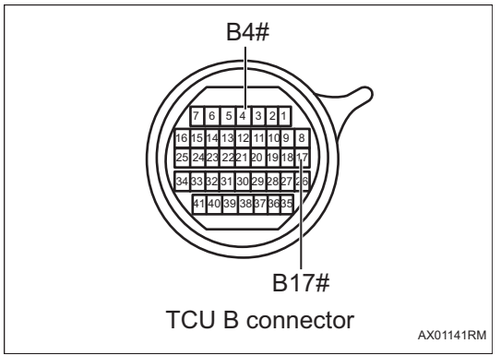
Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check harness and connector (TCU-solenoid valve)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the TCU.

(d) Check whether the harness and connector are connected tightly.

(e) Check whether the harness and connector are open-circuited or short-circuited.

(f) Measure the resistance according to the values in the table below.

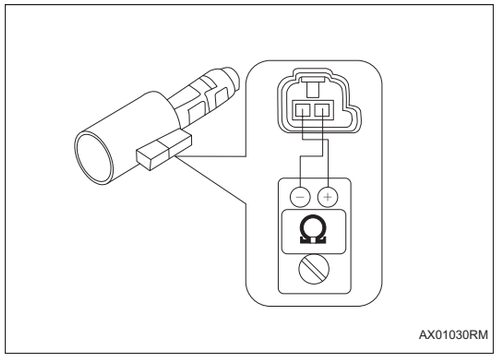
Standard value

Detector connection	Detection conditions	Specified state
TCU connector B4# -body GND	Always connected	No continuity
TCU connector B17# -body GND	Always connected	No continuity
TCU connector B4# -TCU connector B17#	20 ℃	5.0 ~ 5.6Ω

NG → **Repair or replace harness and connector and solenoid valve**

OK

4 Check SL6 solenoid valve resistance



(a) Remove the valve body and remove the solenoid valve from the valve body.

(b) Measure the resistance according to the values in the table below.

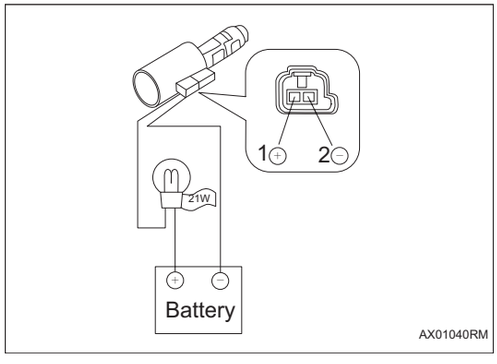
Standard value

Detection conditions	Specified state
20 ℃	5.0 ~ 5.6Ω

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

5 Check the operation of SL6 solenoid valve



(a) Connect the battery positive lead to the solenoid valve terminal 1# and connect a bulb (12 V-21 W) in series, connect the battery negative terminal to the solenoid valve terminal 2#, and then confirm that the solenoid valve works.

Normal

The solenoid valve operation is normal.

NG → **Repair and replace the valve body assembly (See page AX-155)**

AX

OK

6	End

DTC	P1CA000	2nd gear speed ratio stuck
DTC	P1CA100	3rd gear speed ratio stuck
DTC	P1CA200	4th gear speed ratio stuck
DTC	P1CA300	5th gear speed ratio stuck
DTC	P1CA400	6th gear speed ratio stuck
DTC	P1CA500	7th gear speed ratio stuck
DTC	P1CA600	8th gear speed ratio stuck
DTC	P1CB800	1st gear ratio & engine brake stuck in 2nd/ 3rd/4th/5th gear
DTC	P1CBA00	8th gear ratio failure

Description

When a fault related to the seizure of the transmission gear ratio is detected, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1CA000	(a) 2nd gear ratio stuck.	• Transmission fluid • Valve body (C2, C3, C4, B2 hydraulic system) • Transmission
P1CA100	(a) 3rd gear ratio stuck.	• Transmission fluid • Valve body (C2, C4, B1, B2 hydraulic system) • Transmission
P1CA200	(a) 4th gear ratio stuck.	• Transmission fluid • Valve body (C2, C3, B1, B2 hydraulic system) • Transmission
P1CA300	(a) 5th gear ratio stuck.	• Transmission fluid • Valve body (C3, C4, B1, B2 hydraulic system) • Transmission
P1CA400	(a) 6th gear ratio stuck.	• Transmission fluid • Valve body (C1, C3, B1 hydraulic system) • Transmission
P1CA500	(a) 7th gear ratio stuck.	• Transmission fluid • Valve body (C1, C4, B1 hydraulic system) • Transmission
P1CA600	(a) 8 gear ratio stuck.	• Transmission fluid • Valve body (C1, C3, C4 hydraulic system) • Transmission

DTC	DTC detection conditions	Faulty location
P1CB800	(a) 1st gear ratio & engine brake stuck in 2nd/3rd/4th/5th gear	• Transmission fluid • Valve body (C2, C3, C4, B1 hydraulic system) • Transmission
P1CBA00	(a) 8th gear ratio failure.	• Transmission fluid • Valve body (C2, B1 hydraulic system) • Transmission

Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check whether the DTC in the table below appears

(a) Read the DTC.

(b) Check whether the DTC in the table below appears

P1C1000	Linear solenoid valve (SL1) circuit open

AX

P097900	Linear solenoid valve (SL1) circuit shorted to ground
P098000	Linear solenoid valve (SL1) circuit shorted to power supply
P1C1100	Linear solenoid valve (SL2) circuit open
P098200	Linear solenoid valve (SL2) circuit shorted to ground
P098300	Linear solenoid valve (SL2) circuit shorted to power supply
P1C1200	Linear solenoid valve (SL3) circuit open
P098500	Linear solenoid valve (SL3) circuit shorted to ground
P098600	Linear solenoid valve (SL3) circuit shorted to power supply
P1C1300	Linear solenoid valve (SL5) circuit open
P099800	Linear solenoid valve (SL5) circuit shorted to ground
P099900	Linear solenoid valve (SL5) circuit shorted to power supply
P098800	Linear solenoid valve (SL4) circuit open
P098900	Linear solenoid valve (SL4) circuit shorted to ground
P099000	Linear solenoid valve (SL4) circuit shorted to power supply
P281200	Linear solenoid valve (SL6) circuit open
P281400	Linear solenoid valve (SL6) circuit shorted to ground
P281500	Linear solenoid valve (SL6) circuit shorted to power supply

Results

Results	Go to
One DTC in the above table appears	Abnormal
No DTC in the table above appears	Normal

AX

NG → **Repair according to the DTC**

OK

4	**Check ATF**

(a) Check whether the ATF is dirty.

(b) Check whether the ATF level is too low.

NG → **Change or add the ATF (See page AX-148)**

OK

5	**Measure hydraulic pressure**

(a) Measure the clutch and brake hydraulic pressure.

NG → **Replace the transmission assembly (See page AX-152)**

OK

6	**Check TCU data**

(a) Read the TCU data and confirm whether the data is normal.

NG → **Replace TCU (See page AX-155)**

OK

7	**Replace the valve body (See page AX-155)**

DTC	P075C00	Abnormal gear shifting due to SL4 continuous maximum pressure output
DTC	P076200	Abnormal gear shifting due to SL1 continuous maximum pressure output
DTC	P076700	Abnormal gear shifting due to SL2 continuous maximum pressure output
DTC	P077200	Abnormal gear shifting due to SL3 continuous maximum pressure output

Description

When solenoid valve sustained maximum pressure output results in abnormal gear shifting, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P075C00	(a) Abnormal gear shifting due to continuous maximum pressure output.	• Transmission fluid • Valve body (C3 clutch) • Transmission
P076200	(a) Abnormal gear shifting due to continuous maximum pressure output.	• Transmission fluid • Valve body (C1 clutch) • Transmission
P076700	(a) Abnormal gear shifting due to continuous maximum pressure output.	• Transmission fluid • Valve body (C2 clutch) • Transmission
P077200	(a) Abnormal gear shifting due to continuous maximum pressure output.	• Transmission fluid • Valve body (C3 clutch) • Transmission

Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → Repair according to the fault

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	**Check ATF**

(a) Check whether the ATF is dirty.

(b) Check whether the ATF level is too low.

NG → **Change or add the ATF (See page AX-148)**

OK

4	**Check solenoid valve(SL1, SL2, SL3, SL4)**

(a) Remove the side cover and valve body, and remove the solenoid valve from the valve body.

(b) check solenoid valve SL1, SL2, SL3, SL4.

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

5	**Check and repair the transmission**

DTC	P076F00	7th gear ratio failure

Description

When a transmission 7th gear ratio fault is detected, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P076F00	(a) 7th gear ratio failure.	• Transmission fluid • Valve body (C2, C3 hydraulic system) • Valve body (SC2, SC3 solenoid valves) • Transmission

Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check whether the DTC in the table below appears

(a) Read the DTC.

(b) Check whether the DTC in the table below appears

AX

P1C1000	Linear solenoid valve (SL1) circuit open
P097900	Linear solenoid valve (SL1) circuit shorted to ground
P098000	Linear solenoid valve (SL1) circuit shorted to power supply
P1C1100	Linear solenoid valve (SL2) circuit open
P098200	Linear solenoid valve (SL2) circuit shorted to ground
P098300	Linear solenoid valve (SL2) circuit shorted to power supply
P1C1200	Linear solenoid valve (SL3) circuit open
P098500	Linear solenoid valve (SL3) circuit shorted to ground
P098600	Linear solenoid valve (SL3) circuit shorted to power supply
P1C1300	Linear solenoid valve (SL5) circuit open
P099800	Linear solenoid valve (SL5) circuit shorted to ground
P099900	Linear solenoid valve (SL5) circuit shorted to power supply
P098800	Linear solenoid valve (SL4) circuit open
P098900	Linear solenoid valve (SL4) circuit shorted to ground
P099000	Linear solenoid valve (SL4) circuit shorted to power supply
P281200	Linear solenoid valve (SL6) circuit open
P281400	Linear solenoid valve (SL6) circuit shorted to ground
P281500	Linear solenoid valve (SL6) circuit shorted to power supply

Results

AX

Results	Go to
One DTC in the above table appears	Abnormal
No DTC in the table above appears	Normal

NG → **Repair according to the DTC**

OK

4	**Check ATF**

(a) Check whether the ATF is dirty.

(b) Check whether the ATF level is too low.

NG → **Change or add the ATF (See page AX-148)**

OK

5	**Measure hydraulic pressure**

(a) Measure the clutch and brake hydraulic pressure.

NG → **Replace the transmission assembly (See page AX-152)**

OK

6	**Check TCU data**

(a) Read the TCU data and confirm whether the data is normal.

NG → **Replace TCU (See page AX-155)**

OK

7	**Replace the valve body (See page AX-155)**

DTC	P072900	6th gear ratio failure
DTC	P073000	Engine braking speed ratio fault in 1st gear
DTC	P073100	1st gear ratio failure (B1 or C2 or C4 or C3 release failure)
DTC	P073200	2nd gear ratio failure
DTC	P073300	3rd gear ratio failure
DTC	P073400	4th gear ratio failure
DTC	P073500	5th gear ratio failure
DTC	P073600	Reverse gear ratio failure

Description

When no transmission gear ratio is detected or engine braking in 1st gear is not detected, the TCU records DTC.

DTC	DTC detection conditions	Faulty location
P072900	(a) 6th gear ratio failure.	• Transmission fluid • Valve body (C2, C4 hydraulic system) • Valve body (SC2, SC3 solenoid valves) • Transmission
P073000	(a) Engine braking speed ratio fault in 1st gear.	• Transmission fluid • Valve body (C2, B1 hydraulic system) • Valve body (SC2, SC3 solenoid valves) • Transmission
P073100	(a) 1st gear ratio failure (B1 or C2 or C4 or C3 release failure).	• Transmission fluid • Valve body (C2, C3, C4, B1 hydraulic system) • Transmission
P073200	(a) 2nd gear speed ratio fault.	• Transmission fluid • Valve body (C1, B1 hydraulic system) • Valve body (SC2, SC3 solenoid valves) • Transmission
P073300	(a) 3rd gear speed ratio fault.	• Transmission fluid • Valve body (C1, C3 hydraulic system) • Valve body (SC2, SC3 solenoid valves) • Transmission
P073400	(a) 4th gear speed ratio fault.	• Transmission fluid • Valve body (C1, C4 hydraulic system) • Valve body (SC2, SC3 solenoid valves) • Transmission

DTC	DTC detection conditions	Faulty location
P073500	(a) 5th gear speed ratio fault.	• Transmission fluid • Valve body (C1, C2 hydraulic system) • Valve body (SC2, SC3 solenoid valves) • Transmission
P073600	(a) Reverse gear ratio failure.	• Transmission fluid • Valve body (C2, B2 hydraulic system) • Valve body (SC2, SC3, SC4 solenoid valves) • Transmission

Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check whether the DTC in the table below appears

(a) Read the DTC.

(b) Check whether the DTC in the table below appears

P1C1000	Linear solenoid valve (SL1) circuit open
P097900	Linear solenoid valve (SL1) circuit shorted to ground
P098000	Linear solenoid valve (SL1) circuit shorted to power supply
P1C1100	Linear solenoid valve (SL2) circuit open
P098200	Linear solenoid valve (SL2) circuit shorted to ground
P098300	Linear solenoid valve (SL2) circuit shorted to power supply
P1C1200	Linear solenoid valve (SL3) circuit open
P098500	Linear solenoid valve (SL3) circuit shorted to ground
P098600	Linear solenoid valve (SL3) circuit shorted to power supply
P1C1300	Linear solenoid valve (SL5) circuit open
P099800	Linear solenoid valve (SL5) circuit shorted to ground
P099900	Linear solenoid valve (SL5) circuit shorted to power supply
P098800	Linear solenoid valve (SL4) circuit open
P098900	Linear solenoid valve (SL4) circuit shorted to ground
P099000	Linear solenoid valve (SL4) circuit shorted to power supply
P281200	Linear solenoid valve (SL6) circuit open
P281400	Linear solenoid valve (SL6) circuit shorted to ground
P281500	Linear solenoid valve (SL6) circuit shorted to power supply

Results

AX

Results	Go to
One DTC in the above table appears	Abnormal
No DTC in the table above appears	Normal

NG → **Repair according to the DTC**

OK

4	**Check ATF**

(a) Check whether the ATF is dirty.

(b) Check whether the ATF level is too low.

NG → **Change or add the ATF (See page AX-147)**

OK

5	**Measure hydraulic pressure**

(a) Measure the clutch and brake hydraulic pressure.

NG → **Replace the transmission assembly (See page AX-152)**

OK

6	**Check TCU data**

(a) Read the TCU data and confirm whether the data is normal.

NG → **Replace TCU (See page AX-155)**

OK

7	**Replace the valve body (See page AX-155)**

DTC	P074100	Locking control deactivation jamming (SLU deactivation jamming)

Description

When the lockup control solenoid valve SLU has blockage, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P074100	(a) Locking control deactivation jamming.	• Solenoid valve SLU • Torque converter • Valve body (locking hydraulic system) • TCU

Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

AX

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check vehicle driving data

(a) Warm up the engine (coolant temperature: higher than 60 ℃).

(b) Connect the detector to the vehicle and meet the measuring condition. (Vehicle speed, engine speed, A/T input speed).

(c) Accelerate to 100 km/h.

(d) Step the accelerator pedal at the "D" position and check whether the difference between the engine speed and the/T input speed is higher than 100 r/min for less than 3 seconds.

Results

Results	Go to
Not more than 3 seconds	Normal
More than 3 seconds	Abnormal

NG → **Check solenoid valve SLU**

OK

4	**Check ATF**

(a) Check whether the ATF is dirty.

(b) Check whether the ATF level is too low.

NG → **Change or add ATF**

OK

5	**Check solenoid valve (SLU)**

(a) check solenoid valve SLU.

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

6	**Replace TCU (See page AX-155)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace torque converter or AT assembly (See page AX-155)**

OK

7	End

DTC	P074200	Locking control activation jamming (SLU activation jamming)

Description

When the lockup control solenoid valve SLU has blockage, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P074200	(a) Locking control activation jamming.	• Solenoid valve SLU • Torque converter • Valve body (locking hydraulic system) • TCU

Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

AX

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check vehicle driving data

(a) Warm up the engine (coolant temperature: higher than 60 ℃).

(b) Connect the detector to the vehicle and meet the measuring condition. (Vehicle speed, engine speed, A/T input speed).

(c) Accelerate to 40 km/h.

(d) Step/release the accelerator pedal while maintaining the "M2" range and check that the difference between the engine speed and the/T input speed is higher than 50 r/min.

Results

Results	Go to
Above 50 r/min	Normal
Not higher than 50 r/min	Abnormal

NG → **Check solenoid valve SLU**

OK

4	**Check ATF**

(a) Check whether the ATF is dirty.

(b) Check whether the ATF level is too low.

NG → **Change or add the ATF (See page AX-148)**

OK

5	**Check solenoid valve (SLU)**

(a) check solenoid valve SLU.

NG → **Repair and replace the valve body assembly (See page AX-155)**

AX

OK

6	**Replace TCU (See page AX-155)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace torque converter or AT assembly (See page AX-155)**

OK

7	End

DTC	P075600	SPH solenoid valve deactivation jamming
DTC	P075700	SPH solenoid valve activation jamming

Description

When the solenoid valve SPH blockage occurs, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P075600	(a) SPH solenoid valve deactivation jamming.	• Valve body (SPH solenoid valve) • Harness and connector • TCU
P075700	(a) SPH solenoid valve activation jamming.	• Valve body (SPH solenoid valve) • Harness and connector • TCU

Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

AX

OK → **Check harness and connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check harness and connector (TCU-solenoid valve)

(a) Check whether the harness and connector are connected tightly.

(b) Check whether the harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

4	**Check solenoid valve (SPH)**

(a) Remove the side cover and valve body, and remove the solenoid valve from the valve body.

(b) Check whether the solenoid valve SPH is working properly.

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

5	**Replace TCU (See page AX-155)**

DTC	P094200	1st gear ratio error (C1 clutch engagement failure)

Description

When the 1st gear ratio fault is detected (C1 clutch cannot be engaged), the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P094200	(a) 1st gear ratio fault (C1 clutch fails to be engaged).	• Transmission fluid • Valve body (C1 hydraulic system) • Valve body (SC2, SC3 solenoid valves) • Transmission

Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and re-read the DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

AX

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check whether the DTC in the table below appears

(a) Read the DTC.

(b) Check whether the DTC in the table below appears

P1C1000	Linear solenoid valve (SL1) circuit open
P097900	Linear solenoid valve (SL1) circuit shorted to ground
P098000	Linear solenoid valve (SL1) circuit shorted to power supply
P1C1100	Linear solenoid valve (SL2) circuit open
P098200	Linear solenoid valve (SL2) circuit shorted to ground
P098300	Linear solenoid valve (SL2) circuit shorted to power supply
P1C1200	Linear solenoid valve (SL3) circuit open
P098500	Linear solenoid valve (SL3) circuit shorted to ground
P098600	Linear solenoid valve (SL3) circuit shorted to power supply
P1C1300	Linear solenoid valve (SL5) circuit open
P099800	Linear solenoid valve (SL5) circuit shorted to ground
P099900	Linear solenoid valve (SL5) circuit shorted to power supply
P098800	Linear solenoid valve (SL4) circuit open
P098900	Linear solenoid valve (SL4) circuit shorted to ground
P099000	Linear solenoid valve (SL4) circuit shorted to power supply
P281200	Linear solenoid valve (SL6) circuit open
P281400	Linear solenoid valve (SL6) circuit shorted to ground
P281500	Linear solenoid valve (SL6) circuit shorted to power supply

Results

Results	Go to
One DTC in the above table appears	Abnormal
No DTC in the table above appears	Normal

AX

NG → **Repair according to the DTC**

OK

4	**Check ATF**

(a) Check whether the ATF is dirty.

(b) Check whether the ATF level is too low.

NG → **Change or add the ATF (See page AX-148)**

OK

5	**Measure hydraulic pressure**

(a) Measure the clutch and brake hydraulic pressure.

NG → **Replace the transmission assembly (See page AX-155)**

OK

6	**Check TCU data**

(a) Read the TCU data and confirm whether the data is normal.

NG → **Replace TCU (See page AX-155)**

OK

7	**Replace the valve body (See page AX-155)**

DTC	P270800	Abnormal gear shifting due to SLB1 continuous maximum pressure output

Description

When solenoid valve SLB sustained maximum pressure output results in a abnormal gear shifting, the TCU records the DTC

DTC	DTC detection conditions	Faulty location
P270800	(a) Abnormal gear shifting due to SLB1 continuous maximum pressure output.	• Transmission fluid • Valve body (B1 brake) • Transmission

Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and reread the DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

AX

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check ATF

(a) Check whether the ATF is dirty.

(b) Check whether the ATF level is too low.

NG → **Change or add the ATF (See page AX-147)**

OK

4	**Check solenoid valve (SL5)**

(a) Check solenoid valve SL5.

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

5	**Replace TCU (See page AX-155)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Check and repair the transmission (See page AX-152)**

OK

6	**End**

DTC	P280900	Abnormal gear shifting due to SLB2 continuous maximum pressure output

Description

When solenoid valve SLB sustained maximum pressure output results in a abnormal gear shifting, the TCU records the DTC

DTC	DTC detection conditions	Faulty location
P280900	(a) Abnormal gear shifting due to SLB2 continuous maximum pressure output.	• Transmission fluid • Valve body (B2 brake) • Transmission

Inspection procedure

1	Perform basic inspection

(a) Check the battery voltage.

(b) Check whether the fuse box has blown fuses.

NG → **Repair according to the fault**

OK

2	Read freeze frame data and clear the DTC

(a) Check the freeze frame data when the fault occurs and record it.

(b) Read and clear the DTC.

(c) Turn off and then on the ignition switch again, and reread the DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

AX

OK → **Check and clean the connector (with the ignition switch turned ON, swing the harness and connector of the faulty system)**

NG

3	Check ATF

(a) Check whether the ATF is dirty.

(b) Check whether the ATF level is too low.

NG → **Change or add the ATF (See page AX-147)**

OK

4	**Check solenoid valve (SL6)**

(a) Check solenoid valve SL6.

NG → **Repair and replace the valve body assembly (See page AX-155)**

OK

5	**Replace TCU (See page AX-155)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Check and repair the transmission (See page AX-152)**

OK

6	**End**

DTC	U000188	Powertrain CAN bus off
DTC	U010087	ECM node lost
DTC	U010387	EGSM node lost
DTC	U014687	GW node lost
DTC	U015187	ACU node lost
DTC	U023587	IFC node lost
DTC	U040180	Accelerator pedal signal failure
DTC	U040181	EMS _6 message length error
DTC	U040182	EMS _1 message count error
DTC	U040183	EMS _1 message checksum error
DTC	U040184	EMS _1 message length error
DTC	U040185	EMS _2 message count error
DTC	U040186	Engine speed signal failure
DTC	U040187	EMS _3 message count error
DTC	U040188	EMS _4 message count error
DTC	U040189	EMS _2 message checksum error
DTC	U04018A	EMS _3 message checksum error
DTC	U04018B	EMS _4 message checksum error
DTC	U04018C	EMS _2 message length error
DTC	U04018D	EMS_3 message length error
DTC	U04018E	EMS_4 message length error
DTC	U04018F	EMS_5 message length error
DTC	U0401F0	Brake pedal status signal failure
DTC	U0401F2	Engine torque signal failure
DTC	U0401F3	Engine oil temperature signal failure
DTC	U040480	If there are problems with gearshift buttons, enter Limp Home mode 1
DTC	U040481	If there are problems with gearshift buttons, enter Limp Home mode 2

DTC	U040482	EGSM message count error
DTC	U040483	EGSM message checksum error
DTC	U040484	EGSM message length error
DTC	U040485	P position request button signal failure
DTC	U040486	Gearshift lever position signal failure
DTC	U040487	Gear shifting permission signal failure
DTC	U040488	Manual mode switch signal failure
DTC	U040489	Manual mode gear shifting signal failure
DTC	U041580	ESC_5 message count error
DTC	U041581	ESC_5 message checksum error
DTC	U041582	ABS_1 message count error
DTC	U041583	ABS_1 message checksum error
DTC	U041585	ABS_2 message count error
DTC	U041586	Driving direction signal failure
DTC	U041587	ESC_1 message count error
DTC	U041588	ESC_2 message count error
DTC	U041589	ABS_2 message checksum error
DTC	U04158A	ESC_1 message checksum error
DTC	U04158B	ESC_2 message checksum error
DTC	U04158C	ESC_3 message count error
DTC	U04158D	ESC_3 message checksum error
DTC	U0415F0	ESC target gear position signal failure
DTC	U0415F1	Left front wheel speed signal failure
DTC	U0415F2	Right front wheel speed signal failure
DTC	U0415F3	Left rear wheel speed signal failure
DTC	U0415F4	Left rear wheel speed signal failure
DTC	U0415F6	Brake master cylinder pressure signal failure

DTC	U042280	Immobilizer authentication failed or the anti-theft function not open
DTC	U042286	Vehicle power supply mode signal failure
DTC	U042386	Mileage signal failure
DTC	U043382	IFC message count error
DTC	U043383	IFC message checksum error
DTC	U043982	DMS message count error
DTC	U043983	DMS message checksum error
DTC	U044784	GW message length error
DTC	U045282	ACU message count error
DTC	U045283	ACU message checksum error
DTC	U045284	ACU message length error
DTC	U045286	Seat belt status signal failure
DTC	U054482	APA ECU message count error
DTC	U054483	APA ECU message checksum error
DTC	U112187	ESC message lost
DTC	U113887	Driving mode selection control unit message lost
DTC	U114080	Immobilizer authentication timeout or no authentication signal received
DTC	U114087	BCM message lost
DTC	U114687	GW message lost
DTC	U115587	Instrument cluster control unit message lost
DTC	U119987	Driver door module message lost
DTC	U124387	ADV message lost
DTC	U0401F1	Altitude coefficient signal failure

Description

When the communication between the TCU and other systems is abnormal or interrupted, the TCU will record the DTC.

DTC	DTC detection conditions	Faulty location
U000188	(a) Abnormal or interrupted communication.	• Relevant system control unit • Harness and connector
U010087	(a) Abnormal or interrupted communication.	
U010387	(a) Abnormal or interrupted communication.	
U014687	(a) Abnormal or interrupted communication.	
U015187	(a) Abnormal or interrupted communication.	
U023587	(a) Abnormal or interrupted communication.	
U040180	(a) Abnormal or interrupted communication.	
U040181	(a) Abnormal or interrupted communication.	
U040182	(a) Abnormal or interrupted communication.	
U040183	(a) Abnormal or interrupted communication.	
U040184	(a) Abnormal or interrupted communication.	
U040185	(a) Abnormal or interrupted communication.	
U040186	(a) Abnormal or interrupted communication.	
U040187	(a) Abnormal or interrupted communication.	
U040188	(a) Abnormal or interrupted communication.	
U040189	(a) Abnormal or interrupted communication.	
U04018A	(a) Abnormal or interrupted communication.	
U04018B	(a) Abnormal or interrupted communication.	
U04018C	(a) Abnormal or interrupted communication.	
U04018D	(a) Abnormal or interrupted communication.	
U04018E	(a) Abnormal or interrupted communication.	
U04018F	(a) Abnormal or interrupted communication.	
U0401F0	(a) Abnormal or interrupted communication.	
U0401F2	(a) Abnormal or interrupted communication.	
U0401F3	(a) Abnormal or interrupted communication.	
U040480	(a) Abnormal or interrupted communication.	
U040481	(a) Abnormal or interrupted communication.	
U040482	(a) Abnormal or interrupted communication.	
U040483	(a) Abnormal or interrupted communication.	
U040484	(a) Abnormal or interrupted communication.	
U040485	(a) Abnormal or interrupted communication.	
U040486	(a) Abnormal or interrupted communication.	
U040487	(a) Abnormal or interrupted communication.	
U040488	(a) Abnormal or interrupted communication.	
U040489	(a) Abnormal or interrupted communication.	
U041580	(a) Abnormal or interrupted communication.	
U041581	(a) Abnormal or interrupted communication.	
U041582	(a) Abnormal or interrupted communication.	
U041583	(a) Abnormal or interrupted communication.	

DTC	DTC detection conditions	Faulty location
U041585	(a) Abnormal or interrupted communication.	
U041586	(a) Abnormal or interrupted communication.	
U041587	(a) Abnormal or interrupted communication.	
U041588	(a) Abnormal or interrupted communication.	
U041589	(a) Abnormal or interrupted communication.	
U04158A	(a) Abnormal or interrupted communication.	
U04158B	(a) Abnormal or interrupted communication.	
U04158C	(a) Abnormal or interrupted communication.	
U04158D	(a) Abnormal or interrupted communication.	
U0415F0	(a) Abnormal or interrupted communication.	
U0415F1	(a) Abnormal or interrupted communication.	
U0415F2	(a) Abnormal or interrupted communication.	
U0415F3	(a) Abnormal or interrupted communication.	
U0415F4	(a) Abnormal or interrupted communication.	
U0415F6	(a) Abnormal or interrupted communication.	
U042280	(a) Abnormal or interrupted communication.	
U042286	(a) Abnormal or interrupted communication.	
U042386	(a) Abnormal or interrupted communication.	
U043382	(a) Abnormal or interrupted communication.	• Relevant system control unit • Harness and connector
U043383	(a) Abnormal or interrupted communication.	
U043982	(a) Abnormal or interrupted communication.	
U043983	(a) Abnormal or interrupted communication.	
U044784	(a) Abnormal or interrupted communication.	
U045282	(a) Abnormal or interrupted communication.	
U045283	(a) Abnormal or interrupted communication.	
U045284	(a) Abnormal or interrupted communication.	
U045286	(a) Abnormal or interrupted communication.	
U054482	(a) Abnormal or interrupted communication.	
U054483	(a) Abnormal or interrupted communication.	
U112187	(a) Abnormal or interrupted communication.	
U113887	(a) Abnormal or interrupted communication.	
U114080	(a) Abnormal or interrupted communication.	
U114087	(a) Abnormal or interrupted communication.	
U114687	(a) Abnormal or interrupted communication.	
U115587	(a) Abnormal or interrupted communication.	
U119987	(a) Abnormal or interrupted communication.	
U124387	(a) Abnormal or interrupted communication.	
U0401F1	(a) Abnormal or interrupted communication.	

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

ATF

Drain

1. ATF

Caution:

Dispose of the drained transmission fluid properly. One drop of transmission fluid can contaminate 600 L of drinking water.

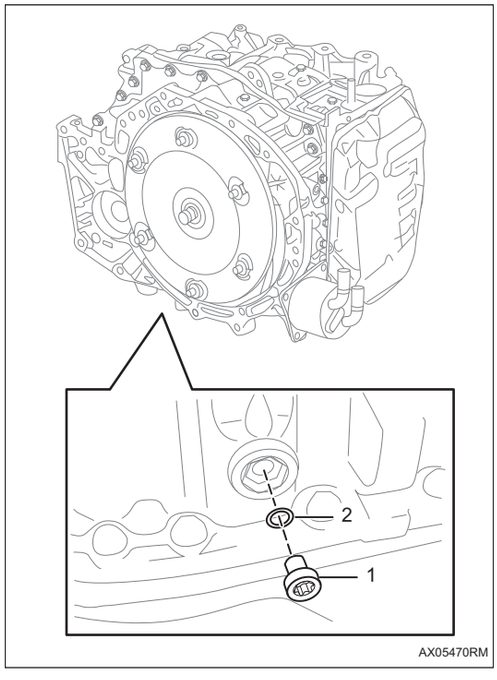
2. Drain ATF

(a) Park the vehicle on a lifting platform or assembling service pit, in a horizontal position, with the shift lever in "P" gear position.

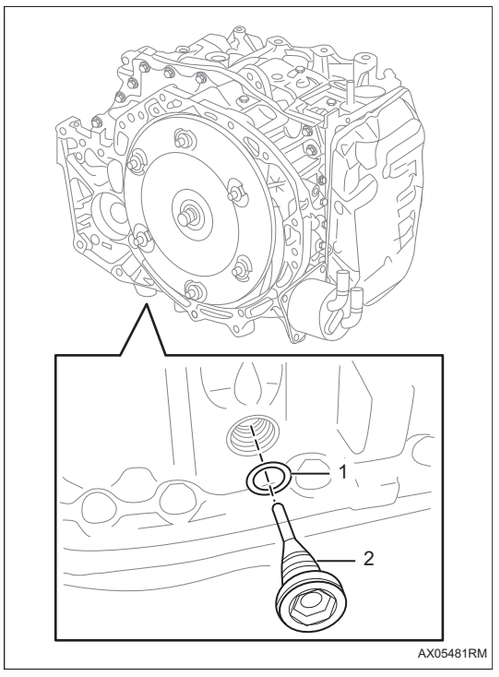
(b) Read the transmission fluid temperature which should be between 35 ℃ -45 ℃ . If the fluid temperature is too low, preheat the transmission fluid to this temperature.

(c) Remove the overflow plug

(1) Unscrew plug -1- and O-ring -2- with a wrench (T40).



O-ring inner diameter (mm)	O-ring thickness (mm)
6.04	1.7



(d) Remove the overflow pipe

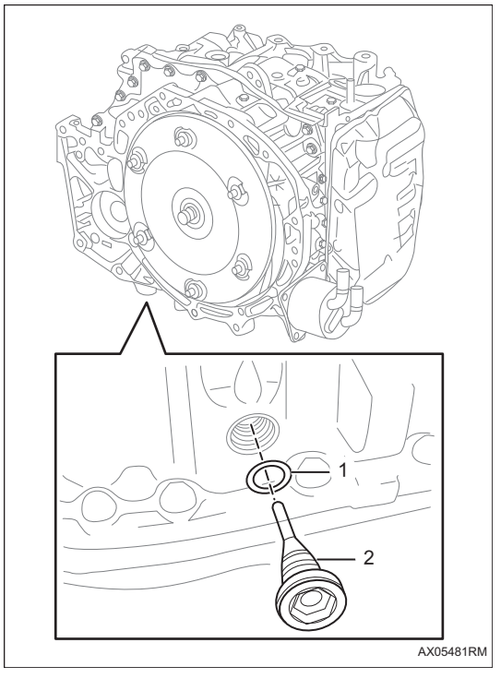
(1) Remove the overflow pipe -2- and the "O"-ring -1.

O-ring inner diameter (mm)	O-ring thickness (mm)
17.8	2.4

(e) Discharge the transmission fluid. Let it stand until no fluid flows out or let it stand for 10 minutes.

(f) Install the overflow pipe

(1) Install "O"-ring -1- and overflow pipe -2- .**Torque: 34 ~ 60 N · m**



O-ring inner diameter (mm)	O-ring thickness (mm)
17.8	2.4

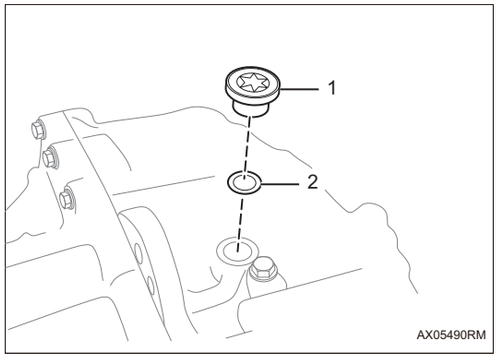
AX

Add

1. Add ATF

Hint:

the "O"-ring is a disposable part; please renew it and apply transmission fluid during installation.



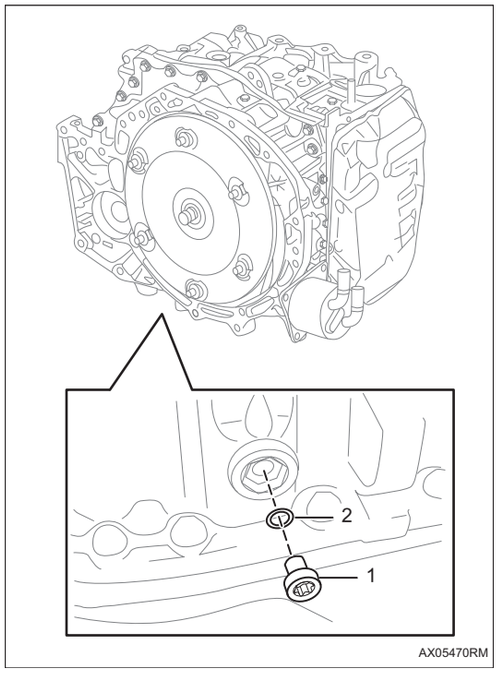
(a) Remove the filler plug -1- and the O-ring -2-.

(b) Use the AT filling tool to add the ATF.

(c) Standard capacity:

Transmission fluid model:	AW-1
Transmission fluid capacity	6.3 L

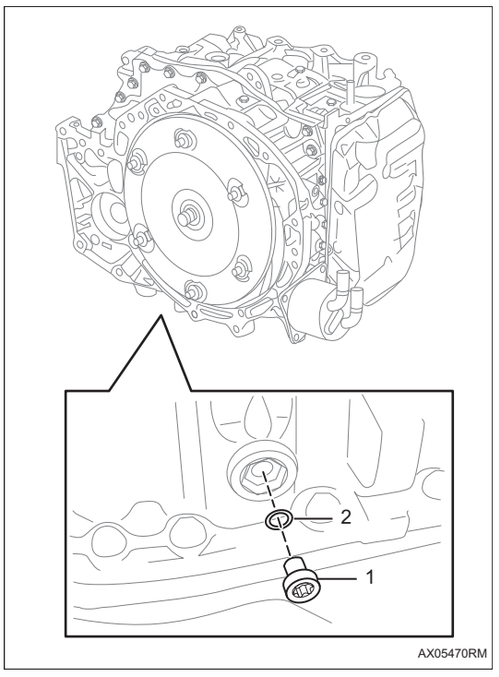
Using other ATF instead of the specified ATF will damage the AT.



(d) Remove the overflow plug

(1) Unscrew plug -1- and O-ring -2- with a wrench (T40).

(e) Check whether the ATF flows out from the overflow hole. If the ATF does not flow out, continue to add ATF until the ATF flows out from the overflow hole.

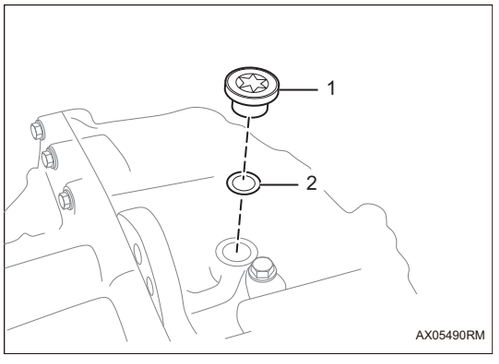


(f) Install the overflow plug

(1) Unscrew plug -1- and O-ring -2- with a wrench (T40).**Torque: 5.9~8.8N · m**

O-ring inner diameter (mm)	O-ring thickness (mm)
6.04	1.7

(g) Add 500 ml (20 degrees Celsius) of transmission fluid from the filler hole.



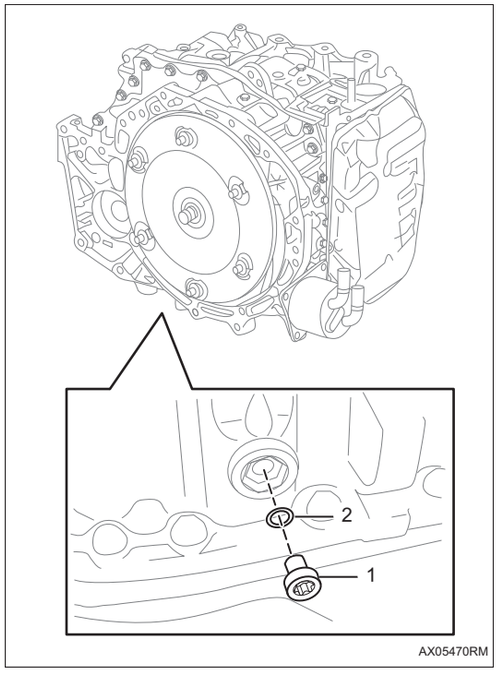
(h) Install the "O" ring -2- and the filler plug -1- .**Torque: 23.5~54.9 N · m**

O-ring inner diameter (mm)	O-ring thickness (mm)
15.41	2.21

(i) Start the engine.

(j) Raise the temperature of ATF to 45 °C.

(k) Shift from the P gear position to the D gear position, and then shift from the D gear position to the P gear position. With the brake pedal depressed by foot, each gear position remains at more than 2 seconds. Repeat the above steps 2 times, and then return to P gear position.



(l) Remove the overflow plug

(1) Unscrew plug -1- and O-ring -2- with a wrench (T40).

(m) Check the ATF oil droplets in the overflow hole. Use transmission fluid temperature sensor to confirm that the temperature of the transmission remains between 45°C and 55°C until the ATF drips out from the overflow hole.

(n) Coat a new O-ring with ATF and install it to the overflow plug.

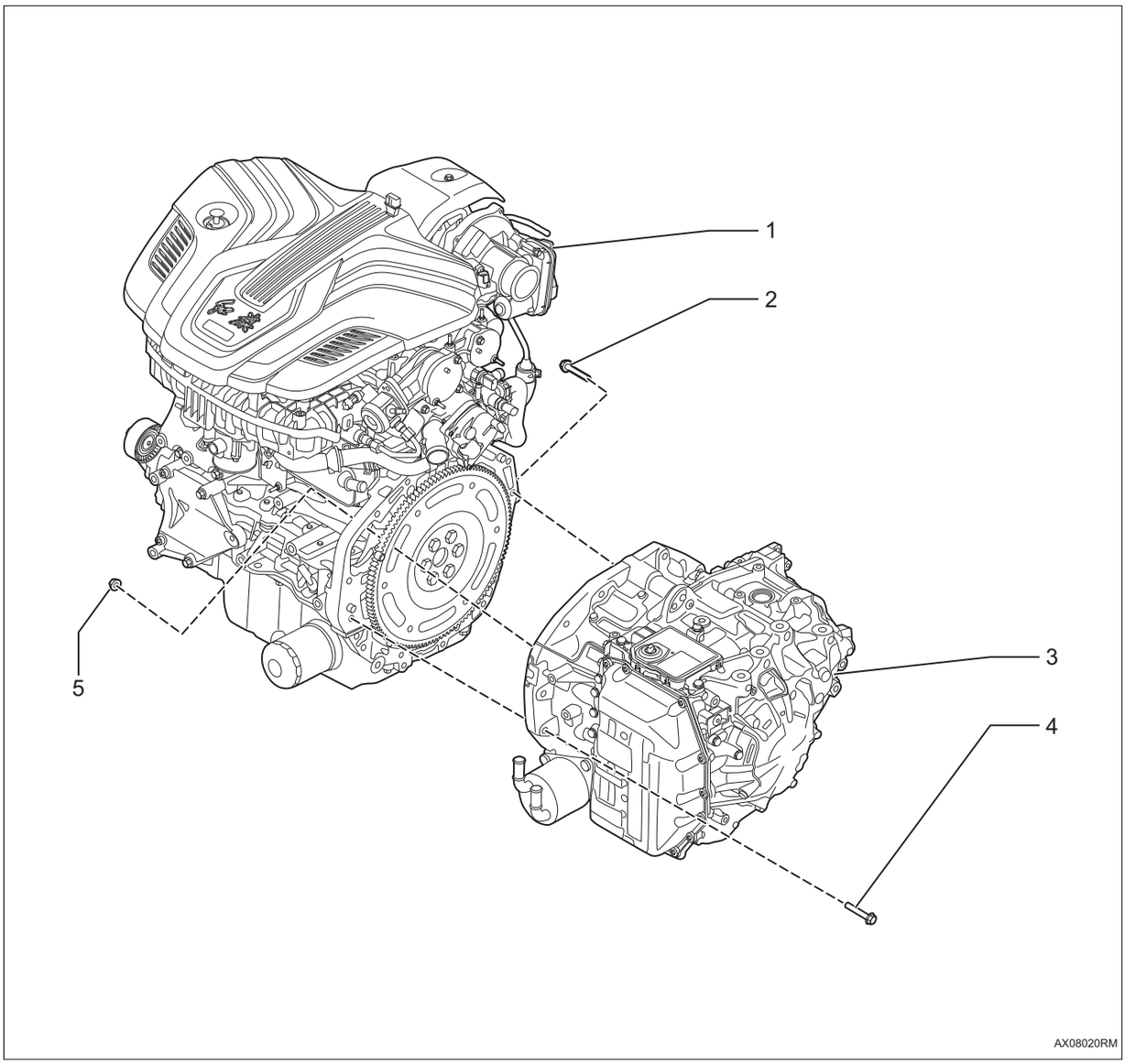
Hint:

After tightening the overflow plug, be sure to wipe off the overflowing ATF thoroughly and draw a mark.

Torque: 5.9~8.8N · m

AT

Parts

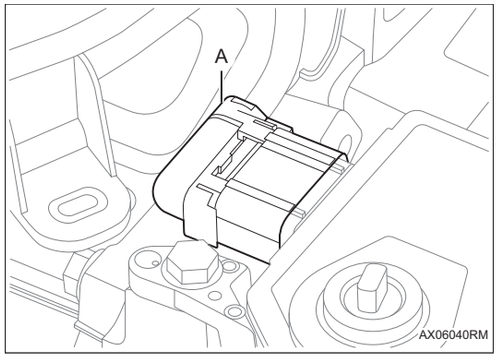


AX

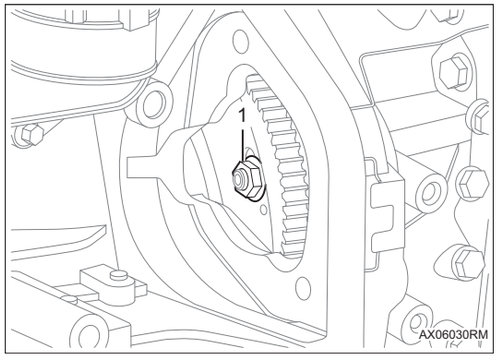
1. **Engine assembly**
2. **Hexagon flange bolt**
   - Torque: 38.5~57.5 N · m
3. **AT**
4. **Hexagon flange bolt**
   - X7
   - Torque: 38.5~57.5 N · m
5. **Hexagon flange nut**
   - X6
   - Torque: 40.5~54.7 N · m

Removal

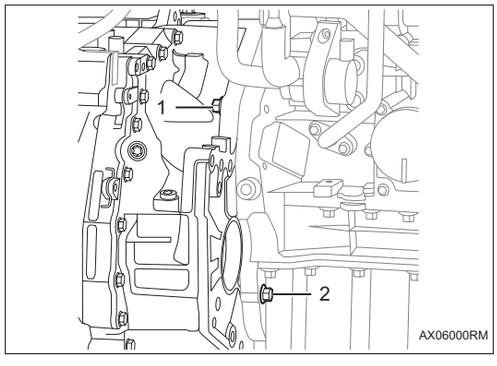
1. **Disconnect the battery negative terminal (See page CH-17)**
2. **Remove the engine assembly (See page EM-8)**
3. **Remove the starter assembly (See page ST-3)**
4. **Remove transmission oil cooler water pipe assembly (See page CO-13)**
5. **Remove AT assembly**



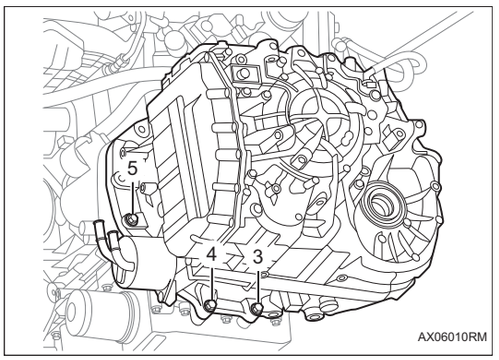
(a) Disconnect the harness connector-A-.



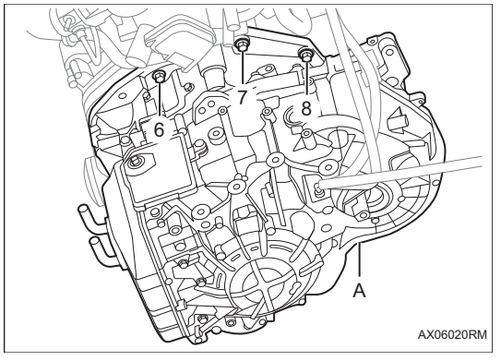
(b) Rotate the crankshaft pulley and remove 6 fixing nuts -1-of hydraulic torque converter and flywheel drive plate.



(c) Remove the fixing bolt -1-2- of the AT assembly.



(d) Remove the fixing bolt -3-5- of the AT assembly.



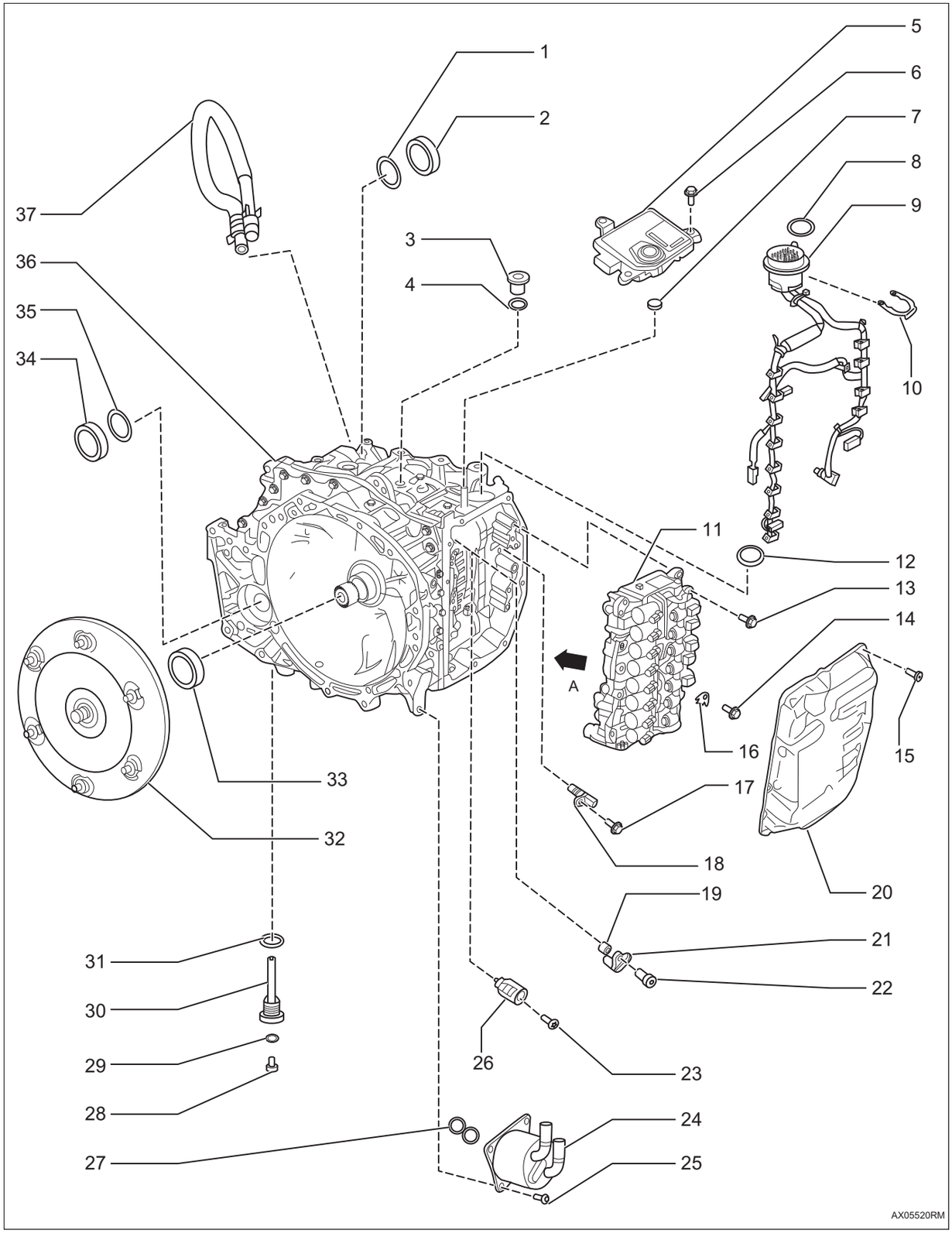
(e) Remove the bolt -6-8- and AT assembly-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

AT assembly unit

Parts



1. O-ring

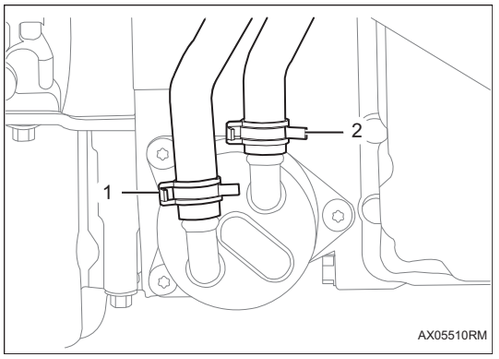
- Disposable part.

2. **Left output shaft seal**
   - Disposable part.
3. **Filler plug**
4. **O-ring**
   - Disposable part.
5. **TCU**
6. **Hexagon flange bolt**
   - X3
   - Torque: 19.6~29.4 N · m
7. **Parking lock lever shaft seal**
8. **O-ring**
   - Disposable part.
9. **Transmission harness**
10. **Lock plate**
11. **Valve body**
12. **Shim**
    - Disposable part.
13. **Hexagon flange bolt**
    - X10
    - Torque: 8~12 N · m
    - Disposable part.
14. **Hexagon flange bolt**
    - Torque: 8~12 N · m
15. **Hexagon flange bolt**
    - X12
    - Torque: 9.8~15.7 N · m
16. **Lock plate**
17. **Hexagon flange bolt**
    - Torque: 3.9~6.9 N · m
18. **Input speed sensor**
19. **Spacer**
20. **Side cover**
21. **Output speed sensor**
22. **Hexagon flange bolt**
    - Torque: 3.9~6.9 N · m
23. **Bolt**
    - Torque: 9~11 N · m

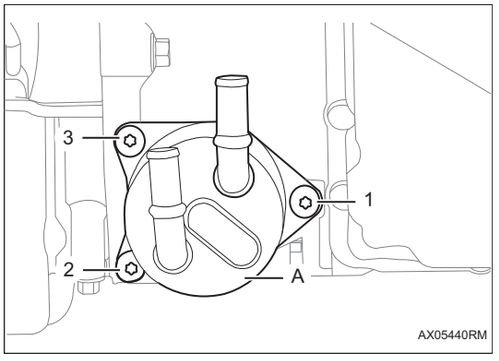
24. **Transmission cooler**
25. **Bolt**
    - Torque: 16.8~25.2 N · m
26. **Solenoid**
27. **Seal ring**
    - Disposable part.
28. **Overflow plug**
    - Torque: 5.9~8.8 N · m
29. **O-ring**
    - Disposable part.
30. **Overflow pipe**
31. **O-ring**
    - Disposable part.
32. **Hydraulic torque converter assembly**
33. **Input shaft oil seal**
    - Disposable part.
34. **Right output shaft seal**
    - Disposable part.
35. **O-ring**
    - Disposable part.
36. **AT assembly**
37. **Vent pipe**

Removal

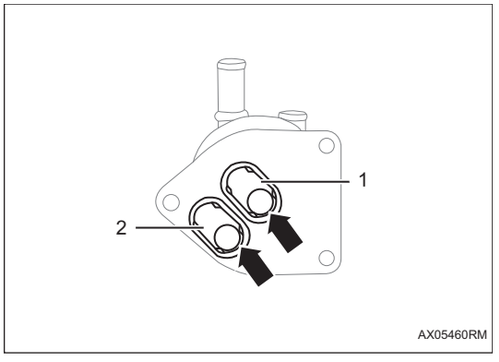
1. Remove the transmission fluid cooler



(a) Detach transmission fluid cooler water inlet hose -1- water outlet hose -2-.



(b) Remove the bolt -1-3- and transmission fluid cooler-A-.



(c) Remove the O-ring -1-2-.

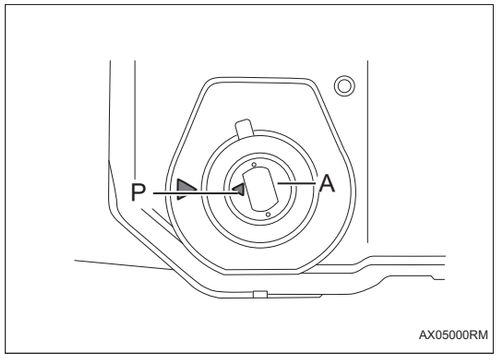
2. Remove TCU

Caution:

Work in sequence at the "P" position.

When replacing the TCU, select the appropriate transmission control unit for installation according to the vehicle model.

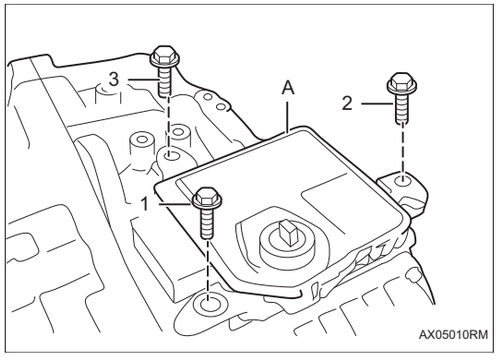
After confirming "how to execute" P "gear position learning", execute the working procedure.



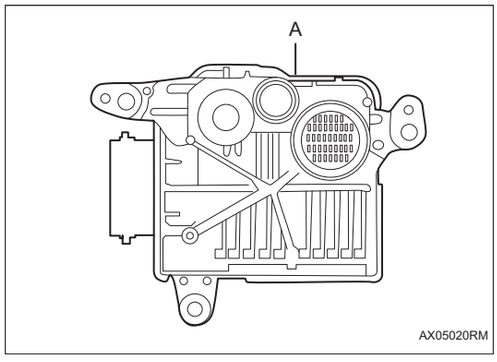
(a) As shown in the figure, rotate the parking lock lever shaft-A to P gear position to align with the TCU mark.

Caution:

Do not turn the TCU by more than 55.5 degrees to exceed the mark position, otherwise the TCU will be damaged.



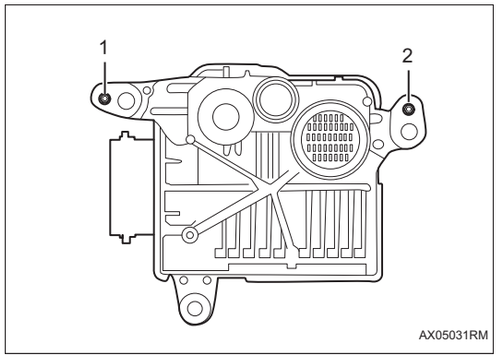
(b) Remove the bolt -1-3- and TCU-A-.



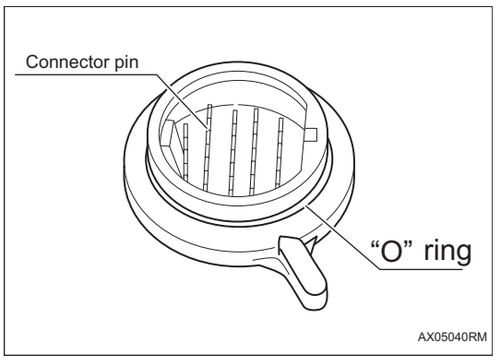
(c) Hold the TCU -A- in your hand as shown in the figure.

Caution:

Do not touch the terminal. Otherwise the TCU will be damaged.



(d) After removal, make sure that the dowel pin -1-2- is not loose on the side of the AT. If the pin is on the AT side, be sure to remove it.



(e) Check the connector-A- and the O-ring-B-.

Caution:

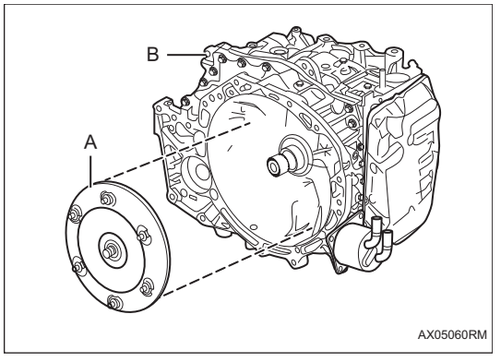
check the terminal for damage.

Check the O-ring for damage and foreign matter, and if the O-ring is damaged, please replace the O-ring for wire transmission.

Do not touch the terminal.

O-ring inner diameter (mm)	O-ring thickness (mm)
34.95	2.4

3. Remove the hydraulic torque converter assembly



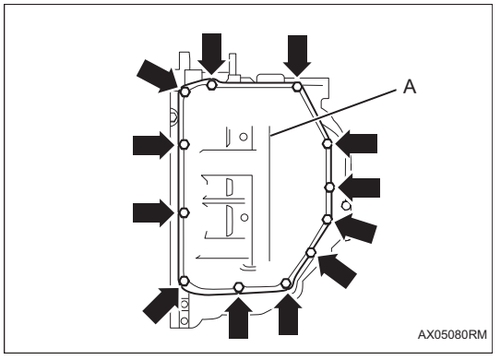
(a) Pull hydraulic torque converter assembly-A- outward from transmission-B-.

Caution:

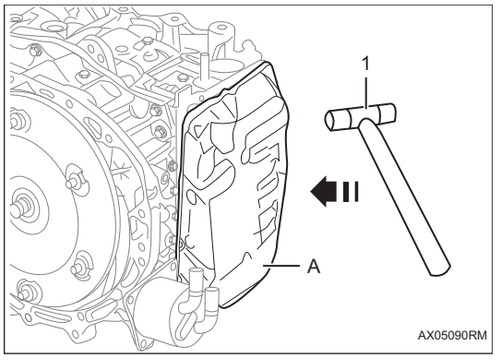
Do not damage the oil seal.

Do not drop the hydraulic torque converter.

4. Remove the side cover



(a) Remove the fixing bolt -arrow- of transmission side cover -A-.



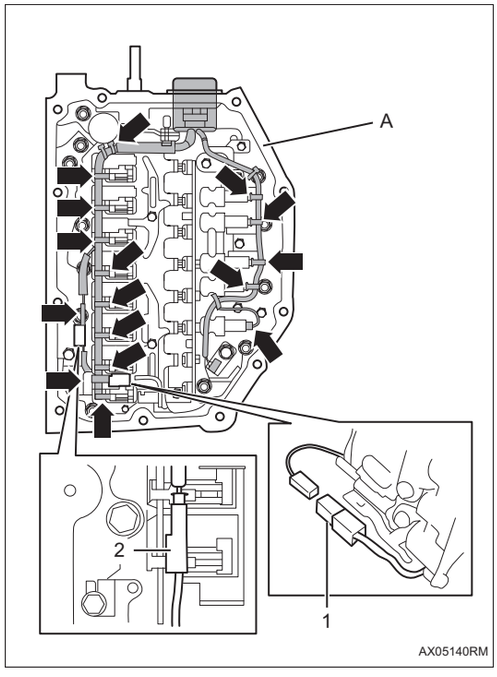
(b) Use the rubber hammer -1- to hit the transmission side cover -A- as arrowed.

Caution:

Handle carefully during removal. Do not damage the side cover and transmission mating face.

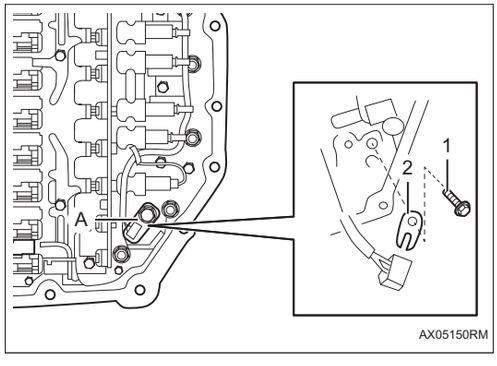
Do not deform the side cover.

5. Remove the valve body assembly

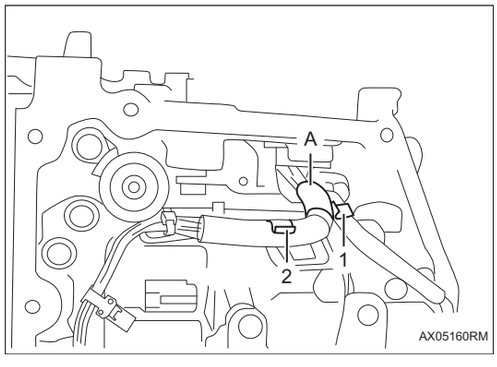


(a) Disconnect the transmission harness -A- connector -1-2-.

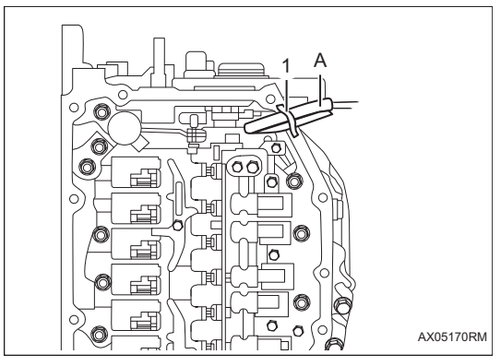
(b) Disconnect the transmission harness connector as arrowed.



(c) Remove bolt -1- and lock plate -2-, and pull out the transmission fluid temperature sensor.



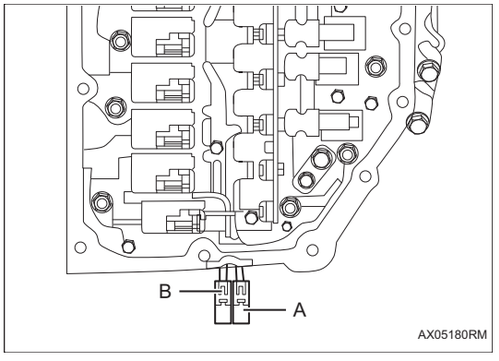
(d) Remove the transmission line -A- from the fixture -1-2-.



(e) Use tape -1- to fix the transmission harness -A- at the position shown in the figure.

Hint:

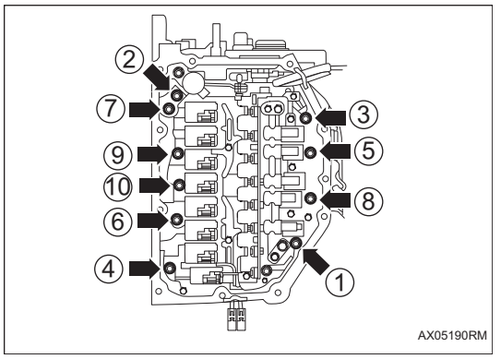
Ensure that the transmission harnesses do not interfere with each other when the valve body assembly is disassembled.



(f) Fix the electronic transmission fluid pump harness -A- and solenoid harness -B- at the positions shown in the figure with tape -1-.

Hint:

Ensure that there is no interference when disassembling the valve body assembly.

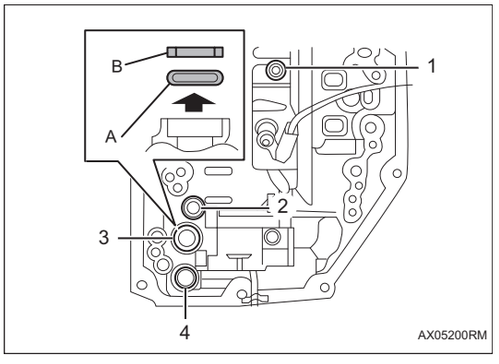


(g) As shown in the figure, remove the bolt -arrow- and valve body assembly -A- in sequence.

Caution:

Uniformly loosen the bolts through multiple bolts in sequence.

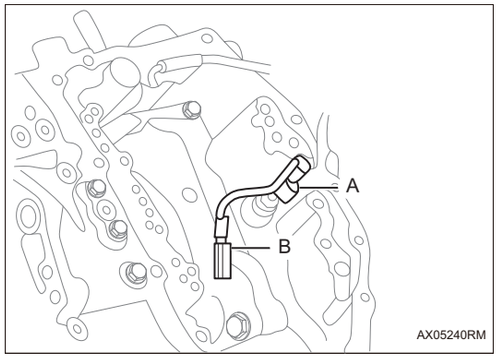
Don't drop the valve body assembly on the ground.



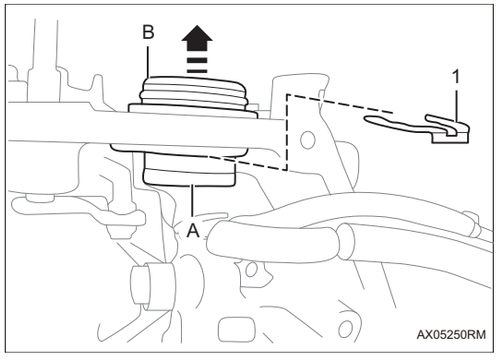
(h) At washer and seal ring position -1-4-, remove the washer - A- and seal ring -B- in the direction of the arrow.

AX

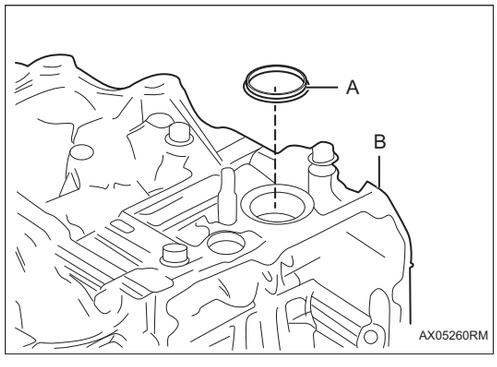
6. Remove the transmission harness



(a) Disconnect the input speed sensor connector-A- and the output sensor connector-B-.

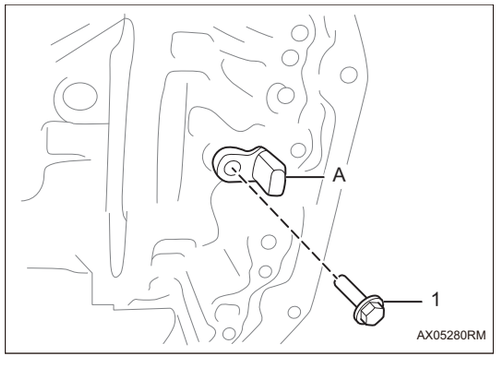


(b) Remove the lock plate -1-, and pull out the transmission harness -A- in the direction of -arrow B- .



(c) Remove the seal ring -A- from the transmission -B-.

7. Remove the speed sensor (input)

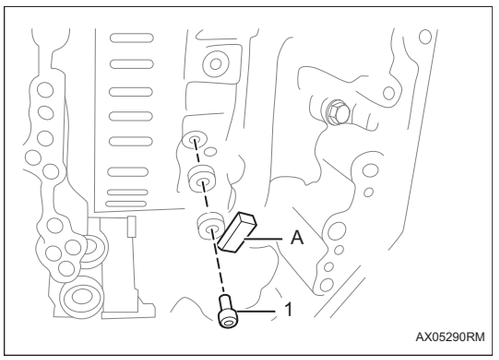


(a) Remove the bolt -1- and remove the speed sensor (input)-A from the transmission.

Notice:

Do not damage the speed sensor.

8. Remove the speed sensor (output)

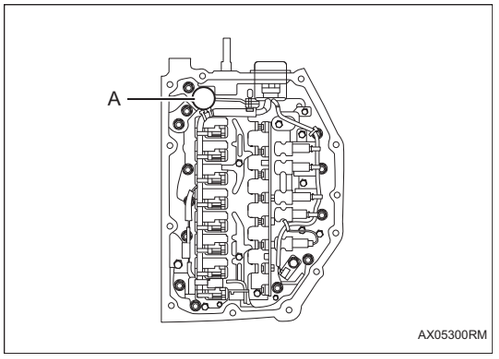


(a) Remove the bolt -1- and detach the speed sensor (output)-A from the transmission.

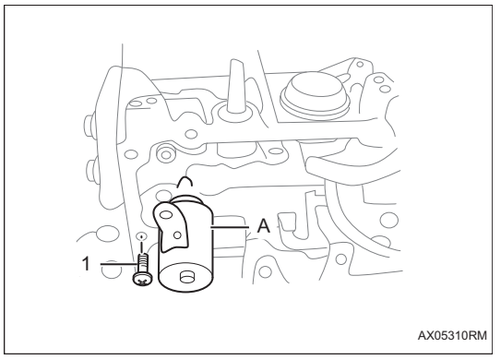
Notice:

Do not damage the speed sensor.

9. Remove the non-P gear holding solenoid

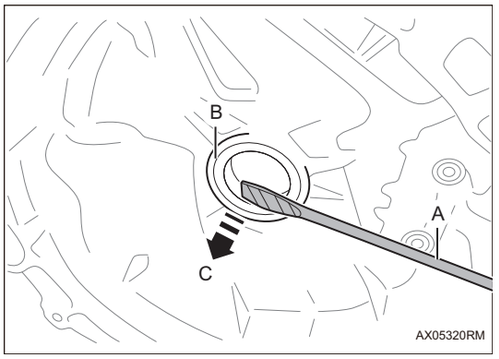


(a) Disconnect the harness connector-A-.



(b) Remove the bolt -1-, and remove the non-P gear holding solenoid-A-from the transmission.

10. Remove the case oil seal



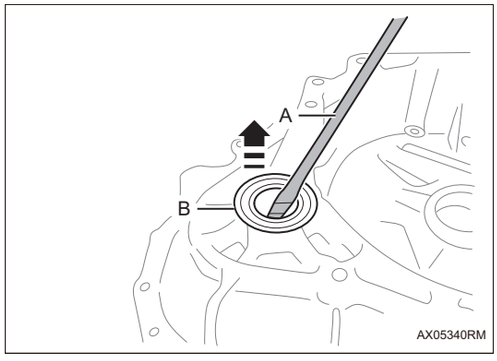
(a) Use a screwdriver -1- to pry the transmission case in the direction of arrow C- , and remove the case oil seal-B-.

Caution:

Stick adhesive tape on the tip of the screwdriver before use.

Take care not to damage the oil seal and contact surfaces.

11. Remove the right output shaft seal



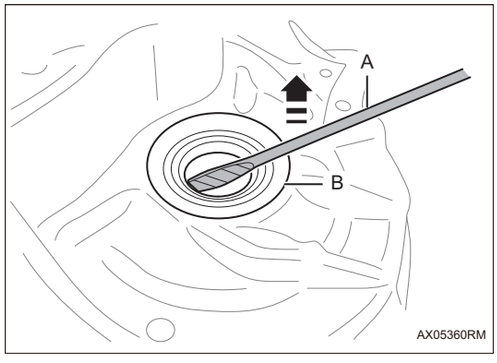
(a) Use a screwdriver-A- to pry the transmission case in the direction of the arrow, and remove the right output shaft seal-B-.

Caution:

Stick adhesive tape on the tip of the screwdriver before use.

Take care not to damage the oil seal and contact surfaces.

12. Remove the left output shaft seal



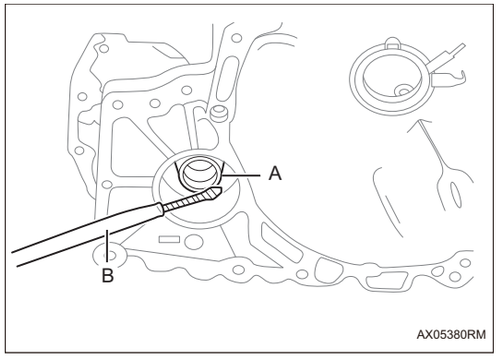
(a) Use a screwdriver-A- to pry the transmission case in the direction of the arrow, and remove the right output shaft seal-B-.

Caution:

Stick adhesive tape on the tip of the screwdriver before use.

Take care not to damage the oil seal and contact surfaces.

13. Remove the differential gear O-ring



(a) Use screwdriver-B- to pry out the right differential gear O-ring- A.

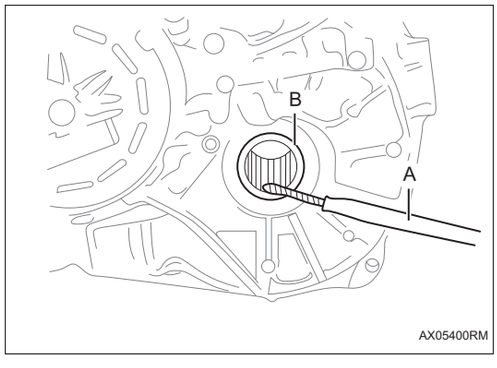
Caution:

stick adhesive tape on the tip of the screwdriver before use.

Take care not to damage the "O" ring and contact surfaces.

(b) The size of "O" ring:

O-ring inner diameter (mm)	O-ring thickness (mm)
32.75	2.62



(c) Use screwdriver-A- to pry out the left differential gear O-ring- B.

Caution:

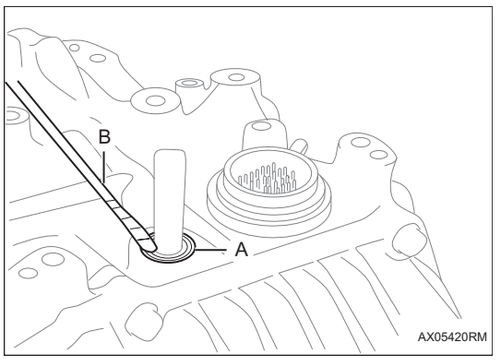
stick adhesive tape on the tip of the screwdriver before use.

Take care not to damage the "O" ring and contact surfaces.

(d) The size of "O" ring:

O-ring inner diameter (mm)	O-ring thickness (mm)
36.0	2.62

14. Remove the parking lock lever shaft seal



(a) Use a screwdriver-B- to pry the parking lock lever shaft oil seal-A- from the transmission case.

Caution:

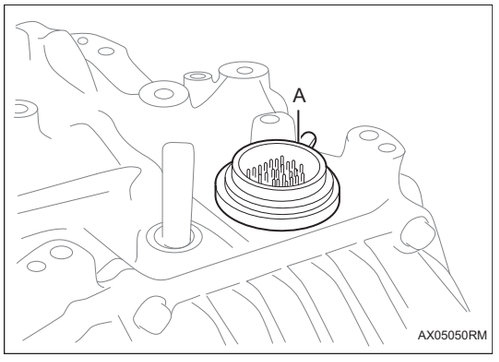
Stick adhesive tape on the tip of the screwdriver before use.

Take care not to damage the oil seal and contact surfaces.

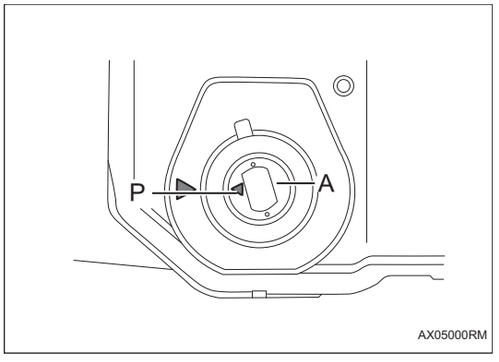
Be careful not to damage the parking lock lever shaft.

Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**
2. **Install TCU**



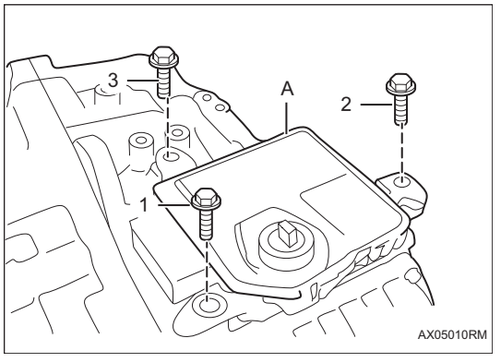
(a) Align the TCU with the harness connector -A-.



(b) As shown in the figure, rotate the parking lock lever shaft-A to P gear position to align with the TCU mark.

Caution:

Do not turn the TCU by more than 55.5 degrees to exceed the mark position, otherwise the TCU will be damaged.



(c) Install TCU -A- by using bolt -1-3-.

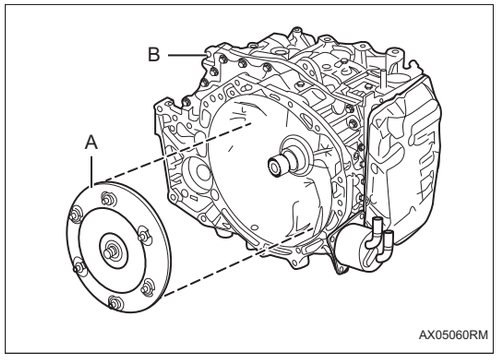
Caution:

Temporarily tighten bolt -1-3- by hand.

Temporarily tighten bolt - 2- according to the specified torque.**Torque: 1.0~5.0 N · m**

Tighten bolts -1-3- in marked order.**Torque: 19.6~29.4 N · m**

3. **Install the hydraulic torque converter assembly**

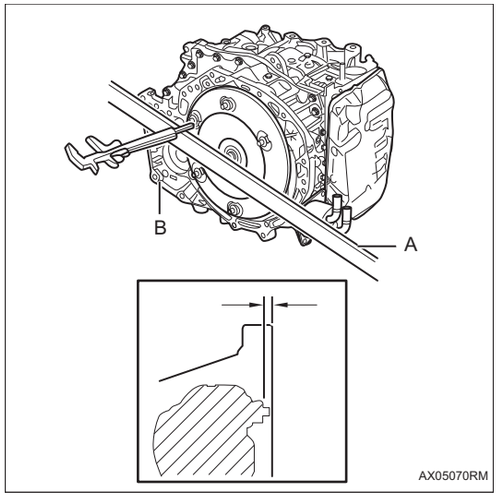


(a) Fix the drive gear at the center of the oil pump assembly with a screwdriver, and then install the torque converter -A- into the transmission -B.

Caution:

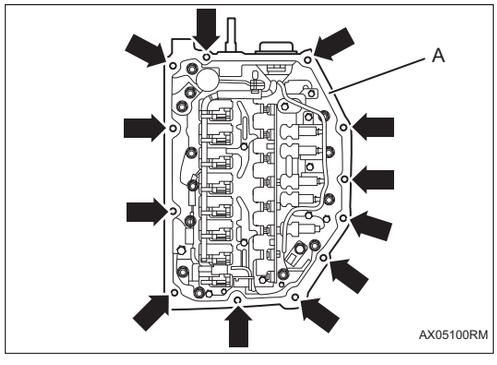
Do not damage the oil seal.

Do not drop the hydraulic torque converter.



(b) Use the tool -A- to measure the dimension of the case end face to the torque converter assembly -B- as arrowed (15.7 mm), and check whether the torque converter assembly is correctly installed.

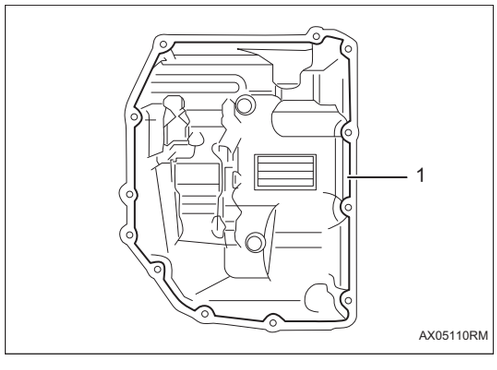
4. Install the side cover



(a) Clean side cover and transmission mating face -A- and bolt holes as arrowed.

Hint:

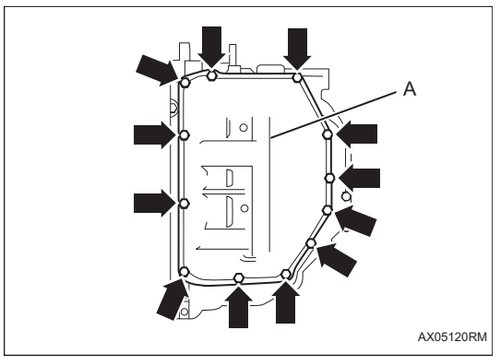
Completely remove oil stains with gasoline or similar oil.



(b) As shown in the figure, apply sealant - 1 - to the transmission side cover.

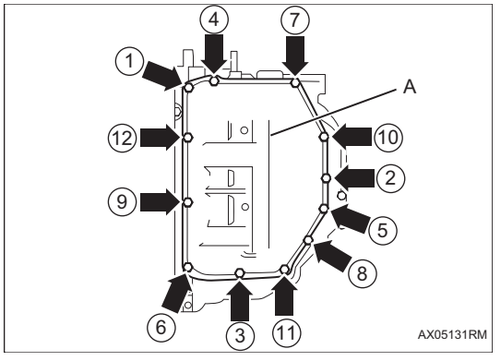
Hint:

Remove oil stains and residual sealant before applying sealant.



(c) Install the fixing bolt -arrow- of transmission side cover -A-.

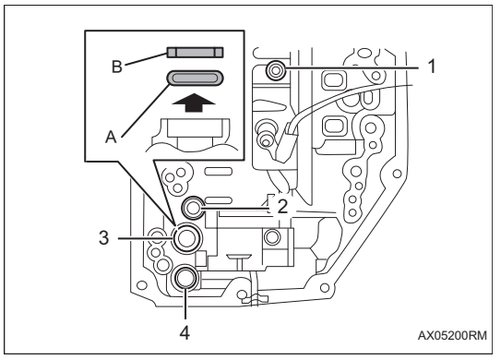
Bolt size: M8 × 1.25 × 15.5 mm



(d) Tighten the fixing bolts -arrow- of transmission side cover -A in the order of numbers.

Torque: 9.8~15.7 N · m

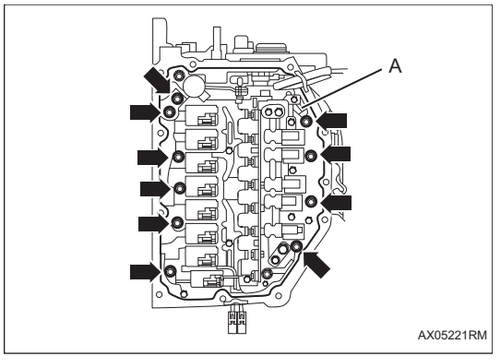
5. Install the valve body assembly



(a) At washer and seal ring position -1-4-, install washer -A- and seal ring -B- in the direction of arrow.

Caution:

Do not apply transmission fluid or grease to the washer-A-seal ring-B.

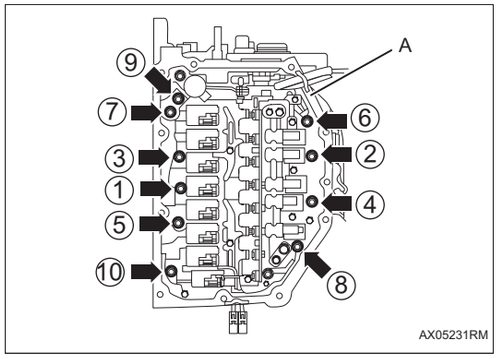


(b) Install the fixing bolt- arrow- of valve body assembly -A-.

Hint:

Temporarily fasten bolt by hand.

Bolt size: M6 x 1.0 x 20 mm



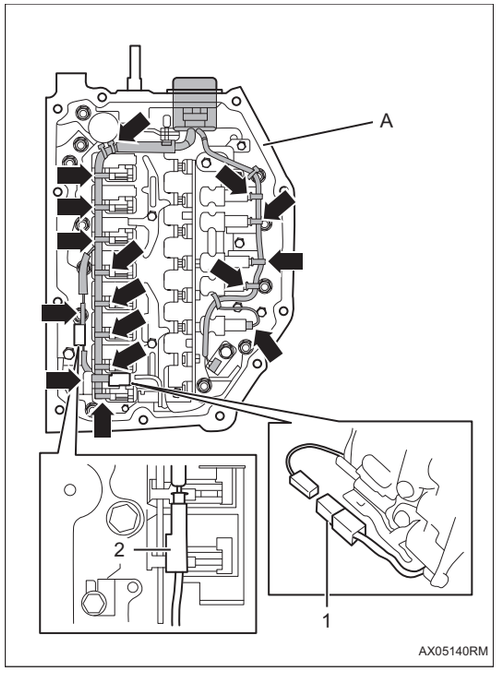
(c) Tighten the fixing bolts -arrow- of valve body assembly - A- in the order of numbers.

Torque: 8.0~12.0 N · m

Caution:

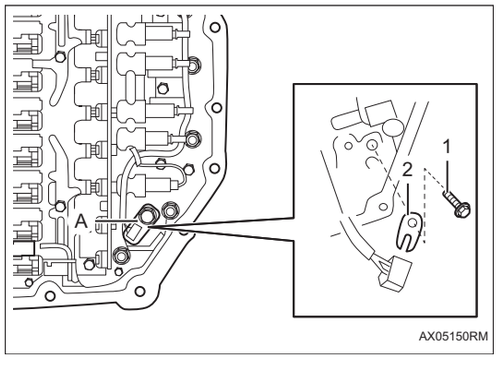
Uniformly loosen the bolts through multiple bolts in sequence.

Don't drop the valve body assembly on the ground.



(d) Connect the transmission harness -A- connector -1-2-.

(e) Connect the transmission harness connector -arrow-.

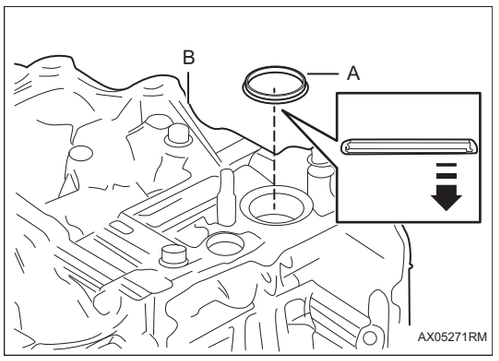


(f) Insert transmission fluid temperature sensor mounting lock plate-2- and bolt-1.

Bolt size: M6x1.0 x12mm

Torque: 8.0~12.0 N · m

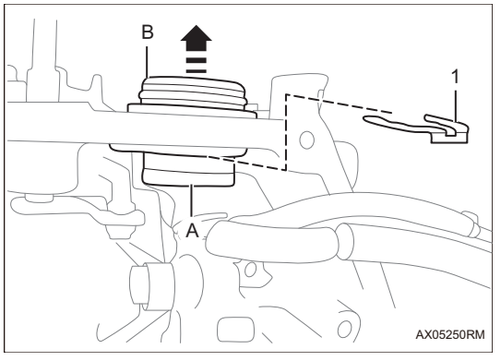
6. Install the transmission harness



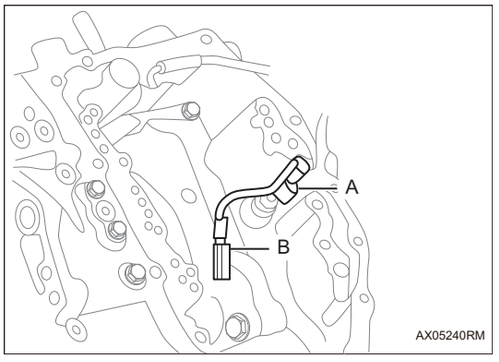
(a) Install the seal ring-A- to the transmission-B- as arrowed.

Hint:

Install the seal ring with chamferred side up as shown in figure.

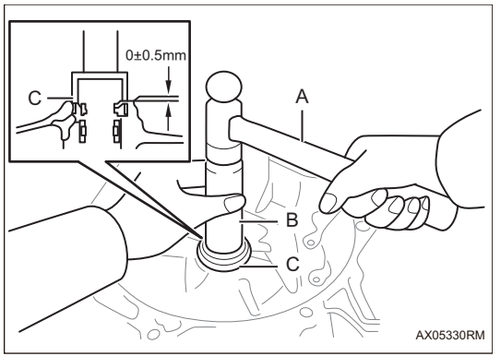


(b) Install the transmission harness -A- in the direction opposite to -arrow B- , and install the lock plate -1-.



(c) Connect the input speed sensor connector-A- and output sensor connector-B-.

7. Install the case oil seal



(a) Install the new oil seal -C- to the transmission case by striking SST (9503220HF01) -B- with hammer -A-.

Standard value: 0±0.5 mm

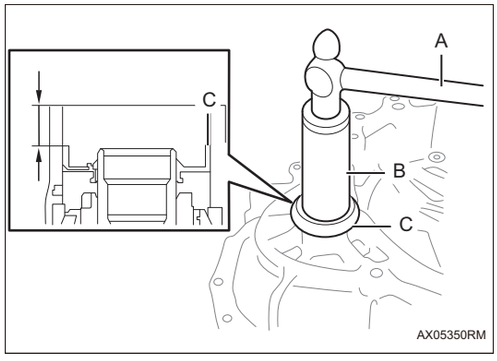
Hint:

The standard value shown by the arrow in the figure is the distance from the outer surface of the oil seal to the end of the housing.

Grease the oil seal edge.

8. Install the right output shaft seal

AX



(a) Install the new oil seal -C- to the transmission case by striking SST (9503230HF01) -B- with hammer -A-.

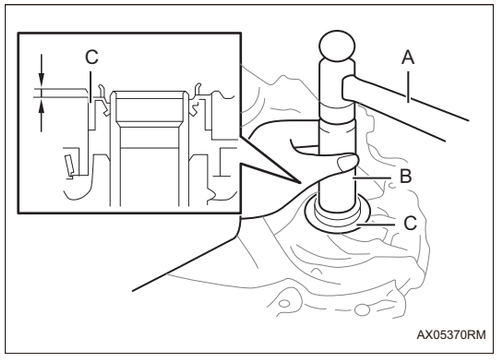
Standard value: 16.7±0.5 mm

Hint:

The standard value shown by the arrow in the figure is the distance from the outer surface of the oil seal to the end of the housing.

Grease the oil seal edge.

9. Install the left output shaft seal



(a) Install the new oil seal -C- to the transmission case by striking SST (9503225HF01) -B- with hammer -A-.

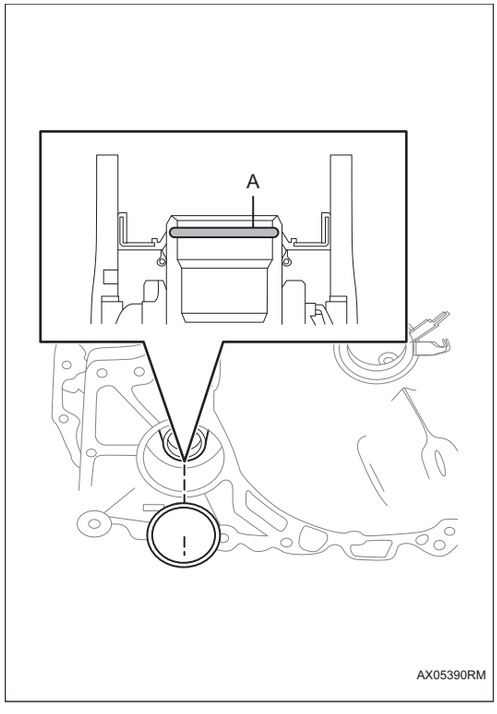
Standard value: 1.9±0.5mm

Hint:

The standard value shown by the arrow in the figure is the distance from the outer surface of the oil seal to the end of the housing.

Grease the oil seal edge.

10. Install the differential gear O-ring



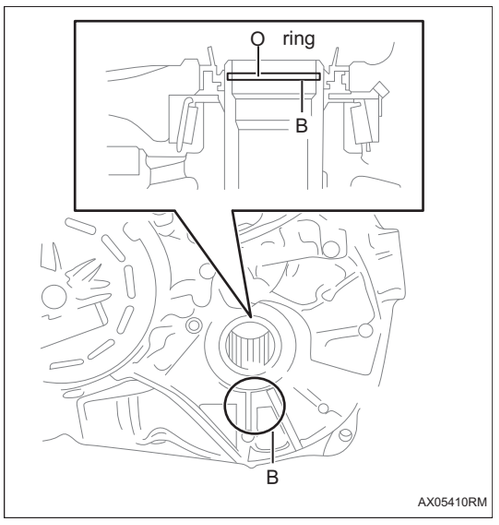
(a) Install the right differential gear O-ring-A- as shown in the figure.

Caution:

Be careful not to damage the "O" ring.

(b) The size of "O" ring:

O-ring inner diameter (mm)	O-ring thickness (mm)
32.75	2.62



(c) Install the right differential gear O-ring-B- as shown in the figure.

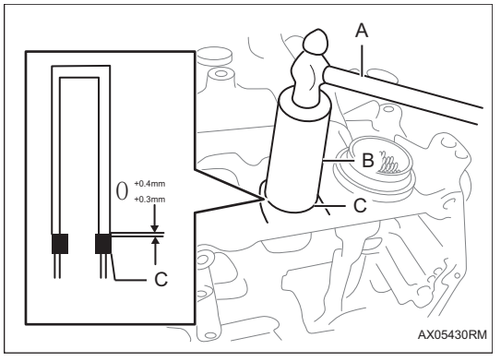
Caution:

Be careful not to damage the "O" ring.

(d) The size of "O" ring:

O-ring inner diameter (mm)	O-ring thickness (mm)
36.0	2.62

11. Install the parking lock lever shaft seal



(a) Install the new oil seal -C- to the transmission case by striking SST(9503215HF01) -B- with hammer -A-.

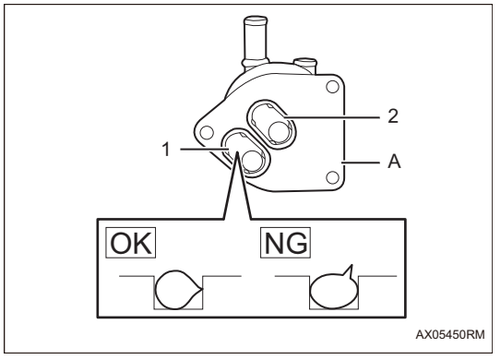
Standard value: 0+0.4/-0.3mm

Hint:

The standard value shown by the arrow in the figure is the distance from the outer surface of the oil seal to the end of the housing.

Grease the oil seal edge.

12. Install the transmission fluid cooler



(a) Coat the new "O" ring -1-2- with transmission fluid and install it to the transmission oil cooler.

Caution:

As shown in the figure, check that the "O" ring -1-2- is correctly positioned in the groove of the oil cooler assembly,

CA7CM270D1 dual clutch transmission

TCU AX-1

Precautions AX-1
Location of parts AX-4
System diagram AX-6
System description AX-7
Symptom chart AX-8
Data recorder/freeze frame data AX-13
ECU terminal AX-23
DTC priority AX-25
Initialization AX-35
The process of component repair and replacement AX-36
Transmission self-learning AX-39
DTC chart AX-41
P071216 ..... AX-48
P071317 ..... AX-51
P071512 ..... AX-54
P071614 ..... AX-54
P071829 ..... AX-54
P072012 ..... AX-59
P072114 ..... AX-59
P072329 ..... AX-64
P077B29 ..... AX-64
P077A31 ..... AX-64
P084317 ..... AX-66
P084216 ..... AX-66
P1C2C29 ..... AX-66
P084817 ..... AX-71
P084716 ..... AX-71
P1C2D29 ..... AX-71
P088317 ..... AX-76
P088216 ..... AX-76
P097412 ..... AX-80
P097311 ..... AX-80
P097213 ..... AX-80
P1C4019 ..... AX-80
P1C4118 ..... AX-80
P1C431D AX-80
P097712 ..... AX-85
P097611 ..... AX-85

P097513 .....AX-85
P1C4419 .....AX-85
P1C4518 .....AX-85
P1C471D AX-85
P098012 .....AX-90
P097911 .....AX-90
P097813 .....AX-90
P1C4819 .....AX-90
P1C4918 .....AX-90
P1C4B1D AX-90
P098312 .....AX-95
P098211 .....AX-95
P098113 .....AX-95
P1C4C19 .....AX-95
P1C4E18 .....AX-95
P1C511D AX-95
P098612 .....AX-100
P098511 .....AX-100
P098413 .....AX-100
P1C5219 .....AX-100
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P099912 .....AX-105
P099811 .....AX-105
P099713 .....AX-105
P1C5619 .....AX-105
P1C5718 .....AX-105
P1C591D AX-105
P099C12 .....AX-110
P099B11 .....AX-110
P099A13 .....AX-110
P1C5A19 .....AX-110
P1C5B18 .....AX-110
P1C5D1D AX-110
P099F12 .....AX-115
P099E11 .....AX-115
P099D13 .....AX-115
P1C6019 .....AX-115
P1C6118 .....AX-115
P1C631D AX-115
P099C12 .....AX-120
P099B11 .....AX-120
P099A13 .....AX-120

P1C5A19 ..... AX-120
P1C5B18 ..... AX-120
P1C5D1D AX-120
P099F12 ..... AX-125
P099E11 ..... AX-125
P099D13 ..... AX-125
P1C6019 ..... AX-125
P1C6118 ..... AX-125
P1C631D AX-125
P1C0E12 ..... AX-130
P1C0F11 ..... AX-130
P1C0A13 ..... AX-130
P1C1012 ..... AX-136
P1C1111 ..... AX-136
P1C0B13 ..... AX-136
P1C1212 ..... AX-142
P1C1311 ..... AX-142
P1C0C13 ..... AX-142
P1C1414 ..... AX-147
P1C1512 ..... AX-147
P1C1617 ..... AX-147
P1C1716 ..... AX-147
P1C1814 ..... AX-151
P1C1912 ..... AX-151
P1C1A17 ..... AX-151
P1C1B16 ..... AX-151
P1C1C14 ..... AX-155
P1C1D12 ..... AX-155
P1C1E17 ..... AX-155
P1C1F16 ..... AX-155
P1C2014 ..... AX-159
P1C2112 ..... AX-159
P1C2217 ..... AX-159
P1C2316 ..... AX-159
P1C244B AX-163
P1C254B AX-163
P27854B AX-163
P1C264B AX-168
P1C274B AX-168
P27874B AX-168
P1C284B AX-173
P1C294B AX-173
P1C4249 ..... AX-177

P1C4649 .....AX-177
P1C4A49 .....AX-177
P1C4F49 .....AX-177
P1C6249 .....AX-177
P1C5449 .....AX-177
P1C5849 .....AX-177
P1C5C49 .....AX-177
P1C0249 .....AX-177
P1C0349 .....AX-177
P1C0449 .....AX-177
P1C0549 .....AX-177
P1C0649 .....AX-177
P1C0049 .....AX-177
P1C0149 .....AX-177
P1C6407 .....AX-180
P1C6507 .....AX-180
P1C6607 .....AX-180
P1C6707 .....AX-180
P1C6807 .....AX-180
P1C6907 .....AX-180
P1C6A07 .....AX-180
P1C6B07 .....AX-180
P1C6C77 .....AX-183
P1C6D76 .....AX-183
P1C6E71 .....AX-183
P1C6F07 .....AX-183
P1C7007 .....AX-183
P1C7176 .....AX-183
P1C7277 .....AX-183
P1C7376 .....AX-183
P1C7471 .....AX-183
P1C7507 .....AX-183
P1C7607 .....AX-183
P1C7776 .....AX-183
P1C7877 .....AX-183
P1C7976 .....AX-183
P1C7A71 .....AX-183
P1C7B07 .....AX-183
P1C7C07 .....AX-183
P1C7D76 .....AX-183
P1C7E77 .....AX-183
P1C7F76 .....AX-183
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P1C8207 ..... AX-183
P1C8376 ..... AX-183
P1C8477 ..... AX-183
P1C8576 ..... AX-183
P1C8671 ..... AX-183
P1C8707 ..... AX-183
P1C8807 ..... AX-183
P1C8976 ..... AX-184
P1C8A77 ..... AX-184
P1C8B76 ..... AX-184
P1C8C71 ..... AX-184
P1C8D07 ..... AX-184
P1C8E07 ..... AX-184
P1C8F76 ..... AX-184
P1C9077 ..... AX-184
P1C9176 ..... AX-184
P1C9271 ..... AX-184
P1C9307 ..... AX-184
P1C9407 ..... AX-184
P1C9576 ..... AX-184
P1C9677 ..... AX-184
P1C9776 ..... AX-184
P1C9871 ..... AX-184
P1C9907 ..... AX-184
P1C9A07 ..... AX-184
P1C9B76 ..... AX-184
P1C9C00 ..... AX-188
P1C9D00 ..... AX-189
P1C9E00 ..... AX-190
P276512 ..... AX-191
P276614 ..... AX-191
P276829 ..... AX-191
P283417 ..... AX-196
P283316 ..... AX-196
P283917 ..... AX-201
P283816 ..... AX-201
P283E17 ..... AX-206
P283D16 ..... AX-206
P284317 ..... AX-211
P284216 ..... AX-211
P285723 ..... AX-216
P286B24 ..... AX-216

P285823 ..... AX-219
P287324 ..... AX-219
U000188 ..... AX-222
U010087 ..... AX-222
U040182 ..... AX-222
U040183 ..... AX-222
U040186 ..... AX-222
U112187 ..... AX-222
U041582 ..... AX-222
U041583 ..... AX-222
U041586 ..... AX-222
U010387 ..... AX-222
U040486 ..... AX-222
U029187 ..... AX-222
U059286 ..... AX-222
U0592F0 ..... AX-222
U014687 ..... AX-222
U115587 ..... AX-222
TCU assembly AX-224
Parts AX-224
Removal AX-225
Installation AX-225
ATF AX-226
Drain AX-226
Add AX-227
AT AX-229
Parts AX-229
Removal AX-230
Installation AX-231
AT assembly unit AX-232
Parts AX-232
Parts AX-235
Removal AX-236
Installation AX-240

TCU

Precautions

Notice:

The initialization is required for some systems after the battery negative terminal cable is disconnected and reconnected.

1. **ENGINE START/STOP button (ignition switch) representation:**

   Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

Notice:

the following basic matters must be followed during the installation and removal of the transmission.

2. **Precautions when handling electronic parts**

   (a) When replacing the electronic parts, be sure to place the ignition switch in the OFF position and disconnect the battery negative (-) terminal cable before servicing the system.

   (b) When disconnecting the connector, pull out the connector after unlocking.

   Notice:

   Do not pull the harness.

   (c) When connecting the connector, push the connector until it is fully locked.

   Hint:

   Check and confirm a click is heard.

   (d) Do not hit the electronic parts. If the part is dropped or impacted, renew it.

3. **Prevent contamination with foreign matters**

   (a) Ensure that dust, sand, etc. are completely removed when removing the relevant parts from the transmission.

   (b) Wrap the removed parts with plastic bags to prevent dust.

(c) Carry out maintenance procedures with bare hands or plastic gloves, and do not use work gloves or rags.

4. **Prevent damage to parts**

(a) When disassembling the contact surface of the box, knock it with a plastic hammer to separate it.

Notice:

It is strictly forbidden to use screwdrivers and other tools to pry open the contact surface.

(b) Do not pull out the solenoid valve or spool valve with excessive force.

(c) Install the parts, and check and confirm that the harness, etc. are not stuck.

5. **Clean the parts**

(a) Thoroughly clean all parts, blow dry with gas and apply the specified oil.

(b) Do not clean aluminum parts and rubber parts with alkaline chemicals.

(c) Do not clean the rubber parts with wash oil (white gasoline).

6. **Precautions when handling ATF**

(a) Do not drain the high-temperature ATF (repair after the ATF cools down).

(b) When the ATF splashes onto the floor, wipe it off immediately, as the floor may become slippery and dangerous.

(c) Be sure to use Castrol BOT351C4 type of ATF.

7. **The DTC must be cleared after the fault is eliminated, otherwise the TCU will always record the DTC, which is easy to cause subsequent misunderstanding.**

8. **When any one of TCU replacement, TCU software upgrade, and transmission (hydraulic module) change occurs, the maintenance or replacement methods of components shall be strictly followed to ensure the normal function and performance of the transmission.**

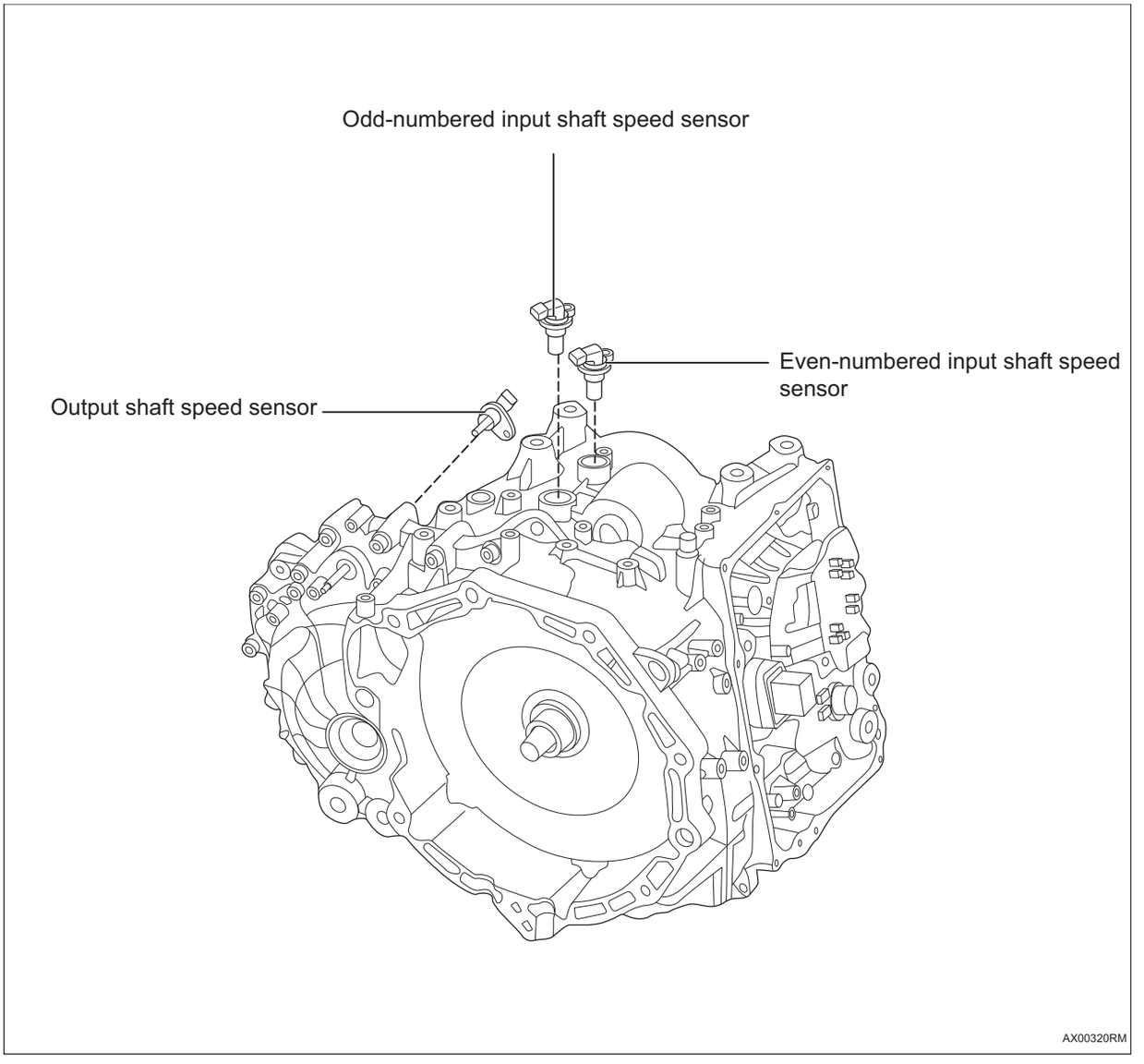
9. **Failure recurrence test: perform the failure recurrence test based on the vehicle working conditions described by the user when the fault occurred.**

Caution:

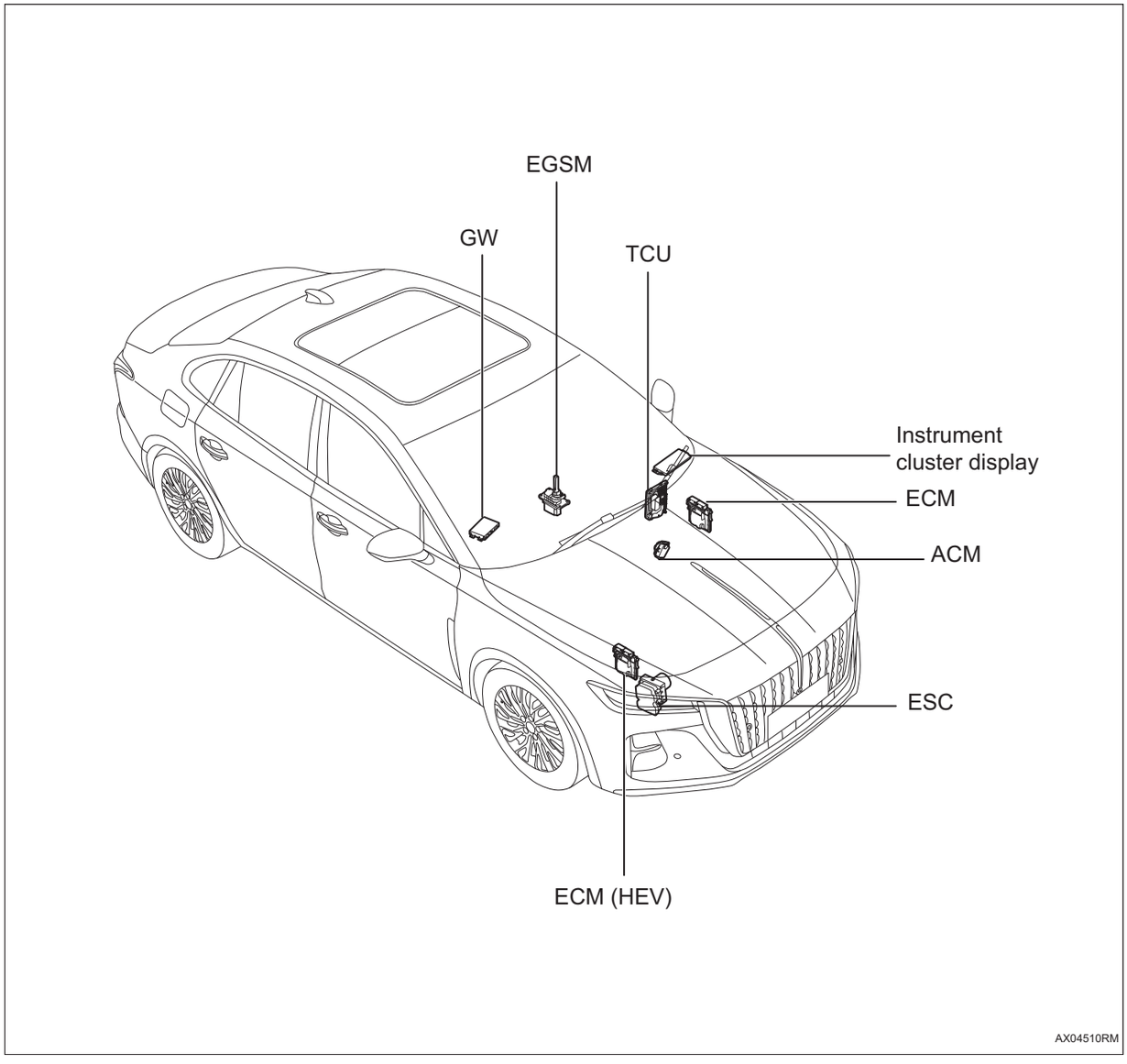
Attention shall be paid to "road conditions, engine speed, vehicle speed, acceleration or deceleration, straight or curve driving, time, weather, etc".

10. **Check connector connection:**
    (a) Visually check whether the connector is abnormal, and pay attention to checking whether the insertion and extraction force is abnormal.
    (b) Attention shall be paid to checking the cases "the connector is not connected, the terminal is rusted, dust or grease enters the terminal, the terminal is deformed, and the fitting joint is loose".
11. **Transient connector poor contact: when the cause of a DTC cannot be determined, it can be considered that the connector has a transient poor contact. Therefore, it is necessary to check and clean the connector, and clear the DTC.**
12. **Clear DTC:**
    (a) The ignition switch is set to "ON" position;
    (b) The engine is shut down or idling;
    (c) The vehicle speed is 0 km/h;
    (d) The SKA is in P gear;
    (e) The vehicle is braked (the EPB is active or brake pedal depressed). The freeze frame data will be cleared at the same time as the DTC is cleared.

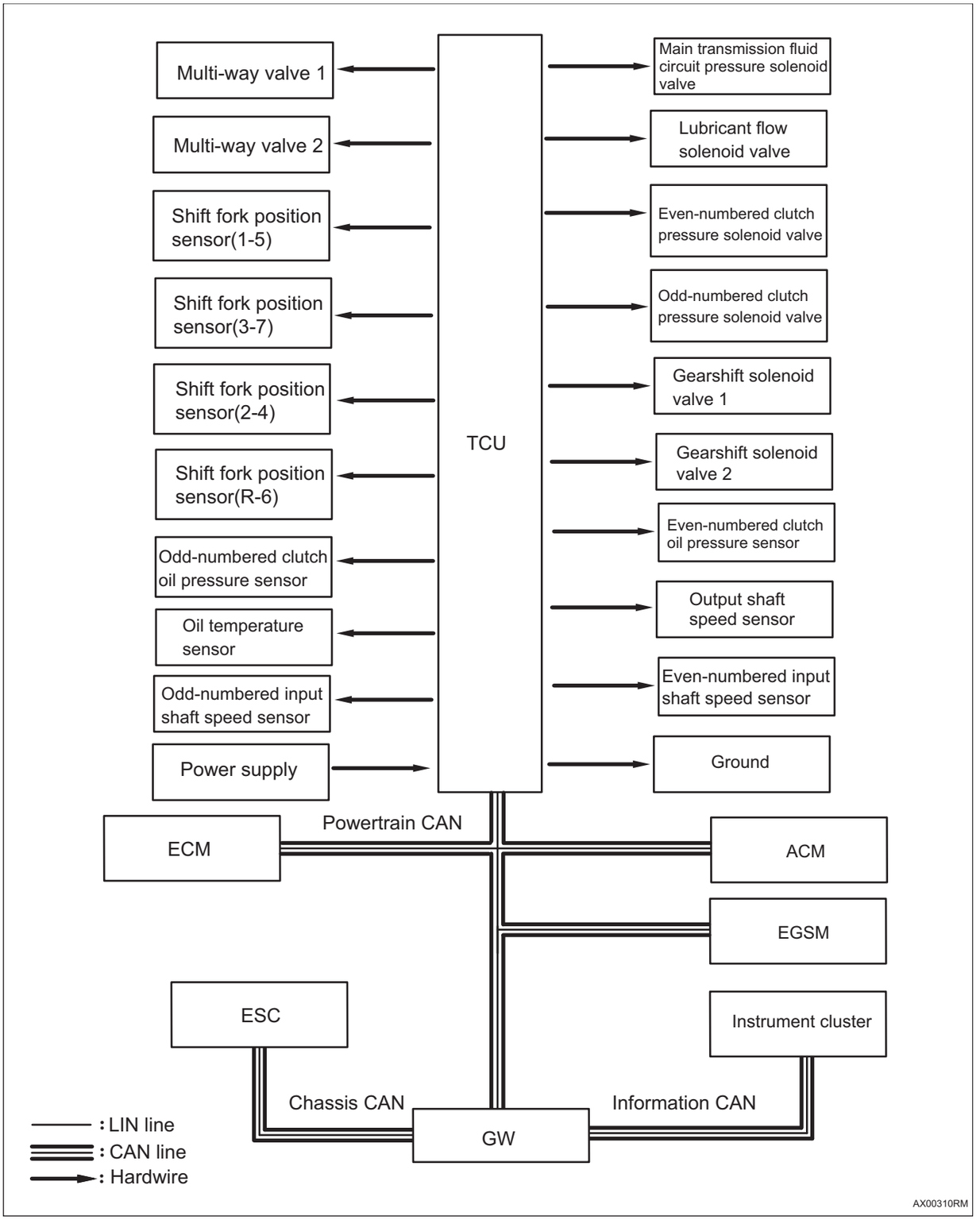
Location of parts



Location of parts



System diagram



System description

The TCU detects the electrical signals of the engine and driving state, and controls the shift point according to the driver's habits and road conditions. As a result, fuel efficiency and drive axle performance are improved.

By controlling the engine and the drive axle simultaneously, the impact of gear shifting can be reduced.

TCU has a self-diagnosis function.

Symptom chart

Fault		Possible location
Failure to move	No movement in D position	• Odd/even-numbered clutch solenoid valve hydraulic circuit • Solenoid valve harness and connector failure • TCU • Brake signal (ESP/EPB signal) • Insufficient ATF or scorching smell of ATF • Water in ATF, incorrect ATF model • Odd/even-numbered clutch plates • Hydraulic module • Internal parts of transmission
	No movement in R position	• Odd-numbered clutch solenoid valve hydraulic circuit • Solenoid valve harness and connector fault • TCU • Brake signal (ESP/EPB signal) • Insufficient ATF or scorching smell of ATF • Water in ATF, incorrect ATF model • Odd-numbered clutch plate • Hydraulic module • Internal parts of transmission
Delay	N → D	• Battery voltage out of limit • Odd-numbered clutch solenoid valve hydraulic circuit • Oil temperature sensor • Solenoid valve harness and connector fault • TCU • Insufficient ATF or scorching smell of ATF • Water in ATF, incorrect ATF model • Hydraulic module • Internal parts of transmission
	N → R	• Battery voltage out of limit • Odd-numbered clutch solenoid valve hydraulic circuit • Oil temperature sensor • Solenoid valve harness and connector fault • TCU • Insufficient ATF or scorching smell of ATF • Water in ATF, incorrect ATF model • Hydraulic module • Internal parts of transmission

Fault		Possible location
Engine start failure		• Engine failure • Odd/even-numbered clutch solenoid valve harness and connector failure • TCU • P/N gear signal fault
Poor acceleration		• Engine failure • Clutch pressure solenoid valve hydraulic circuit • TCU • Hydraulic module
Engine stall	N → D， N → R	• Engine failure • Clutch pressure solenoid valve hydraulic circuit • TCU • Hydraulic module • Internal parts of transmission
	Insufficient power	• Clutch overtemperature • All situations that cause a limit torque to be sent to the EMS
Failure to upshift or downshift		• Multi-way valve 1 solenoid valve hydraulic circuit • Multi-way valve 2 solenoid valve hydraulic circuit • Gearshift solenoid valve 1 hydraulic circuit • Gearshift solenoid valve 2 hydraulic circuit • Odd/even-numbered clutch solenoid valve hydraulic circuit • Solenoid valve harness and connector fault • TCU • Engine speed signal • Accelerator pedal position signal • Engine torque signal • Brake signal (ESP/EPB signal) • Transmission output shaft speed signal • TCU torque reduction request signal • Insufficient ATF or scorching smell of ATF • Water in ATF, incorrect ATF model • Hydraulic module • Internal parts of transmission

Fault	Possible location
Odd-numbered shaft gear position unavailable	• Odd-numbered clutch solenoid valve hydraulic circuit • Odd-numbered clutch solenoid valve harness and connector fault • Odd-numbered clutch oil pressure sensor • Odd-numbered clutch oil pressure sensor harness and connector fault • Shift fork position sensor 5-1 • Shift fork position sensor 7-3 • Shift fork position sensor R-6(R) • Fork 5-1 • Fork 7-3 • Fork R-6 (R) • Internal parts of transmission
Even-numbered shaft gear position unavailable	• Even-numbered clutch solenoid valve hydraulic circuit • Even-numbered clutch solenoid valve harness and connector fault • Even-numbered clutch oil pressure sensor • Even-numbered clutch oil pressure sensor harness and connector fault • Shift fork position sensor 2-4 • Shift fork position sensor R-6(6) • Fork 2-4 • Fork R-6 (6) • Internal parts of transmission
Engine braking failure	• Odd/even-numbered clutch solenoid valve hydraulic circuit • Odd/even-numbered clutch solenoid valve cable failure • Engine speed signal • Accelerator pedal position signal • Engine torque signal • Engine coolant temperature signal • Brake switch signal • Transmission output shaft speed signal • TCU torque reduction signal • Insufficient ATF or scorching smell of ATF • Water in ATF, incorrect ATF model • Hydraulic module • Internal parts of transmission

Fault	Possible location
Downshift failure	• Engine speed signal • Accelerator pedal position signal • Engine torque signal • Transmission output shaft speed signal • TCU torque reduction signal • Insufficient ATF or scorching smell of ATF • Water in ATF, incorrect ATF model • Hydraulic module • Internal parts of transmission
Unstable fuel efficiency	• Engine failure • Engine speed signal • Accelerator pedal signal • Engine torque signal • Engine coolant temperature signal • Brake switch signal • Transmission output shaft speed signal • TCU torque reduction signal • Insufficient ATF or scorching smell of ATF • Water in ATF, incorrect ATF model • Hydraulic module • Internal parts of transmission
Unstable gear shifting	• Transmission output shaft speed sensor • Transmission even/odd-numbered input shaft speed sensor • Solenoid valve cable failure • Oil temperature sensor • TCU • Engine speed signal • Accelerator pedal signal • Engine torque signal • Brake master cylinder pressure signal • Brake switch signal • TCU torque reduction signal • Clutch solenoid valve hydraulic circuit • Insufficient ATF or scorching smell of ATF • Water in ATF, incorrect ATF model • Hydraulic module
Manual gear shifting failure	• EGSM assembly • Shifter assembly wire fault • TCU

Fault		Possible location
Impact of gear shifting	N → D	• Engine failure • Battery voltage out of limit • Transmission even/odd-numbered input shaft speed sensor • Output shaft speed sensor • Solenoid valve cable failure • Even/odd-numbered clutch solenoid valve hydraulic circuit • Oil temperature sensor • TCU • Accelerator pedal signal • Engine torque signal • Engine coolant temperature signal • Brake master cylinder pressure signal • Brake switch signal • Vehicle speed signal • TCU torque reduction signal • Hydraulic module • Internal parts of transmission • Clutch plate
	N → R	
	First gear → second gear, second gear → first gear	
	Second gear → third gear, third gear → second gear	
	Third gear → fourth gear, fourth gear → third gear	
	Fourth gear → fifth gear, fifth gear → fourth gear	
	Fifth gear → sixth gear, sixth gear → fifth gear	
	Sixth gear → seventh gear, seventh gear → sixth gear	
	Forced downshift	

Data recorder/freeze frame data

1. Data recorder

Hint:

Reading data flow by using HQ-VDS, the values or states of switch, sensor, actuator, and other items can be read. There is no need to remove any parts for this method, which can save diagnosis time.

Diagnostic information	Actual physical range	Unit
Battery voltage	0 ~ 15	V
Accelerator pedal position	0 ~ 100	%
Braking state	0 ~ 1	0: No braking 1: Brake enabled
Parking braking state	0 ~ 1	0: No parking brake 1: Parking brake enabled
Engine speed	0 ~ +9000	Rpm
Target idle speed	0 ~ +9000	Rpm
Engine torque	-1000 ~ +1000	Nm
Engine demand torque	-1000 ~ +1000	Nm
Engine coolant temperature	-200 ~ +200	℃
Vehicle speed	0 ~ 327.65	Km/h
Fuel cutoff mark	0 ~ 1	0: no fuel cutoff 1: Fuel cut-off
Ignition switch status	0 ~ 1	0: ignition switch OFF 1: ignition switch ON
P/N gear position signal output	0 ~ 1	0: Starter switch is OFF 1: Starter switch is ON
PRND position	1 ~ 255	1: P (parking) 2: R (reverse gear) 3: N (neutral gear) 4: D (drive position) 5: M (M mode) 6: M+ (M+) 7: M- (M-) 255: Undefined (no definition)
Driving mode	1 ~ 8	1: Economy driving mode 2: Manual mode 3: Sport mode 4: Snow mode 5: Manual upshift 6: Manual downshift
Hydraulic oil temperature	-200 ~ +200	℃
Fork 1 position sensor voltage	0 ~ 15	V
Fork 2 position sensor voltage	0 ~ 15	V

Diagnostic information	Actual physical range	Unit
Fork 3 position sensor voltage	0 ~ 15	V
Fork 4 position sensor voltage	0 ~ 15	V
Odd-numbered shaft speed	0 ~ +9000	rpm
Even-numbered shaft speed	0 ~ +9000	rpm
Output shaft speed	0 ~ +9000	rpm
Vehicle travel direction	0 ~ 1	0: Backward 1: Forward
Required odd-numbered clutch pressure	0 ~ 30	bar
Actual odd-numbered clutch pressure	0 ~ 30	bar
Desired even-numbered clutch pressure	0 ~ 30	bar
Actual even-numbered clutch pressure	0 ~ 30	bar
Solenoid valve VFS1 current	0 ~ 2	A
Solenoid valve VFS2 current	0 ~ 2	A
Solenoid valve VBS1 current	0 ~ 2	A
Solenoid valve VBS2 current	0 ~ 2	A
Solenoid valve Act1 current	0 ~ 2	A
Solenoid valve Act2 current	0 ~ 2	A
Solenoid valve Mul1 current	0 ~ 2	A
Solenoid valve Mul2 current	0 ~ 2	A
Solenoid valve HS1 closed state	0 ~ 255	0: High side open 1: High side closed
Solenoid valve HS2 closed state	0 ~ 255	0: High side open 1: High side closed
Solenoid valve HS3 closed state	0 ~ 255	0: High side open 1: High side closed
Demand gear position after TCU calculation	0 ~ 255	1: 1st gear 2: 2nd gear 3: 3rd gear 4: 4th gear 5: 5th gear 6: 6th gear 7: 7th gear 8: Reverse gear 255: Neutral gear

Diagnostic information	Actual physical range	Unit
Current actual gear position	0 ~ 255	1: 1st gear 2: 2nd gear 3: 3rd gear 4: 4th gear 5: 5th gear 6: 6th gear 7: 7th gear 8: Reverse gear 255: Neutral gear
Odd-numbered clutch oil state	0 ~ 255	1: Draining completed 2: Draining 3: Wait for oil filling 4: Rapid oil filling 5: Oil filling 6: End of oil filling
Even-numbered clutch oil state	0 ~ 255	1: Draining completed 2: Draining 3: Wait for oil filling 4: Rapid oil filling 5: Oil filling 6: End of oil filling
ESP status (prohibition of gear shifting)	0 ~ 1	0: Release prohibition of gear shifting 1: Prohibition of gear shifting
Fork 1 learning position lower limit	0 ~ 15	V
Fork 1 learning position upper limit	0 ~ 15	V
Fork 2 learning position lower limit	0 ~ 15	V
Fork 2 learning position upper limit	0 ~ 15	V
Fork 3 learning position lower limit	0 ~ 15	V
Fork 3 learning position upper limit	0 ~ 15	V
Fork 4 learning position lower limit	0 ~ 15	V
Fork 4 learning position upper limit	0 ~ 15	V
Shift mode	0 ~ 255	1: No shift 2: Shift stop 3: Shift preparation 4: Clutch switching phase 5: Engine synchronization phase 6: Engine synchronization and clutch switching
Current controlled axis	0 ~ 255	1: Odd-numbered shaft 2: Even-numbered shaft 3: None 4: Two shafts

Diagnostic information	Actual physical range	Unit
Control strategy requirement gear position	0 ~ 255	1: 1st gear 2: 2nd gear 3: 3rd gear 4: 4th gear 5: 5th gear 6: 6th gear 7: 7th gear 8: Reverse gear 255: Neutral gear
Launch status	0 ~ 255	1: Vehicle stop 2: Start preparation 3: Start without accelerator 4: Uncreep stage 5: Start with accelerator 6: Unlaunch stage 7: Acceleration 8: Deceleration
Engine requirements of TCU	0 ~ 255	1: No engine request 2: speed control 3: Increased torsion 4: Torque reduction 5: Zero torque 6: Torque limitation
Gear shift control mode	0 ~ 255	1: Initial status 2: Normal 3: Try to engage gear 4: Try to engage neutral gear 5: Unexpected skipping into neutral gear and re-engagement 6: Fault 7: Non-transmission power shaft fault recovery
Gear shift control status	0 ~ 255	1: No shift 2: In gear 3: Out of gear
Gear is engaged	0 ~ 255	1: 1st gear 2: 2nd gear 3: 3rd gear 4: 4th gear 5: 5th gear 6: 6th gear 7: 7th gear 8: Reverse gear 255: Neutral gear

Diagnostic information	Actual physical range	Unit
Gear engagement stage	0 ~ 255	1: No gear engaged stage 2: Wait for pressure to build up 3: Gear engagement stage 4: In gear 5: Gear engagement completed
Clutch target slip	0 ~ +9000	Rpm
Clutch actual slip	0 ~ +9000	Rpm
Odd-numbered clutch required torque	0 ~ +1000	Nm
Even-numbered clutch required torque	0 ~ +1000	Nm
Clutch control mode	0 ~ 255	1: Normal 2: Torque reduction 3: Clutch ready to open 4: Clutch open
Odd-numbered clutch spring pressure	0 ~ 30	Bar
Even-numbered clutch spring pressure	0 ~ 30	Bar
Transmission mileage	0 ~ 4294967.296	Km
Effective state of 1st gear	1 ~ 255	1: 1st gear position normal 2: 1st gear position shift failure 3: 1 shift fork stuck between two gears 4: Stuck in 1st gear position 5: 1st gear position not available 5: 1st gear disengagement failure 7: 1st gear out of position
Effective state of 2nd gear	1 ~ 255	1: 2nd gear position normal 2: 2nd gear position shift failure 3: 2 shift fork stuck between two gears 4: Stuck in 2nd gear position 5: 2nd gear position not available 6: 2nd gear disengagement failure 7: 2nd gear out of position
Effective state of 3rd gear	1 ~ 255	1: 3rd gear position normal 2: 3rd gear position shift failure 3: 3 shift fork stuck between two gears 4: Stuck in 3rd gear position 5: 3rd gear position not available 6: 3rd gear disengagement failure 7: 3rd gear out of position
Effective state of 4th gear	1 ~ 255	1: 4th gear position normal 2: 4th gear position shift failure 3: 4 shift fork stuck between two gears 4: Stuck in 4th gear position 5: 4th gear position not available 6: 4th gear disengagement failure 7: 4th gear out of position

Diagnostic information	Actual physical range	Unit
Effective state of 5th gear	1 ~ 255	1: 5th gear position normal 2: 5th gear position shift failure 3: 5 shift fork stuck between two gears 4: Stuck in 5th gear position 5: 5th gear position not available 6: 5th gear disengagement failure 7: 5th gear out of position
Effective state of 6th gear	1 ~ 255	1: 6th gear position normal 2: 6th gear position shift failure 3: 6 shift fork stuck between two gears 4: Stuck in 6th gear position 5: 6th gear position not available 6: 6th gear disengagement failure 7: 6th gear out of position
Effective state of 7th gear	1 ~ 255	1: 7th gear position normal 2: 7th gear position shift failure 3: 7 shift fork stuck between two gears 4: Stuck in 7th gear position 5: 7th gear position not available 6: 7th gear disengagement failure 7: 7th gear out of position
Effective state of R gear	1 ~ 255	1: R gear position normal 2: R gear position shift failure 3: R shift fork stuck between two gears 4: Stuck in R gear position 5: R gear position not available 6 : R gear disengagement failure 7: R gear out of position
Fork 1 motion state	1 ~ 255	1: Fork 1 in the middle position 2: Fork 1 off the middle position 3: Fork 1 in wrong position 4: The moving direction of shift fork 1 is wrong 5: fork 1 moving in the right direction 6: Fork 1 in required engagement gear 7: Fork 1 position sensor failure
Fork 2 motion state	1 ~ 255	1: Fork 2 in the middle position 2: Fork 2 off the middle position 3: Fork 2 in wrong position 4: The moving direction of shift fork 2 is wrong 5: fork 2 moving in the right direction 6: Fork 2 in required engagement gear 7: Fork 2 position sensor failure

Diagnostic information	Actual physical range	Unit
Fork 3 motion state	1 ~ 255	1: Fork 3 in the middle position 2: Fork 3 off the middle position 3: Fork 3 in wrong position 4: The moving direction of shift fork 3 is wrong 5: fork 3 moving in the right direction 6: Fork 3 in required engagement gear 7: Fork 3 position sensor failure
Fork 4 motion state	1 ~ 255	1: Fork 4 in the middle position 2: Fork 4 off the middle position 3: Fork 4 in wrong position 4: The moving direction of shift fork 4 is wrong 5: fork 4 moving in the right direction 6: Fork 4 in required engagement gear 7: Fork 4 position sensor failure
Multi-way valve 1 valid status	1 ~ 255	1: The multi-way valve 1 is faulty and can only be in open state 5: The multi-way valve 1 is faulty and can only be in closed state 6: multi-way valve 1 valid
Multi-way valve 2 valid status	1 ~ 255	1: The multi-way valve 2 is faulty and can only be in open state 5: The multi-way valve 2 is faulty and can only be in closed state 6: multi-way valve 2 valid
Engaged gear of odd-numbered shaft	1 ~ 255	1: 1st gear 2: 2nd gear 3: 3rd gear 4: 4th gear 5: 5th gear 6: 6th gear 7: 7th gear 8: Reverse gear 255: Neutral gear
Engaged gear of even-numbered shaft	1 ~ 255	1: 1st gear 2: 2nd gear 3: 3rd gear 4: 4th gear 5: 5th gear 6: 6th gear 7: 7th gear 8: Reverse gear 255: Neutral gear

Diagnostic information	Actual physical range	Unit
Odd-numbered shaft requirement gear position	1 ~ 255	1: 1st gear 2: 2nd gear 3: 3rd gear 4: 4th gear 5: 5th gear 6: 6th gear 7: 7th gear 8: Reverse gear 255: Neutral gear
Even-numbered shaft requirement gear position	1 ~ 255	1: 1st gear 2: 2nd gear 3: 3rd gear 4: 4th gear 5: 5th gear 6: 6th gear 7: 7th gear 8: Reverse gear 255: Neutral gear
Preselected gear position	1 ~ 255	1: 1st gear 2: 2nd gear 3: 3rd gear 4: 4th gear 5: 5th gear 6: 6th gear 7: 7th gear 8: Reverse gear 255: Neutral gear
Commanded gear of odd-numbered shaft	1 ~ 255	1: 1st gear 2: 2nd gear 3: 3rd gear 4: 4th gear 5: 5th gear 6: 6th gear 7: 7th gear 8: Reverse gear 255: Neutral gear
Commanded gear of even-numbered shaft	1 ~ 255	1: 1st gear 2: 2nd gear 3: 3rd gear 4: 4th gear 5: 5th gear 6: 6th gear 7: 7th gear 8: Reverse gear 255: Neutral gear
Observed torque	-1000 ~ +1000	Nm

Diagnostic information	Actual physical range	Unit
Fork 1 learning position lower limit status	0 ~ 1	0: Normal 1: Out of limit
Fork 1 learning position upper limit status	0 ~ 1	0: Normal 1: Out of limit
Fork 2 learning position lower limit status	0 ~ 1	0: Normal 1: Out of limit
Fork 2 learning position upper limit status	0 ~ 1	0: Normal 1: Out of limit
Fork 3 learning position lower limit status	0 ~ 1	0: Normal 1: Out of limit
Fork 3 learning position upper limit status	0 ~ 1	0: Normal 1: Out of limit
Fork 4 learning position lower limit status	0 ~ 1	0: Normal 1: Out of limit
Odd-numbered clutch kisspoint point	0 ~ 41.943	bar
Even-numbered clutch kisspoint	0 ~ 41.943	bar
Odd-numbered clutch kisspoint status	0 ~ 2	0: Normal 1: Out of limit 2: Condition not satisfied
Even-numbered clutch kisspoint status	0 ~ 2	0: Normal 1: Out of limit 2: Condition not satisfied
Shift time	0 ~ 1000	10ms
Lubricant flow	0 ~ 128	LPM
Main oil circuit command pressure	0 ~ 41.943	bar
Voltage of the odd-numbered clutch pressure sensor	0 ~ 5	V
Voltage of the even-numbered clutch pressure sensor	0 ~ 5	V

2. Freeze frame data

Hint:

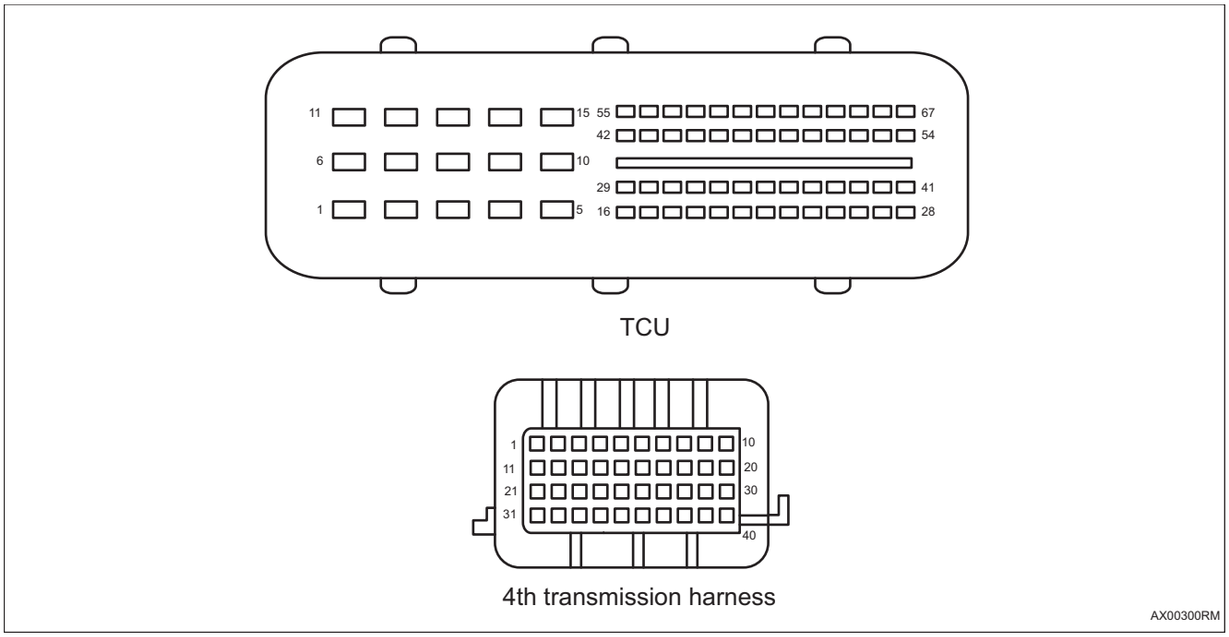
use the HQ-VDS to read the freeze frame data, and view the values and status of switches, sensors, actuators and other items in case of failure. There is no need to remove any parts for this method, which can save diagnosis time.

AX

Data item	Unit
Battery voltage	[V]
Transmission mileage	[km]
Accelerator pedal position	[%]
Engine speed	[rpm]
Engine torque	[Nm]

Data item	Unit
Hydraulic oil temperature	[C]
5th-1st shift fork position 1	[V]
2nd-4th shift fork position 2	[V]
R-6th shift fork position 3	[V]
7th-3rd shift fork position 4	[V]
Odd-numbered shaft speed	[rpm]
Even-numbered shaft speed	[rpm]
Output shaft speed	[rpm]
Actual odd-numbered clutch pressure	[bar]
Actual even-numbered clutch pressure	[bar]
Solenoid valve VFS1 current	[A]
Solenoid valve VFS2 current	[A]
Solenoid valve VBS1 current	[A]
Solenoid valve VBS2 current	[A]
Solenoid valve Act1 current	[A]
Solenoid valve Act2 current	[A]
Solenoid valve Mul1 current	[A]
Solenoid valve Mul2 current	[A]
Current actual gear position	—
Solenoid valve fault information (only stored when a fault is in solenoid valve, and different information is stored for different solenoid valve)	—
Internal code	—

ECU terminal



TCU and 4th transmission harness		
TCU pin number	**DEFINITIONS**	**4th transmission harness pin No.**
1	—	—
2	—	—
3	—	—
4	Multi-way valve 2 low side drive	24
5	Ground	—
6	High side drive 3 (corresponding to even-numbered clutch pressure solenoid valve and lubricant flow solenoid valve low side drive)	29、31
7	Ground	—
8	Gearshift solenoid valve 1(pwm)	14
9	Gearshift solenoid valve 2(pwm)	21
10	Multi-way valve 1(on/off)	38
11	High end drive 1	13、22、23、39
12	High end drive 2	15、30
13	—	—
14	—	—
15	B+	—
16	—	—
17	—	—
18	—	—
19	CAN-H	—
20	CAN-L	

TCU and 4th transmission harness		
TCU pin number	**DEFINITIONS**	**4th transmission harness pin No.**
21	—	—
22	—	—
23	—	—
24	5 V sensor ground 2	12、20
25	—	—
26	—	—
27	—	—
28	—	—
29	—	—
30	—	—
31	—	—
32	IG	—
33	Main transmission fluid circuit pressure solenoid valve (pwm)	16
34	—	—
35	—	—
36	—	—
37	—	—
38	Transmission fluid sump temperature signal (analog)	11
39	—	—
40	—	—
41	—	—
42	5 V sensor power supply 1	37
43	8 V sensor power supply 1	—
44	Even-numbered clutch pressure solenoid valve (pwm)	28
45	Lubricant flow solenoid valve (pwm)	25
46	—	—
47	—	—
48	Odd-numbered clutch pressure solenoid valve (pwm)	17
49	5 V sensor ground 1	36
50	Odd-numbered clutch oil pressure signal (analog quantity)	40
51	Even-numbered clutch fluid pressure signal (analog quantity)	18
52	—	—
53	8 V sensor power supply 2	—
54	5 V sensor power supply 2	19
55	—	—
56	—	—
57	Shift fork position sensor 1 signal (analog)	32

TCU and 4th transmission harness		
TCU pin number	**DEFINITIONS**	**4th transmission harness pin No.**
58	Shift fork position sensor 4 signal (analog)	35
59	Output shaft with direction and speed signals	—
60	—	—
61	—	—
62	Even-numbered input shaft speed signal	—
63	Odd-numbered input shaft speed signal	—
64	Shift fork position sensor 2 signal (analog)	33
65	Shift fork position sensor 3 signal (analog)	34
66	—	—
67	—	—
68	—	—

DTC priority

1. **The DTCs are divided into 8 failure levels. The failure level 1 has the highest priority and failure level 8 has the lowest priority. When there are multiple DTCs, the higher failure level should be handled first until all failures have disappeared. The failure levels can be obtained directly from the HQ-VDS DTC Description.**
2. **The DTC level are classified as follows. When there are multiple faults with the same failure level in the system, please handle them in the order shown in the following figure.**

DTC level	DTC category	DTC
Level 1	TCU power supply input fault (battery voltage fault)	P088317: Battery overvoltage
		P088216: Battery undervoltage

DTC level	DTC category	DTC
Level 2	TCU output sensor power supply failure (5V or 8V power supply group fault)	P1C1414: 5v sensor bank 1 power supply SCG fault
		P1C1512: 5v sensor bank 1 power supply SCB fault
		P1C1617: 5v sensor bank 1 power supply undervoltage
		P1C1716: 5v sensor bank 1 power supply overvoltage
		P1C1814: 5v sensor bank 2 power supply SCG fault
		P1C1912: 5v sensor bank 2 power supply SCB fault
		P1C1A17: 5v sensor bank 2 power supply undervoltage
		P1C1B16: 5v sensor bank 2 power supply overvoltage
		P1C1C14: 8v sensor bank 1 power supply SCG fault
		P1C1D12: 8v sensor bank 1 power supply SCB fault
		P1C1E17: 8v sensor bank 1 power supply undervoltage
		P1C1F16: 8v sensor bank 1 power supply overvoltage
		P1C2014: 8v sensor bank 2 power supply SCG fault
		P1C2112: 8v sensor bank 2 power supply SCB fault
		P1C2217: 8v sensor bank 2 power supply undervoltage
		P1C2316: 8v sensor bank 2 power supply overvoltage
Level 3	TCU sensor input interface abnormal (electrical fault of oil temperature sensor)	P071317: oil temperature sensor sampling voltage high
		P071216: oil temperature sensor sampling voltage low
	TCU sensor input interface abnormal (electrical fault of pressure sensor)	P084317: odd-numbered clutch pressure sensor sampling voltage too high
		P084216: Odd-numbered clutch pressure sensor sampling voltage low
		P084817: even-numbered clutch pressure sensor sampling voltage high
		P084716: even-numbered clutch pressure sensor sampling voltage low

DTC level	DTC category	DTC
Level 3	TCU sensor input interface abnormal (electrical fault of shift fork position sensor)	P283417: fork position sensor 1 sampling voltage high
		P283316: fork position sensor 1 sampling voltage low
		P283917: fork position sensor 2 sampling voltage high
		P283816: fork position sensor 2 sampling voltage low
		P283 E17: fork position sensor 3 sampling voltage high
		P283 D16: fork position sensor 3 sampling voltage low
		P284317: fork position sensor 4 sampling voltage high
		P284216: fork position sensor 4 sampling voltage low
	TCU sensor input interface abnormal (electrical fault of speed sensor)	P072012: output shaft speed sensor circuit shorted to power supply
		P072114: output shaft speed sensor circuit shorted to ground/open
		P072329: output shaft speed sensor implausible
		P077A31: output speed direction signal lost
		P077B29: output speed direction signal failure
		P071512: odd-numbered clutch speed sensor circuit shorted to power supply
		P071614: odd-numbered clutch speed sensor circuit shorted to ground/open
		P276512: even-numbered clutch speed sensor circuit shorted to power supply
		P276614: even-numbered clutch speed sensor circuit shorted to ground/open
		P071829: odd-numbered clutch speed sensor not credible
		P276829: even-numbered clutch speed sensor implausible
	TCU sensor input interface abnormal (pressure sensor pressure implausible)	P1C2C29: odd-numbered clutch pressure value implausible
		P1C2D29: even-numbered clutch pressure value implausible

DTC level	DTC category	DTC
Level 4	TCU output interface abnormal (solenoid valve high side fault)	P1C0E12: solenoid valve high side 1 circuit shorted to power supply
		P1C0F11: solenoid valve high side 1 circuit shorted to ground
		P1C0A13: Solenoid valve high side 1 open circuit
		P1C1012: solenoid valve high side 2 circuit shorted to power supply
		P1C1111: solenoid valve high side 2 circuit shorted to ground
		P1C0B13: Solenoid valve high side 2 open circuit
		P1C1212: solenoid valve high side 3 circuit shorted to power supply
		P1C1311: solenoid valve high side 3 circuit shorted to ground
		P1C0C130: Solenoid valve high side 3 open circuit

DTC level	DTC category	DTC
Level 4	TCU output interface abnormal (solenoid valve low side fault)	P097412: main transmission fluid circuit solenoid valve circuit shorted to power supply
		P097311: main transmission fluid circuit solenoid valve circuit shorted to ground
		P097213: main transmission fluid circuit solenoid valve circuit open
		P1C4019: Main transmission fluid circuit solenoid valve feedback overcurrent
		P1C4118: Main transmission fluid circuit solenoid valve feedback undercurrent
		P1C431D: main transmission fluid circuit solenoid valve unexpected current failure
		P097712: lubrication solenoid valve circuit shorted to power supply
		P097611: lubrication solenoid valve circuit shorted to ground
		P097513: lubrication solenoid valve circuit open
		P1C4419: Lubrication solenoid valve feedback overcurrent
		P1C4518: Lubrication solenoid valve feedback overcurrent
		P1C471D: lubrication solenoid valve unexpected current failure
		P098012: even-numbered clutch solenoid valve circuit shorted to power supply
		P097911: Even-numbered clutch solenoid valve circuit shorted to ground
		P097813: even-numbered clutch solenoid valve circuit open
		P1C4819: Even-numbered clutch solenoid valve feedback overcurrent
		P1C4918: Even-numbered clutch solenoid valve feedback undercurrent
		P1C4B1D: even-numbered clutch solenoid valve unexpected current failure
		P098312: odd-numbered clutch solenoid valve circuit shorted to power supply
		P098211: Odd-numbered clutch solenoid valve circuit shorted to ground
		P098113: Odd-numbered clutch solenoid valve circuit open
		P1C4C19: Odd-numbered clutch solenoid valve feedback overcurrent
		P1C4E18: Odd-numbered clutch solenoid valve feedback undercurrent
		P1C511D: odd-numbered clutch solenoid valve unexpected current failure
		P099F12: Act1 solenoid valve circuit shorted to power supply

DTC level	DTC category	DTC
Level 4	TCU output interface abnormal (solenoid valve low side fault)	P099E11: Act1 solenoid valve circuit shorted to ground
		P099D13:Act1 solenoid valve open circuit
		P1C6019: Act1 solenoid valve feedback overcurrent
		P1C6118: Act1 solenoid valve feedback undercurrent
		P1C631D: Act1 solenoid valve unexpected current failure
		P098612: Act2 solenoid valve circuit shorted to power supply
		P098511: Act2 solenoid valve circuit shorted to ground
		P098413:Act2 solenoid valve open circuit
		P1C5219: Act2 solenoid valve feedback overcurrent
		P1C5318: Act2 solenoid valve feedback undercurrent
		P1C551D: Act2 solenoid valve unexpected current failure
		P099912: Mul1 solenoid valve circuit shorted to power supply
		P099811: Mul1 solenoid valve circuit shorted to ground
		P099713:Mul1 solenoid valve open circuit
		P1C5619: Mul1 solenoid valve feedback overcurrent
		P1C5718: Mul1 solenoid valve feedback undercurrent
		P1C591D: Mul2 solenoid valve unexpected current failure
		P099C12: Mul2 solenoid valve circuit shorted to power supply
		P099B11: Mul2 solenoid valve circuit shorted to ground
		P099A13:Mul2 solenoid valve open circuit
		P1C5A19: Mul2 solenoid valve feedback overcurrent
		P1C5B18: Mul2 solenoid valve feedback undercurrent
		P1C5D1D: Mul2 solenoid valve unexpected current failure

DTC level	DTC category	DTC
Level 5	CAN communication failure	U000188: Bus-Off fault
		U014687: TCU and GW communication loss
		U114687: GW message lost
		U010087: TCU and EMS communication loss
		U010387: TCU and EGSM communication loss
		U029187: TCU and ACM communication loss
		U112187: TCU and ESP communication loss
		U115587: TCU and IC communication loss
		U040182: EMS message count error
		U040183: EMS checksum error
		U041582: ESP message count error
		U041583: EMS checksum error
		U040186: EMS core signal invalid
		U041586: ESP core signal invalid
		U040486: EGSM core signal invalid
		U059286: ACM core signal invalid
		U0592F0: ACM NoConnection fault
Level 6	TCU control abnormal	P1C0049: System IPT initialization failure
		P1C0149: system OPS fault
		P1C0249: TCU hardware fault
		P1C0349: SPI communication failure
		P1C0449: accidental shutdown
		P1C0549: DN Test fault
		P1C0649: EN Test fault
		P1C4249: main transmission fluid circuit solenoid valve accidental shutdown
		P1C4649: lubrication solenoid valve accidental shutdown
		P1C4A49: even-numbered clutch solenoid valve accidental shutdown
		P1C4F49: odd-numbered clutch solenoid valve accidental shutdown
		P1C6249: Act1 solenoid valve accidental shutdown
		P1C5449: Act2 solenoid valve accidental shutdown
		P1C5849: Mul1 solenoid valve accidental shutdown
		P1C5C49: Mul2 solenoid valve accidental shutdown

DTC level	DTC category	DTC
Level 7	Clutch fork system fault (abnormal hydraulic data writing)	P1C9C00: Hydraulic data unwritten
	Clutch fork system fault (abnormal clutch pressure)	P285723: Odd-numbered clutch actual pressure far below estimated pressure
		P286B24: Odd-numbered clutch actual pressure far above estimated pressure
		P285823: Even-numbered clutch actual pressure far below estimated pressure
		P287324: Even-numbered clutch actual pressure far above estimated pressure
	Clutch fork system fault (temperature alarm fault)	P1C244B: Odd-numbered clutch overtemperature
		P1C254B: odd-numbered clutch temperature high
		P27854B: odd-numbered clutch temperature extremely high
		P1C264B: Even-numbered clutch overtemperature
		P1C274 B: even-numbered clutch temperature high
		P27874B: even-numbered clutch temperature extremely high
		P1C3700: 6th gear fault
		P1C284B: Oil temperature alarm
		P1C294B: Oil overtemperature
	Clutch fork system fault (abnormal fork position)	P1C6C77: 1st gear engagement failure
		P1C6D76: 1st gear travel jamming
		P1C6E71: 1st gear disengagement failure
		P1C6F07: 1st gear not available
		P1C7007: 1st gear disengagement failure
		P1C7176: 1st gear out of position
		P1C7277: 2nd gear engagement failure
		P1C7376: 2nd gear travel jamming
		P1C7471: 2nd gear disengagement failure
		P1C7507: 2nd gear not available
		P1C7607: 2nd gear disengagement failure
		P1C7776: 2nd gear out of position
		P1C7877: 3rd gear engagement failure
		P1C7976: 3rd gear travel jamming
		P1C7A71: 3rd gear disengagement failure
		P1C7B07: 3rd gear not available
		P1C7C07: 3rd gear disengagement failure
		P1C7D76: 3rd gear out of position
		P1C7E77: 4th gear engagement failure

DTC level	DTC category	DTC
Level 7	Clutch fork system fault (abnormal fork position)	P1C7F76: 4th gear travel jamming
		P1C8071: 4th gear disengagement failure
		P1C8107: 4th gear not available
		P1C8207: 4th gear disengagement failure
		P1C8376: 4th gear out of position
		P1C8477: 5th gear engagement failure
		P1C8576: 5th gear travel jamming
		P1C8671: 5th gear disengagement failure
		P1C8707: 5th gear not available
		P1C8807: 5th gear disengagement failure
		P1C8976: 5th gear out of position
		P1C8A77: 6th gear engagement failure
		P1C8B76: 6th gear travel jamming
		P1C8C71: 6th gear disengagement failure
		P1C8D07: 6th gear not available
		P1C8E07: 6th gear disengagement failure
		P1C8F76: 6th gear out of position
		P1C9077: 7th gear engagement failure
		P1C9176: 7th gear travel jamming
		P1C9271: 7th gear disengagement failure
		P1C9307: 7th gear not available
		P1C9407: 7th gear disengagement failure
		P1C9576: 7th gear out of position
		P1C9871: R gear disengagement failure
		P1C9907: R gear not available
		P1C9A07: R gear disengagement failure
		P1C9B76: R gear out of position
		P1C9677: R gear engagement failure
		P1C9776: R gear travel jamming

DTC level	DTC category	DTC
Level 8	Drive shaft system fault (drive shaft abnormal)	P1C6407: Odd-numbered gearshift shaft gear engagement failure
		P1C6507: odd-numbered gearshift shaft gear disengagement failure
		P1C6607: Odd-numbered drive shaft inoperative
		P1C6707: odd-numbered gearshift shaft without valid gear position
		P1C6807: Even-numbered gearshift shaft gear engagement failure
		P1C6907: even-numbered gearshift shaft gear disengagement failure
		P1C6A07: Even-numbered gearshift shaft inoperative
		P1C6B07: even-numbered gearshift shaft without valid gear position

Initialization

Notice:

If either of the transmission, transmission control unit (TCU) or TCU control software changes, confirm whether the calibration data in the TCU control software matches the transmission hydraulic module after replacement. After confirmation, vehicle test shall be carried out to complete the initial self-learning of shift fork position and clutch pressure.

1. Static test

(a) Power on the vehicle, set IG ON, connect the HQ-VDS, read the DTC, and eliminate the fault;

(b) SKA test: shift the SKA to P->R->N->D->M->(Tap +)->(Tap-)->D->N->R->P in sequence, and confirm it is correct through HQ-VDS.

2. Vehicle warm-up

(a) Increase the engine coolant temperature by idling the vehicle or performing an urban driving cycle. Make sure the engine coolant temperature is higher than 65 ℃. If the engine coolant temperature is lower than this temperature, self-learning operation cannot be performed.

3. Dynamic test

(a) Place the SKA at the "D" position, release the brake pedal, and depress the accelerator pedal until upshifting to the 7th gear. During the upshifting, keep each gear position for 5 seconds, and keep it for 30 seconds after the vehicle speed reaches 90 km/h;

(b) Release the accelerator pedal, coast to downshift for 60 seconds, and depress the brake pedal until the vehicle speed is 0;

(c) When the engine is at idle speed, push the SKA to the "R" position, release the brake pedal, keep the vehicle driving backward for 5 s, and depress the brake pedal until the vehicle speed is 0;

(d) Repeat the above steps 10 times.

The process of component repair and replacement

Caution:

If a fault is diagnosed in the transmission system, please make sure to follow the processing sequence shown in the table below after the repair or replacement of components. And make sure that there is no other operation between steps (e.g. stepping on the accelerator pedal in D gear position). Before repairing the components, please obtain the transmission assembly number in advance, which can be read in the serial number of the diagnostic scan tool module or obtained from the transmission case.

Repair or replacement of components	Treatment sequence and method
TCU software upgrade	• HQ-VDS-module reprogramming
Replace the TCU	• HQ-VDS-clear transmission characteristic data (clear old transmission characteristic data in TCU) • HQ-VDS -automatic configuration (writing configuration code) • HQ-VDS - DCT characteristic data writing (write all characteristic data of current transmission)
Replace the transmission	• HQ-VDS-clear transmission characteristic data (clear old transmission characteristic data in TCU) • characteristic data of old transmission in TCU) HQ-VDS - DCT characteristic data writing (write all characteristic data of the replacement transmission)

1. Module reprogramming (transmission software rewriting)

(a) Programming preparation: one diagnostic scan tool;

(b) Programming conditions: the vehicle ignition is powered on, at which point the instrument cluster lights up;

(1) The engine is not started;

(2) The gearshift lever is in the P gear position.

(c) Operation steps

(1) Connect the HQ-VDS;

(2) Follow the HQ-VDS prompts to reprogram the module;

(3) After the programming is completed, the HQ-VDS prompts that the programming is successful;

(4) Turn off the ignition to save the software automatically.

2. Automatic configuration (write transmission configuration information)

(a) Programming preparation

(1) One diagnostic scan tool.

(2) Transmission characteristic data file.

(b) Programming conditions

(1) The vehicle ignition switch is powered on, at which point the instrument cluster lights up;

(2) The engine is not started;

(3) The gearshift lever is in the P gear position.

(c) Operation steps

(1) Connect the HQ-VDS;

(2) Follow the HQ-VDS prompts to perform automatic configuration;

(3) After the configuration is completed, the HQ-VDS prompts that the programming is successful;

(4) Turn off the ignition to save the data automatically.

3. DCT characteristic data writing: the mechanical characteristics data of the DCT transmission is written in four categories: hydraulic characteristic data, clutch pressure self-learning data, shift fork position self-learning data and clutch spring pressure self-learning data. Each transmission has a separate set of characteristic data. When replacing the TCU or transmission, all characteristic data needs to be rewritten.

(a) Programming preparation

(1) One diagnostic scan tool;

(2) Transmission characteristic data file.

(b) Programming conditions

(1) The vehicle ignition switch is powered on, at which point the instrument cluster lights up;

(2) The engine is not started;

(3) The gearshift lever is in the P gear position.

(c) Operation steps

(1) Connect the HQ-VDS;

(2) Follow the HQ-VDS prompts to enter the transmission number for writing DCT feature data;

(3) After the programming is completed, the HQ-VDS prompts that the programming is successful;

(4) Turn off the ignition to save the data automatically.

4. Clear the transmission characteristic data: clear the transmission characteristic data saved in the TCU.

(a) Programming preparation

(1) One diagnostic scan tool;

(2) Transmission characteristic data file.

(b) Programming conditions

(1) The vehicle ignition switch is powered on, at which point the instrument cluster lights up;

(2) The engine is not started;

(3) The gearshift lever is in the P gear position.

(c) Operation steps

(1) Connect the HQ-VDS;

(2) Follow the HQ-VDS prompts to clear the transmission characteristic data;

(3) After the clearing is completed, the HQ-VDS prompts that the clearing is successful;

(4) Turn off the ignition to clear the data.

Transmission self-learning

Transmission characteristic data adjustment is required with the help of HQ-VDS when processing some DTCs. When there is driving difference before and after replacing the TCU or transmission, the self-learning can also be required for adjustment. Note: The self-learning sequence must be fork self-learning, clutch pressure self-learning, and clutch KissPoint point self-learning.

1. Shift fork position self-learning

(a) Programming preparation: one diagnostic scan tool;

(b) Programming conditions:

(1) Set the ignition switch to "ON";

(2) Start the engine and keep it at idle speed;

(3) The gearshift lever is in the N gear position;

(4) The vehicle is in braking state and keeps stationary;

(5) There is no DTC;

(6) The transmission fluid temperature is higher than 20°C.

(c) Operation steps:

(1) Connect the HQ-VDS;

(2) Operate the HQ-VDS to start the shift fork position self-learning;

(3) After the self-learning is completed, the HQ-VDS prompts that the self-learning is successful, and the process takes about 1 min;

(4) Turn off the ignition to save the data automatically.

2. Clutch pressure self-learning

(a) Programming preparation: one diagnostic scan tool;

(b) Programming conditions:

(1) Set the ignition switch to "ON";

(2) Start the engine and keep it at idle speed;

(3) The gearshift lever is in the N gear position;

(4) The vehicle is in braking state and keeps stationary;

(5) There is no DTC;

(6) The transmission fluid temperature is higher than 30°C.

(c) Operation steps:

(1) Connect the equipment;

(2) Operate the HQ-VDS to start the clutch pressure self-learning.

(3) After the learning is completed, the HQ-VDS prompts that the self-learning is successful, and the process takes about 5 min;

(4) Turn off the ignition to save the data automatically.

3. Clutch KissPoint self-learning

(a) Programming preparation: one diagnostic scan tool;

(b) Programming conditions:

(1) Set the ignition switch to "ON";

(2) Start the engine and keep it at idle speed;

(3) The gearshift lever is in the N gear position;

(4) The vehicle is in braking state and keeps stationary;

(5) There is no DTC;

(6) The transmission fluid temperature is higher than 40°C and less than 100°C.

(c) Operation steps:

(1) Connect the equipment;

(2) Operate the HQ-VDS to start the clutch KissPoint point self-learning;

(3) After the self-learning is completed, the HQ-VDS prompts that the self-learning is successful, and the process takes about 5 min;

(4) Turn off the ignition to save the self-learning data automatically.

DTC chart

DTC	Description	Reference page
P285723	Odd-numbered clutch actual pressure far below estimated pressure	(See page AX-216)
P286B24	Odd-numbered clutch actual pressure far above estimated pressure	(See page AX-216)
P285823	Even-numbered clutch actual pressure far below estimated pressure	(See page AX-219)
P287324	Even-numbered clutch actual pressure far above estimated pressure	(See page AX-219)
P071317	Oil temperature sensor sampling voltage high	(See page AX-51)
P071216	Oil temperature sensor sampling voltage low	(See page AX-48)
P084317	Odd-numbered clutch pressure sensor sampling voltage high	(See page AX-66)
P084216	Odd-numbered clutch pressure sensor sampling undervoltage	(See page AX-66)
P084817	Even-numbered clutch pressure sensor sampling overvoltage	(See page AX-71)
P084716	Even-numbered clutch pressure sensor sampling undervoltage	(See page AX-71)
P1C2C29	Odd-numbered clutch pressure value implausible	(See page AX-66)
P1C2D29	Even-numbered clutch pressure value implausible	(See page AX-71)
P283417	Fork position sensor 1 sampling voltage high	(See page AX-196)
P283316	Fork position sensor 1 sampling voltage low	(See page AX-196)
P283917	Fork position sensor 2 sampling voltage high	(See page AX-201)
P283816	Fork position sensor 2 sampling voltage low	(See page AX-201)
P283E17	Fork position sensor 3 sampling voltage high	(See page AX-206)
P283D16	Fork position sensor 3 sampling voltage low	(See page AX-206)
P284317	Fork position sensor 3 sampling voltage high	(See page AX-211)
P284216	Fork position sensor 4 sampling voltage low	(See page AX-211)
P072012	Output shaft speed sensor circuit shorted to power supply	(See page AX-59)
P072114	Output shaft speed sensor circuit shorted to ground/open	(See page AX-59)
P072329	Output shaft speed sensor implausible	(See page AX-64)
P077A31	Output shaft speed direction signal lost	(See page AX-64)
P077B29	Output shaft speed direction signal failure	(See page AX-64)
P071512	Odd-numbered clutch speed sensor circuit shorted to power supply	(See page AX-54)
P071614	Odd-numbered clutch speed sensor circuit shorted to ground/open	(See page AX-54)
P276512	Even-numbered clutch speed sensor circuit shorted to power supply	(See page AX-191)

DTC	Description	Reference page
P276614	Even-numbered clutch speed sensor circuit shorted to ground/open	(See page AX-191)
P097412	Main transmission fluid solenoid valve circuit shorted to power supply	(See page AX-80)
P097311	Main transmission fluid solenoid valve circuit shorted to ground	(See page AX-80)
P097213	Main transmission fluid circuit solenoid valve circuit	(See page AX-80)
P1C4019	Main transmission fluid circuit solenoid valve feedback overcurrent	(See page AX-80)
P1C4118	Main transmission fluid circuit solenoid valve feedback undercurrent	(See page AX-80)
P1C4249	Main transmission fluid circuit solenoid valve accidental shutdown	(See page AX-177)
P1C431D	Main transmission fluid circuit solenoid valve unexpected current failure	(See page AX-80)
P097712	Lubrication solenoid valve circuit shorted to power supply	(See page AX-85)
P097611	Lubrication solenoid valve circuit shorted to ground	(See page AX-85)
P097513	Lubrication solenoid valve circuit open	(See page AX-85)
P1C4419	Lubrication solenoid valve feedback overcurrent	(See page AX-85)
P1C4518	Lubrication solenoid valve feedback undercurrent	(See page AX-85)
P1C4649	Lubrication solenoid valve accidental shutdown	(See page AX-177)
P1C471D	Lubrication solenoid valve unexpected current failure	(See page AX-85)
P098012	Even-numbered clutch solenoid valve circuit shorted to power supply	(See page AX-90)
P097911	Even-numbered clutch solenoid valve circuit shorted to ground	(See page AX-90)
P097813	Even-numbered clutch solenoid valve circuit open	(See page AX-90)
P1C4819	Even-numbered clutch solenoid valve feedback overcurrent	(See page AX-90)
P1C4918	Even-numbered clutch solenoid valve feedback undercurrent	(See page AX-90)
P1C4A49	Even-numbered clutch solenoid valve accidental shutdown	(See page AX-177)
P1C4B1D	Even-numbered clutch solenoid valve unexpected current failure	(See page AX-90)
P098312	Odd-numbered clutch solenoid valve circuit shorted to power supply	(See page AX-95)
P098211	Odd-numbered clutch solenoid valve circuit shorted to ground	(See page AX-95)
P098113	Odd-numbered clutch solenoid valve circuit open	(See page AX-95)

DTC	Description	Reference page
P1C4C19	Odd-numbered clutch solenoid valve feedback overcurrent	(See page AX-95)
P1C4E18	Odd-numbered clutch solenoid valve feedback undercurrent	(See page AX-95)
P1C4F49	Odd-numbered clutch solenoid valve accidental shutdown	(See page AX-177)
P1C511D	Odd-numbered clutch solenoid valve unexpected current failure	(See page AX-95)
P099F12	Act1 solenoid valve circuit shorted to power supply	(See page AX-115)
P099E11	Act1 solenoid valve circuit shorted to ground	(See page AX-115)
P099D13	Act1 solenoid valve open circuit	(See page AX-115)
P1C6019	Act1 solenoid valve feedback overcurrent	(See page AX-115)
P1C6118	Act1 solenoid valve feedback undercurrent	(See page AX-115)
P1C6249	Act1 solenoid valve accidental shutdown	(See page AX-177)
P1C631D	Act1 solenoid valve unexpected current failure	(See page AX-115)
P098612	Act2 solenoid valve circuit shorted to power supply	(See page AX-100)
P098511	Act2 solenoid valve circuit shorted to ground	(See page AX-100)
P098413	Act2 solenoid valve open circuit	(See page AX-100)
P1C5219	Act2 solenoid valve feedback current too high	(See page AX-100)
P1C5318	Act2 solenoid valve feedback current too low	(See page AX-100)
P1C5449	Act2 solenoid valve accidental shutdown	(See page AX-177)
P1C551D	Act2 solenoid valve unexpected current failure	(See page AX-100)
P099912	Mul1 solenoid valve circuit shorted to power supply	(See page AX-105)
P099811	Mul1 solenoid valve circuit shorted to ground	(See page AX-105)
P099713	Mul1 solenoid valve open circuit	(See page AX-105)
P1C5619	Mul1 solenoid valve feedback current too high	(See page AX-105)
P1C5718	Mul1 solenoid valve feedback current too low	(See page AX-105)
P1C5849	Mul1 solenoid valve accidental shutdown	(See page AX-177)
P1C591D	Mul2 solenoid valve unexpected current failure	(See page AX-105)
P099C12	Mul2 solenoid valve circuit shorted to power supply	(See page AX-110)
P099B11	Mul2 solenoid valve circuit shorted to ground	(See page AX-110)
P099A13	Mul2 solenoid valve open circuit	(See page AX-110)
P1C5A19	Mul2 solenoid valve feedback current too high	(See page AX-110)
P1C5B18	Mul2 solenoid valve feedback current too low	(See page AX-110)

DTC	Description	Reference page
P1C5C49	Mul2 solenoid valve accidental shutdown	(See page AX-177)
P1C5D1D	Mul2 solenoid valve unexpected current failure	(See page AX-110)
P1C0E12	Solenoid valve high side 1 circuit shorted to power supply	(See page AX-130)
P1C0F11	Solenoid valve high side 1 circuit shorted to ground	(See page AX-130)
P1C0A13	Solenoid valve high side 1 open circuit	(See page AX-130)
P1C1012	Solenoid valve high side 2 circuit shorted to power supply	(See page AX-136)
P1C1111	Solenoid valve high side 2 circuit shorted to ground	(See page AX-136)
P1C0B13	Solenoid valve high side 2 open circuit	(See page AX-136)
P1C1212	Solenoid valve high side 3 circuit shorted to power supply	(See page AX-142)
P1C1311	Solenoid valve high side 3 circuit shorted to ground	(See page AX-142)
P1C0C13	Solenoid valve high side 3 open circuit	(See page AX-142)
P1C0049	System IPT initialization failure	(See page AX-177)
P1C0149	System OPS fault	(See page AX-177)
P1C0249	TCU hardware fault	(See page AX-177)
P1C0349	SPI communication failure	(See page AX-177)
P1C0449	Accidental shutdown	(See page AX-177)
P1C0549	DN Test fault	(See page AX-177)
P1C0649	EN Test fault	(See page AX-177)
P1C6407	Odd-numbered gearshift shaft gear engagement failure	(See page AX-180)
P1C6507	Odd-numbered gearshift shaft gear disengagement failure	(See page AX-180)
P1C6607	Odd-numbered drive shaft inoperative	(See page AX-180)
P1C6707	Odd-numbered gearshift shaft without valid gear position	(See page AX-180)
P1C6807	Even-numbered gearshift shaft gear engagement failure	(See page AX-180)
P1C6907	Even-numbered gearshift shaft gear disengagement failure	(See page AX-180)
P1C6A07	Even-numbered gearshift shaft inoperative	(See page AX-180)
P1C6B07	Even-numbered gearshift shaft without valid gear position	(See page AX-180)
P088317	Battery overvoltage	(See page AX-76)
P088216	Battery undervoltage	(See page AX-76)
P1C6C77	1st gear engagement failure	(See page AX-184)
P1C6D76	1st gear travel jamming	(See page AX-184)
P1C6E71	1st gear disengagement failure	(See page AX-184)
P1C6F07	1st gear not available	(See page AX-184)

DTC	Description	Reference page
P1C7007	1st gear disengagement failure	(See page AX-184)
P1C7176	1st gear out of position	(See page AX-184)
P1C7277	2nd gear engagement failure	(See page AX-184)
P1C7376	2nd gear travel jamming	(See page AX-184)
P1C7471	2nd gear disengagement failure	(See page AX-184)
P1C7507	2nd gear not available	(See page AX-184)
P1C7607	2nd gear disengagement failure	(See page AX-184)
P1C7776	2nd gear out of position	(See page AX-184)
P1C7877	3rd gear engagement failure	(See page AX-184)
P1C7976	3rd gear travel jamming	(See page AX-184)
P1C7A71	3rd gear disengagement failure	(See page AX-184)
P1C7B07	3rd gear not available	(See page AX-184)
P1C7C07	3rd gear disengagement failure	(See page AX-184)
P1C7D76	3rd gear out of position	(See page AX-184)
P1C7E77	4th gear engagement failure	(See page AX-184)
P1C7F76	4th gear travel jamming	(See page AX-184)
P1C8071	4th gear disengagement failure	(See page AX-184)
P1C8107	4th gear not available	(See page AX-184)
P1C8207	4th gear disengagement failure	(See page AX-184)
P1C8376	4th gear out of position	(See page AX-184)
P1C8477	5th gear engagement failure	(See page AX-184)
P1C8576	5th gear travel jamming	(See page AX-184)
P1C8671	5th gear disengagement failure	(See page AX-184)
P1C8707	5th gear not available	(See page AX-184)
P1C8807	5th gear disengagement failure	(See page AX-184)
P1C8976	5th gear out of position	(See page AX-184)
P1C8A77	6th gear engagement failure	(See page AX-184)
P1C8B76	6th gear travel jamming	(See page AX-184)
P1C8C71	6th gear disengagement failure	(See page AX-184)
P1C8D07	6th gear not available	(See page AX-184)
P1C8E07	6th gear disengagement failure	(See page AX-184)
P1C8F76	6th gear out of position	(See page AX-184)
P1C9077	7th gear engagement failure	(See page AX-184)
P1C9176	7th gear travel jamming	(See page AX-184)
P1C9271	7th gear disengagement failure	(See page AX-184)
P1C9307	7th gear not available	(See page AX-184)
P1C9407	7th gear disengagement failure	(See page AX-184)
P1C9576	7th gear out of position	(See page AX-184)
P1C9677	R gear engagement failure	(See page AX-184)

DTC	Description	Reference page
P1C9776	R gear travel jamming	(See page AX-184)
P1C9871	R gear disengagement failure	(See page AX-184)
P1C9907	R gear not available	(See page AX-184)
P1C9A07	R gear disengagement failure	(See page AX-184)
P1C9B76	R gear out of position	(See page AX-184)
P1C1414	5v sensor bank 1 power supply SCG fault	(See page AX-147)
P1C1512	5v sensor bank 1 power supply SCB fault	(See page AX-147)
P1C1617	5 v sensor bank 1 power supply undervolt-age	(See page AX-147)
P1C1716	5v sensor bank 1 power supply overvoltage	(See page AX-147)
P1C1814	5v sensor bank 2 power supply SCG fault	(See page AX-151)
P1C1912	5v sensor bank 2 power supply SCB fault	(See page AX-151)
P1C1A17	5 v sensor bank 2 power supply undervolt-age	(See page AX-151)
P1C1B16	5v sensor bank 2 power supply overvoltage	(See page AX-151)
P1C1C14	8v sensor bank 1 power supply SCG fault	(See page AX-155)
P1C1D12	8v sensor bank 1 power supply SCB fault	(See page AX-155)
P1C1E17	8v sensor bank 1 power supply undervoltage	(See page AX-155)
P1C1F16	8v sensor bank 1 power supply overvoltage	(See page AX-155)
P1C2014	8v sensor bank 2 power supply SCG fault	(See page AX-155)
P1C2112	8v sensor bank 2 power supply SCB fault	(See page AX-155)
P1C2217	8v sensor bank 2 power supply undervoltage	(See page AX-155)
P1C2316	8v sensor bank 2 power supply overvoltage	(See page AX-155)
P1C244B	Odd-numbered clutch temperature high	(See page AX-163)
P1C254B	Odd-numbered clutch temperature high	(See page AX-163)
P27854B	Odd-numbered clutch temperature extremely high	(See page AX-163)
P1C264B	Even-numbered clutch temperature extremely high	(See page AX-168)
P1C274B	Even-numbered clutch temperature high	(See page AX-168)
P27874B	Even-numbered clutch temperature extremely high	(See page AX-168)
P1C284B	Oil temperature alarm	(See page AX-173)
P1C294B	Oil overtemperature	(See page AX-173)
U000188	Bus-off fault	(See page AX-222)
U014687	TCU and GW communication loss	(See page AX-222)
U114687	GW message lost	(See page AX-222)
U010087	TCU and EMS communication loss	(See page AX-222)
U010387	TCU and EGSM communication loss	(See page AX-222)
U029187	TCU and ACM communication loss	(See page AX-222)
U112187	TCU and ESP communication loss	(See page AX-222)

DTC	Description	Reference page
U115587	TCU and IC communication loss	(See page AX-222)
U040182	EMS message count error	(See page AX-222)
U040183	EMS checksum error	(See page AX-222)
U041582	ESP message count error	(See page AX-222)
U041583	EMS checksum error	(See page AX-222)
U040186	EMS core signal invalid	(See page AX-222)
U041586	ESP core signal invalid	(See page AX-222)
U040486	EGSM core signal invalid	(See page AX-222)
U059286	ACM core signal invalid	(See page AX-222)
U0592F0	ACM NoConnection fault	(See page AX-222)
P1C9C00	Hydraulic data unwritten	(See page AX-222)
P071829	Odd-numbered clutch speed sensor implausible	(See page AX-54)
P276829	Even-numbered clutch speed sensor implausible	(See page AX-191)
P1C9E00	Pressure sensor type match failure	(See page AX-190)
P1C9D00	Hydraulic data mismatch with current valve body	(See page AX-189)

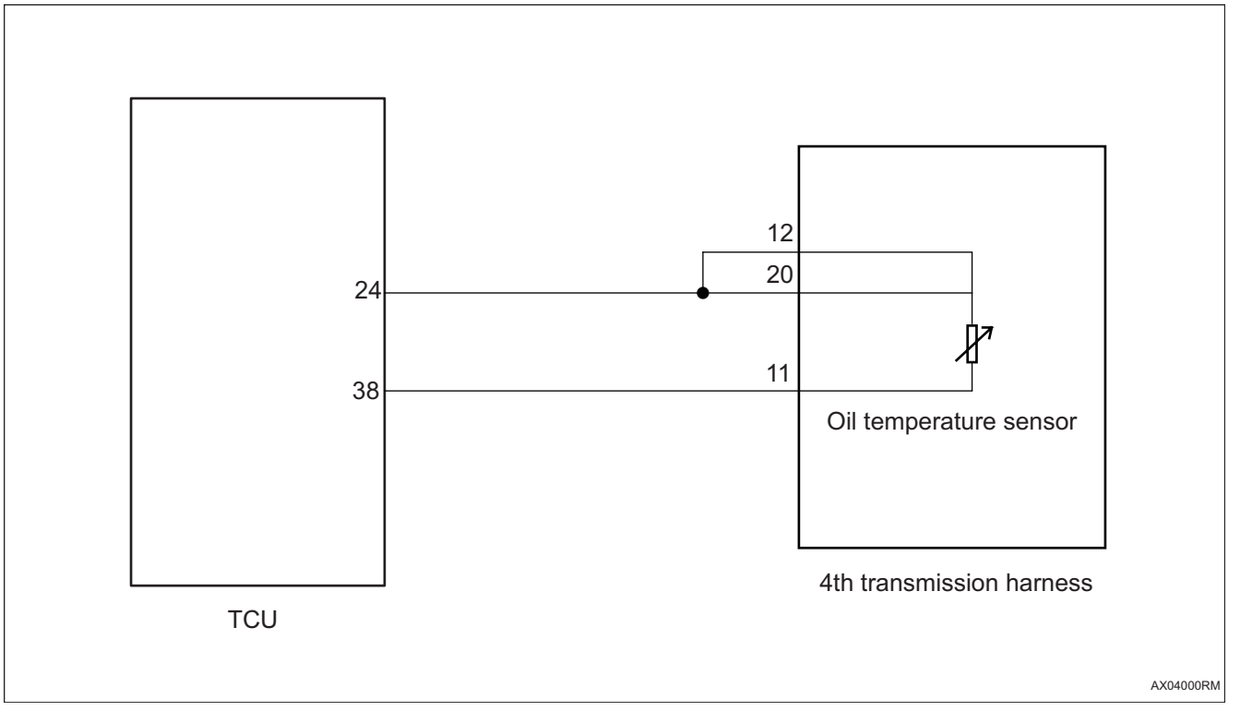
DTC	P071216	Oil temperature sensor sampling voltage low

Description

When the oil temperature sensor sampling voltage is too low, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P071216	(a) Oil temperature sensor sampling voltage low.	• TCU • Harness and connector • Oil temperature sensor

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

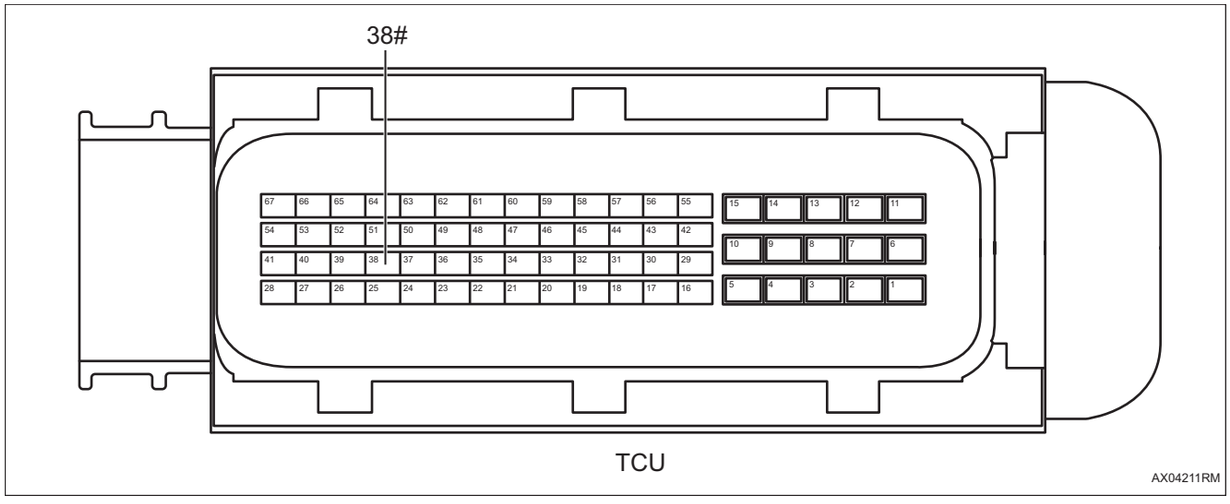
Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

2	**Check harness and connector for circuit shorted to ground (TCU-4th transmission harness)**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 38# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

AX

OK

3	**Replace the TCU (See page AX-224)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Return transmission to factory for repair (hydraulic module) (See page AX-229)**

Caution:

Before returning the transmission to the factory for repair, it is necessary to confirm whether it is a transmission problem according to the oil temperature sensor resistance in the table below.

Detector connection	Detection conditions	Specified value			
		Minimum Resistance(Ω)	Nominal Resistance(Ω)	Maximum Resistance(Ω)	Resistance Tol(±%)
4th transmission harness 11# -4th transmission harness 12 (or 20)#	-40 ℃	939900	1000000	1064000	6.40%
	-30 ℃	497200	525400	554900	5.61%
	-20 ℃	274500	288200	302400	4.93%
	-10 ℃	157400	164330	171400	4.30%
	0 ℃	93490	97040	100700	3.77%
	10 ℃	57300	59180	61080	3.21%
	20 ℃	36160	37160	38170	2.72%
	30 ℃	23320	23970	24620	2.71%
	40 ℃	15350	15850	16340	3.09%
	50 ℃	10340	10710	11090	3.55%
	60 ℃	7114	7398	7688	3.92%
	70 ℃	4991	5208	5431	4.28%
	80 ℃	3566	3733	3905	4.61%
	90 ℃	2590	2720	2855	4.96%
	100 ℃	1912	2013	2119	5.27%
	110 ℃	1432	1512	1596	5.56%
	120 ℃	1087	1151	1218	5.82%
	130 ℃	835.9	887.3	941.3	6.09%
	140 ℃	650.5	692.2	736.1	6.34%
	150 ℃	512.0	546.0	582.0	6.59%

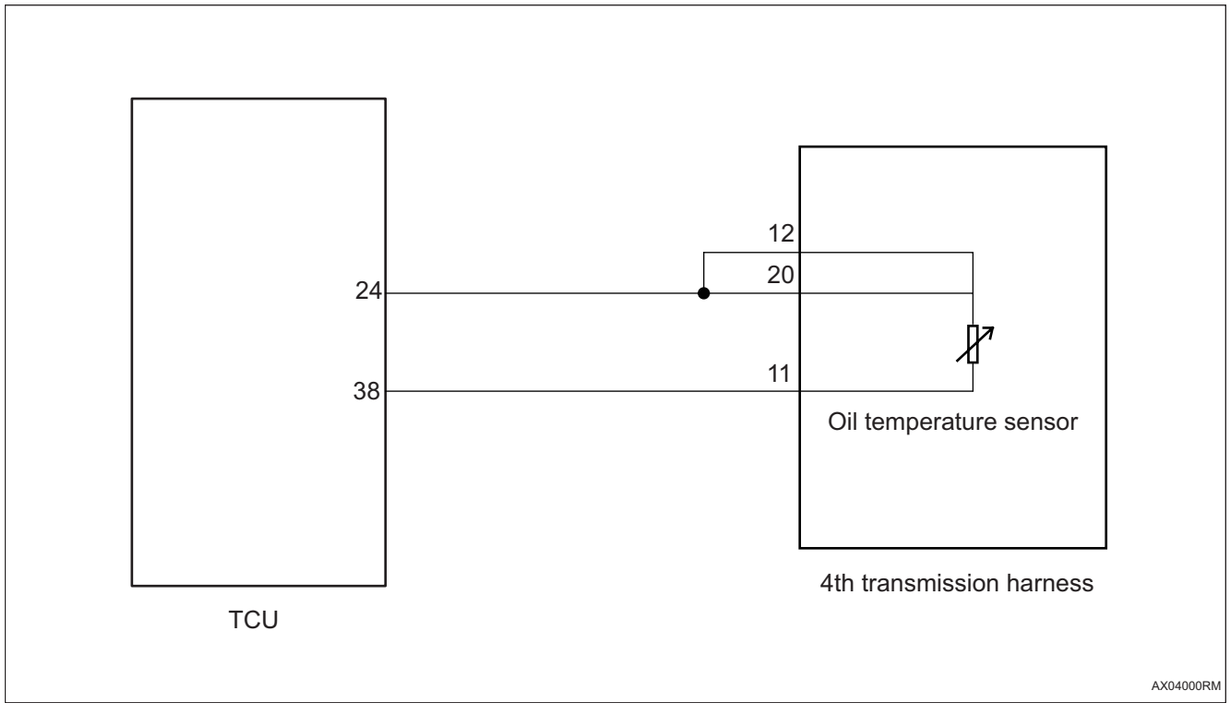
DTC	P071317	Oil temperature sensor sampling voltage high

Description

When the oil temperature sensor sampling voltage is too high, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P071317	(a) Oil temperature sensor sampling voltage high.	• TCU • Harness and connector • Oil temperature sensor

Circuit diagram



Inspection procedure

1	Perform basic inspection

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

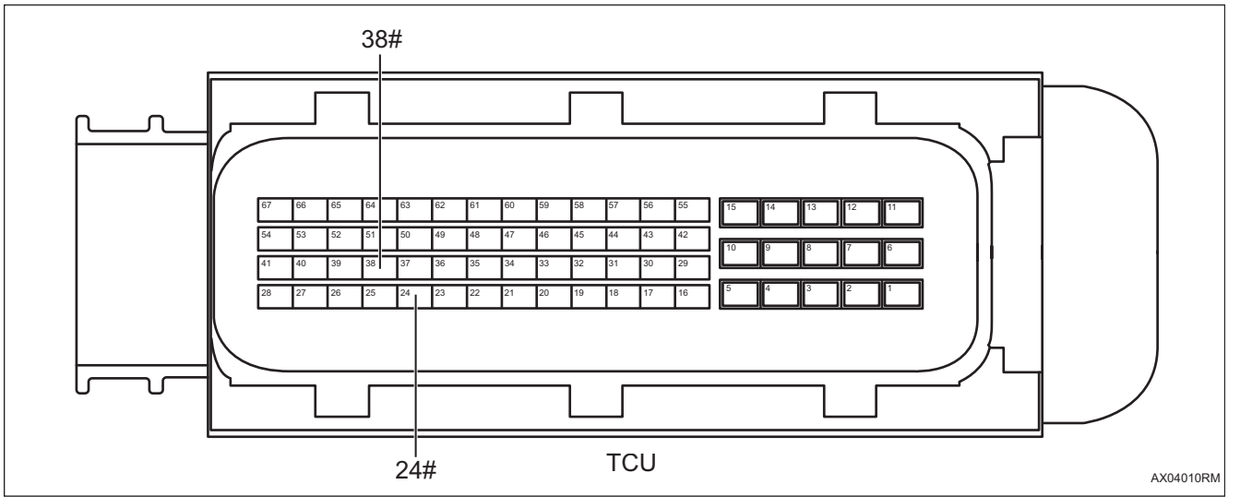
Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

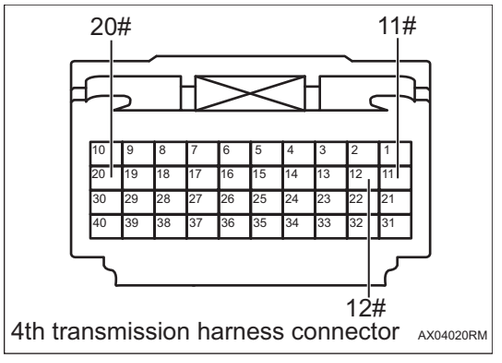
AX

NG → **Check connector fit and clean connector**

OK

2	Check harness and connector for open circuit (TCU-4th transmission harness)





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the transmission internal wire harness connector.

(e) According to value in the table, measure resistance.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 38# -4th transmission harness connector 11#	Always connected	Less than 1Ω
TCU connector 24# -4th transmission harness connector 12#(or 20#)	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Replace the TCU (See page AX-224)

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

AX

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Return transmission to factory for repair (hydraulic module) (See page AX-229)**

Caution:

Before returning the transmission to the factory for repair, it is necessary to confirm whether it is a transmission problem according to the oil temperature sensor resistance in the table below.

Detector connection	Detection conditions	Specified value			
		Minimum Resistance(Ω)	Nominal Resistance(Ω)	Maximum Resistance(Ω)	Resistance Tol(±%)
4th transmission harness 11# -4th transmission harness 12 (or 20)#	-40 ℃	939900	1000000	1064000	6.40%
	-30 ℃	497200	525400	554900	5.61%
	-20 ℃	274500	288200	302400	4.93%
	-10 ℃	157400	164330	171400	4.30%
	0 ℃	93490	97040	100700	3.77%
	10 ℃	57300	59180	61080	3.21%
	20 ℃	36160	37160	38170	2.72%
	30 ℃	23320	23970	24620	2.71%
	40 ℃	15350	15850	16340	3.09%
	50 ℃	10340	10710	11090	3.55%
	60 ℃	7114	7398	7688	3.92%
	70 ℃	4991	5208	5431	4.28%
	80 ℃	3566	3733	3905	4.61%
	90 ℃	2590	2720	2855	4.96%
	100 ℃	1912	2013	2119	5.27%
	110 ℃	1432	1512	1596	5.56%
	120 ℃	1087	1151	1218	5.82%
	130 ℃	835.9	887.3	941.3	6.09%
	140 ℃	650.5	692.2	736.1	6.34%
	150 ℃	512.0	546.0	582.0	6.59%

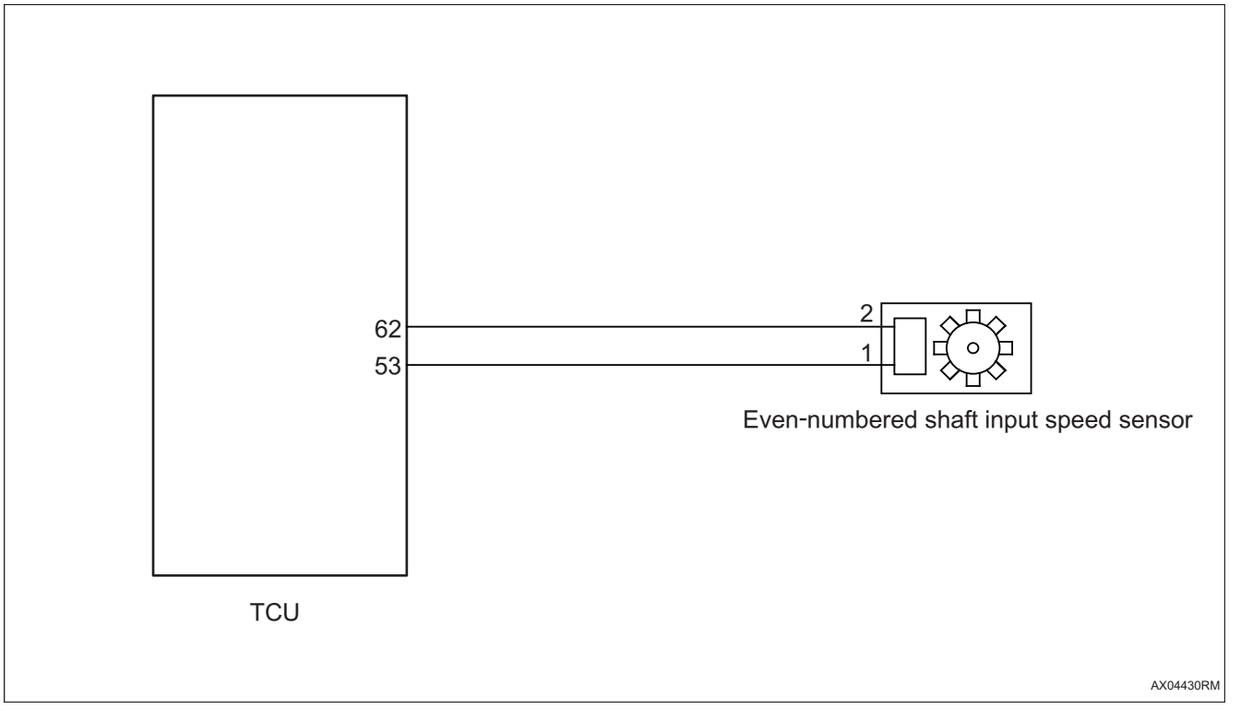
DTC	**P071512**	**Odd-numbered clutch speed sensor circuit shorted to power supply**
DTC	**P071614**	**Odd-numbered clutch speed sensor circuit shorted to ground/open**
DTC	**P071829**	**Odd-numbered clutch speed sensor implausible Abnormal**

Description

When even-numbered shaft input speed sensor open circuit or short circuit is detected, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P071512	(a) Even-numbered shaft input speed sensor circuit shorted to power supply.	• Even-numbered shaft input speed sensor • Harness and connector • TCU
P071614	(a) Even-numbered shaft input speed sensor circuit shorted to ground/open.	• Even-numbered shaft input speed sensor • Harness and connector • TCU
P071829	(a) Even-numbered shaft input speed sensor implausible.	• Even-numbered shaft input speed sensor • Harness and connector • TCU

Circuit diagram



Inspection procedure

1	**Confirm and clear the DTC**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

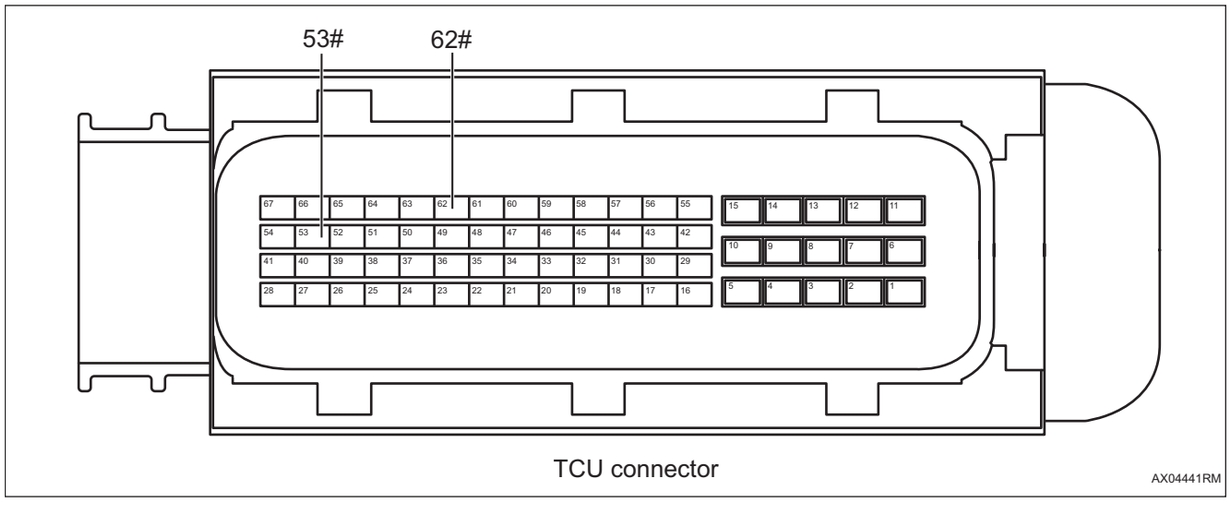
2	**Check harness and connector for circuit shorted to each other (TCU-even-numbered shaft input speed sensor)**

(a) Check whether the harness and connector are shorted to each other.

NG → **Repair or replace harness (TCU- evennumbered shaft input speed sensor)**

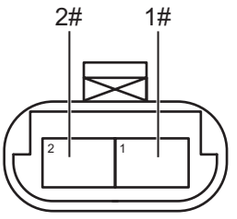
OK

3	**Check harness and connector for open circuit (TCU-even-numbered shaft input speed sensor)**



TCU connector

AX04441RM



Even-numbered shaft input speed sensor connector

AX04451RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the even-numbered shaft input speed sensor connector.

(e) Measure the resistance according to the values in the table below.

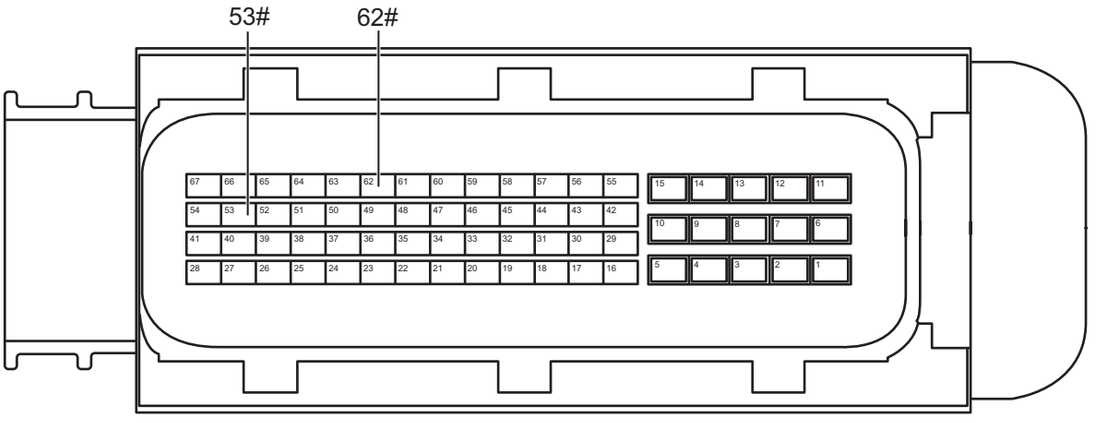
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 62# -even-numbered shaft input speed sensor connector 2#	Always connected	Less than 1Ω
TCU connector 53# -even-numbered shaft input speed sensor connector 1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check harness and connector for circuit shorted to ground (TCU-even-numbered shaft input speed sensor)**



TCU connector

AX04441RM

(a) Measure the resistance according to the values in the table below.

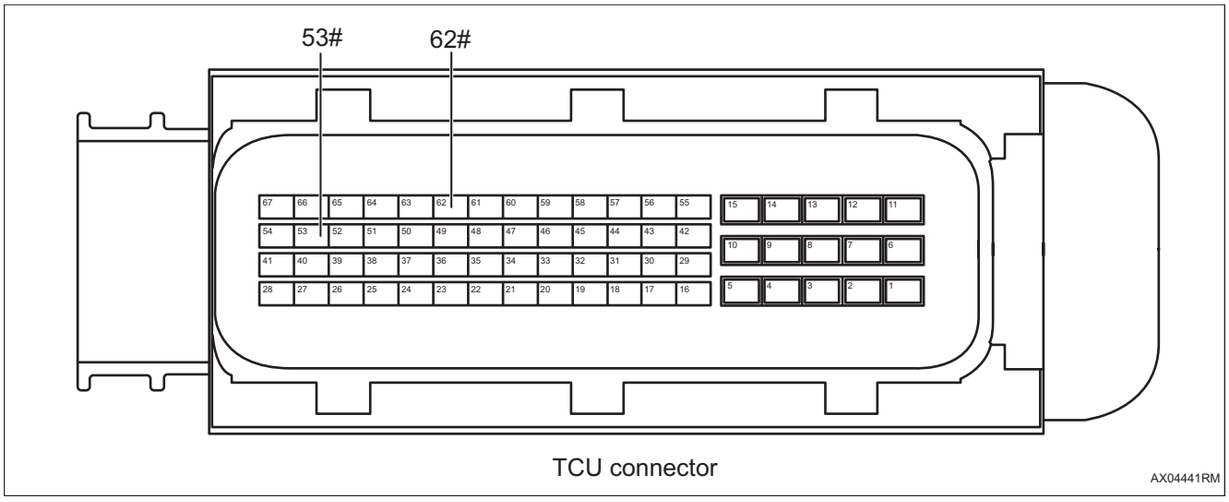
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 62# -body GND	Always connected	10 KΩ or greater
TCU connector 53# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	Check harness and connector for circuit shorted to power supply (TCU-even-numbered shaft input speed sensor)



TCU connector

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 62# -body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 53# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

AX

OK

6	Replace the even-numbered shaft input speed sensor (See page AX-232)

(a) Replace the even-numbered shaft input speed sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the TCU (See page AX-224)**

OK

7	**End**

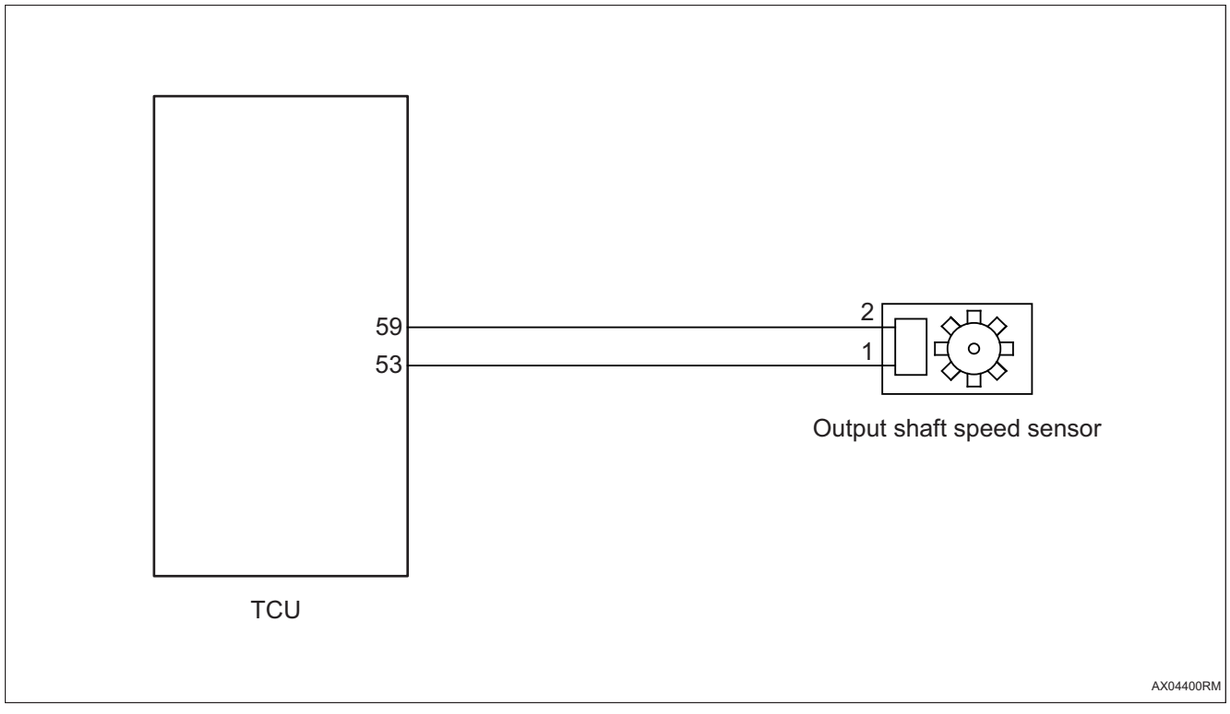
DTC	P072012	Output shaft speed sensor circuit shorted to power supply
DTC	P072114	Output shaft speed sensor circuit shorted to ground/open

Description

When the output shaft speed sensor open circuit or short circuit is detected, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P072012	(a) Output shaft speed sensor circuit shorted to power supply.	• Output shaft speed sensor • Harness and connector • TCU
P072114	(a) Output shaft speed sensor circuit shorted to ground/open.	• Output shaft speed sensor • Harness and connector • TCU

Circuit diagram



Inspection procedure

1	Perform basic inspection

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

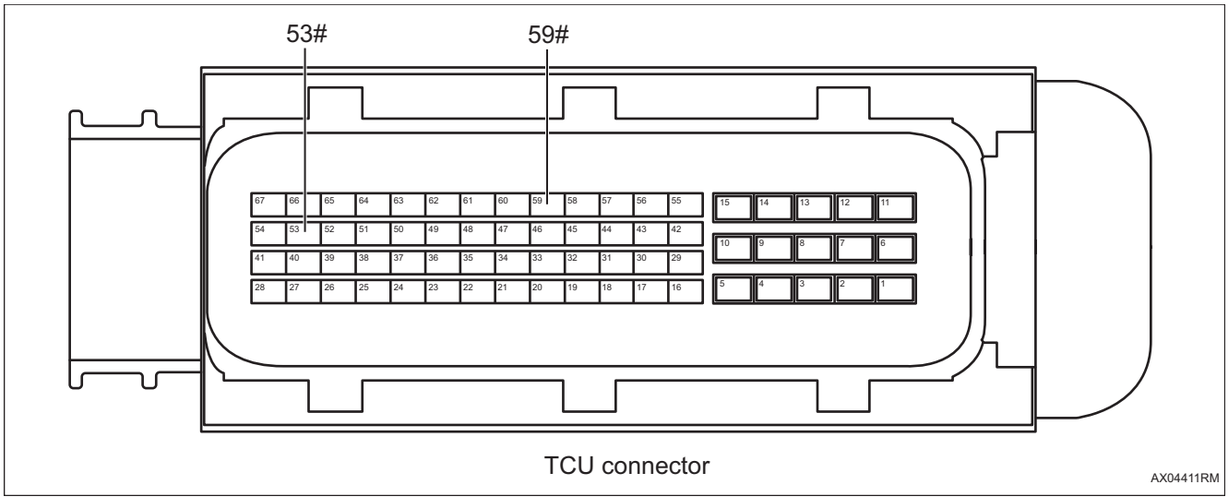
2	**Check harness and connector for circuit shorted to each other (TCU-output shaft speed sensor)**

(a) Check whether the harness and connector are shorted to each other.

NG → **Repair or replace harness (TCU- output shaft speed sensor)**

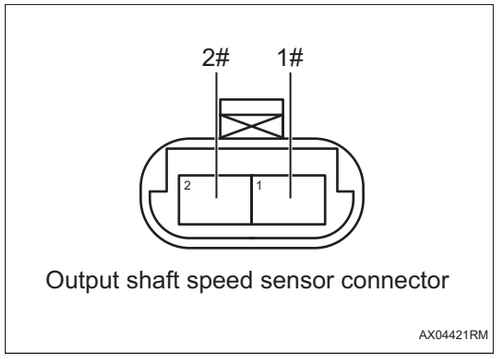
OK

3	**Check harness and connector for open circuit (TCU-output shaft speed sensor)**



TCU connector

AX04411RM



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the output shaft speed sensor connector.

(e) Measure the resistance according to the values in the table below.

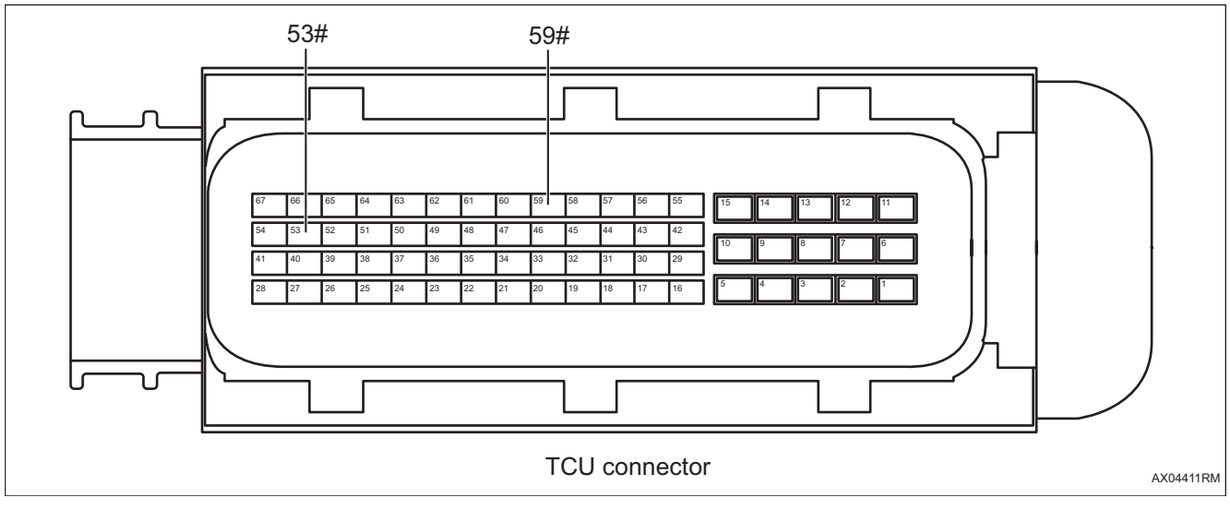
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 59# -output shaft speed sensor connector 2#	Always connected	Less than 1Ω
TCU connector 53# -output shaft speed sensor connector 1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check harness and connector for circuit shorted to ground (TCU-output shaft speed sensor)**



(a) Measure the resistance according to the values in the table below.

Standard value

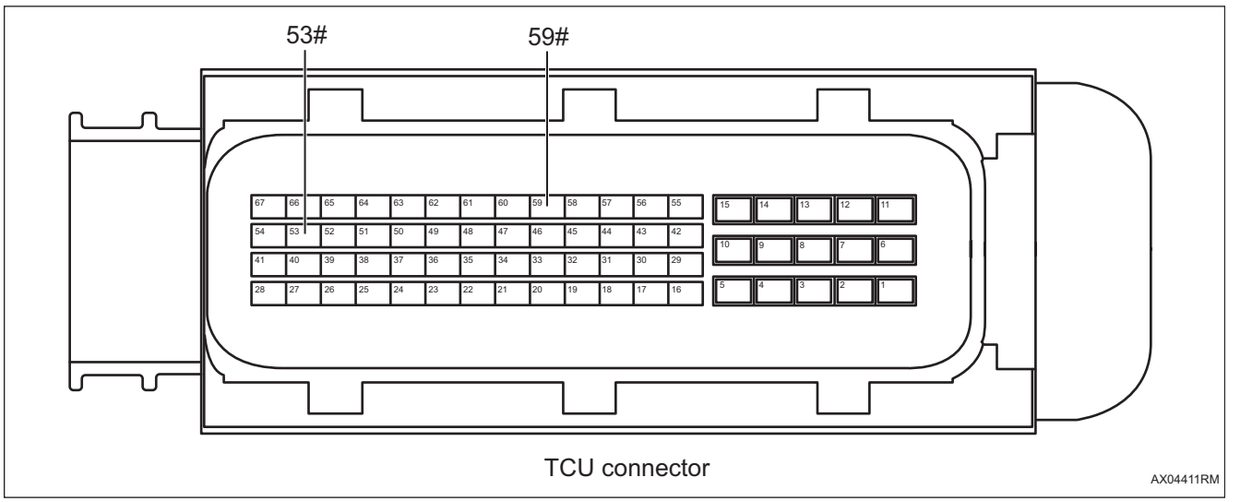
Detector connection	Detection conditions	Specified state
TCU connector 59# -body GND	Always connected	10 KΩ or greater
TCU connector 53# -body GND	Always connected	10 KΩ or greater

AX

NG → **Repair or replace the harness and connector**

OK

5	**Check harness and connector for circuit shorted to power supply (TCU-output shaft speed sensor)**



TCU connector

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 59# -body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 53# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Replace the output shaft speed sensor (See page AX-232)**

(a) Replace the output shaft speed sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the TCU (See page AX-224)**

OK

7	**End**

DTC	P072329	Output shaft speed sensor implausible
DTC	P077B29	Output shaft speed direction signal failure
DTC	P077A31	Output shaft speed direction signal lost

Description

When abnormal output shaft speed sensor signal is detected, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P072329	(a) Output shaft speed sensor implausible.	• Output shaft speed sensor • Harness and connector • TCU • ABS sensor, relevant harness or control unit
P077B29	(a) Output shaft speed direction signal failure.	• Output shaft speed sensor • Harness and connector • TCU • ABS sensor, relevant harness or control unit
P077A31	(a) Output shaft speed direction signal lost.	• Output shaft speed sensor • Harness and connector • TCU • ABS sensor, relevant harness or control unit

Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

AX

NG → **Check connector fit and clean connector**

OK

2	Check whether the ABS speed and direction signals are normal

(a) Check whether the ABS speed and direction signals are normal.

NG	**Repair ABS sensor, relevant harness or control unit**

OK

3	**Check the output shaft speed sensor harness and connector**

(a) Check whether the output shaft speed sensor harness and connector are connected tightly.

(b) Check whether there is short circuit or open circuit in the output shaft speed sensor harness and connector.

NG	**Repair or replace the harness and connector**

OK

4	**Replace the output shaft speed sensor (See page AX-232)**

(a) Replace the output shaft speed sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG	**Replace the TCU (See page AX-224)**

OK

5	**End**

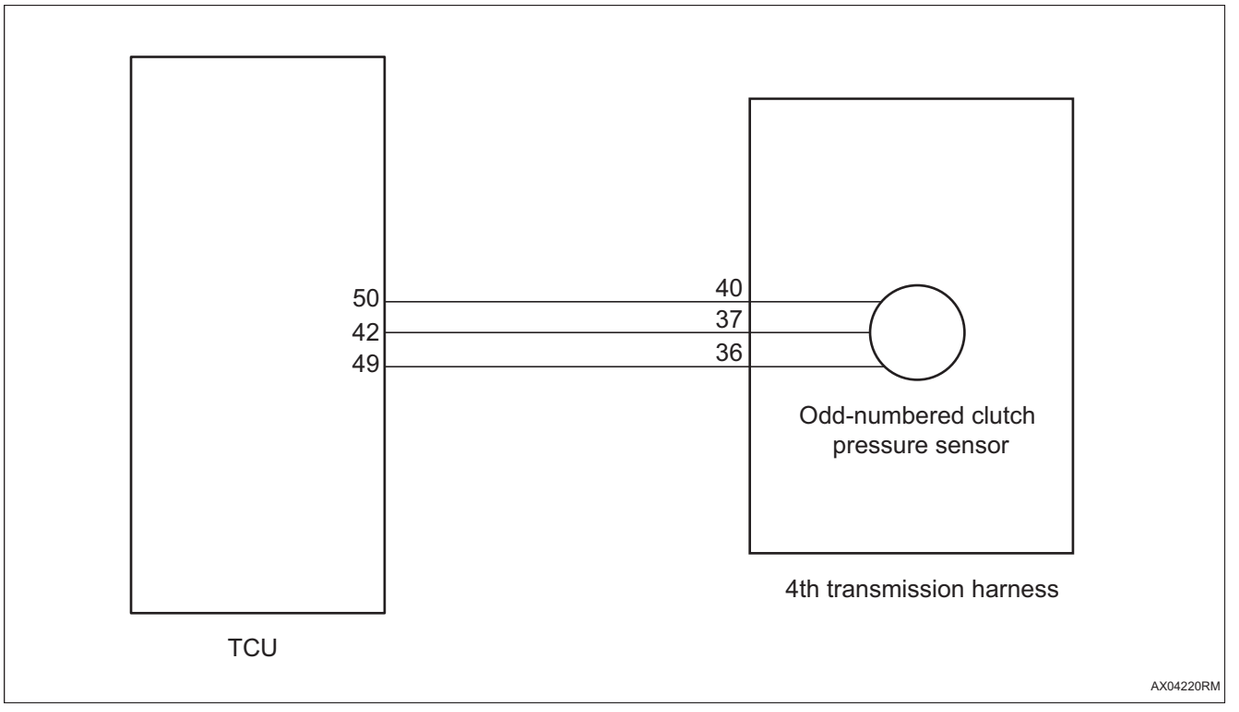
DTC	P084317	Odd-numbered clutch pressure sensor sampling voltage high
DTC	P084216	Odd-numbered clutch pressure sensor sampling undervoltage
DTC	P1C2C29	Odd-numbered clutch pressure implausible

Description

When an abnormal odd-numbered clutch pressure sensor sampling voltage is detected, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P084317	(a) Odd-numbered clutch pressure sensor sampling voltage too high.	• Harness and connector • Odd-numbered clutch oil pressure sensor • TCU
P084216	(a) Odd-numbered clutch pressure sensor sampling voltage low.	• Harness and connector • Odd-numbered clutch oil pressure sensor • TCU
P1C2C29	(a) The odd-numbered clutch pressure is implausible.	• Harness and connector • Odd-numbered clutch oil pressure sensor • TCU

Circuit diagram



Inspection procedure

1	**Confirm and clear the DTC**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

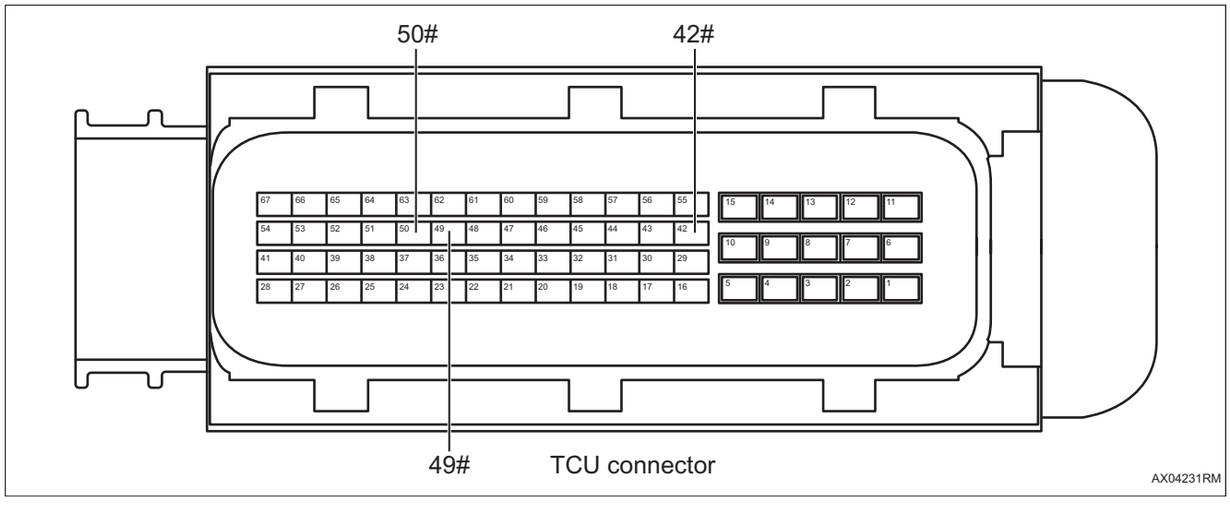
2	Check harness and connector for circuit shorted to each other (TCU-4th transmission harness harness)

(a) Check whether the harness and connector are shorted to each other.

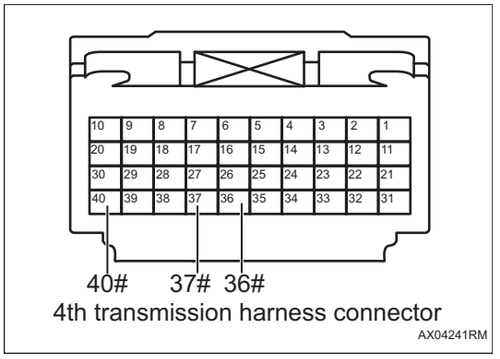
NG → **Repair or replace harness (TCU-4th transmission harness)**

OK

3	Check harness and connector for open circuit (TCU-4th transmission harness)



AX



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

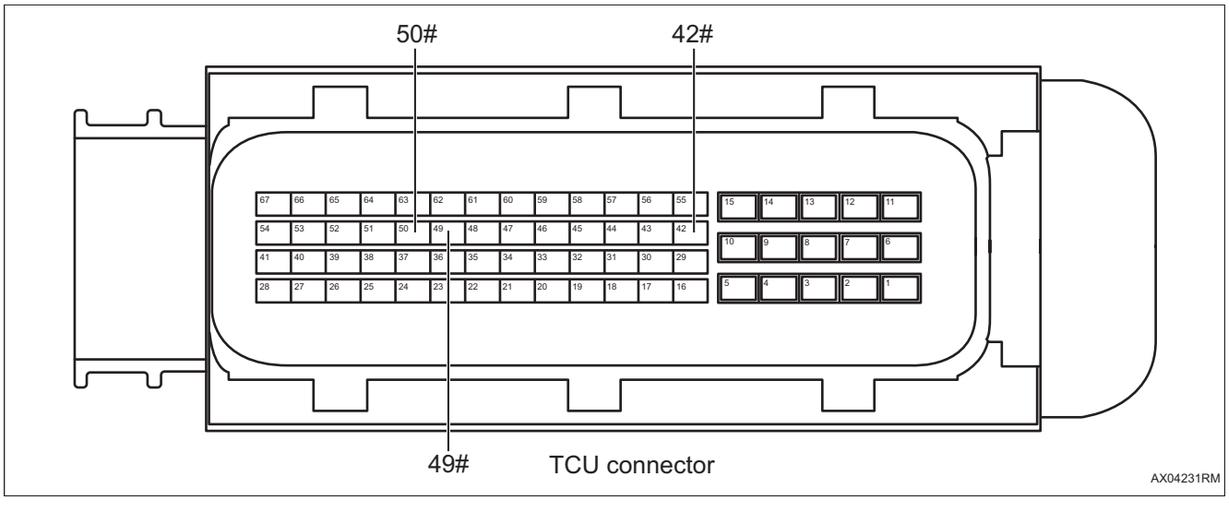
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 50# -4th transmission harness connector 40#	Always connected	Less than 1Ω
TCU connector 42# -4th transmission harness connector 37#	Always connected	Less than 1Ω
TCU connector 49# -4th transmission harness connector 36#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check harness and connector for circuit shorted to ground (TCU-4th transmission harness)**



(a) Measure the resistance according to the values in the table below.

Standard value

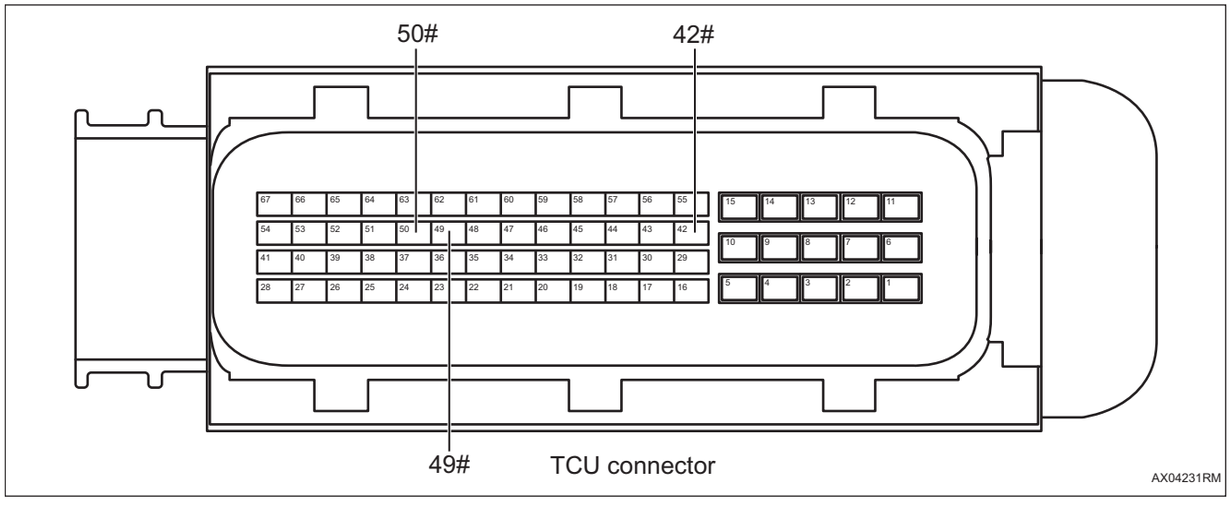
Detector connection	Detection conditions	Specified state
TCU connector 50# -body GND	Always connected	10 KΩ or greater

Detector connection	Detection conditions	Specified state
TCU connector 42# -body GND	Always connected	10 KΩ or greater
TCU connector 49# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5 **Check harness and connector for circuit shorted to power supply (TCU-4th transmission harness)**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 50# -body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 42# -body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 49# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

AX

OK

6	**Replace the TCU (See page AX-224)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Return transmission to factory for repair (hydraulic module) (See page AX-229)**

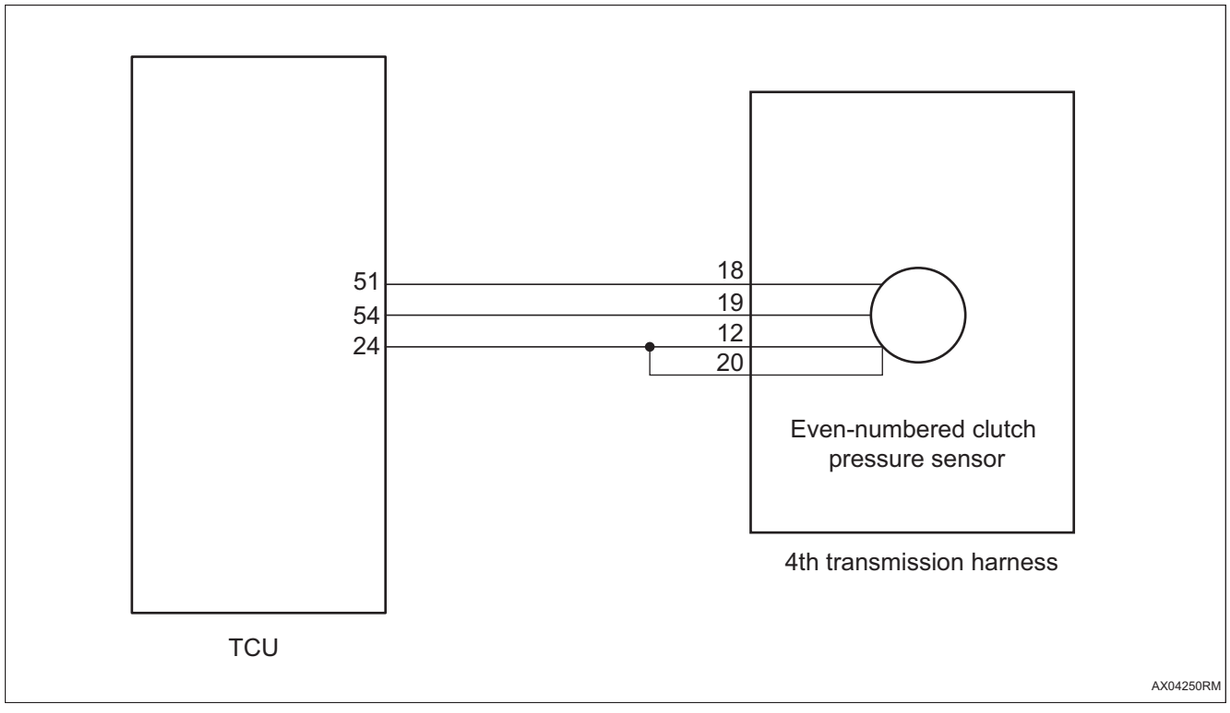
DTC	P084817	Even-numbered clutch pressure sensor sampling overvoltage
DTC	P084716	Even-numbered clutch pressure sensor sampling undervoltage
DTC	P1C2D29	Even-numbered clutch pressure implausible

Description

When an abnormal even-numbered clutch pressure sensor sampling voltage is detected, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P084817	(a) Even-numbered clutch pressure sensor sampling voltage high.	• Harness and connector • Even-numbered clutch oil pressure sensor • TCU
P084716	(a) Even-numbered clutch pressure sensor sampling voltage low.	• Harness and connector • Even-numbered clutch oil pressure sensor • TCU
P1C2D29	(a) The even-numbered clutch pressure is implausible.	• Harness and connector • Even-numbered clutch oil pressure sensor • TCU

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

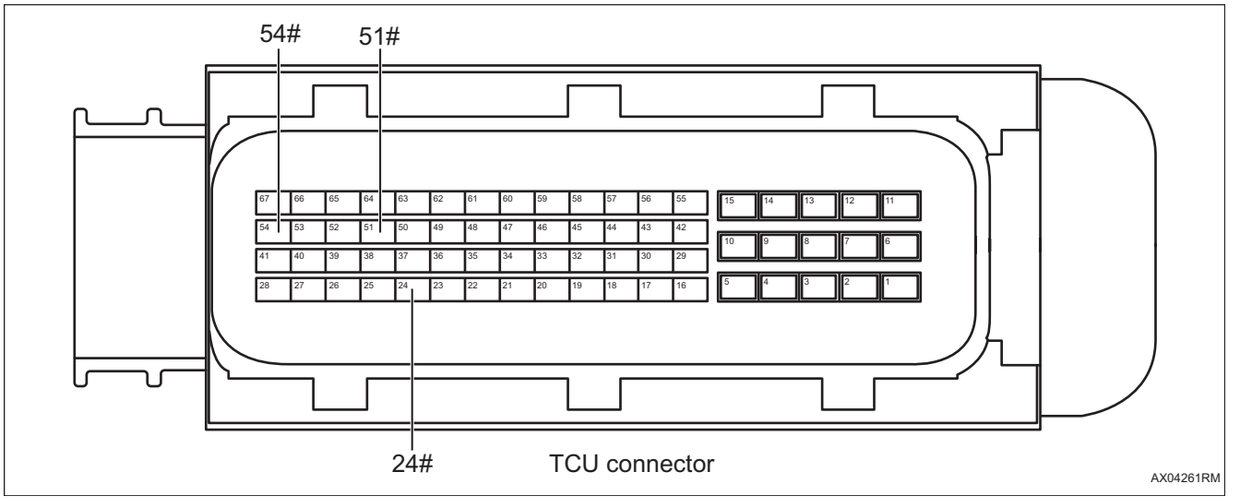
2	Check harness and connector for circuit shorted to each other (TCU-4th transmission harness harness)

(a) Check harness and connector for circuit shorted to each other.

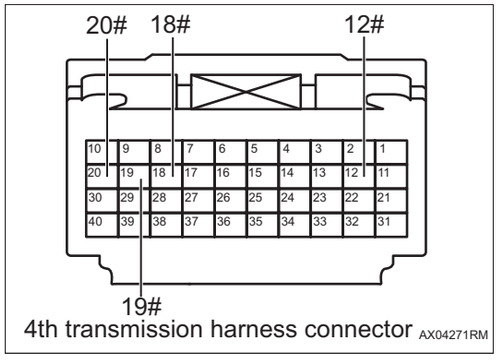
NG → **Repair or replace harness (TCU-4th transmission harness)**

OK

3	Check harness and connector for open circuit (TCU-4th transmission harness)



AX



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

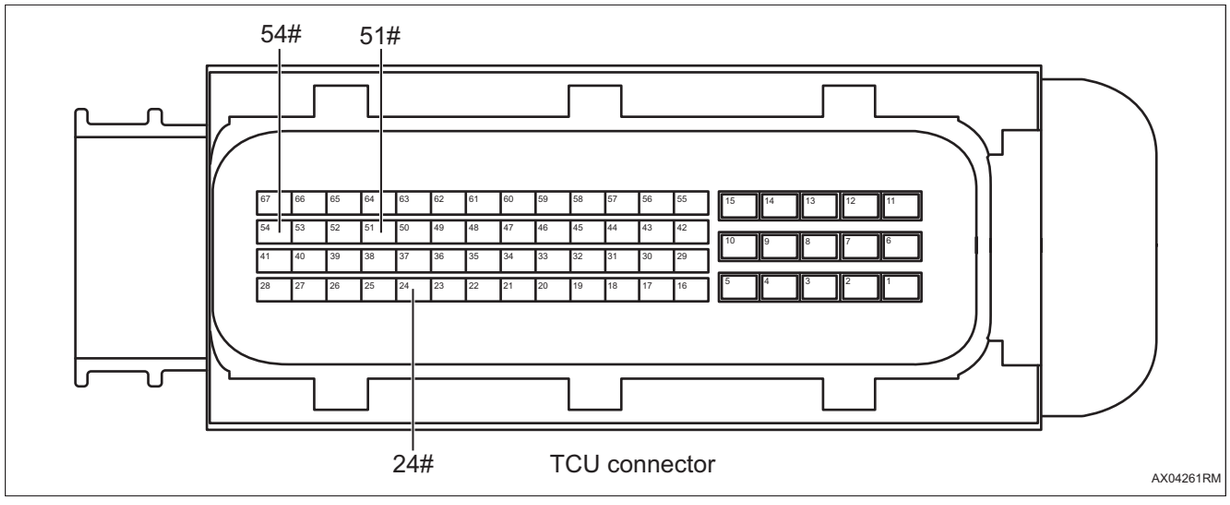
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 51# -4th transmission harness connector 18#	Always connected	Less than 1Ω
TCU connector 54# -4th transmission harness connector 19#	Always connected	Less than 1Ω
TCU connector 24# -4th transmission harness connector 12#(or 20#)	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

4	Check harness and connector for circuit shorted to ground (TCU-4th transmission harness)



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 51# -body GND	Always connected	10 KΩ or greater

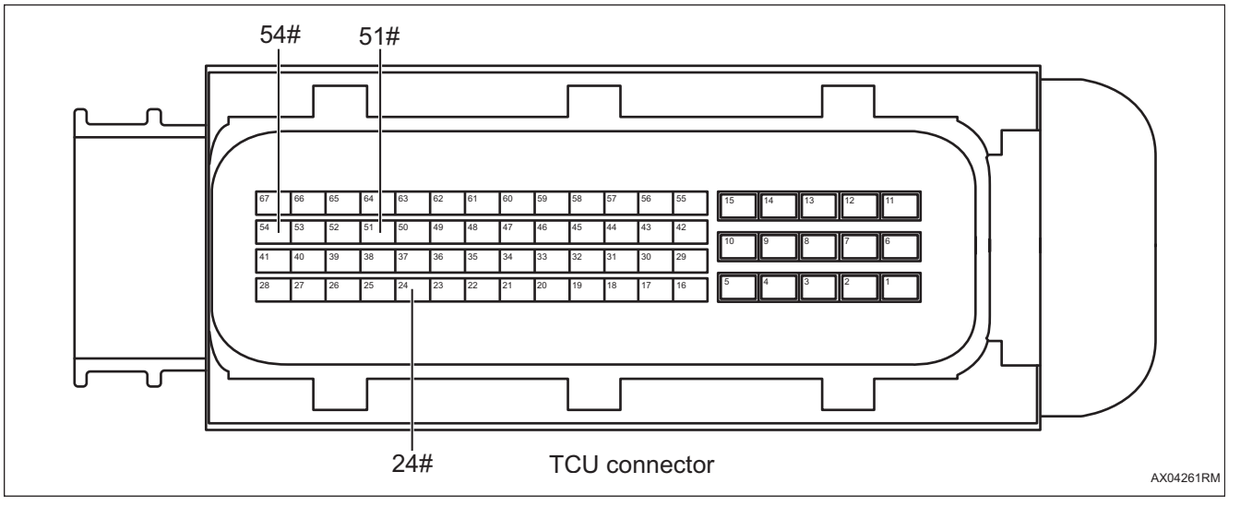
AX

Detector connection	Detection conditions	Specified state
TCU connector 54# - body GND	Always connected	10 KΩ or greater
TCU connector 24# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	**Check harness and connector for circuit shorted to power supply (TCU-4th transmission harness)**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 51# -body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 54# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 24# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Replace the TCU (See page AX-224)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Return transmission to factory for repair (hydraulic module) (See page AX-229)**

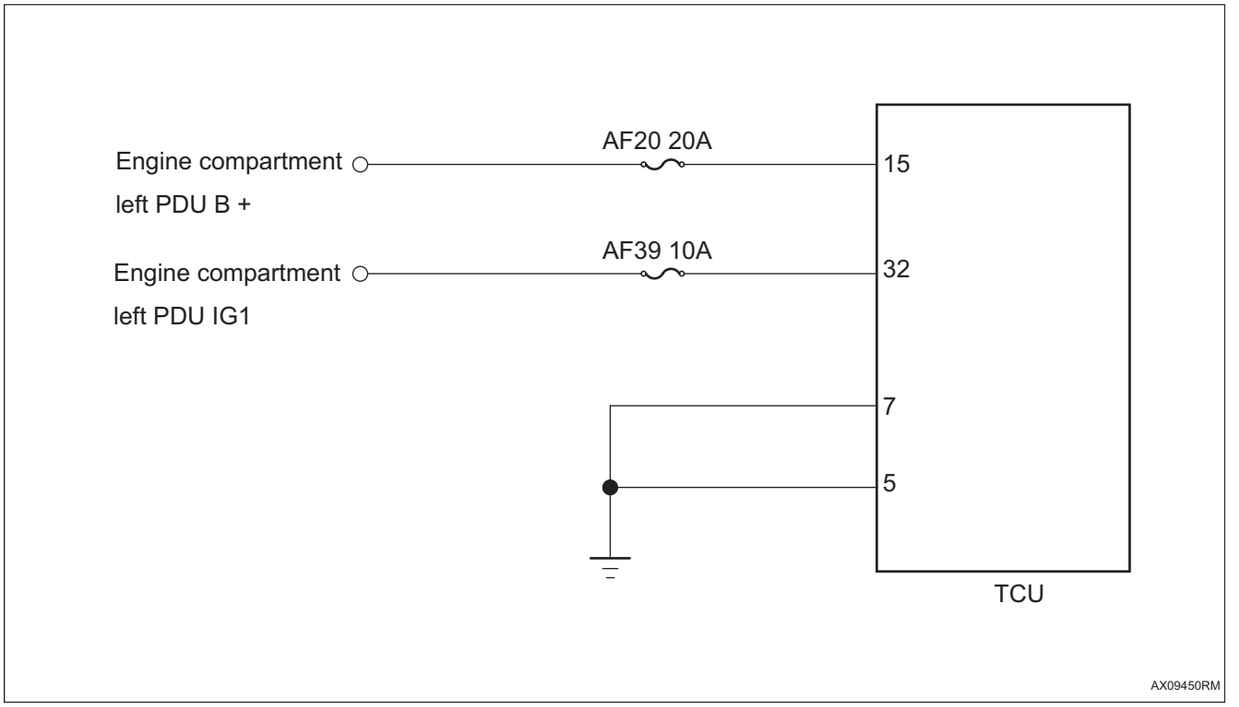
DTC	P088317	Battery overvoltage
DTC	P088216	Battery undervoltage

Description

When the TCU power supply is out of the normal operating range, TCU records DTC.

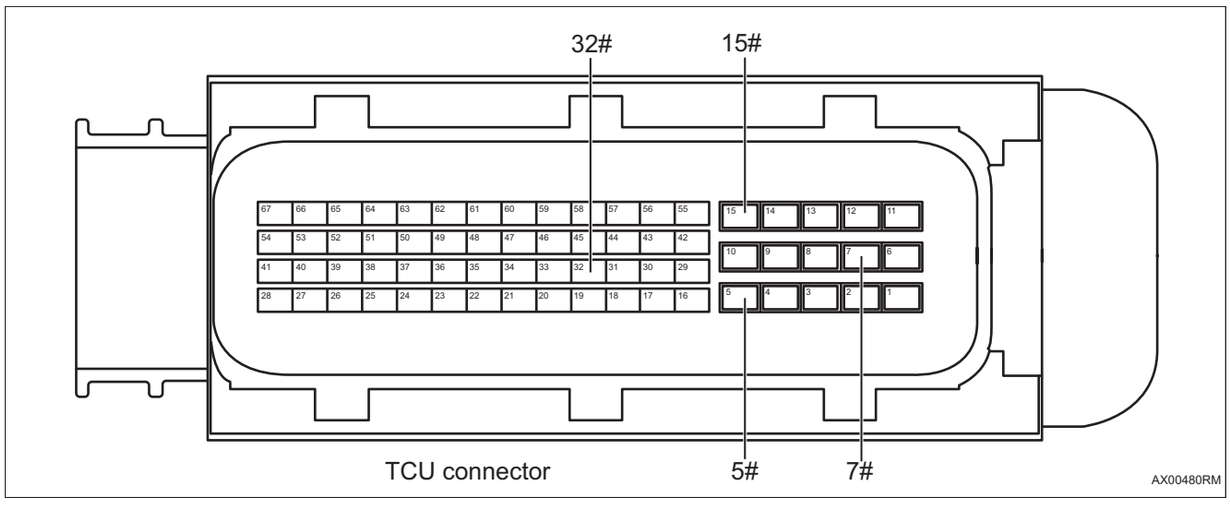
DTC	DTC detection conditions	Faulty location
P088317	(a) Battery overvoltage.	• TCU • Charging system
P088216	(a) Battery undervoltage.	• TCU • Harness and connector • Charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 15# - TCU connector 5#	Always connected	9 ~ 16V
TCU connector 15# - TCU connector 7#	Always connected	9 ~ 16V
TCU connector 32# - TCU connector 5#	Always connected	9 ~ 16V
TCU connector 32# - TCU connector 7#	Always connected	9 ~ 16V

OK → **Replace the TCU**

NG

2	**Check TCU fuse**

AX

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the TCU fuse.

(d) Measure the resistance according to the values in the table below.

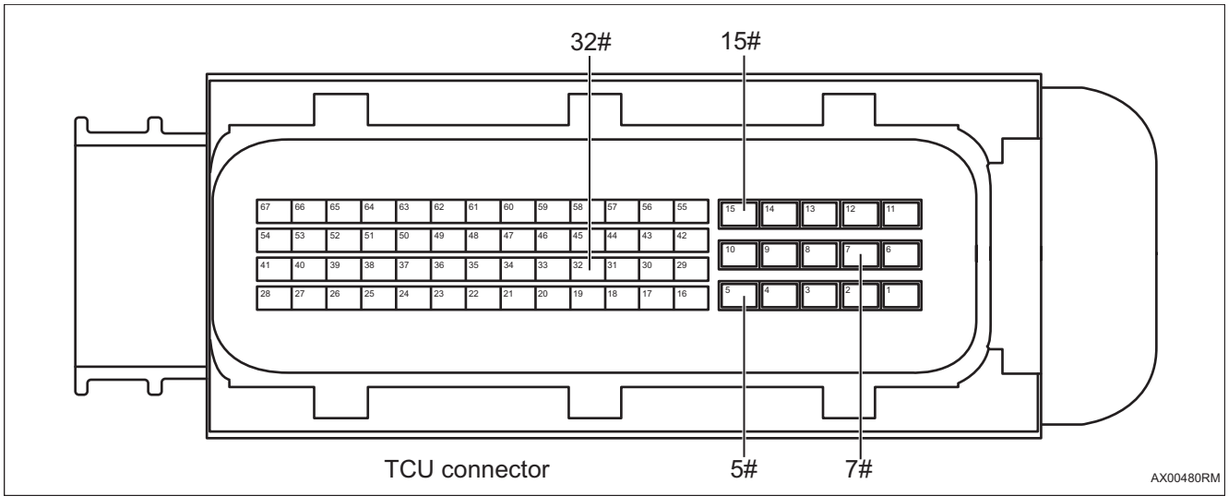
Standard value

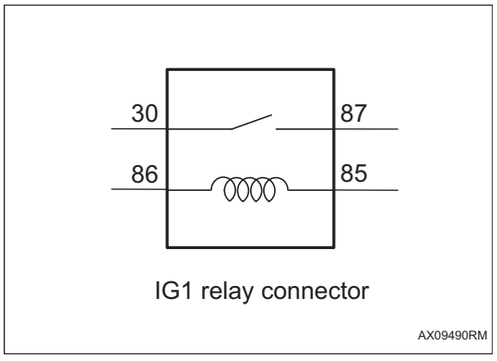
Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3 Check TCU harness connector for open circuit





(a) Install the TCU fuse.

(b) Disconnect the IG1 relay connector.

(c) Measure the resistance according to the values in the table below.

Standard value

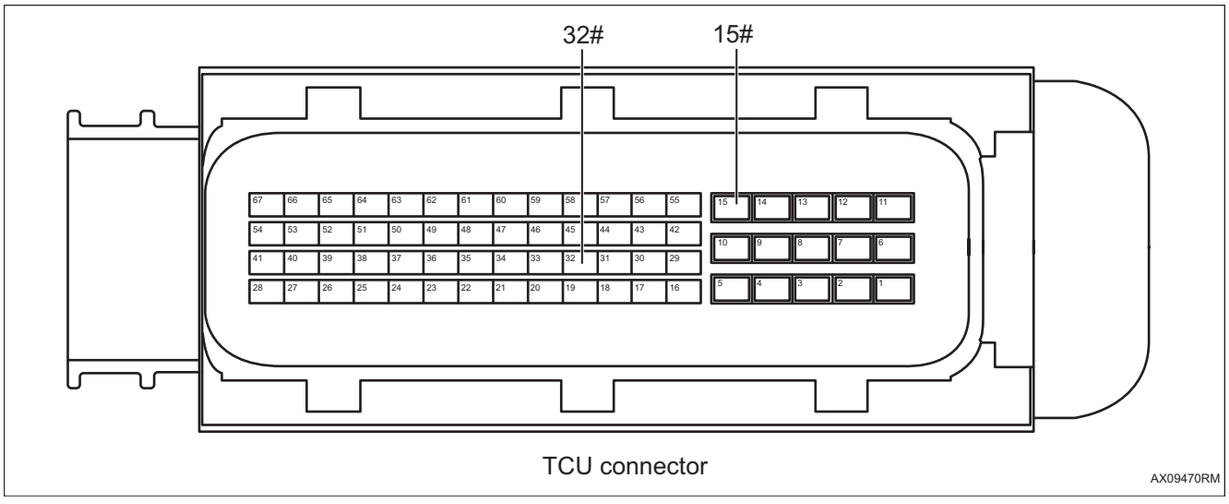
Detector connection	Detection conditions	Specified state
TCU connector 15# - B +	Always connected	Less than 1Ω
TCU connector 32# - IG1 relay 87#	Always connected	Less than 1Ω
TCU connector 5# - body GND	Always connected	Less than 1Ω
TCU connector 7# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

AX

OK

4	Check TCU harness connector for short circuit



TCU connector

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 15# - body GND	Always connected	Greater than or equal to 10 kΩ
TCU connector 32# - body GND	Always connected	Greater than or equal to 10 kΩ

NG → **Repair or replace the harness and connector**

OK

5	Replace battery or repair charging system

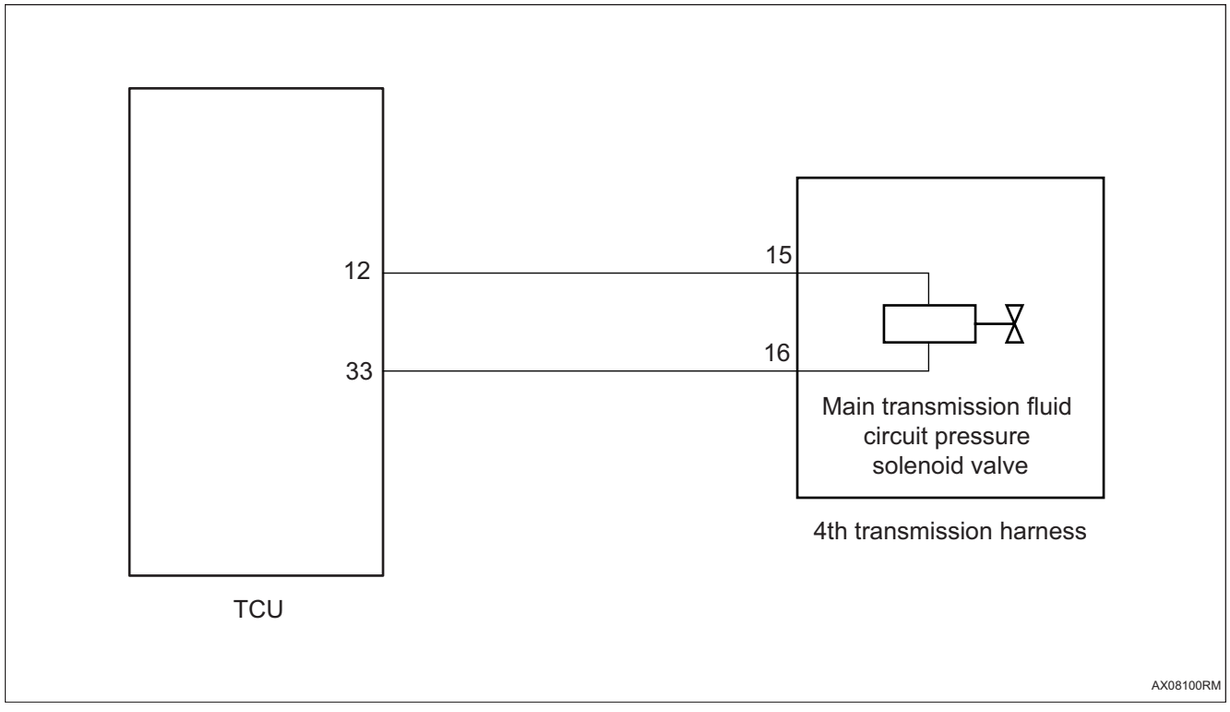
DTC	P097412	Main transmission fluid solenoid valve circuit shorted to power supply
DTC	P097311	Main transmission fluid solenoid valve circuit shorted to ground
DTC	P097213	Main transmission fluid circuit solenoid valve circuit
DTC	P1C4019	Main transmission fluid circuit solenoid valve feedback overcurrent
DTC	P1C4118	Main transmission fluid circuit solenoid valve feedback undercurrent
DTC	P1C431D	Main transmission fluid circuit solenoid valve unexpected current failure

Description

When main transmission fluid circuit solenoid valve circuit is shorted to power supply, shorted to ground, or open, TCU records DTC.

DTC	DTC detection conditions	Faulty location
P097412	(a) Main transmission fluid circuit solenoid valve circuit shorted to power supply.	• TCU • Harness and connector • Main transmission fluid circuit pressure solenoid valve
P097311	(a) Main transmission fluid circuit solenoid valve circuit shorted to ground.	• TCU • Harness and connector • Main transmission fluid circuit pressure solenoid valve
P097213	(a) Main transmission fluid circuit solenoid valve circuit open.	• TCU • Harness and connector • Main transmission fluid circuit pressure solenoid valve
P1C4019	(a) Main transmission fluid circuit solenoid valve feedback current too high.	• TCU • Harness and connector • Main transmission fluid circuit pressure solenoid valve
P1C4118	(a) Main transmission fluid circuit solenoid valve feedback current too low.	• TCU • Harness and connector • Main transmission fluid circuit pressure solenoid valve
P1C431D	(a) Main transmission fluid circuit solenoid valve unexpected current failure.	• TCU • Harness and connector • Main transmission fluid circuit pressure solenoid valve

Circuit diagram



Inspection procedure

1	**Confirm and clear the DTC**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

AX

OK

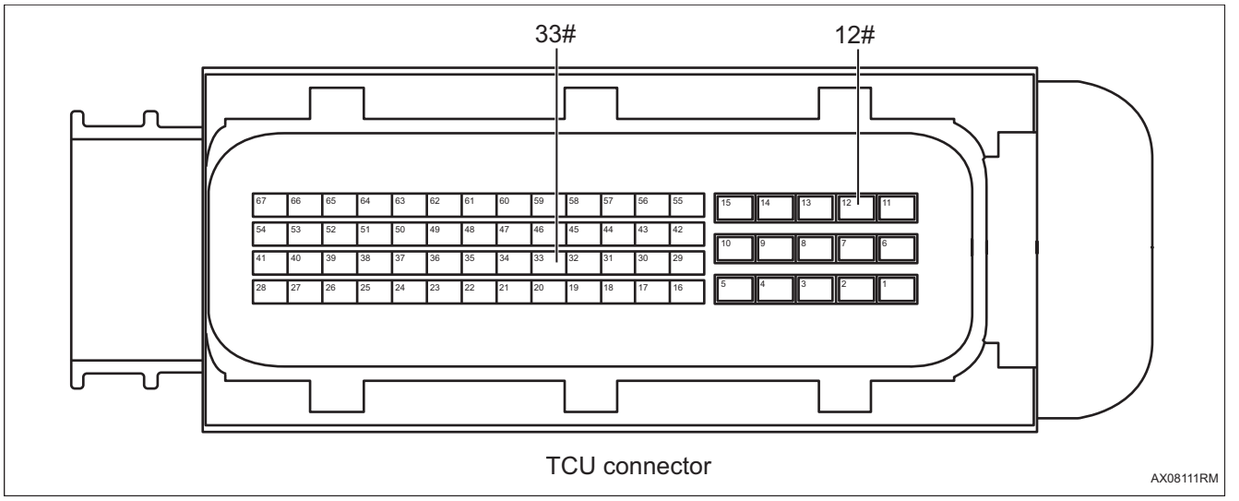
2	**Check harness and connector for circuit shorted to each other (TCU-4th transmission harness harness)**

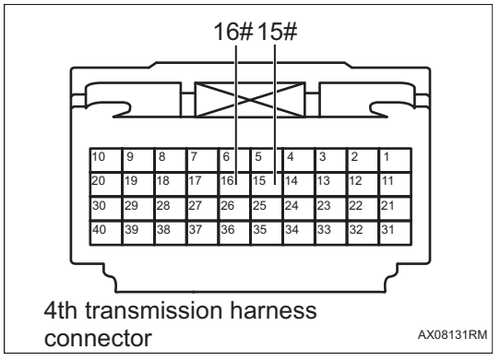
(a) Check whether the harness and connector are shorted to each other.

NG → **Repair or replace the harness and connector**

OK

3	Check the vehicle harness for open circuit (TCU-4th transmission harness)





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

Standard value

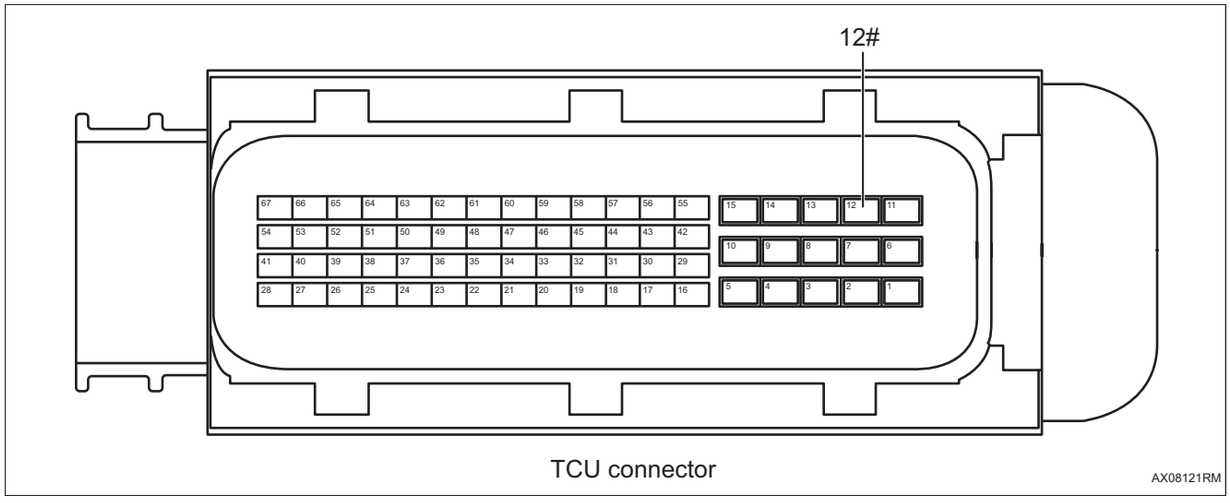
Detector connection	Detection conditions	Specified state
TCU connector 12# -4th transmission harness connector 15#	Always connected	Less than 1Ω
TCU connector 33# -4th transmission harness connector 16#	Always connected	Less than 1Ω

AX

NG → **Repair or replace the harness and connector**

OK

4	Check whether the vehicle harness is shorted to ground (TCU-4th transmission harness)



(a) Measure the resistance according to the values in the table below.

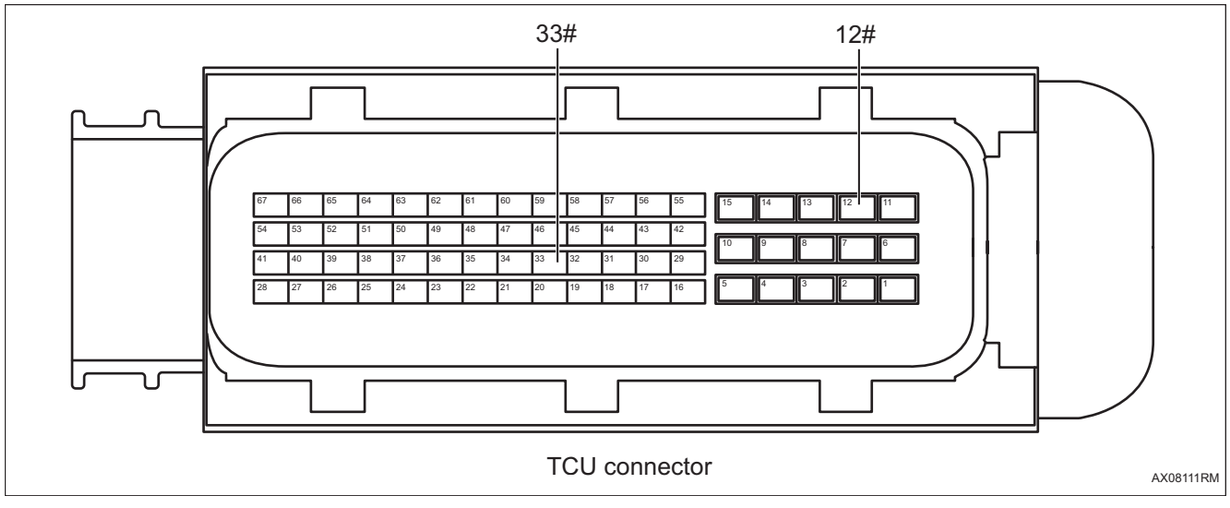
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 12# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

5	Check harness and connector for circuit shorted to power supply (TCU-4th transmission harness)



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

AX

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 12# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 33# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Replace the TCU (See page AX-224)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Return transmission to factory for repair (hydraulic module) (See page AX-229)**

Caution:

The resistance value of main transmission fluid circuit pressure solenoid valve shall be confirmed before the transmission is returned to the factory for repair.

Detector connection	Detection conditions	Specified state
4th transmission harness 16# -4th transmission harness 15#	22 ℃	4.14±0.26Ω

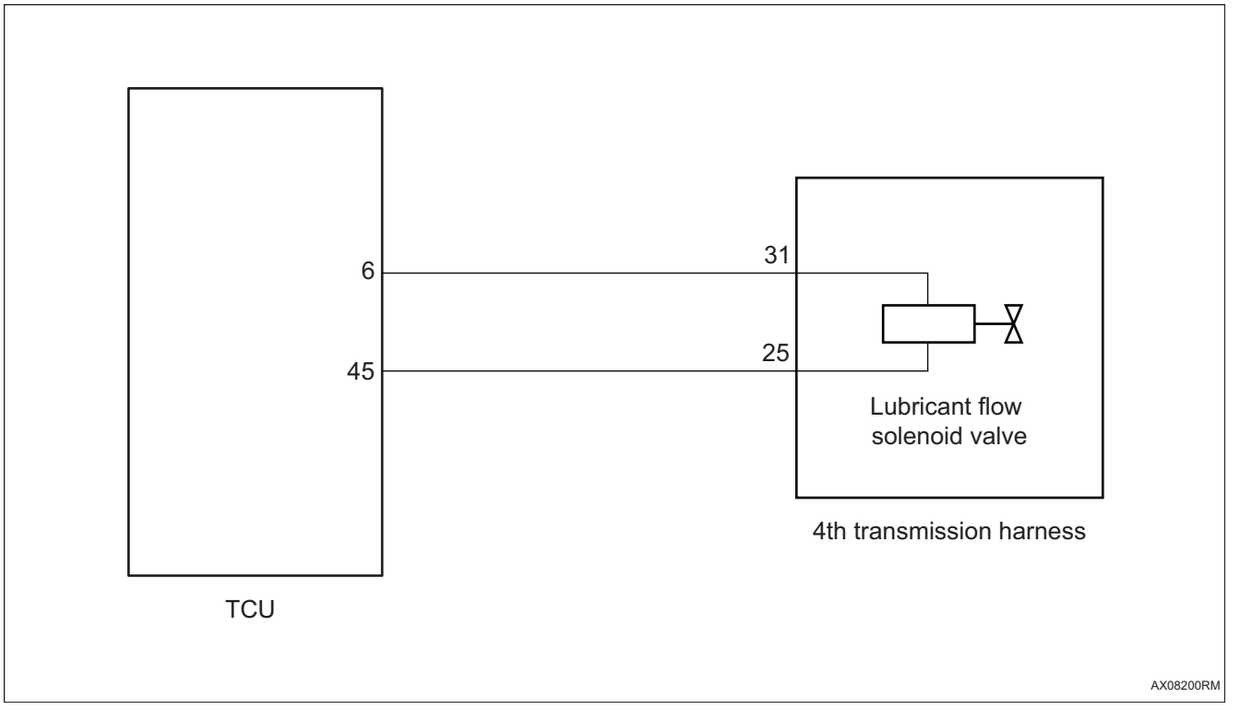
DTC	P097712	Lubrication solenoid valve circuit shorted to power supply
DTC	P097611	Lubrication solenoid valve circuit shorted to ground
DTC	P097513	Lubrication solenoid valve circuit open
DTC	P1C4419	Lubrication solenoid valve feedback over-current
DTC	P1C4518	Lubrication solenoid valve feedback under-current
DTC	P1C471D	Lubrication solenoid valve unexpected current failure

Description

When lubricant flow solenoid valve circuit is shorted to power supply, shorted to ground, or open, TCU records DTC.

DTC	DTC detection conditions	Faulty location
P097712	(a) Lubricant flow solenoid valve circuit shorted to power supply.	• TCU • Harness and connector • Lubricant flow solenoid valve
P097611	(a) Lubricant flow solenoid valve circuit shorted to ground.	• TCU • Harness and connector • Lubricant flow solenoid valve
P097513	(a) Lubricant flow solenoid valve open circuit.	• TCU • Harness and connector • Lubricant flow solenoid valve
P1C4419	(a) Lubrication solenoid valve feedback current high	• TCU • Harness and connector • Lubricant flow solenoid valve
P1C4518	(a) Lubrication solenoid valve feedback current low	• TCU • Harness and connector • Lubricant flow solenoid valve
P1C471D	(a) Lubrication solenoid valve unexpected current failure.	• TCU • Harness and connector • Lubricant flow solenoid valve

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

AX

NG → **Check connector fit and clean connector**

OK

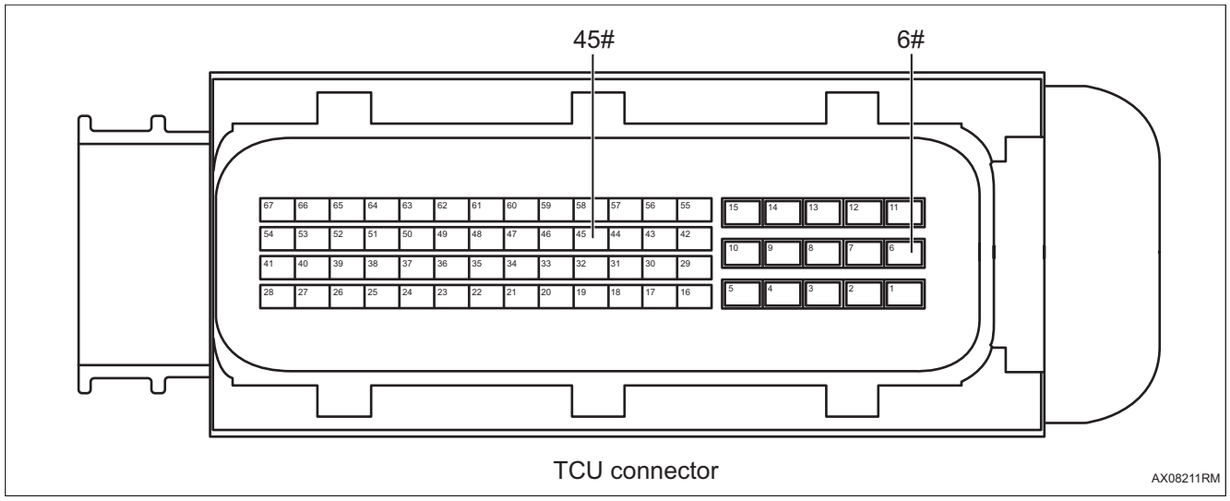
2	Check harness and connector for circuit shorted to each other (TCU-4th transmission harness harness)

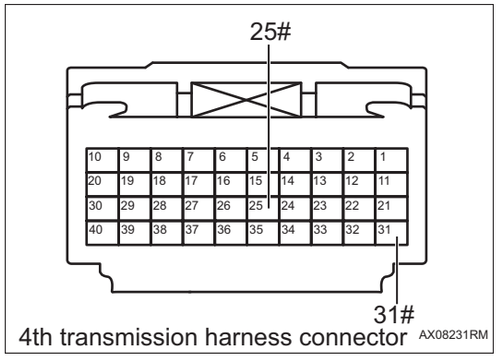
(a) Check whether the harness and connector are shorted to each other.

NG → **Repair or replace the harness and connector**

OK

3	Check the vehicle harness for open circuit (TCU-4th transmission harness)





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

Standard value

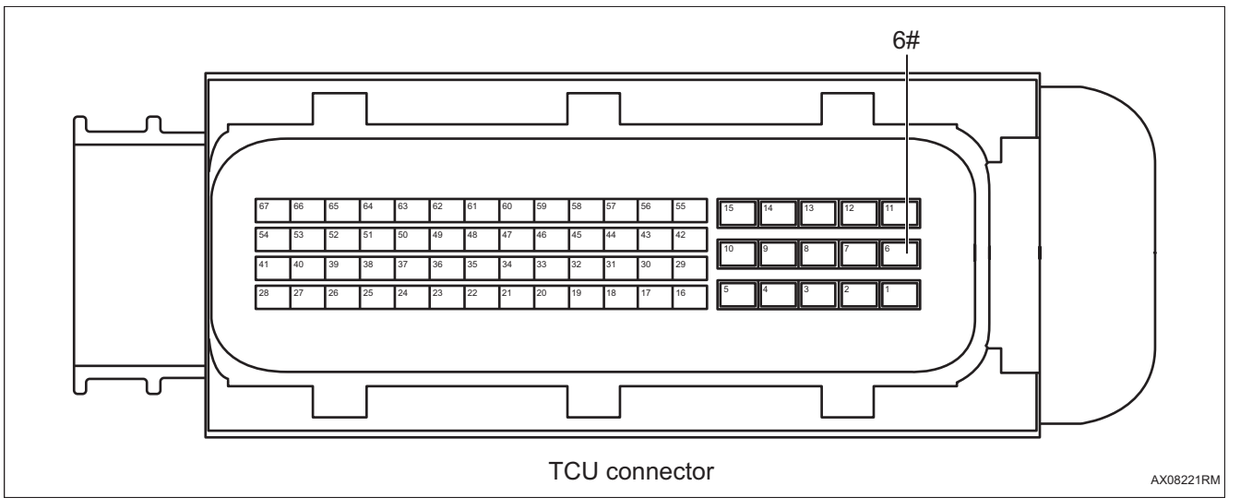
Detector connection	Detection conditions	Specified state
TCU connector 6# -4th transmission harness connector 31#	Always connected	Less than 1Ω
TCU connector 45# -4th transmission harness connector 25#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

AX

OK

4	Check whether the vehicle harness is shorted to ground (TCU-4th transmission harness)



(a) Measure the resistance according to the values in the table below.

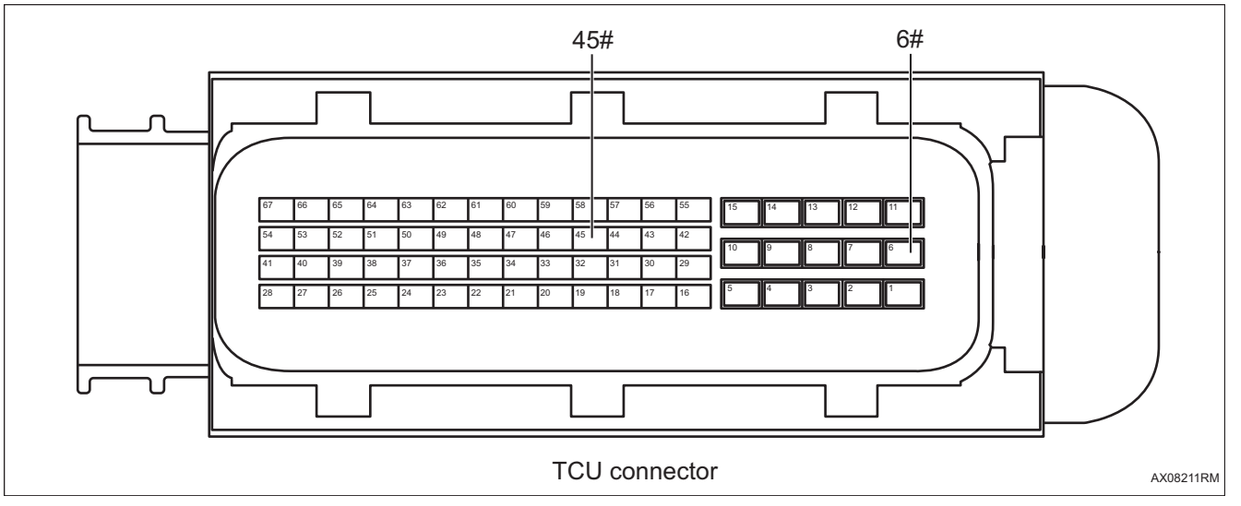
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 6# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	**Check harness and connector for circuit shorted to power supply (TCU-4th transmission harness)**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

AX

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 6# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 45# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	Replace the TCU (See page AX-224)

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Return transmission to factory for repair (hydraulic module) (See page AX-229)**

Caution:

The resistance value of lubricant flow solenoid valve shall be confirmed before the transmission is returned to the factory for repair.

Detector connection	Detection conditions	Specified state
4th transmission harness 31# -4th transmission harness 25#	22 ℃	4.14±0.26Ω

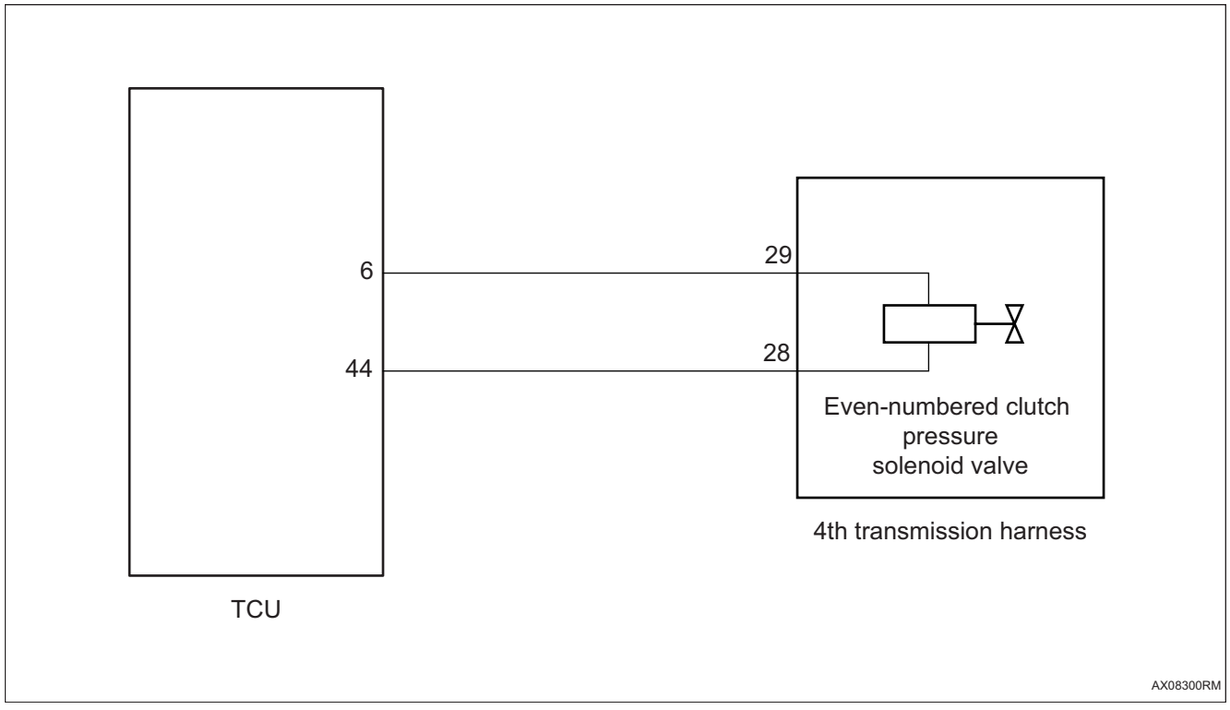
DTC	P098012	Even-numbered clutch solenoid valve circuit shorted to power supply
DTC	P097911	Even-numbered clutch solenoid valve circuit shorted to ground
DTC	P097813	Even-numbered clutch solenoid valve circuit open
DTC	P1C4819	Even-numbered clutch solenoid valve feedback overcurrent
DTC	P1C4918	Even-numbered clutch solenoid valve feedback undercurrent
DTC	P1C4B1D	Even-numbered clutch solenoid valve unexpected current failure

Description

When even-numbered clutch pressure solenoid valve circuit is shorted to power supply or shorted to ground or open, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P098012	(a) Even-numbered clutch pressure solenoid valve circuit shorted to power supply.	• TCU • Harness and connector • Even-numbered clutch pressure solenoid valve
P097911	(a) The even-numbered clutch pressure solenoid valve circuit shorted to ground.	• TCU • Harness and connector • Even-numbered clutch pressure solenoid valve
P097813	(a) The even-numbered clutch pressure solenoid valve circuit open.	• TCU • Harness and connector • Even-numbered clutch pressure solenoid valve
P1C4819	(a) Even-numbered clutch pressure solenoid valve overcurrent.	• TCU • Harness and connector • Even-numbered clutch pressure solenoid valve
P1C4918	(a) Even-numbered clutch pressure solenoid valve undercurrent.	• TCU • Harness and connector • Even-numbered clutch pressure solenoid valve
P1C4B1D	(a) Unexpected current failure of the even-numbered clutch pressure solenoid valve.	• TCU • Harness and connector • Even-numbered clutch pressure solenoid valve

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

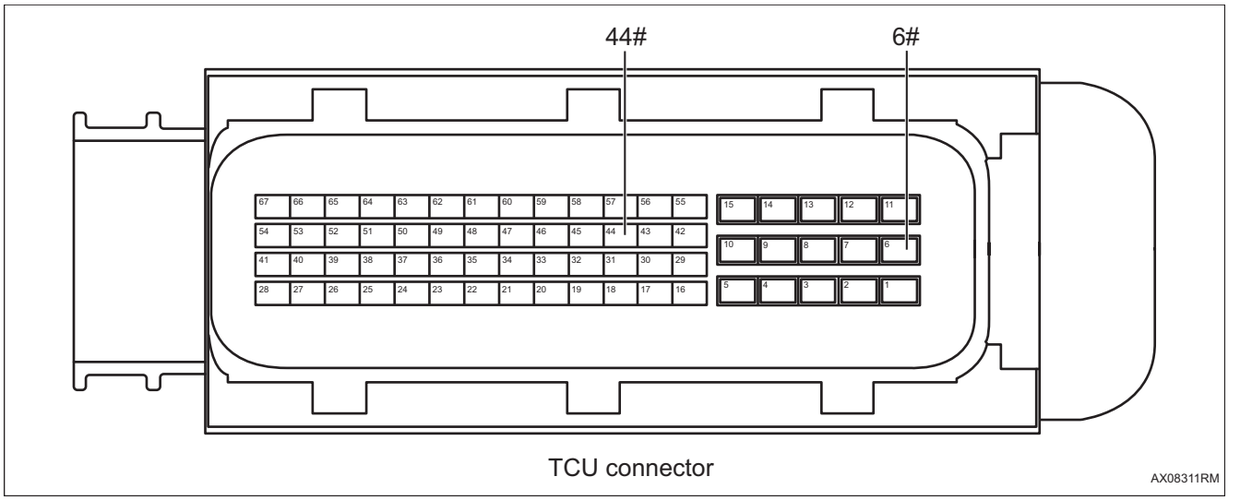
2	Check harness and connector for circuit shorted to each other (TCU-4th transmission harness harness)

(a) Check whether the harness and connector are shorted to each other.

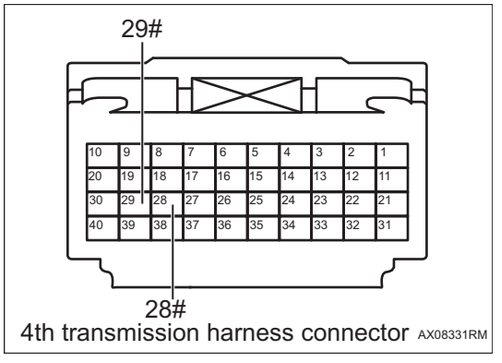
NG → **Repair or replace the harness and connector**

OK

3	Check the vehicle harness for open circuit (TCU-4th transmission harness)



TCU connector AX08311RM



4th transmission harness connector AX08331RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

Standard value

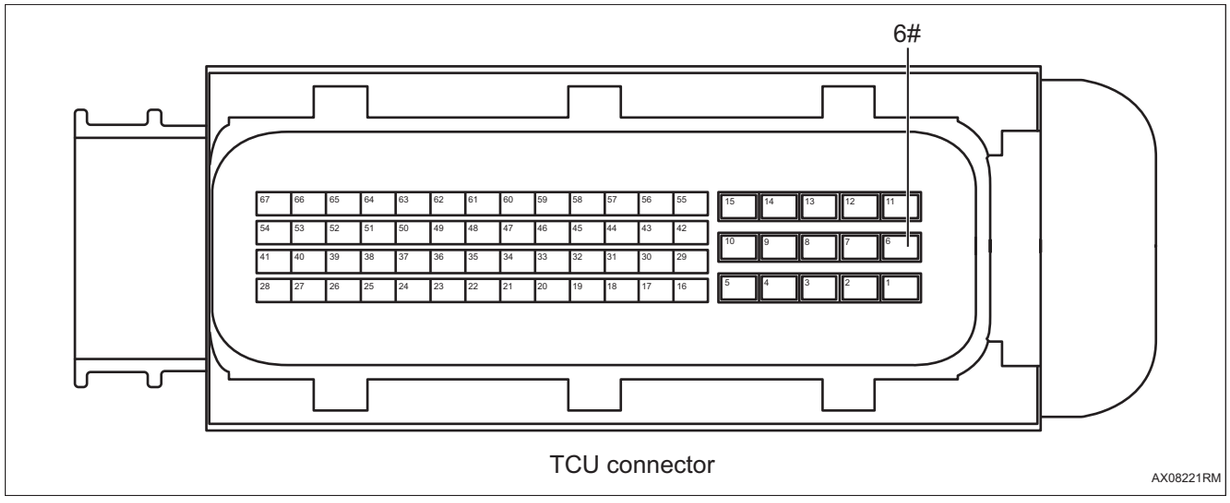
Detector connection	Detection conditions	Specified state
TCU connector 6# -4th transmission harness connector 29#	Always connected	Less than 1Ω
TCU connector 44# -4th transmission harness connector 28#	Always connected	Less than 1Ω

AX

NG → **Repair or replace the harness and connector**

OK

4	Check whether the vehicle harness is shorted to ground (TCU-4th transmission harness)



(a) Measure the resistance according to the values in the table below.

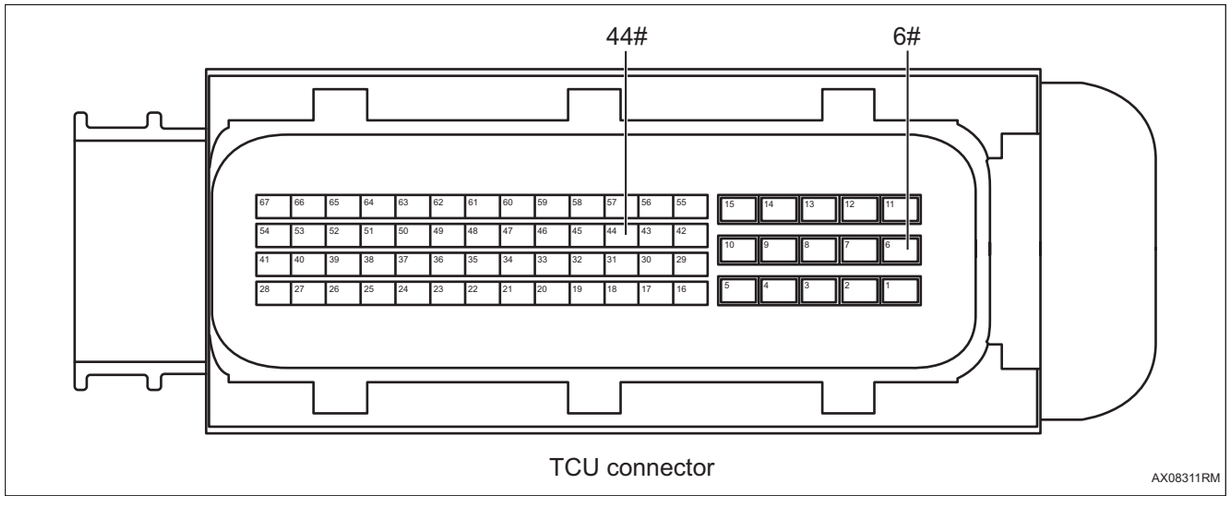
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 6# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

5	Check harness and connector for circuit shorted to power supply (TCU-4th transmission harness)



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

AX

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 6# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 44# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Replace the TCU (See page AX-224)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Return transmission to factory for repair (hydraulic module) (See page AX-229)**

Caution:

The resistance value of even-numbered clutch solenoid valve shall be confirmed before the transmission is returned to the factory for repair.

Detector connection	Detection conditions	Specified state
4th transmission harness 28# -4th transmission harness 29#	22 ℃	5.15±0.2Ω

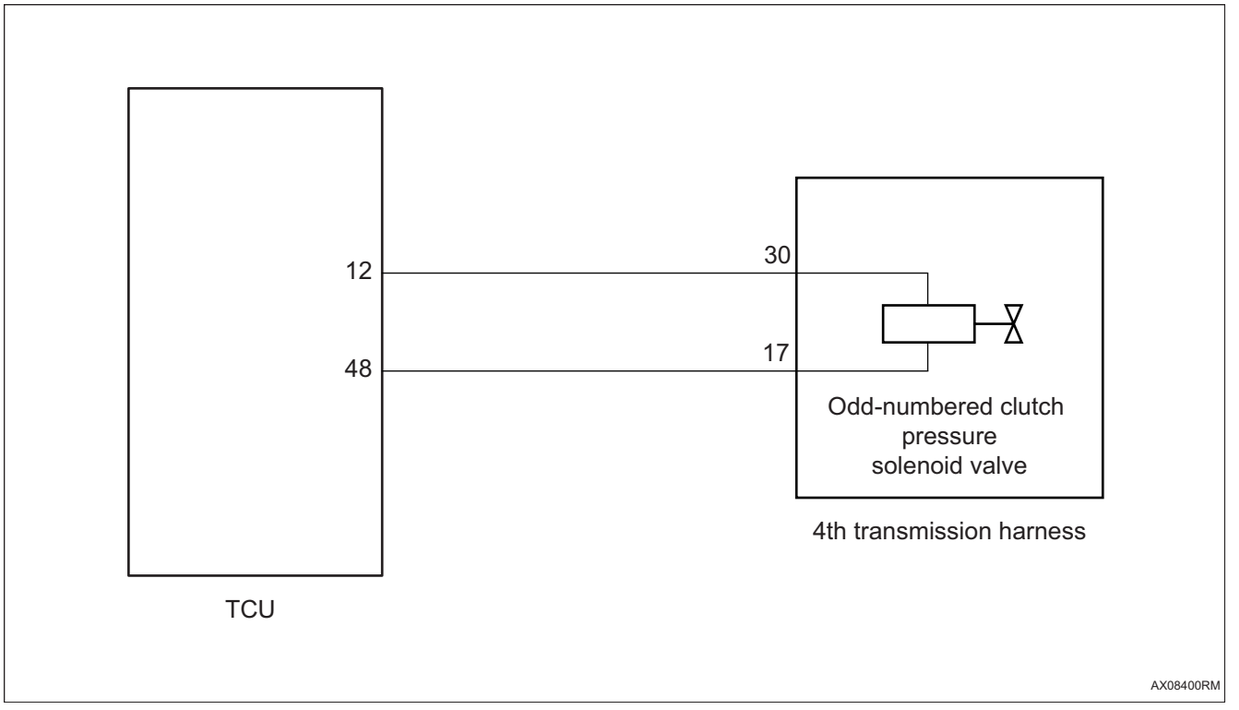
DTC	P098312	Odd-numbered clutch solenoid valve circuit shorted to power supply
DTC	P098211	Odd-numbered clutch solenoid valve circuit shorted to ground
DTC	P098113	Odd-numbered clutch solenoid valve circuit open
DTC	P1C4C19	Odd-numbered clutch solenoid valve feedback overcurrent
DTC	P1C4E18	Odd-numbered clutch solenoid valve feedback undercurrent
DTC	P1C511D	Odd-numbered clutch solenoid valve unexpected current failure

Description

When odd-numbered clutch pressure solenoid valve circuit is shorted to power supply or shorted to ground or open, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P098312	(a) Odd-numbered clutch pressure solenoid valve circuit shorted to power supply.	• TCU • Harness and connector • Odd-numbered clutch pressure solenoid valve
P098211	(a) The odd-numbered clutch pressure solenoid valve circuit shorted to ground.	• TCU • Harness and connector • Odd-numbered clutch pressure solenoid valve
P098113	(a) The odd-numbered clutch pressure solenoid valve circuit open.	• TCU • Harness and connector • Odd-numbered clutch pressure solenoid valve
P1C4C19	(a) Odd-numbered clutch pressure solenoid valve feedback overcurrent.	• TCU • Harness and connector • Odd-numbered clutch pressure solenoid valve
P1C4E18	(a) Odd-numbered clutch pressure solenoid valve feedback undercurrent.	• TCU • Harness and connector • Odd-numbered clutch pressure solenoid valve
P1C511D	(a) Unexpected current failure of the odd-numbered clutch pressure solenoid valve.	• TCU • Harness and connector • Odd-numbered clutch pressure solenoid valve

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

AX

NG → **Check connector fit and clean connector**

OK

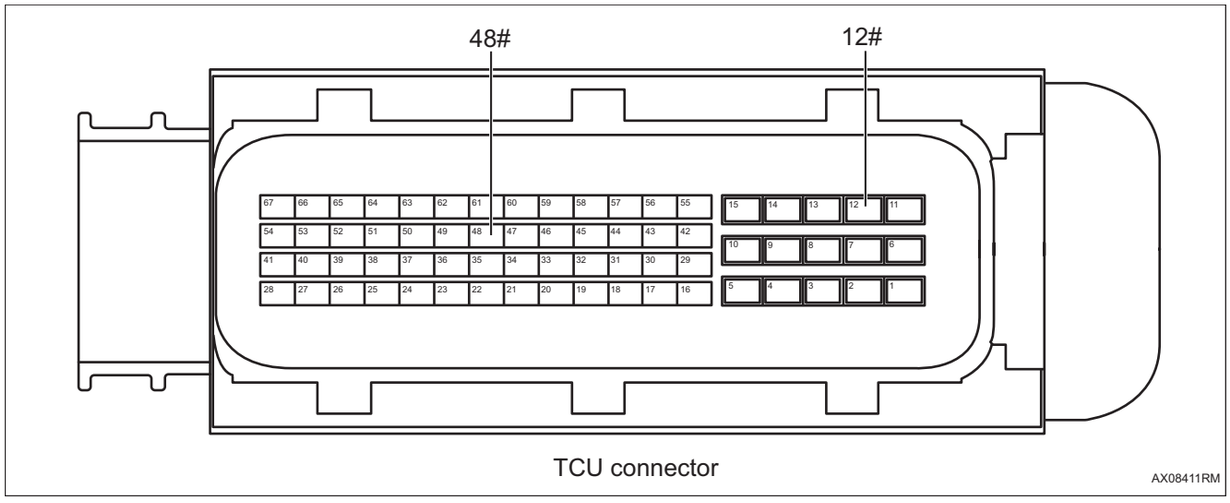
2	Check harness and connector for circuit shorted to each other (TCU-4th transmission harness harness)

(a) Check whether the harness and connector are shorted to each other.

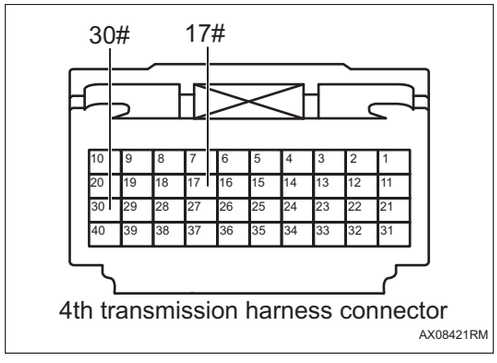
NG → **Repair or replace the harness and connector**

OK

3	Check the vehicle harness for open circuit (TCU-4th transmission harness)



TCU connector
AX08411RM



4th transmission harness connector
AX08421RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

Standard value

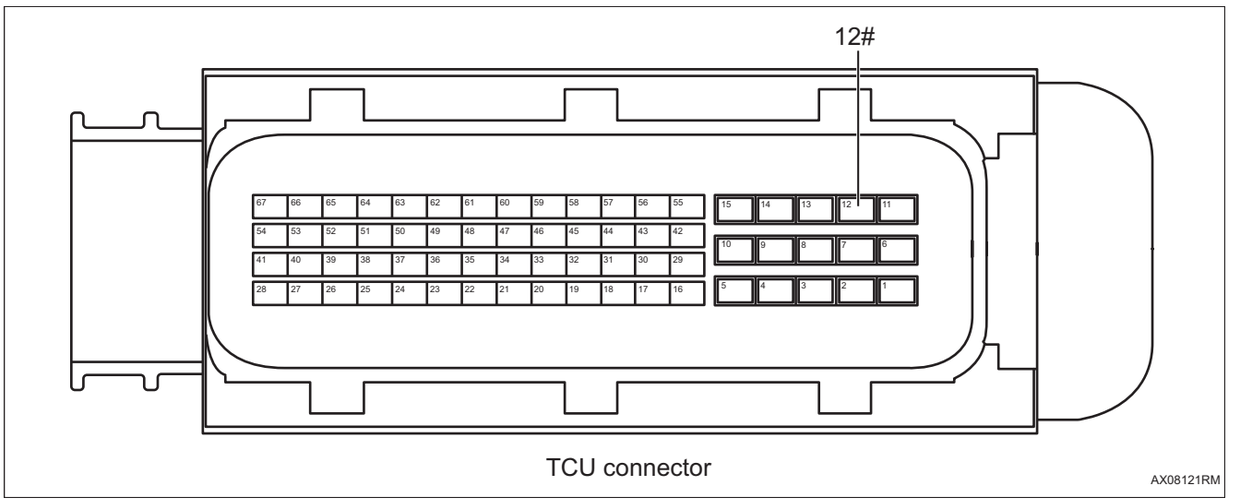
Detector connection	Detection conditions	Specified state
TCU connector 12# -4th transmission harness connector 30#	Always connected	Less than 1Ω
TCU connector 48# -4th transmission harness connector 17#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

AX

OK

4	Check whether the vehicle harness is shorted to ground (TCU-4th transmission harness)



TCU connector

(a) Measure the resistance according to the values in the table below.

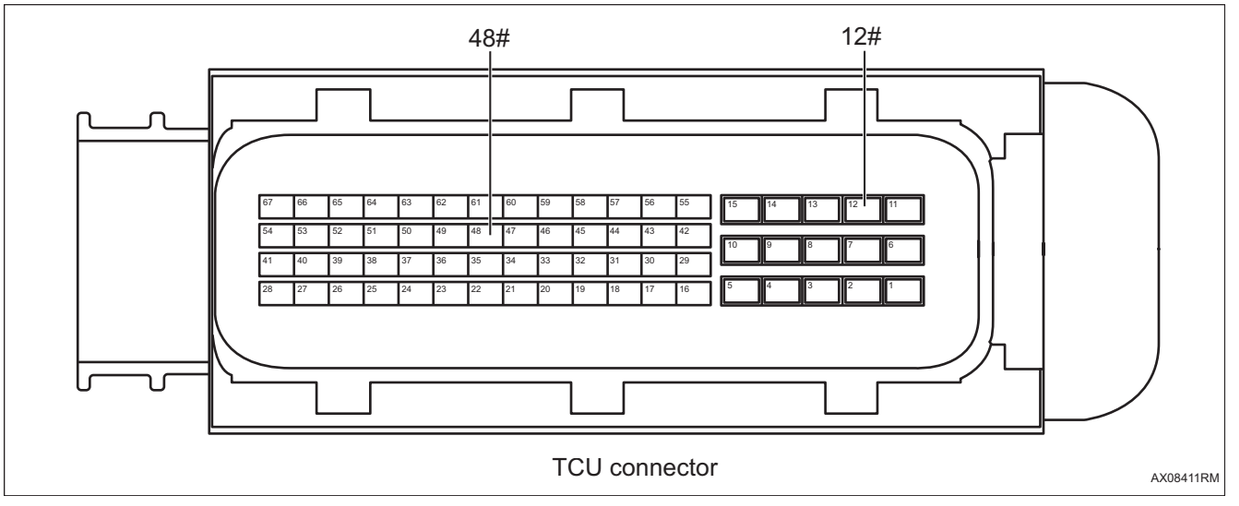
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 12# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

5	**Check harness and connector for circuit shorted to power supply (TCU-4th transmission harness)**



TCU connector

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

AX

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 12# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 48# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Replace the TCU (See page AX-224)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Return transmission to factory for repair (hydraulic module) (See page AX-229)**

Caution:

The resistance value of odd-numbered clutch solenoid valve shall be confirmed before the transmission is returned to the factory for repair.

Detector connection	Detection conditions	Specified state
4th transmission harness 17# -4th transmission harness 30#	22 ℃	5.15±0.2Ω

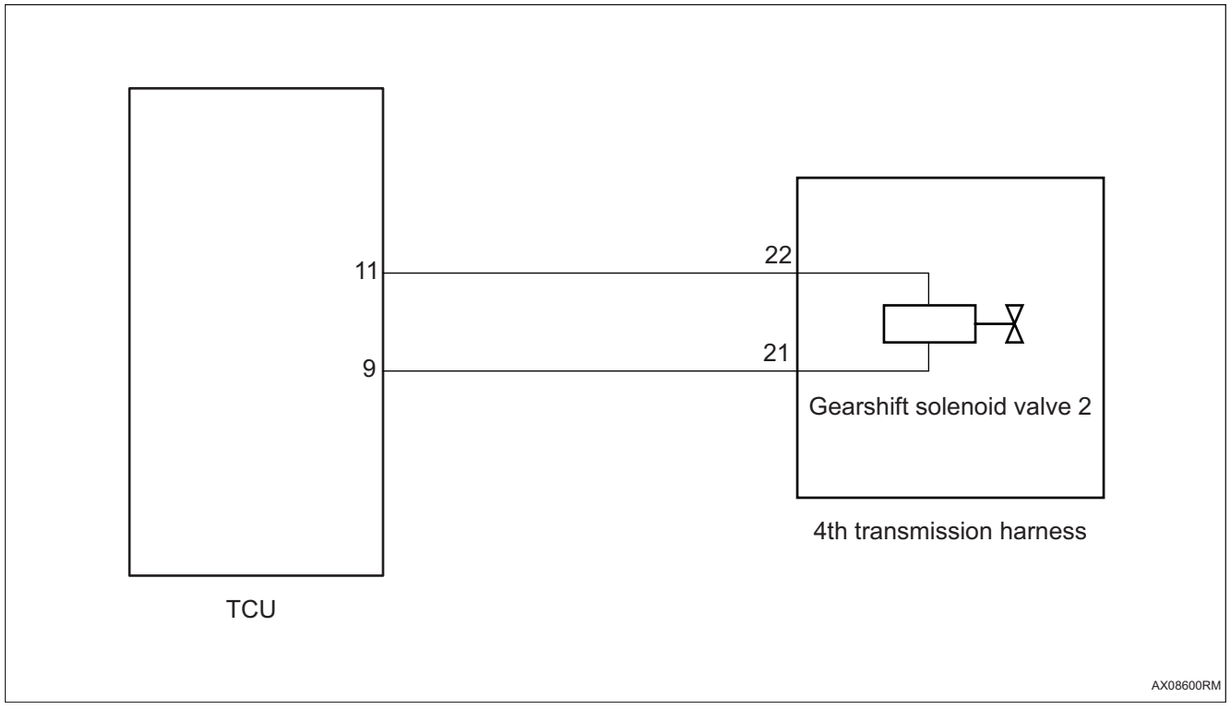
DTC	P098612	Act2 solenoid valve circuit shorted to power supply
DTC	P098511	Act2 solenoid valve circuit shorted to ground
DTC	P098413	Act2 solenoid valve open circuit
DTC	P1C5219	Act2 solenoid valve feedback current too high
DTC	P1C5318	Act2 solenoid valve feedback current too low
DTC	P1C551D	Act2 solenoid valve unexpected current failure

Description

When gearshift solenoid valve 2 circuit is shorted to power supply, shorted to ground, or open, TCU records DTC.

DTC	DTC detection conditions	Faulty location
P098612	(a) Gearshift solenoid valve 2 circuit shorted to power supply.	• TCU • Harness and connector • Gearshift solenoid valve 2
P098511	(a) Gearshift solenoid valve 2 circuit shorted to ground.	• TCU • Harness and connector • Gearshift solenoid valve 2
P098413	(a) Gearshift solenoid valve 2 open circuit.	• TCU • Harness and connector • Gearshift solenoid valve 2
P1C5219	(a) Gearshift solenoid valve 2 feedback current too high.	• TCU • Harness and connector • Gearshift solenoid valve 2
P1C5318	(a) Gearshift solenoid valve 2 feedback current too low.	• TCU • Harness and connector • Gearshift solenoid valve 2
P1C551D	(a) Gearshift solenoid valve 2 unexpected current failure.	• TCU • Harness and connector • Gearshift solenoid valve 2

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

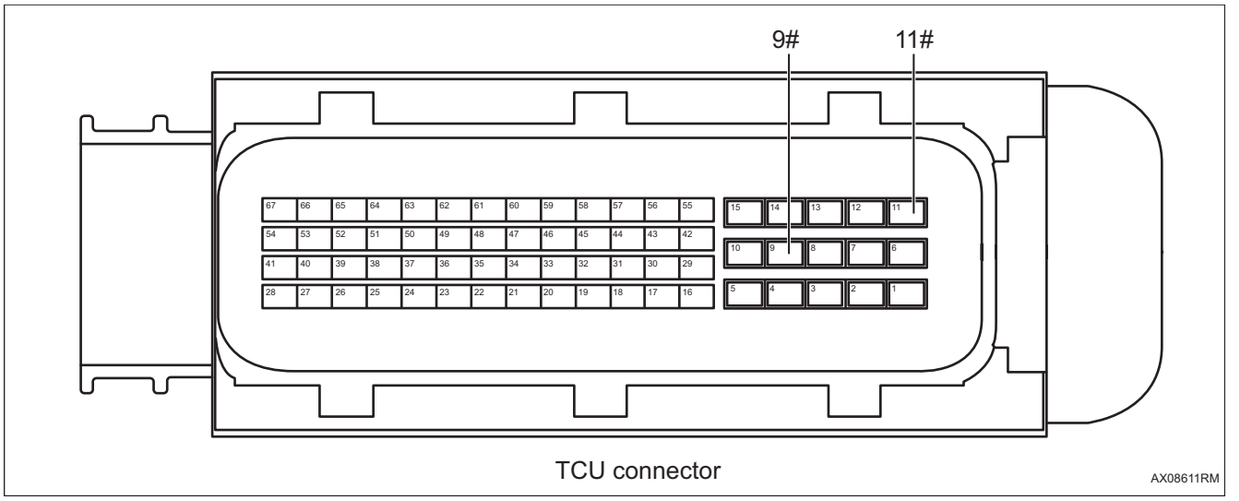
2	Check harness and connector for circuit shorted to each other (TCU-4th transmission harness harness)

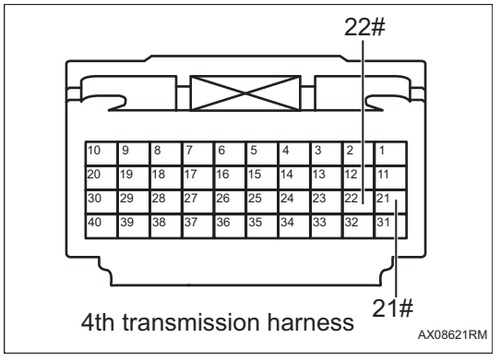
(a) Check whether the harness and connector are shorted to each other.

NG → **Repair or replace the harness and connector**

OK

3	Check the vehicle harness for open circuit (TCU-4th transmission harness)





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

Standard value

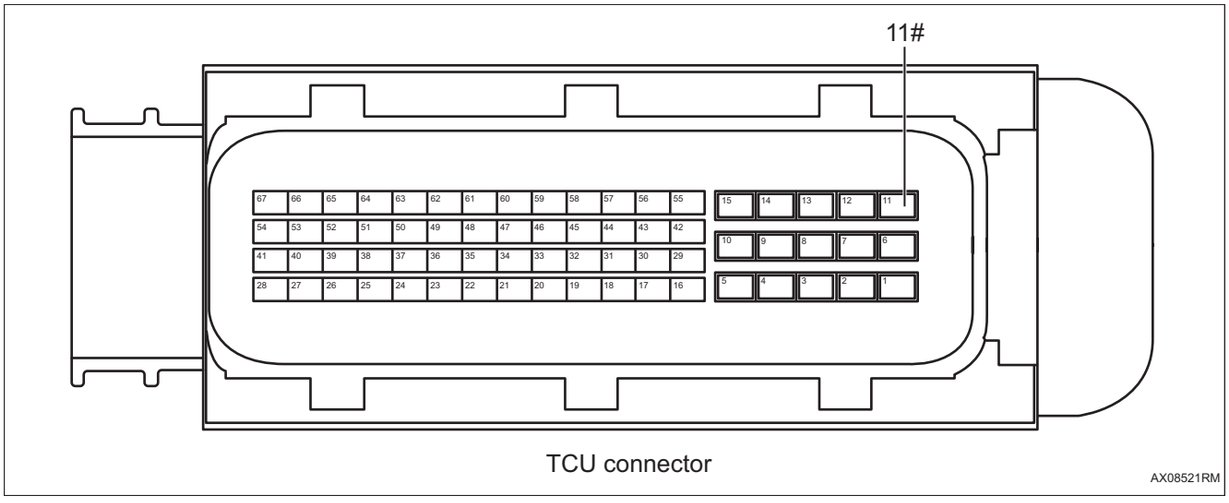
Detector connection	Detection conditions	Specified state
TCU connector 11# -4th transmission harness connector 22#	Always connected	Less than 1Ω
TCU connector 9# -4th transmission harness connector 21#	Always connected	Less than 1Ω

AX

NG → **Repair or replace the harness and connector**

OK

4	Check whether the vehicle harness is shorted to ground (TCU-4th transmission harness)



TCU connector

AX08521RM

(a) Measure the resistance according to the values in the table below.

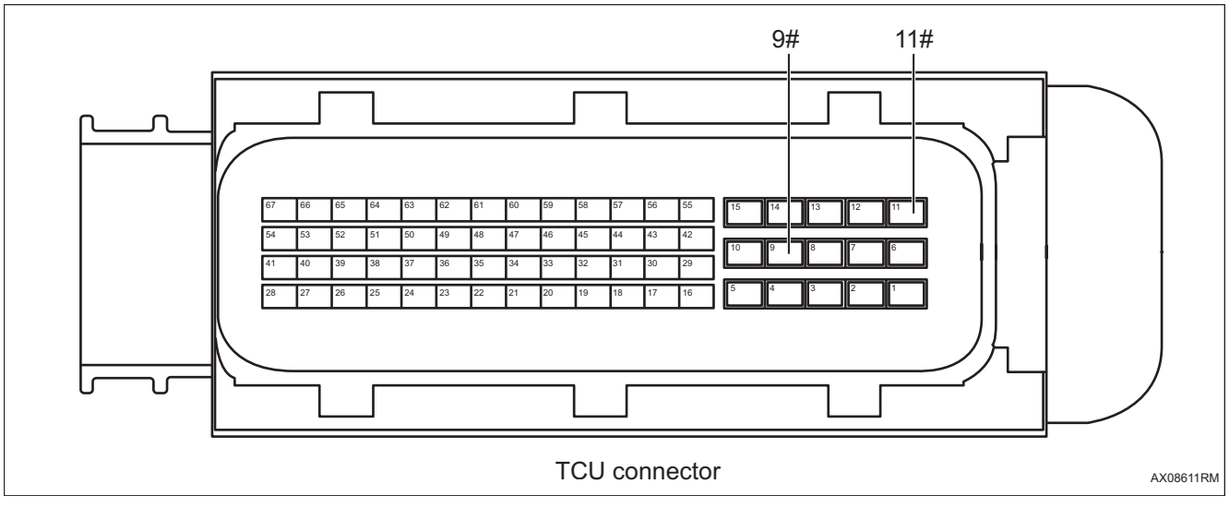
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 11# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

5	Check harness and connector for circuit shorted to power supply (TCU-4th transmission harness)



TCU connector

AX08611RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

AX

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 11# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 9# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Replace the TCU (See page AX-224)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Return transmission to factory for repair (hydraulic module) (See page AX-229)**

Caution:

The resistance of gearshift solenoid valve 2 shall be confirmed before the transmission is returned to the factory for repair.

Detector connection	Detection conditions	Specified state
4th transmission harness 21# -4th transmission harness 22#	22 ℃	4.14±0.26Ω

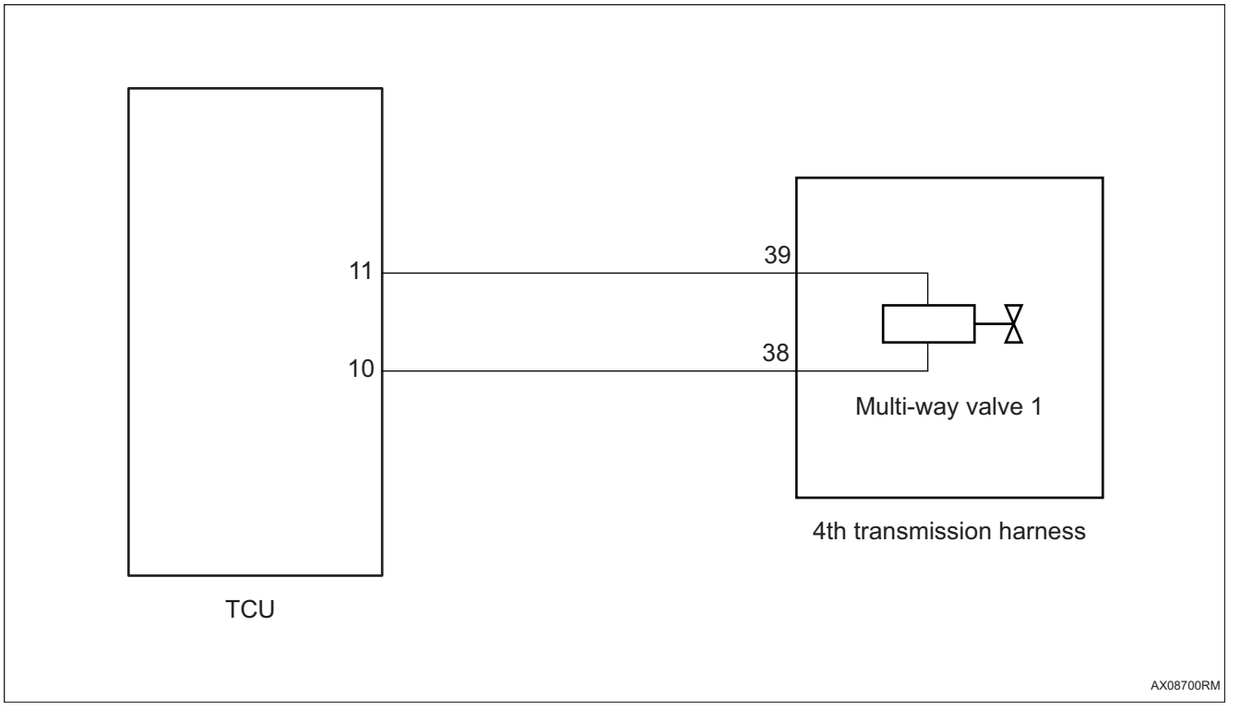
DTC	P099912	Mul1 solenoid valve circuit shorted to power supply
DTC	P099811	Mul1 solenoid valve circuit shorted to ground
DTC	P099713	Mul1 solenoid valve open circuit
DTC	P1C5619	Mul1 solenoid valve feedback current too high
DTC	P1C5718	Mul1 solenoid valve feedback current too low
DTC	P1C591D	Mul1 solenoid valve unexpected current failure

Description

When multi-way valve 1 circuit is shorted to power supply, shorted to ground, or open, TCU records DTC.

DTC	DTC detection conditions	Faulty location
P099912	(a) Multi-way valve 1 circuit shorted to power supply.	• TCU • Harness and connector • Multi-way valve 1
P099811	(a) Multi-way valve 1 circuit shorted to ground.	• TCU • Harness and connector • Multi-way valve 1
P099713	(a) Multi-way valve 1 open circuit.	• TCU • Harness and connector • Multi-way valve 1
P1C5619	(a) Multi-way valve 1 feedback current too high.	• TCU • Harness and connector • Multi-way valve 1
P1C5718	(a) Multi-way valve 1 feedback current too low.	• TCU • Harness and connector • Multi-way valve 1
P1C591D	(a) Multi-way valve 1 unexpected current failure.	• TCU • Harness and connector • Multi-way valve 1

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

AX

NG → **Check connector fit and clean connector**

OK

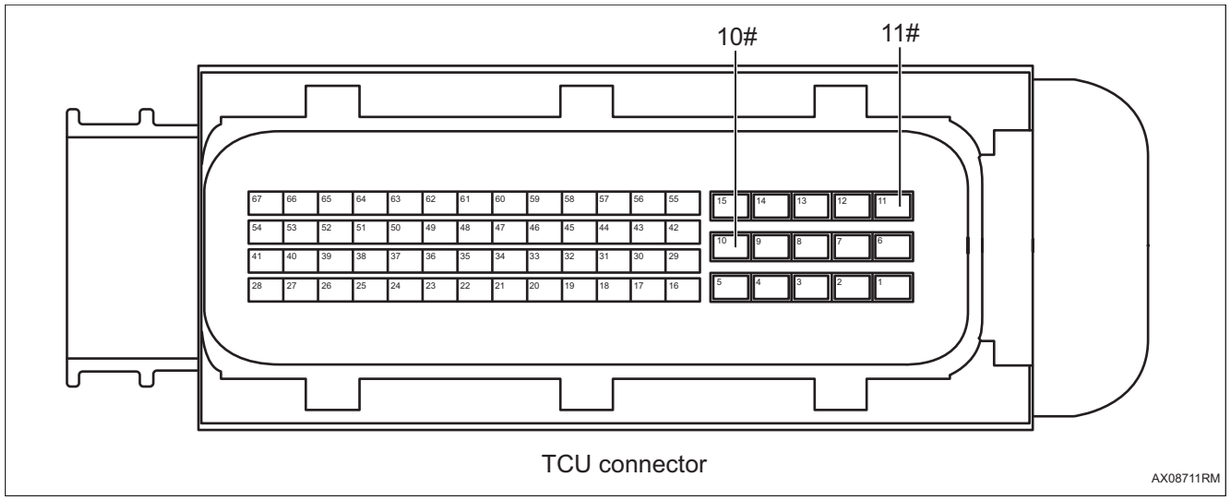
2	Check harness and connector for circuit shorted to each other (TCU-4th transmission harness harness)

(a) Check whether the harness and connector are shorted to each other.

NG → **Repair or replace the harness and connector**

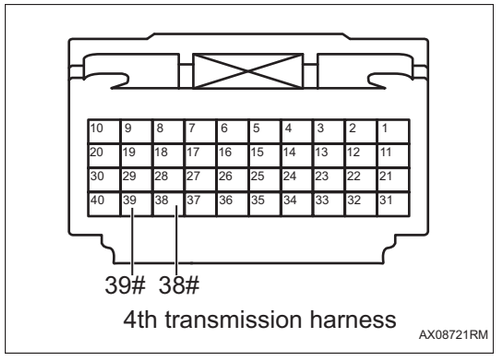
OK

3	Check the vehicle harness for open circuit (TCU-4th transmission harness)



TCU connector

AX08711RM



4th transmission harness

AX08721RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

Standard value

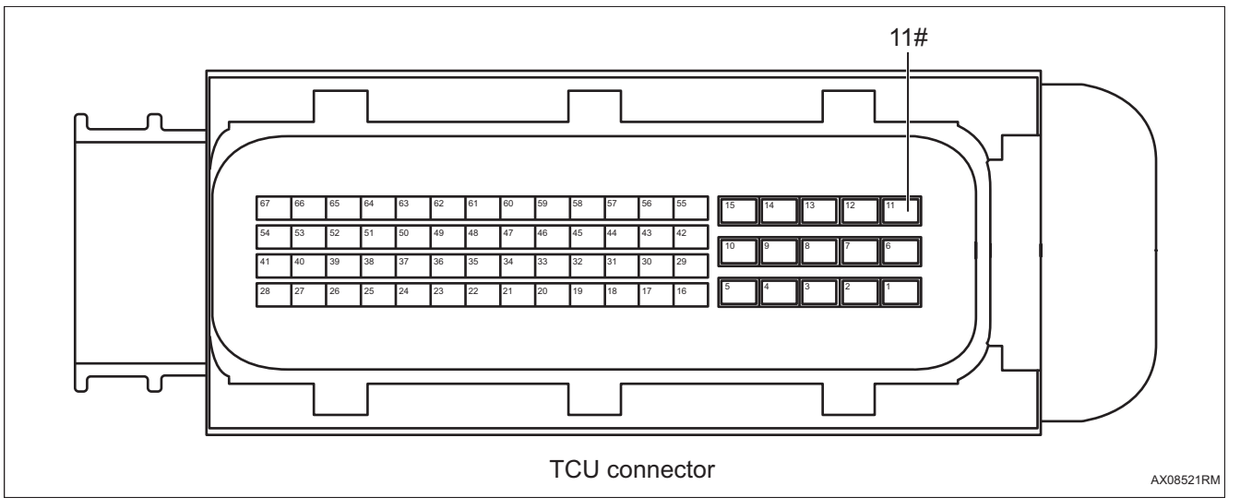
Detector connection	Detection conditions	Specified state
TCU connector 11# -4th transmission harness connector 39#	Always connected	Less than 1Ω
TCU connector 10# -4th transmission harness connector 38#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

AX

OK

4	Check whether the vehicle harness is shorted to ground (TCU-4th transmission harness)



TCU connector

AX08521RM

(a) Measure the resistance according to the values in the table below.

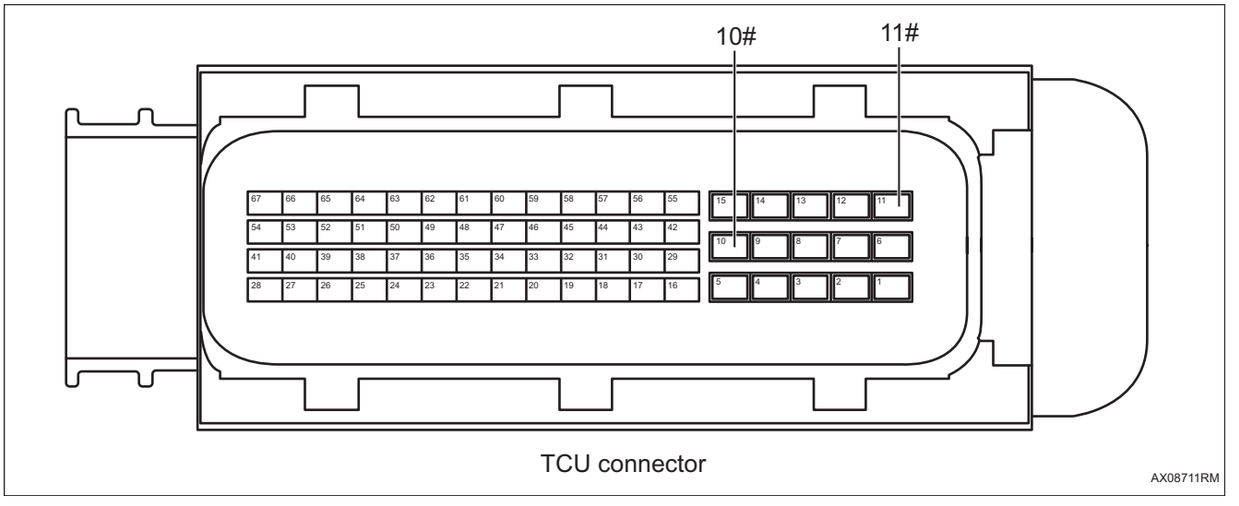
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 11# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	Check harness and connector for circuit shorted to power supply (TCU-4th transmission harness)



TCU connector

AX08711RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

AX

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 11# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 10# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	Replace the TCU (See page AX-224)

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Return transmission to factory for repair (hydraulic module) (See page AX-229)**

Caution:

The resistance of multi-way valve 1 shall be confirmed before the transmission is returned to the factory for repair.

Detector connection	Detection conditions	Specified state
4th transmission harness 38# -4th transmission harness 39#	22 ℃	16.0±1.45Ω

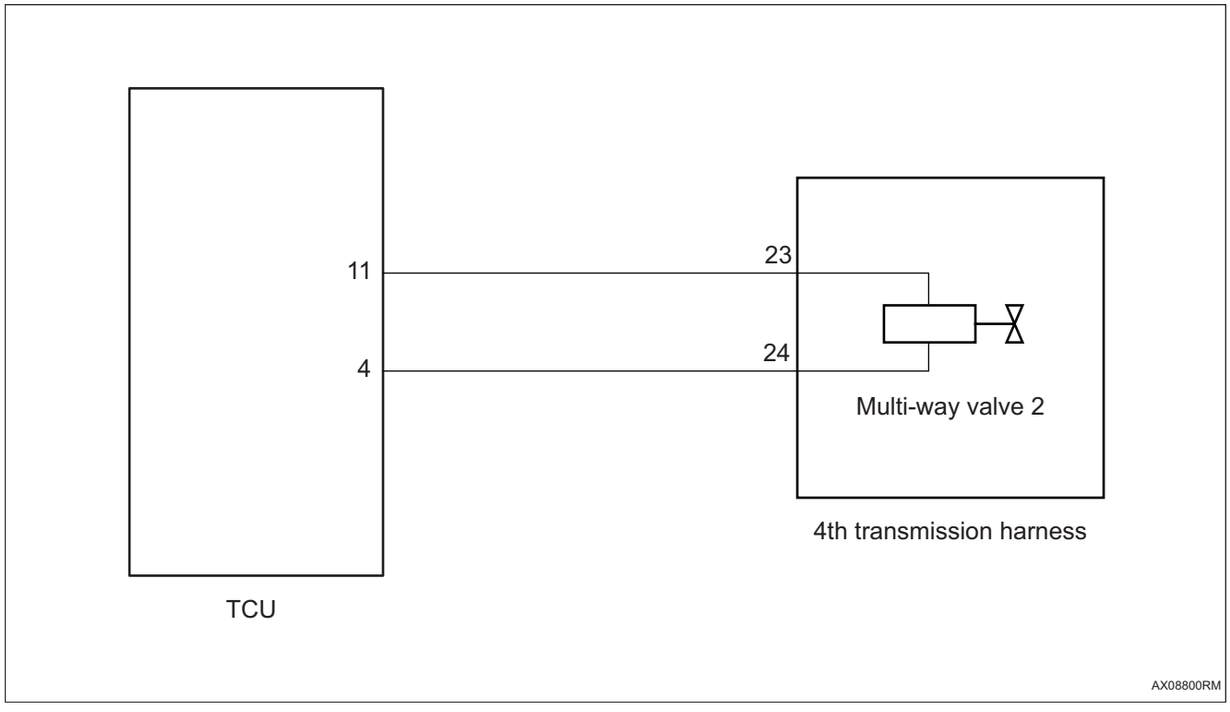
DTC	P099C12	Mul2 solenoid valve circuit shorted to power supply
DTC	P099B11	Mul2 solenoid valve circuit shorted to ground
DTC	P099A13	Mul2 solenoid valve open circuit
DTC	P1C5A19	Mul2 solenoid valve feedback current too high
DTC	P1C5B18	Mul2 solenoid valve feedback current too low
DTC	P1C5D1D	Mul2 solenoid valve unexpected current failure

Description

When multi-way valve 2 circuit is shorted to power supply, shorted to ground, or open, TCU records DTC.

DTC	DTC detection conditions	Faulty location
P099C12	(a) Multi-way valve 2 circuit shorted to power supply.	• TCU • Harness and connector • Multi-way valve 2
P099B11	(a) Multi-way valve 2 circuit shorted to ground.	• TCU • Harness and connector • Multi-way valve 2
P099A13	(a) Multi-way valve 2 open circuit.	• TCU • Harness and connector • Multi-way valve 2
P1C5A19	(a) Multi-way valve 2 feedback current too high.	• TCU • Harness and connector • Multi-way valve 2
P1C5B18	(a) Multi-way valve 2 feedback current too low.	• TCU • Harness and connector • Multi-way valve 2
P1C5D1D	(a) Multi-way valve 2 unexpected current failure.	• TCU • Harness and connector • Multi-way valve 2

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

2	Check harness and connector for circuit shorted to each other (TCU-4th transmission harness harness)

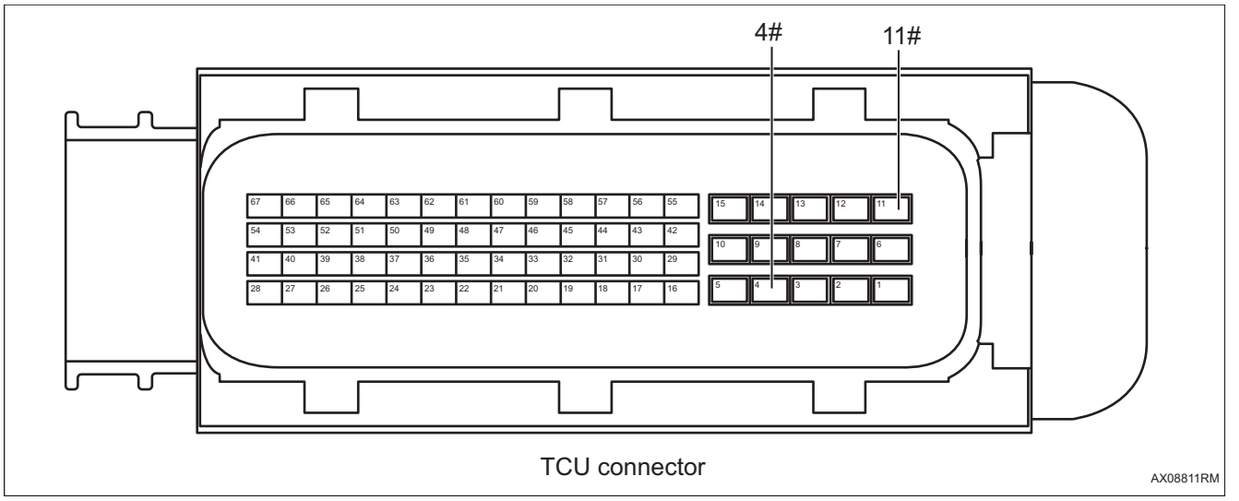
(a) Check whether the harness and connector are shorted to each other.

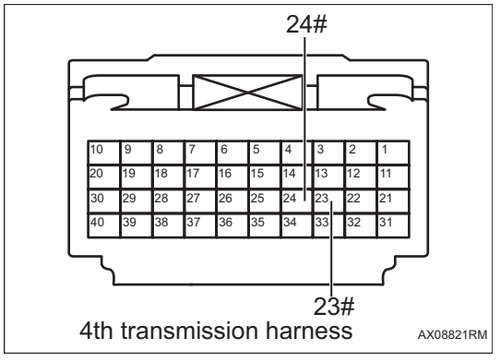
AX

NG → **Repair or replace the harness and connector**

OK

3	Check the vehicle harness for open circuit (TCU-4th transmission harness)





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

Standard value

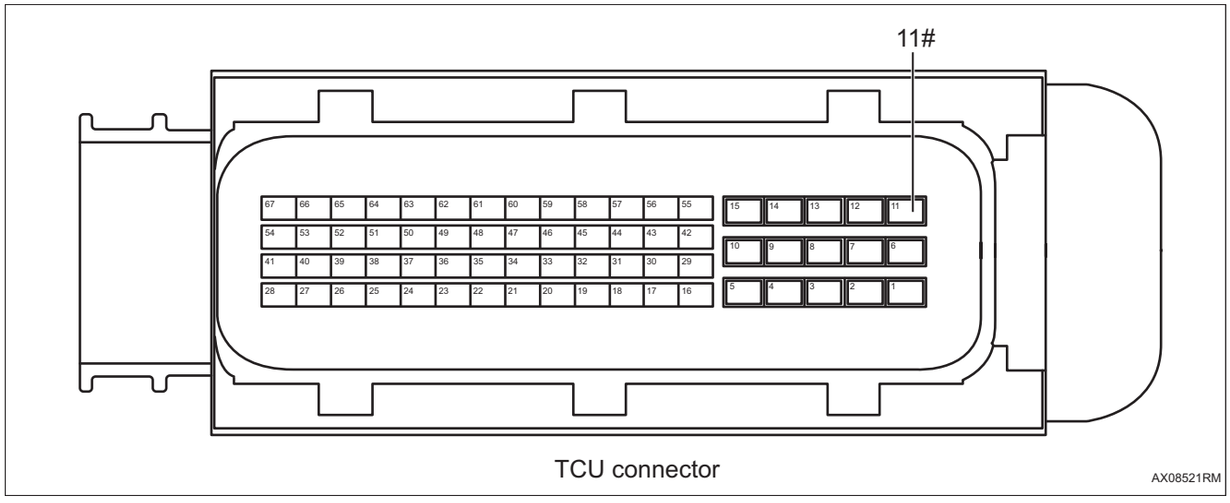
Detector connection	Detection conditions	Specified state
TCU connector 11# -4th transmission harness connector 23#	Always connected	Less than 1Ω
TCU connector 4# -4th transmission harness connector 24#	Always connected	Less than 1Ω

AX

NG → **Repair or replace the harness and connector**

OK

4	Check whether the vehicle harness is shorted to ground (TCU-4th transmission harness)



TCU connector

AX08521RM

(a) Measure the resistance according to the values in the table below.

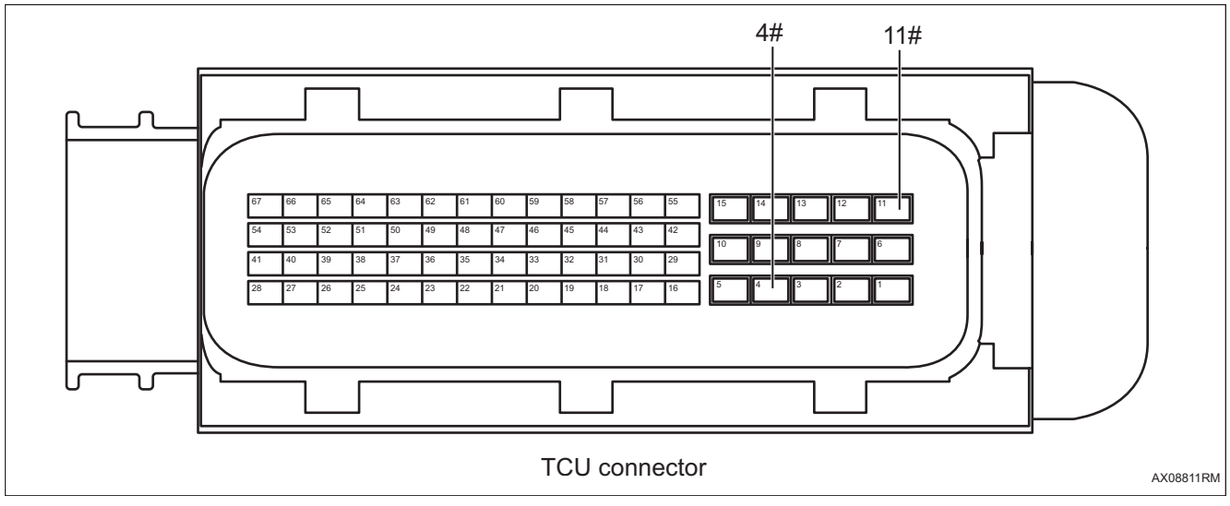
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 11# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

5	Check harness and connector for circuit shorted to power supply (TCU-4th transmission harness)



TCU connector

AX08811RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

AX

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 11# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 4# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Replace the TCU (See page AX-224)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Return transmission to factory for repair (hydraulic module) (See page AX-229)**

Caution:

The resistance of multi-way valve 2 shall be confirmed before the transmission is returned to the factory for repair.

Detector connection	Detection conditions	Specified state
4th transmission harness 23# -4th transmission harness 24#	22 ℃	16.0±1.45Ω

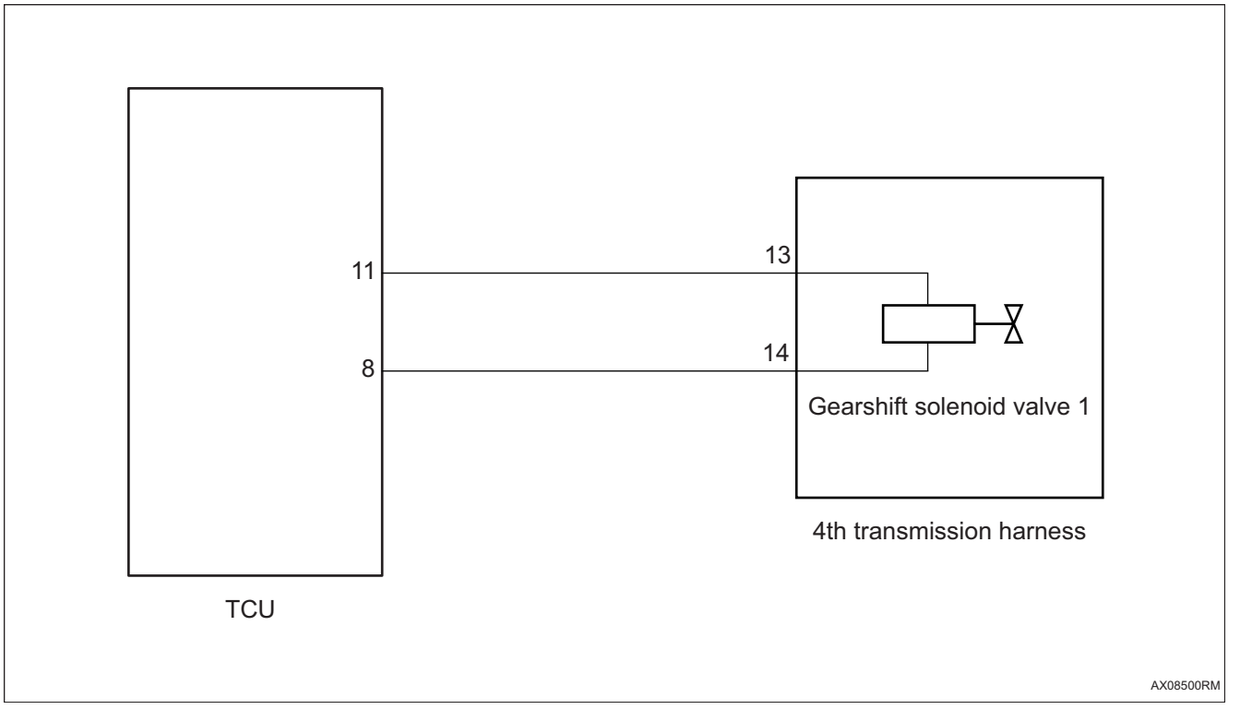
DTC	P099F12	Act1 solenoid valve circuit shorted to power supply
DTC	P099E11	Act1 solenoid valve circuit shorted to ground
DTC	P099D13	Act1 solenoid valve open circuit
DTC	P1C6019	Act1 solenoid valve feedback overcurrent
DTC	P1C6118	Act1 solenoid valve feedback undercurrent
DTC	P1C631D	Act1 solenoid valve unexpected current failure

Description

When gearshift solenoid valve 1 circuit is shorted to power supply, shorted to ground, or open, TCU records DTC.

DTC	DTC detection conditions	Faulty location
P099F12	(a) Gearshift solenoid valve 1 circuit shorted to power supply.	• TCU • Harness and connector • Gearshift solenoid valve 1
P099E11	(a) Gearshift solenoid valve 1 circuit shorted to ground.	• TCU • Harness and connector • Gearshift solenoid valve 1
P099D13	(a) Gearshift solenoid valve 1 open circuit.	• TCU • Harness and connector • Gearshift solenoid valve 1
P1C6019	(a) Gearshift solenoid valve 1 feedback current too high.	• TCU • Harness and connector • Gearshift solenoid valve 1
P1C6118	(a) Gearshift solenoid valve 1 feedback current too low.	• TCU • Harness and connector • Gearshift solenoid valve 1
P1C631D	(a) Gearshift solenoid valve 1 unexpected current failure.	• TCU • Harness and connector • Gearshift solenoid valve 1

Circuit diagram



Inspection procedure

1	**Confirm and clear the DTC**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

AX

NG → **Check connector fit and clean connector**

OK

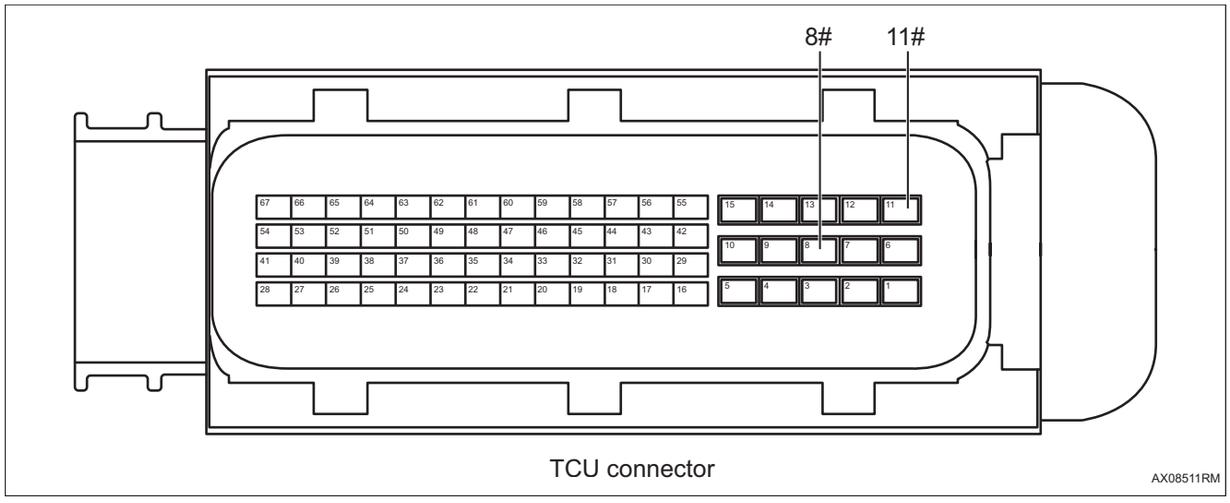
2	**Check harness and connector for circuit shorted to each other (TCU-4th transmission harness harness)**

(a) Check whether the harness and connector are shorted to each other.

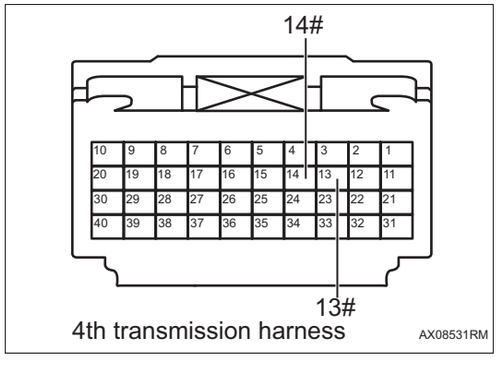
NG → **Repair or replace the harness and connector**

OK

3	Check the vehicle harness for open circuit (TCU-4th transmission harness)



TCU connector



4th transmission harness

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

Standard value

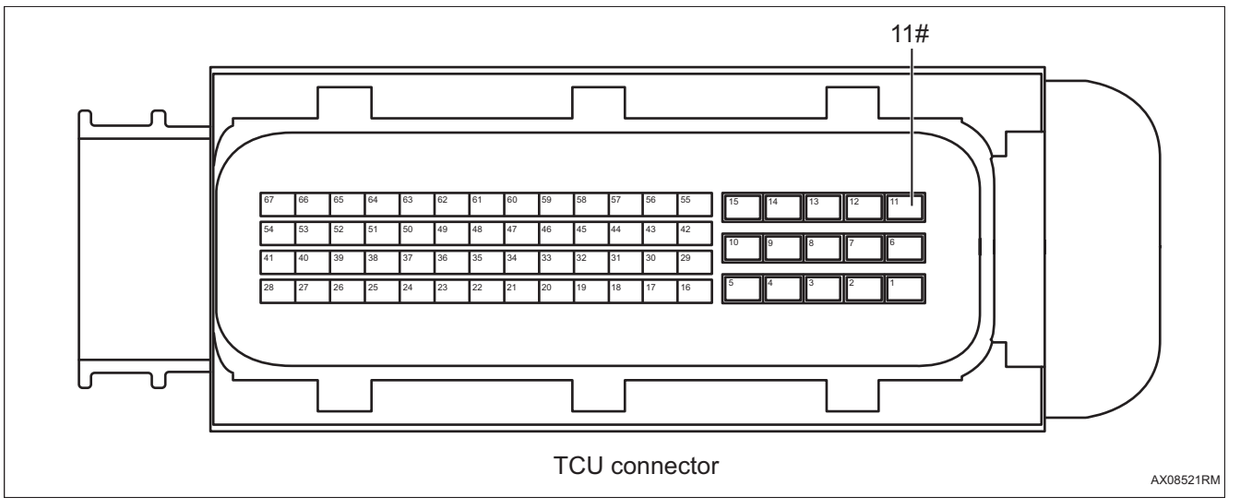
Detector connection	Detection conditions	Specified state
TCU connector 11# -4th transmission harness connector 13#	Always connected	Less than 1Ω
TCU connector 8# -4th transmission harness connector 14#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

AX

OK

4	Check whether the vehicle harness is shorted to ground (TCU-4th transmission harness)



TCU connector

(a) Measure the resistance according to the values in the table below.

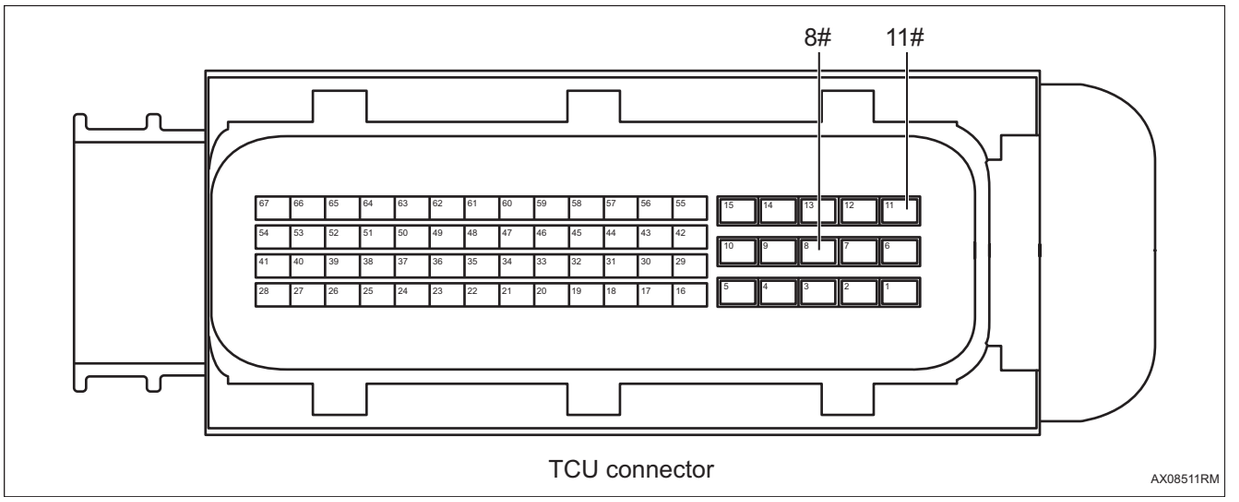
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 11# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	**Check harness and connector for circuit shorted to power supply (TCU-4th transmission harness)**



TCU connector

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

AX

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 11# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 8# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Replace the TCU (See page AX-224)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Return transmission to factory for repair (hydraulic module) (See page AX-229)**

Caution:

The resistance of gearshift solenoid valve 1 shall be confirmed before the transmission is returned to the factory for repair.

Detector connection	Detection conditions	Specified state
4th transmission harness 13# -4th transmission harness 14#	22 ℃	4.14±0.26Ω

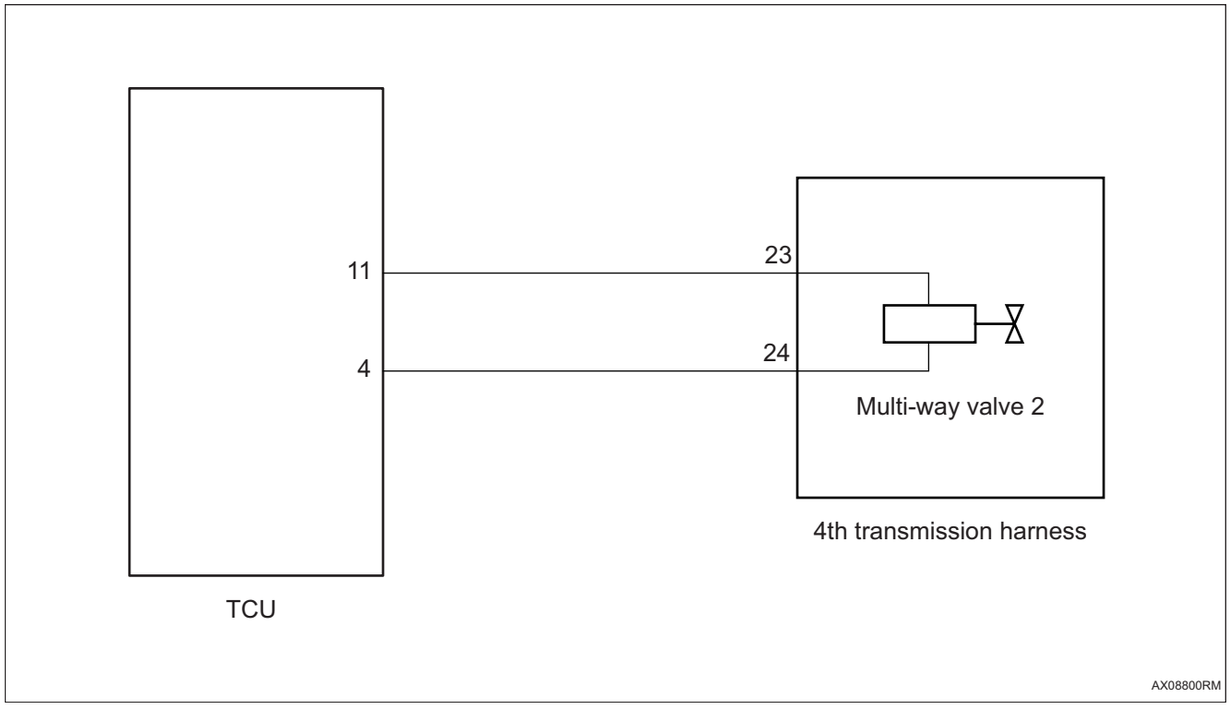
DTC	P099C12	Mul2 solenoid valve circuit shorted to power supply
DTC	P099B11	Mul2 solenoid valve circuit shorted to ground
DTC	P099A13	Mul2 solenoid valve open circuit
DTC	P1C5A19	Mul2 solenoid valve feedback current too high
DTC	P1C5B18	Mul2 solenoid valve feedback current too low
DTC	P1C5D1D	Mul2 solenoid valve unexpected current failure

Description

When multi-way valve 2 circuit is shorted to power supply, shorted to ground, or open, TCU records DTC.

DTC	DTC detection conditions	Faulty location
P099C12	(a) Multi-way valve 2 circuit shorted to power supply.	• TCU • Harness and connector • Multi-way valve 2
P099B11	(a) Multi-way valve 2 circuit shorted to ground.	• TCU • Harness and connector • Multi-way valve 2
P099A13	(a) Multi-way valve 2 open circuit.	• TCU • Harness and connector • Multi-way valve 2
P1C5A19	(a) Multi-way valve 2 feedback current too high.	• TCU • Harness and connector • Multi-way valve 2
P1C5B18	(a) Multi-way valve 2 feedback current too low.	• TCU • Harness and connector • Multi-way valve 2
P1C5D1D	(a) Multi-way valve 2 unexpected current failure.	• TCU • Harness and connector • Multi-way valve 2

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

2	Check harness and connector for circuit shorted to each other (TCU-4th transmission harness harness)

(a) Check whether the harness and connector are shorted to each other.

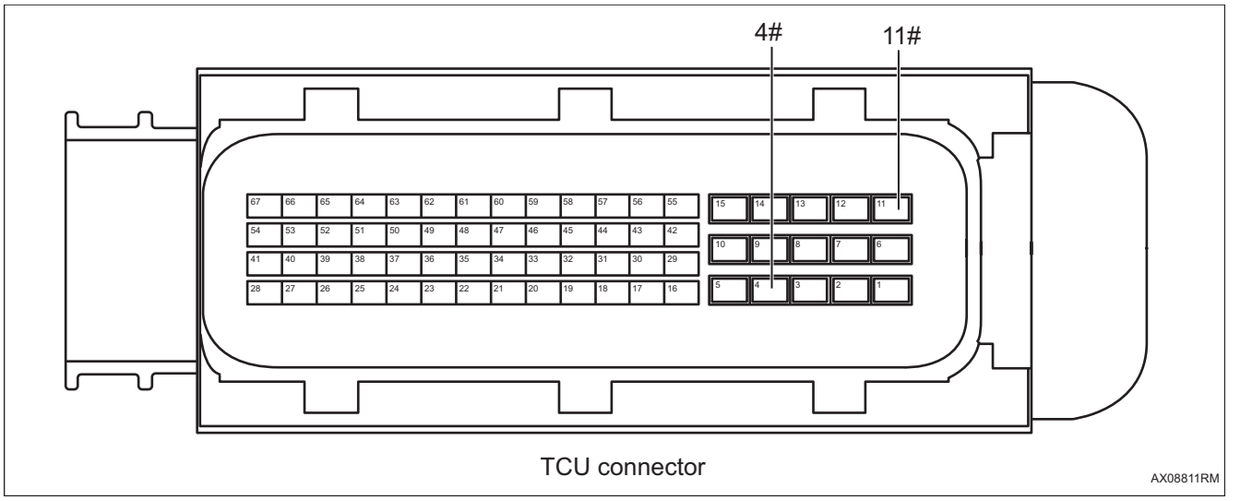
AX

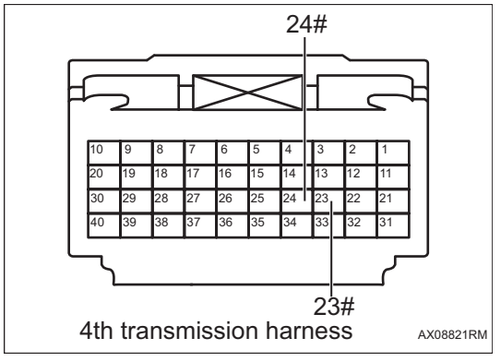
NG

Repair or replace the harness and connector

OK

3	Check the vehicle harness for open circuit (TCU-4th transmission harness)





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 11# -4th transmission harness connector 23#	Always connected	Less than 1Ω
TCU connector 4# -4th transmission harness connector 24#	Always connected	Less than 1Ω

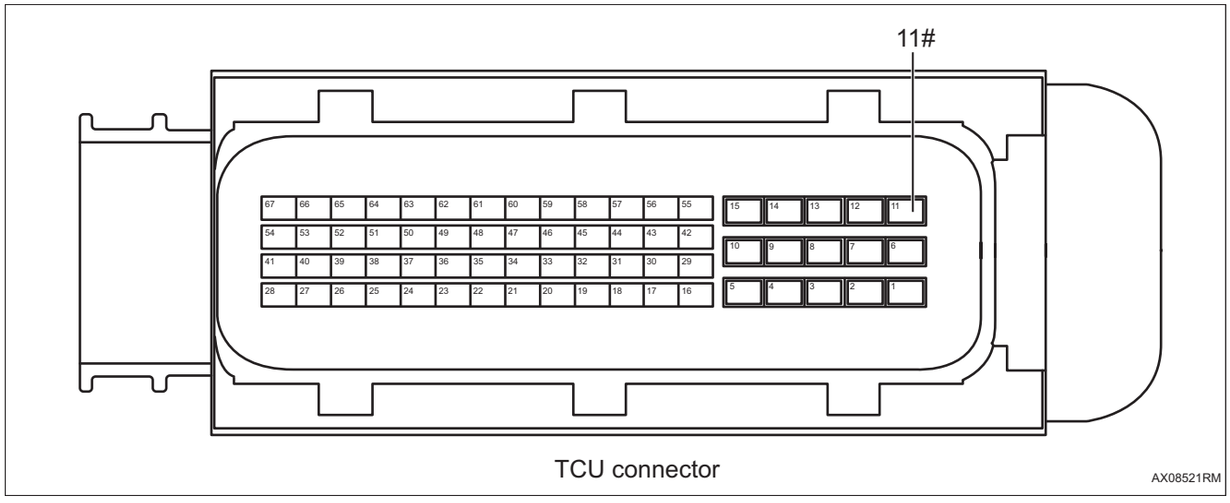
AX

NG

Repair or replace the harness and connector

OK

4	Check whether the vehicle harness is shorted to ground (TCU-4th transmission harness)



TCU connector

AX08521RM

(a) Measure the resistance according to the values in the table below.

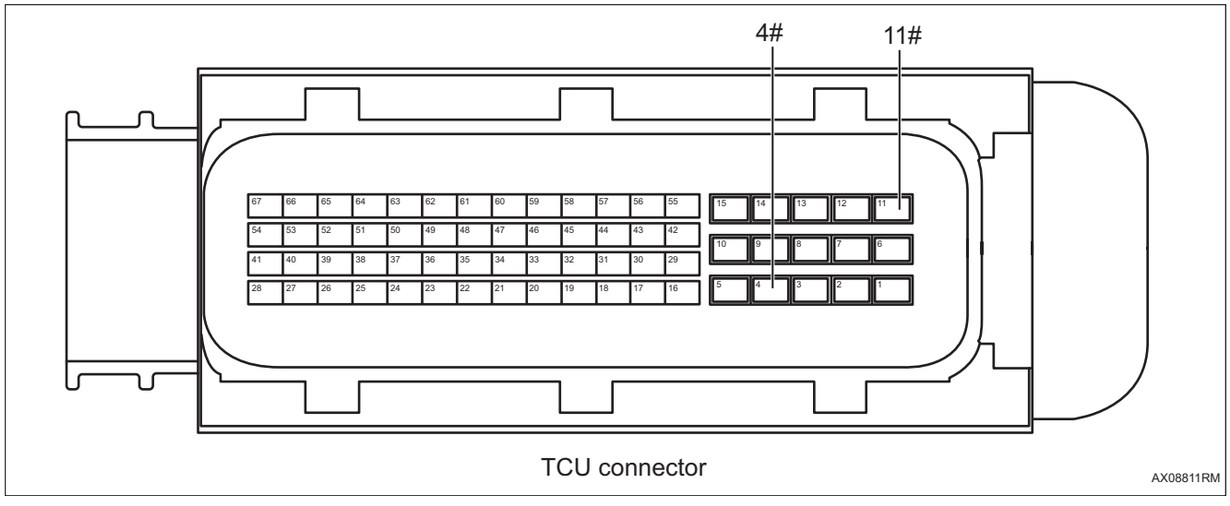
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 11# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

5	Check harness and connector for circuit shorted to power supply (TCU-4th transmission harness)



TCU connector

AX08811RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

AX

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 11# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 4# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Replace the TCU (See page AX-224)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Return transmission to factory for repair (hydraulic module) (See page AX-229)**

Caution:

The resistance of multi-way valve 2 shall be confirmed before the transmission is returned to the factory for repair.

Detector connection	Detection conditions	Specified state
4th transmission harness 23# -4th transmission harness 24#	22 ℃	16.0±1.45Ω

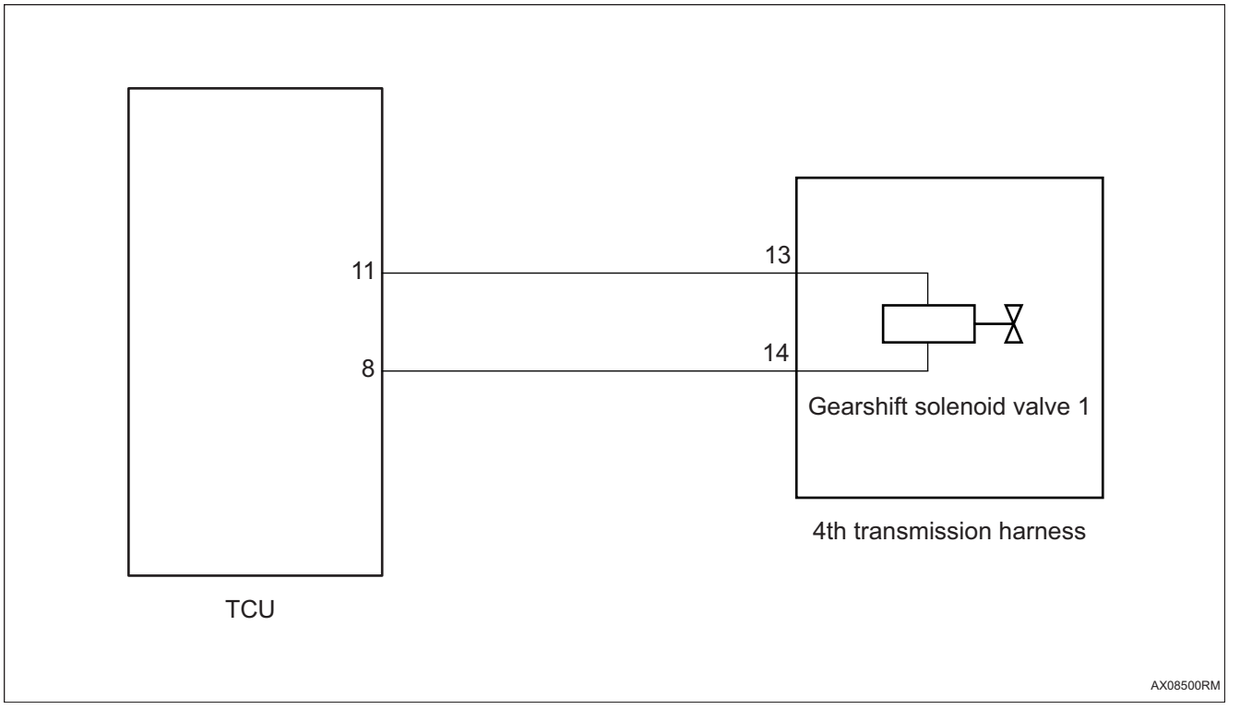
DTC	P099F12	Act1 solenoid valve circuit shorted to power supply
DTC	P099E11	Act1 solenoid valve circuit shorted to ground
DTC	P099D13	Act1 solenoid valve open circuit
DTC	P1C6019	Act1 solenoid valve feedback overcurrent
DTC	P1C6118	Act1 solenoid valve feedback undercurrent
DTC	P1C631D	Act1 solenoid valve unexpected current failure

Description

When gearshift solenoid valve 1 circuit is shorted to power supply, shorted to ground, or open, TCU records DTC.

DTC	DTC detection conditions	Faulty location
P099F12	(a) Gearshift solenoid valve 1 circuit shorted to power supply.	• TCU • Harness and connector • Gearshift solenoid valve 1
P099E11	(a) Gearshift solenoid valve 1 circuit shorted to ground.	• TCU • Harness and connector • Gearshift solenoid valve 1
P099D13	(a) Gearshift solenoid valve 1 open circuit.	• TCU • Harness and connector • Gearshift solenoid valve 1
P1C6019	(a) Gearshift solenoid valve 1 feedback current too high.	• TCU • Harness and connector • Gearshift solenoid valve 1
P1C6118	(a) Gearshift solenoid valve 1 feedback current too low.	• TCU • Harness and connector • Gearshift solenoid valve 1
P1C631D	(a) Gearshift solenoid valve 1 unexpected current failure.	• TCU • Harness and connector • Gearshift solenoid valve 1

Circuit diagram



Inspection procedure

1	**Confirm and clear the DTC**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

AX

NG → **Check connector fit and clean connector**

OK

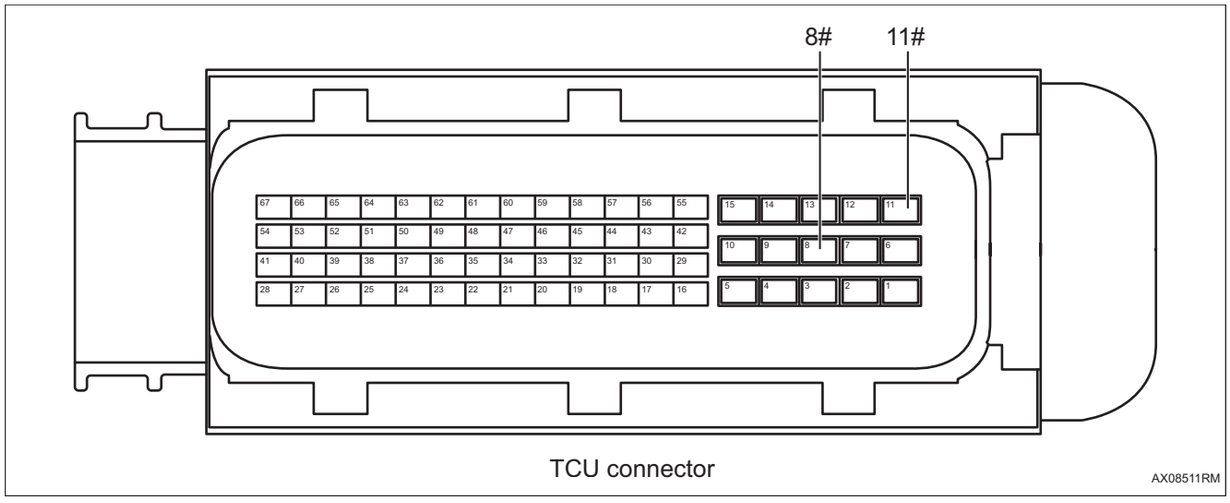
2	**Check harness and connector for circuit shorted to each other (TCU-4th transmission harness harness)**

(a) Check whether the harness and connector are shorted to each other.

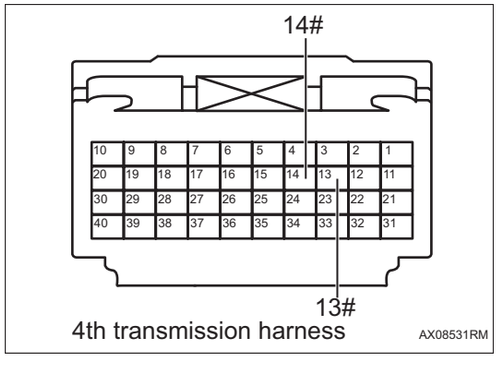
NG → **Repair or replace the harness and connector**

OK

3	Check the vehicle harness for open circuit (TCU-4th transmission harness)



TCU connector



4th transmission harness

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

Standard value

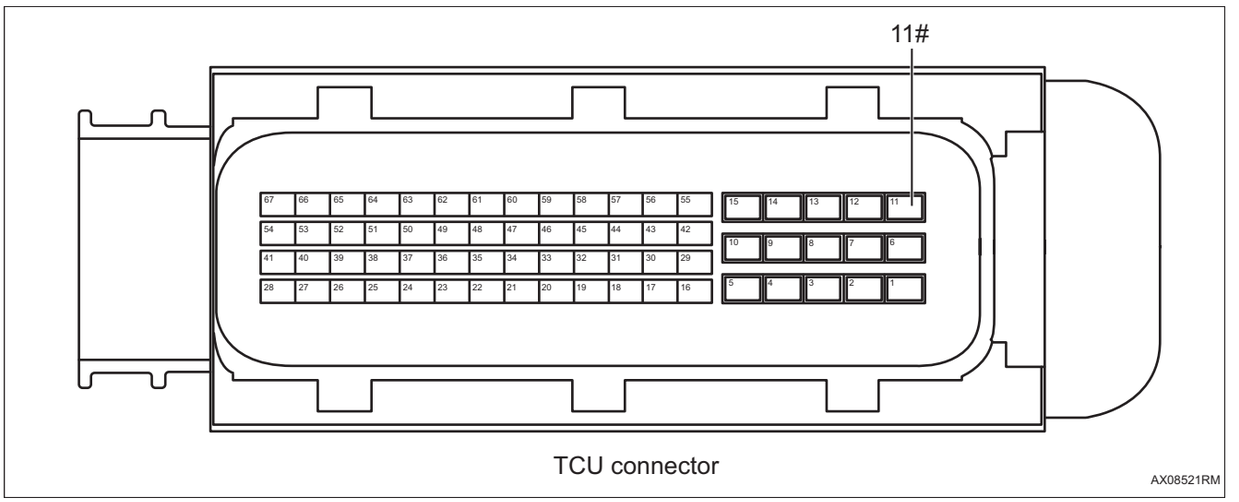
Detector connection	Detection conditions	Specified state
TCU connector 11# -4th transmission harness connector 13#	Always connected	Less than 1Ω
TCU connector 8# -4th transmission harness connector 14#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

AX

OK

4	Check whether the vehicle harness is shorted to ground (TCU-4th transmission harness)



TCU connector

(a) Measure the resistance according to the values in the table below.

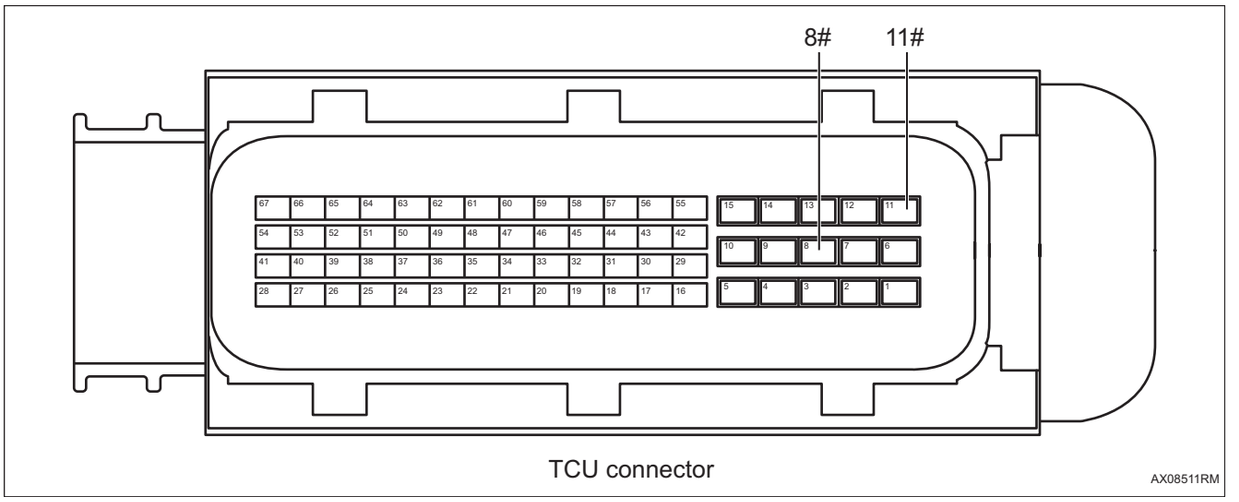
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 11# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	**Check harness and connector for circuit shorted to power supply (TCU-4th transmission harness)**



TCU connector

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

AX

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 11# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 8# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	Replace the TCU (See page AX-224)

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Return transmission to factory for repair (hydraulic module) (See page AX-229)**

Caution:

The resistance of gearshift solenoid valve 1 shall be confirmed before the transmission is returned to the factory for repair.

Detector connection	Detection conditions	Specified state
4th transmission harness 13# -4th transmission harness 14#	22 ℃	4.14±0.26Ω

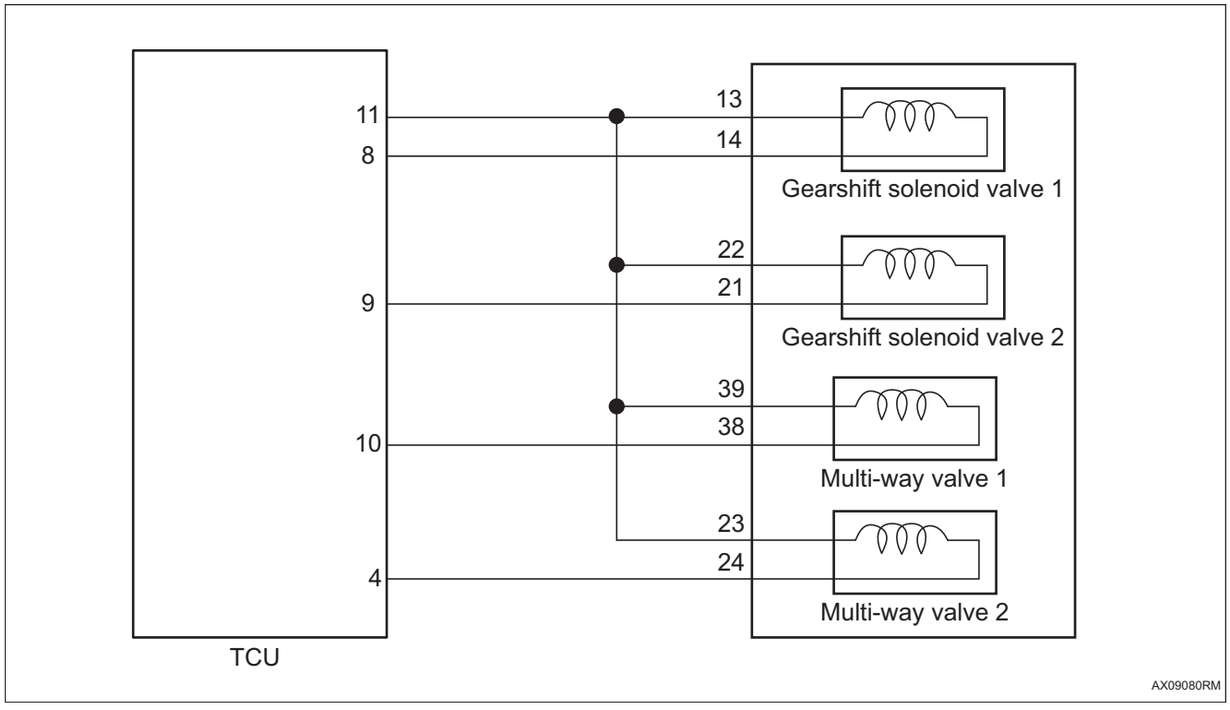
DTC	**P1C0E12**	**Solenoid valve high side 1 circuit shorted to power supply**
DTC	**P1C0F11**	**Solenoid valve high side 1 circuit shorted to ground**
DTC	**P1C0A13**	**Solenoid valve high side 1 open circuit**

Description

When gearshift solenoid valve and multi-way valve circuit faults are detected, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1C0E12	(a) Solenoid valve high side 1 circuit shorted to power supply.	• Gearshift solenoid valve 1 • Gearshift solenoid valve 2 • Multi-way valve 1 • Multi-way valve 2 • TCU • Harness and connector
P1C0F11	(a) Solenoid valve high side 1 circuit shorted to ground.	• Gearshift solenoid valve 1 • Gearshift solenoid valve 2 • Multi-way valve 1 • Multi-way valve 2 • TCU • Harness and connector
P1C0A13	(a) Solenoid valve high side 1 open circuit.	• Gearshift solenoid valve 1 • Gearshift solenoid valve 2 • Multi-way valve 1 • Multi-way valve 2 • TCU • Harness and connector

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

AX

OK

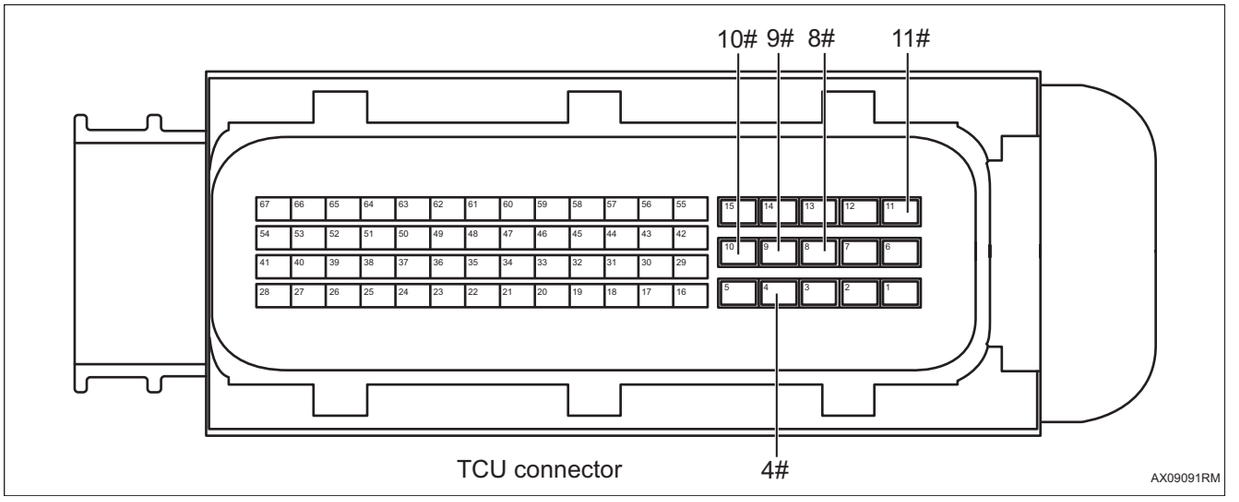
2	Check harness and connector for circuit shorted to each other (TCU-4th transmission harness harness)

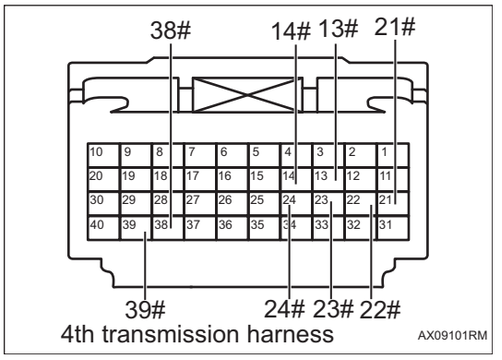
(a) Check whether the harness and connector are shorted to each other.

NG → **Repair or replace harness**

OK

3	Check harness and connector for open circuit (TCU-4th transmission harness)





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the transmission internal wire harness connector.

(e) According to value in the table, measure resistance.

Standard value

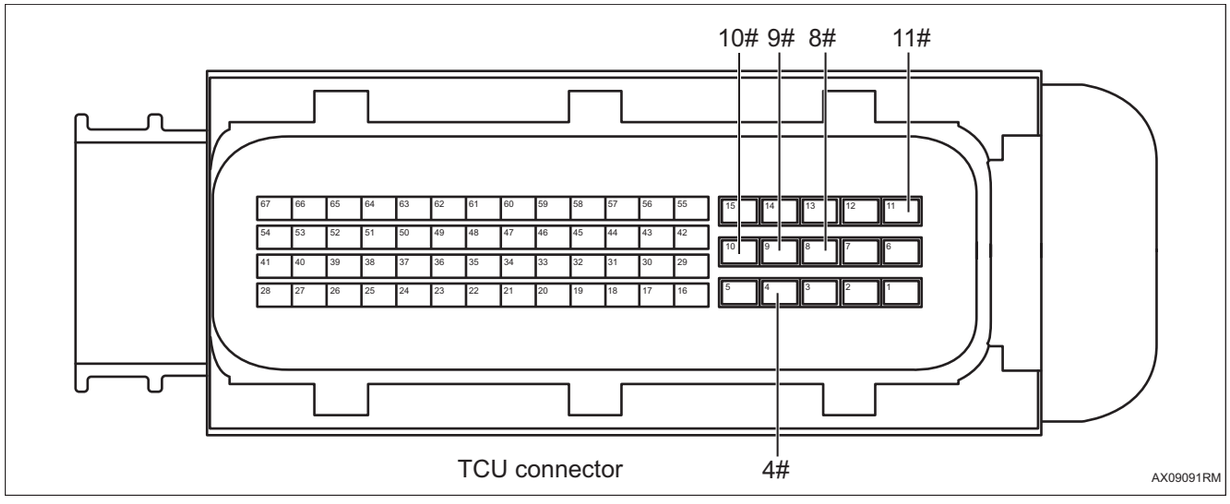
Detector connection	Detection conditions	Specified state
TCU connector 8# -4th transmission harness connector 14#	Always connected	Greater than or equal to 10 kΩ
TCU connector 9# -4th transmission harness connector 21#	Always connected	Greater than or equal to 10 kΩ
TCU connector 10# -4th transmission harness connector 38#	Always connected	Greater than or equal to 10 kΩ
TCU connector 4# -4th transmission harness connector 24#	Always connected	Greater than or equal to 10 kΩ
TCU connector 11# -4th transmission harness connector 13#	Always connected	Greater than or equal to 10 kΩ
TCU connector 11# -4th transmission harness connector 22#	Always connected	Greater than or equal to 10 kΩ

Detector connection	Detection conditions	Specified state
TCU connector 11# -4th transmission harness connector 39#	Always connected	Greater than or equal to 10 kΩ
TCU connector 11# -4th transmission harness connector 23#	Always connected	Greater than or equal to 10 kΩ

NG → **Repair or replace harness (TCU-4th transmission harness)**

OK

4	**Check harness and connector for circuit shorted to ground (TCU-4th transmission harness)**



(a) Measure the resistance according to the values in the table below.

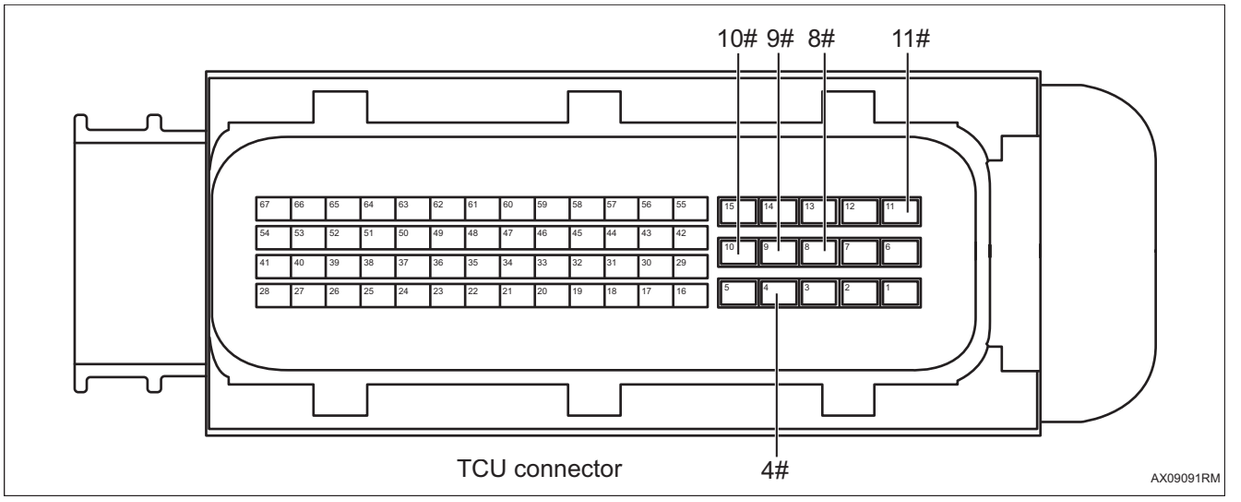
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 8# - body GND	Always connected	Greater than or equal to 10 kΩ
TCU connector 9# - body GND	Always connected	Greater than or equal to 10 kΩ
TCU connector 10# - body GND	Always connected	Greater than or equal to 10 kΩ
TCU connector 11# - body GND	Always connected	Greater than or equal to 10 kΩ
TCU connector 4# - body GND	Always connected	Greater than or equal to 10 kΩ

NG → **Repair or replace harness (TCU-4th transmission harness)**

OK

5	**Check harness and connector for circuit shorted to power supply (TCU-4th transmission harness)**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 8# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 9# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 10# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 11# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 4# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace harness (TCU-4th transmission harness)**

OK

6	**Replace the TCU (See page AX-224)**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

NG → **Return transmission to factory for repair (See page AX-229)**

OK

7	**End**

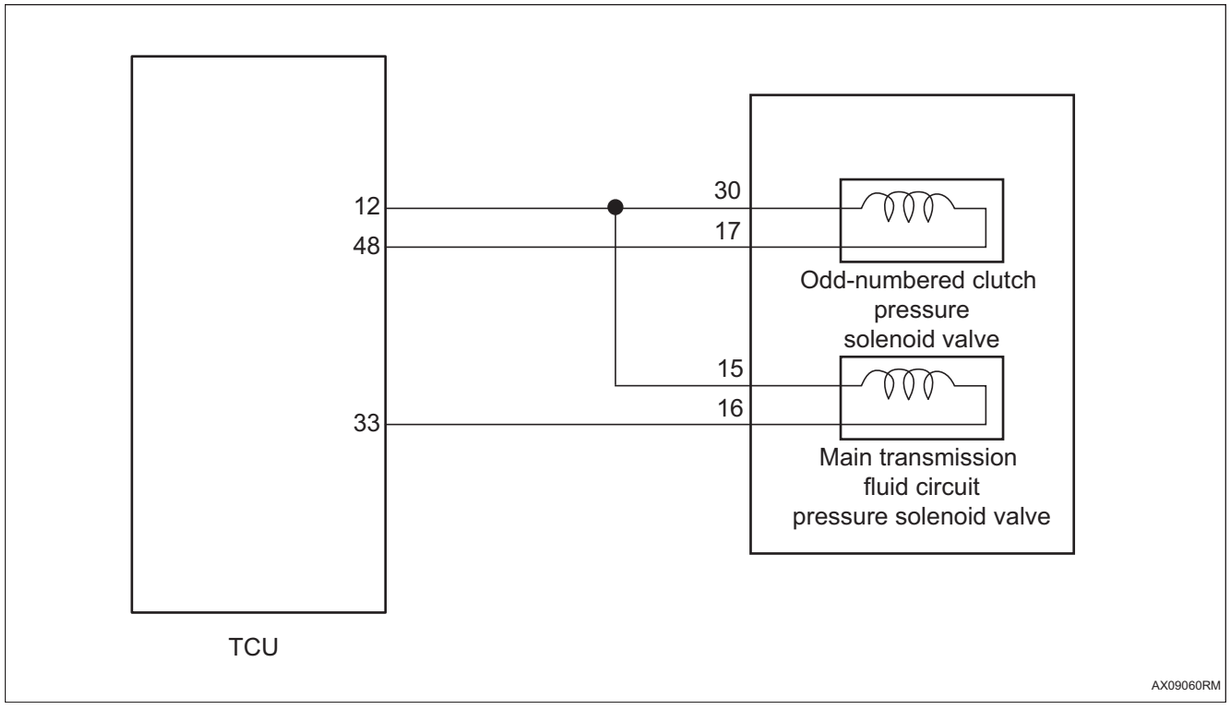
DTC	**P1C1012**	**Solenoid valve high side 2 circuit shorted to power supply**
DTC	**P1C1111**	**Solenoid valve high side 2 circuit shorted to ground**
DTC	**P1C0B13**	**Solenoid valve high side 2 open circuit**

Description

When odd-numbered clutch pressure solenoid valve and main transmission fluid circuit pressure solenoid valve circuit faults are detected, the TCU records DTC.

DTC	DTC detection conditions	Faulty location
P1C1012	(a) Solenoid valve high side 2 circuit shorted to power supply.	• Odd-numbered clutch pressure solenoid valve • Main transmission fluid circuit pressure solenoid valve • TCU • Harness and connector
P1C1111	(a) Solenoid valve high side 2 circuit shorted to ground.	• Odd-numbered clutch pressure solenoid valve • Main transmission fluid circuit pressure solenoid valve • TCU • Harness and connector
P1C0B13	(a) Solenoid valve high side 2 open circuit.	• Odd-numbered clutch pressure solenoid valve • Main transmission fluid circuit pressure solenoid valve • TCU • Harness and connector

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

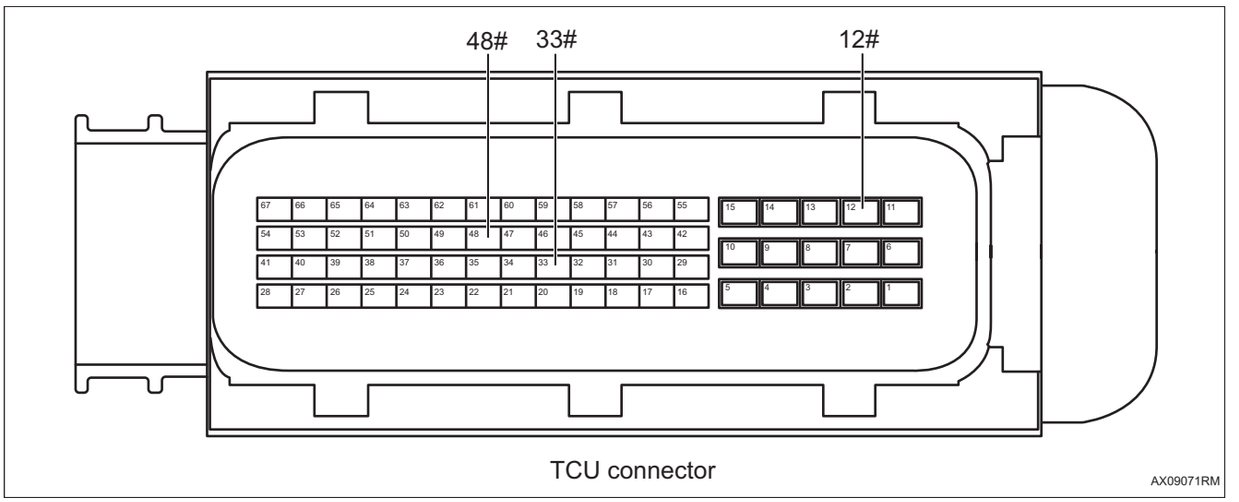
Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

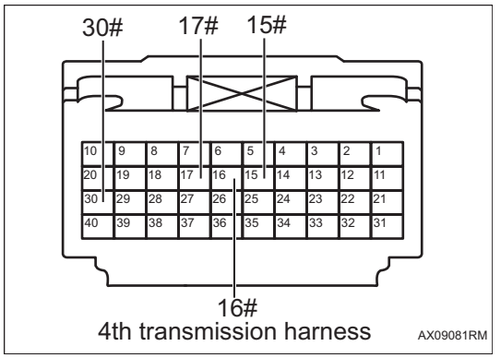
NG → **Check connector fit and clean connector**

OK

2	Check harness and connector for open circuit (TCU-4th transmission harness)

AX





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

Standard value

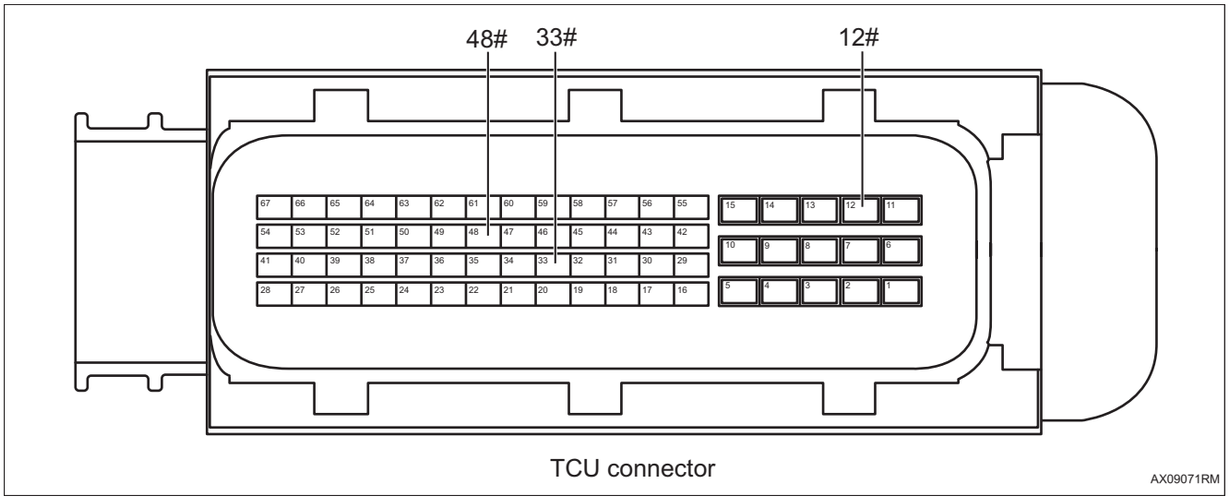
Detector connection	Detection conditions	Specified state
TCU connector 48# -4th transmission harness connector 17#	Always connected	Greater than or equal to 10 kΩ
TCU connector 33# -4th transmission harness connector 16#	Always connected	Greater than or equal to 10 kΩ
TCU connector 12# -4th transmission harness connector 30#	Always connected	Greater than or equal to 10 kΩ
TCU connector 12# -4th transmission harness connector 15#	Always connected	Greater than or equal to 10 kΩ

NG → **Repair or replace harness (TCU-4th transmission harness)**

AX

OK

3	**Check harness and connector for circuit shorted to ground (TCU-4th transmission harness)**



TCU connector

AX09071RM

(a) Measure the resistance according to the values in the table below.

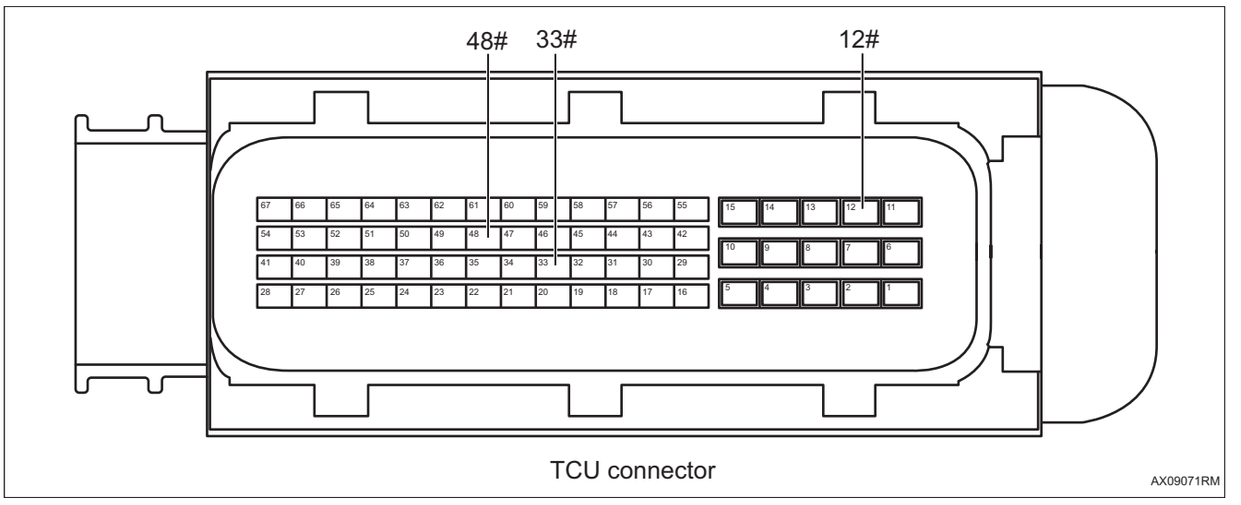
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 12# - body GND	Always connected	Greater than or equal to 10 kΩ
TCU connector 33# - body GND	Always connected	Greater than or equal to 10 kΩ
TCU connector 48# - body GND	Always connected	Greater than or equal to 10 kΩ

NG → **Repair or replace harness (TCU-4th transmission harness)**

OK

4	**Check harness and connector for circuit shorted to power supply (TCU-4th transmission harness)**



TCU connector

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 12# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 33# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 48# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace harness (TCU-4th transmission harness)**

OK

5	**Replace the TCU (See page AX-224)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Set the ignition switch to "ON".

(d) Clear the DTC.

(e) Re-conduct the test drive under the conditions stated by the user.

(f) Check whether the DTC appears again.

NG → **Return transmission to factory for repair (hydraulic module) (See page AX-229)**

OK

6	End

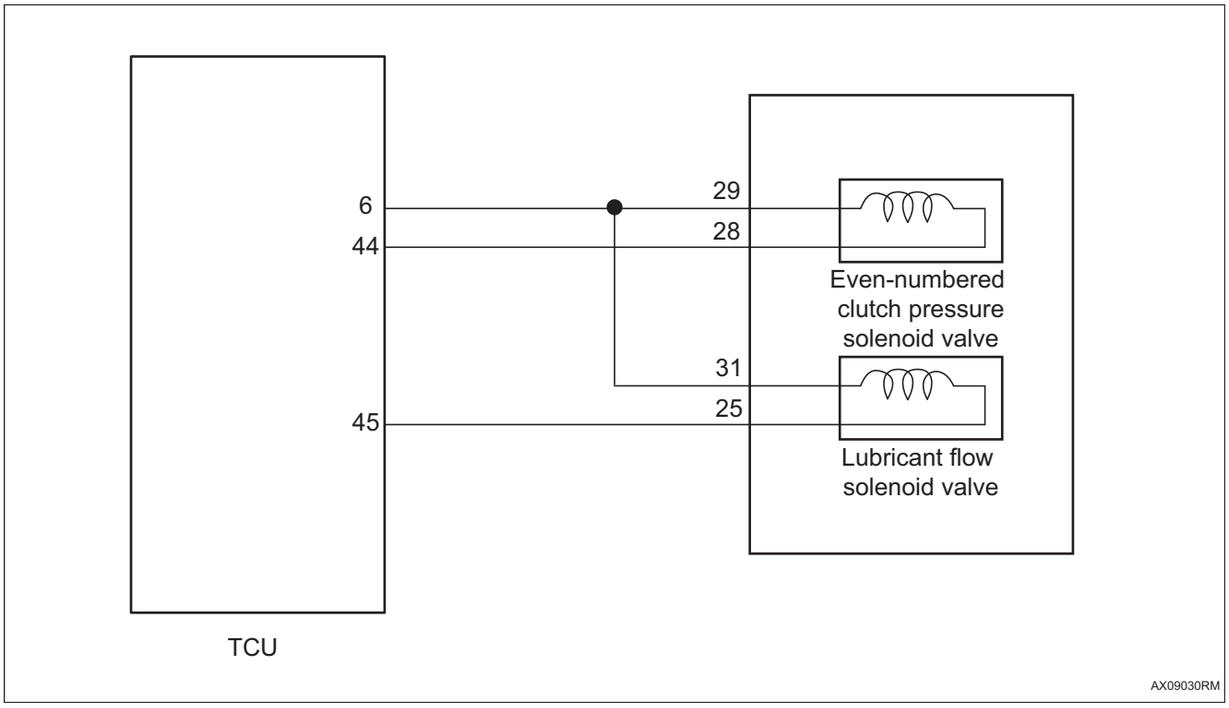
DTC	**P1C1212**	**Solenoid valve high side 3 circuit shorted to power supply**
DTC	**P1C1311**	**Solenoid valve high side 3 circuit shorted to ground**
DTC	**P1C0C13**	**Solenoid valve high side 3 open circuit**

Description

When even-numbered clutch pressure solenoid valve circuit fault is detected, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1C1212	(a) Solenoid valve high side 3 circuit shorted to power supply.	• Even-numbered clutch pressure solenoid valve • Lubricant flow solenoid valve • TCU • Harness and connector
P1C1311	(a) Solenoid valve high side 3 circuit shorted to ground.	• Even-numbered clutch pressure solenoid valve • Lubricant flow solenoid valve • TCU • Harness and connector
P1C0C13	(a) Solenoid valve high side 3 open circuit.	• Even-numbered clutch pressure solenoid valve • Lubricant flow solenoid valve • TCU • Harness and connector

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

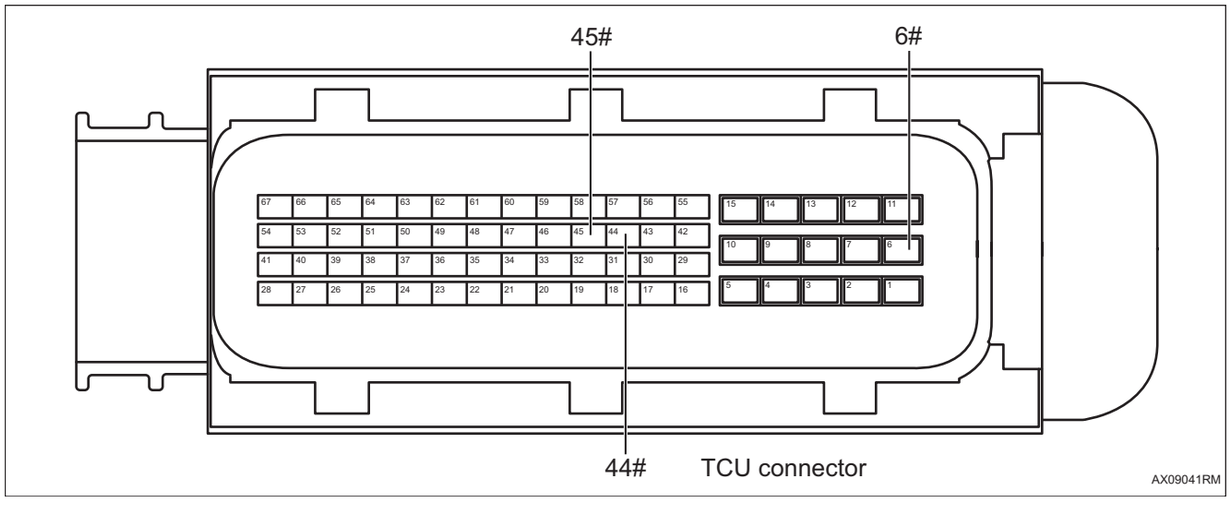
Results

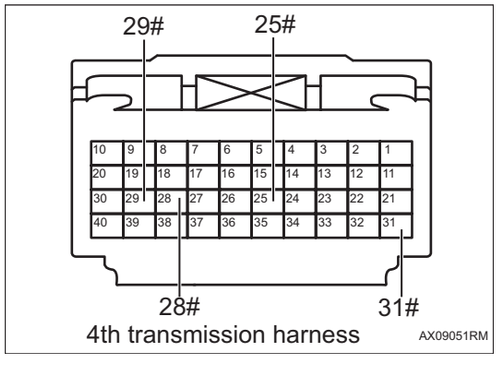
Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

2	Check harness and connector for open circuit (TCU-4th transmission harness)





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the transmission internal wire harness connector.

(e) According to value in the table, measure resistance.

Standard value

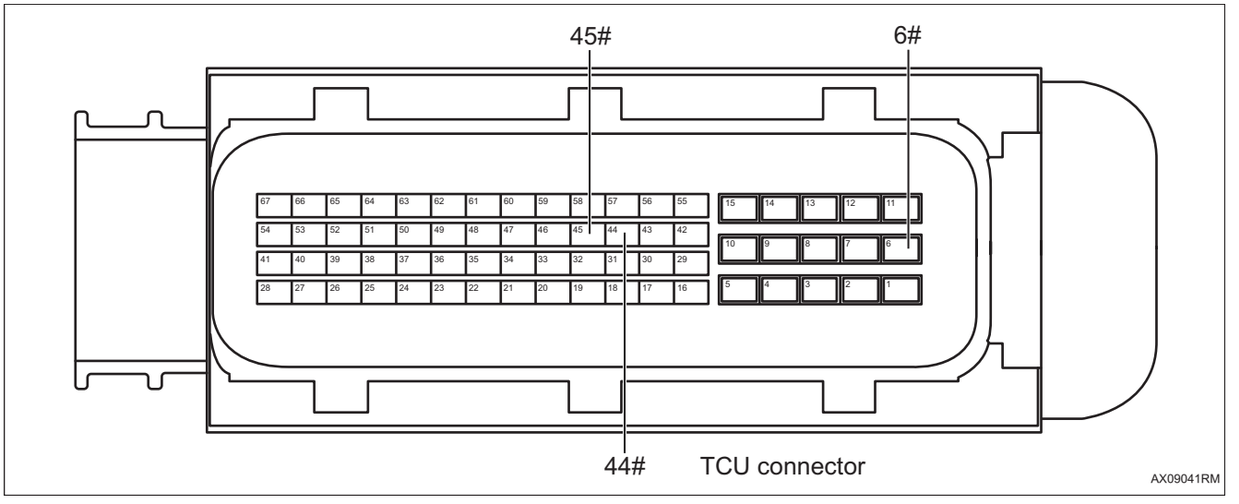
AX

Detector connection	Detection conditions	Specified state
TCU connector 44# -4th transmission harness connector 28#	Always connected	Greater than or equal to 10 kΩ
TCU connector 45# -4th transmission harness connector 25#	Always connected	Greater than or equal to 10 kΩ
TCU connector 6# -4th transmission harness connector 29#	Always connected	Greater than or equal to 10 kΩ
TCU connector 6# -4th transmission harness connector 31#	Always connected	Greater than or equal to 10 kΩ

NG → **Repair or replace harness (TCU-4th transmission harness)**

OK

3	**Check harness and connector for circuit shorted to ground (TCU-4th transmission harness)**



(a) Measure the resistance according to the values in the table below.

Standard value

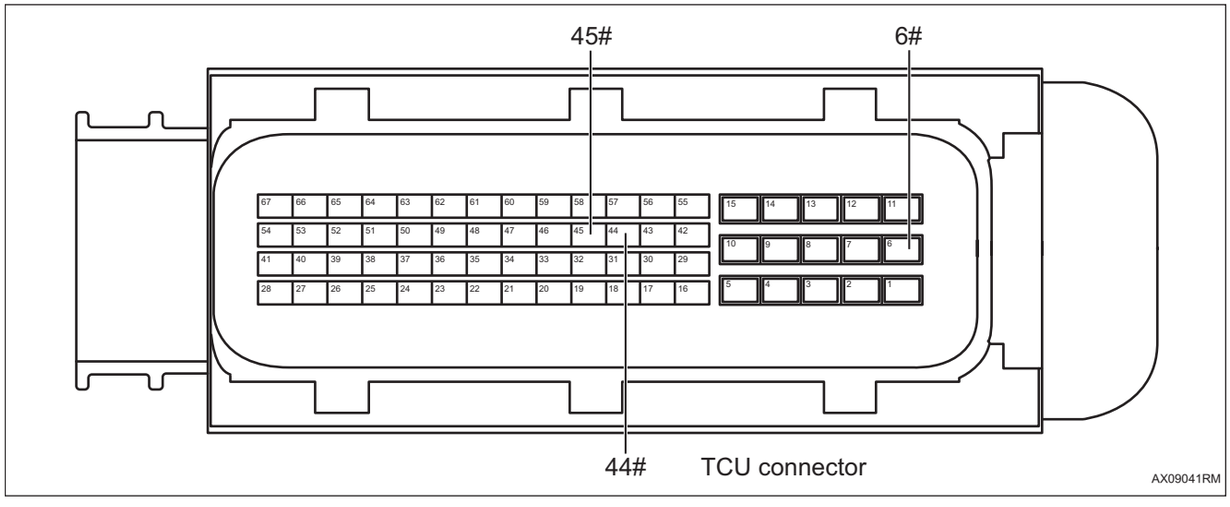
Detector connection	Detection conditions	Specified state
TCU connector 6# - body GND	Always connected	Greater than or equal to 10 kΩ
TCU connector 44# - body GND	Always connected	Greater than or equal to 10 kΩ

Detector connection	Detection conditions	Specified state
TCU connector 45# - body GND	Always connected	Greater than or equal to 10 kΩ

NG → **Repair or replace the harness (TCU-4th transmission harness)**

OK

4	**Check harness and connector for circuit shorted to power supply (TCU-4th transmission harness)**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 6# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 44# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 45# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace harness (TCU-4th transmission harness)**

AX

OK

5	**Replace the automatic TCU (See page AX-224)**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

NG → **Return transmission to factory for repair (See page AX-229)**

OK

6	**End**

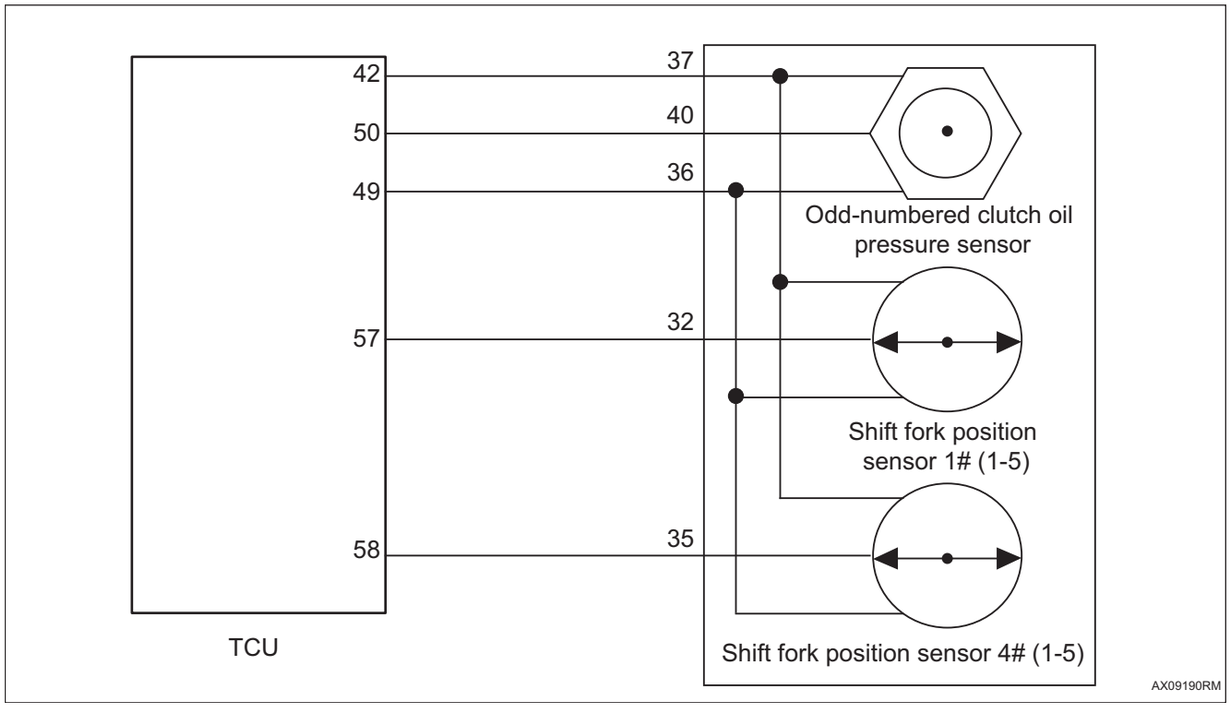
DTC	P1C1414	5v sensor bank 1 power supply SCG fault
DTC	P1C1512	5v sensor bank 1 power supply SCB fault
DTC	P1C1617	5v sensor bank 1 power supply undervoltage
DTC	P1C1716	5v sensor bank 1 power supply overvoltage

Description

When 5v sensor bank 1 power supply failure is detected, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1C1414	(a) 5v sensor bank 1 power supply SCG fault.	• Hydraulic module • TCU • Harness and connector
P1C1512	(a) 5v sensor bank 1 power supply SCB fault.	• Hydraulic module • TCU • Harness and connector
P1C1617	(a) 5v sensor bank 1 power supply undervoltage.	• Hydraulic module • TCU • Harness and connector
P1C1716	(a) 5v sensor bank 1 power supply overvoltage.	• Hydraulic module • TCU • Harness and connector

Circuit diagram



AX

Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

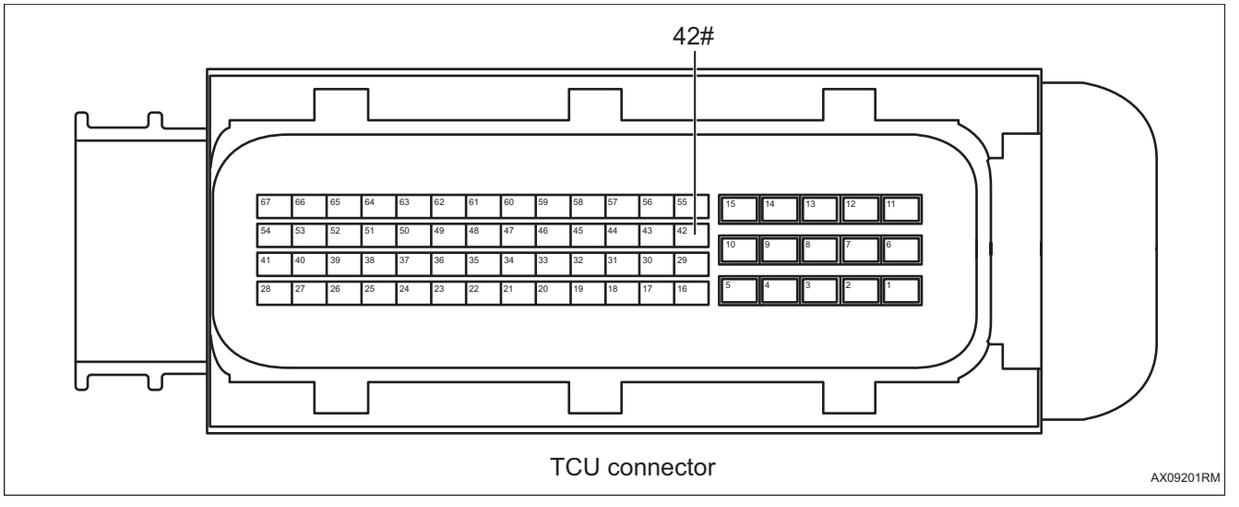
2	Check TCU harness and connector for circuit shorted to each other

(a) Check TCU harness and connector for circuit shorted to each other.

NG → **Repair or replace harness**

OK

3	Check harness and connector for circuit shorted to ground (TCU-hydraulic module)



TCU connector

(a) Set the ignition switch to "OFF".

AX

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the hydraulic module connector.

(e) Measure the resistance according to the values in the table below.

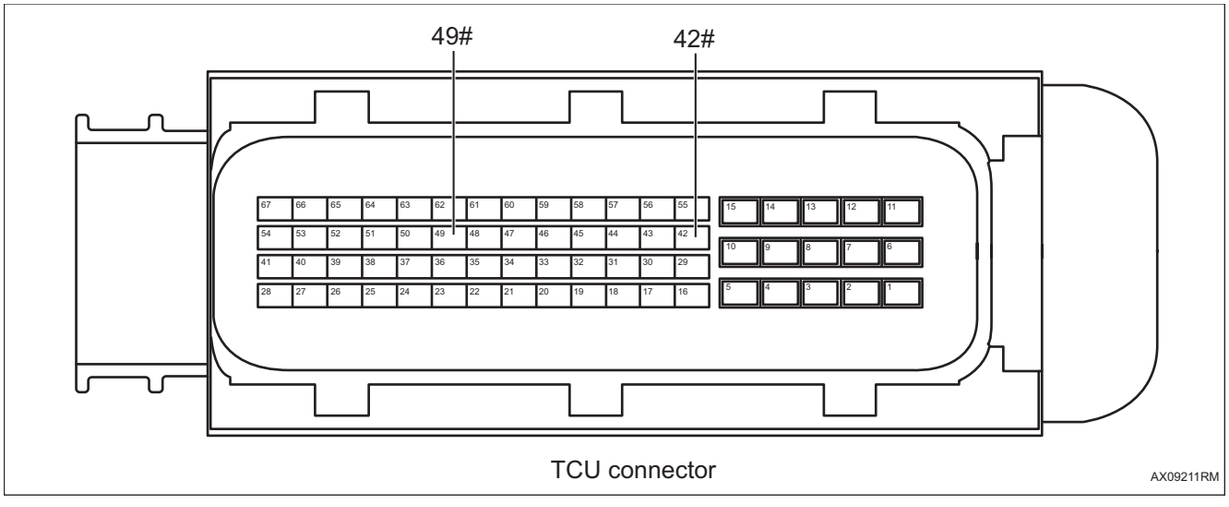
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 42# -body GND	Always connected	Greater than or equal to 10 kΩ

NG → **Repair or replace harness (TCU - hydraulic module)**

OK

4	**Check harness and connector for circuit shorted to power supply (TCU - hydraulic module)**



TCU connector

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 42# -body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 49# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace harness (TCU - hydraulic module)**

OK

5	**Replace the TCU (See page AX-224)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Set the ignition switch to "ON".

(d) Clear the DTC.

(e) Re-conduct the test drive under the conditions stated by the user.

(f) Check whether the DTC appears again.

NG → **Return transmission to factory for repair (hydraulic module) (See page AX-229)**

OK

6	**End**

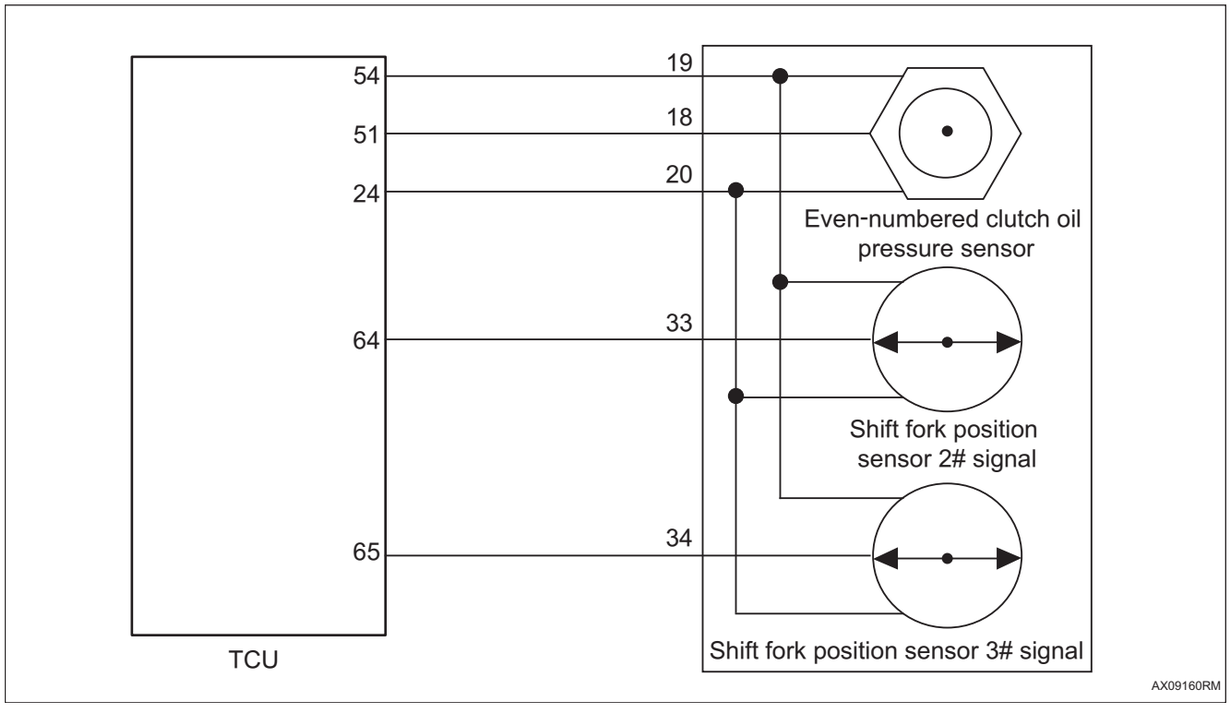
DTC	P1C1814	5v sensor bank 2 power supply SCG fault
DTC	P1C1912	5v sensor bank 2 power supply SCB fault
DTC	P1C1A17	5v sensor bank 2 power supply undervoltage
DTC	P1C1B16	5v sensor bank 2 power supply overvoltage

Description

When 5v sensor bank 2 power supply failure is detected, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1C1814	(a) 5v sensor bank 2 power supply SCG fault.	• Hydraulic module • TCU • Harness and connector
P1C1912	(a) 5v sensor bank 2 power supply SCB fault.	• Hydraulic module • TCU • Harness and connector
P1C1A17	(a) 5v sensor bank 2 power supply undervoltage.	• Hydraulic module • TCU • Harness and connector
P1C1B16	(a) 5v sensor bank 2 power supply overvoltage.	• Hydraulic module • TCU • Harness and connector

Circuit diagram



AX

Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

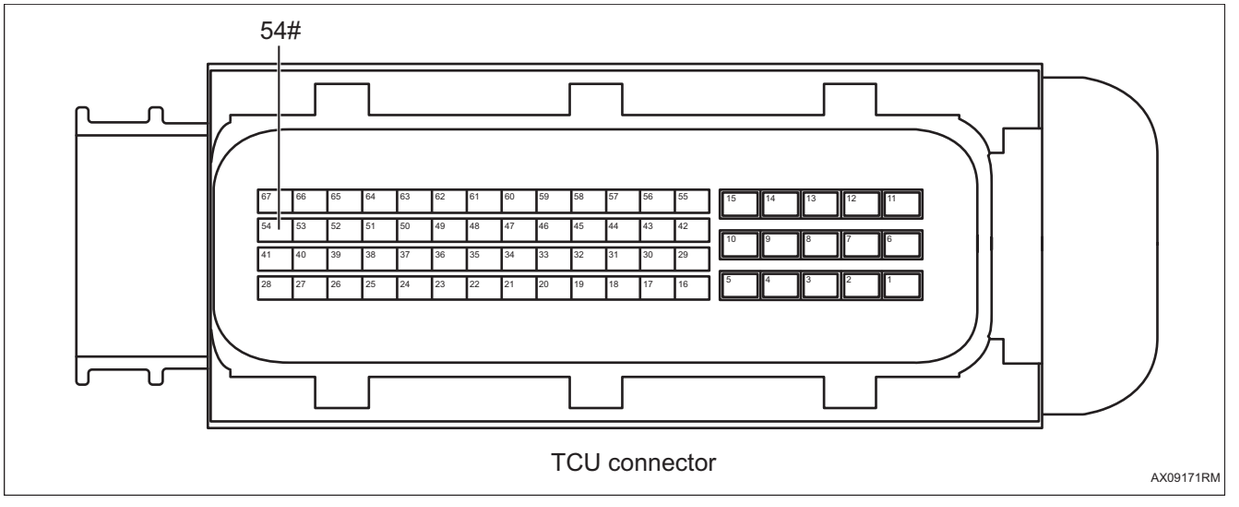
2	Check TCU harness and connector for circuit shorted to each other

(a) Check TCU harness and connector for circuit shorted to each other.

NG → **Repair or replace harness**

OK

3	Check harness and connector for circuit shorted to ground (TCU-hydraulic module)



TCU connector

(a) Set the ignition switch to "OFF".

AX

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the hydraulic module connector.

(e) Measure the resistance according to the values in the table below.

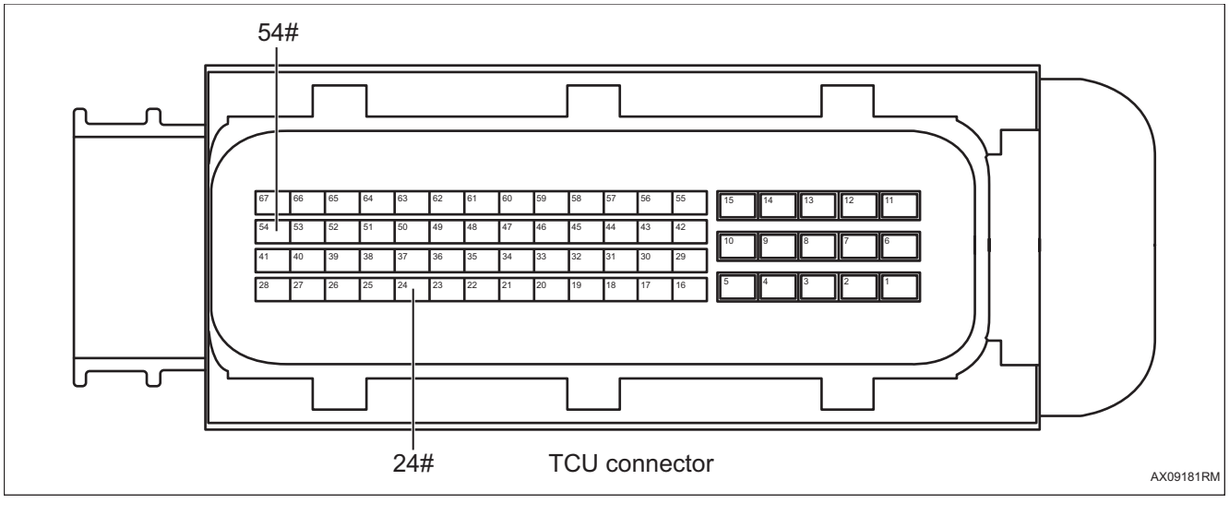
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 54# - body GND	Always connected	Greater than or equal to 10 kΩ

NG **Repair or replace harness (TCU - hydraulic module)**

OK

4	Check harness and connector for circuit shorted to power supply (TCU - hydraulic module)



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 54# - body GND	Always connected	Greater than or equal to 10 kΩ
TCU connector 24# - body GND	Always connected	Greater than or equal to 10 kΩ

AX

NG → **Repair or replace harness (TCU - hydraulic module)**

OK

5	**Replace the TCU (See page AX-224)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Set the ignition switch to "ON".

(d) Clear the DTC.

(e) Re-conduct the test drive under the conditions stated by the user.

(f) Check whether the DTC appears again.

NG → **Return transmission to factory for repair (hydraulic module) (See page AX-229)**

OK

6	**End**

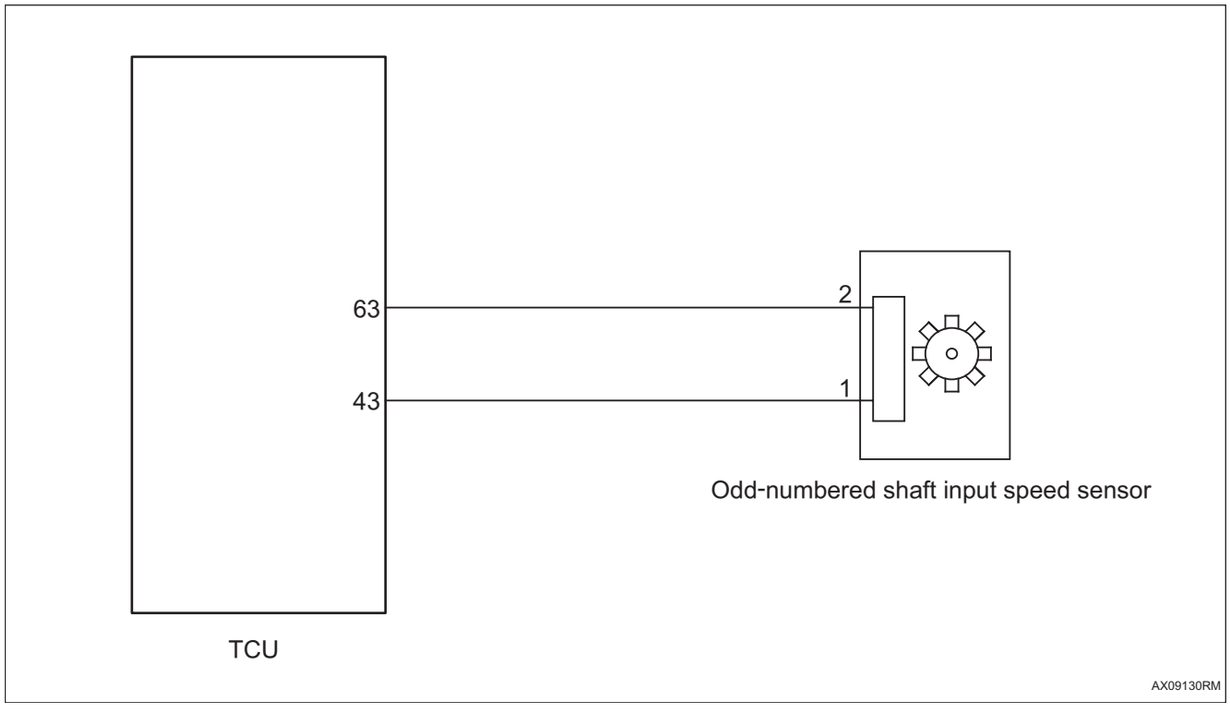
DTC	P1C1C14	8v sensor bank 1 power supply SCG fault
DTC	P1C1D12	8v sensor bank 1 power supply SCB fault
DTC	P1C1E17	8v sensor bank 1 power supply undervoltage
DTC	P1C1F16	8v sensor bank 1 power supply overvoltage

Description

When 8v sensor bank 1 power supply failure is detected, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1C1C14	(a) 8v sensor bank 1 power supply SCG fault.	• Odd-numbered input shaft speed sensor • TCU • Harness and connector
P1C1D12	(a) 8v sensor bank 1 power supply SCB fault.	• Odd-numbered input shaft speed sensor • TCU • Harness and connector
P1C1E17	(a) 8v sensor bank 1 power supply undervoltage.	• Odd-numbered input shaft speed sensor • TCU • Harness and connector
P1C1F16	(a) 8v sensor bank 1 power supply overvoltage.	• Odd-numbered input shaft speed sensor • TCU • Harness and connector

Circuit diagram



AX

Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

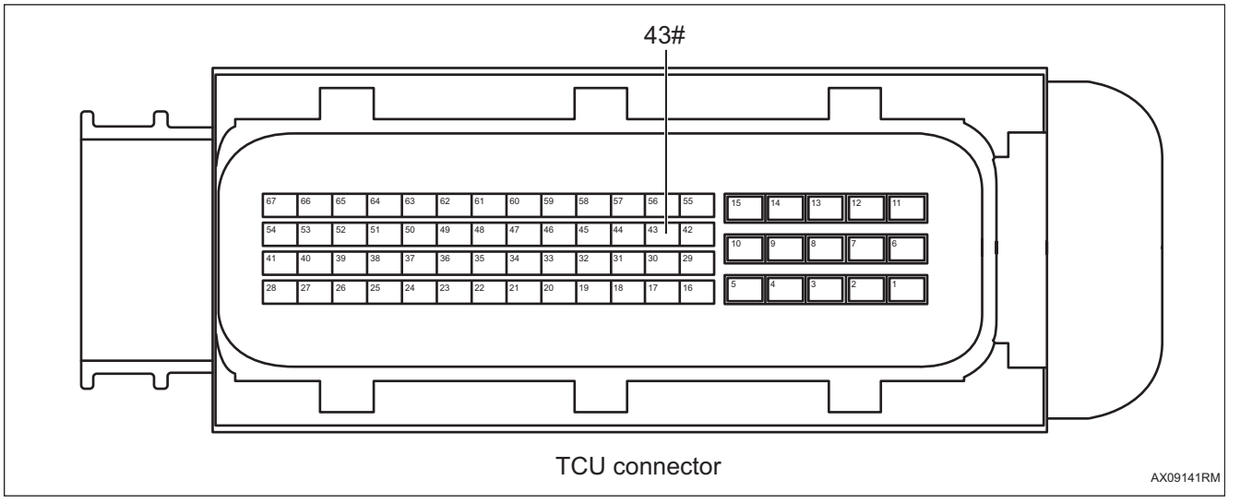
2	Check TCU harness and connector for circuit shorted to each other

(a) Check TCU harness and connector for circuit shorted to each other.

NG → **Repair or replace harness**

OK

3	Check harness and connector for circuit shorted to ground (TCU - odd-numbered input shaft speed sensor)



TCU connector

AX

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the odd-numbered input shaft speed sensor connector.

(e) Measure the resistance according to the values in the table below.

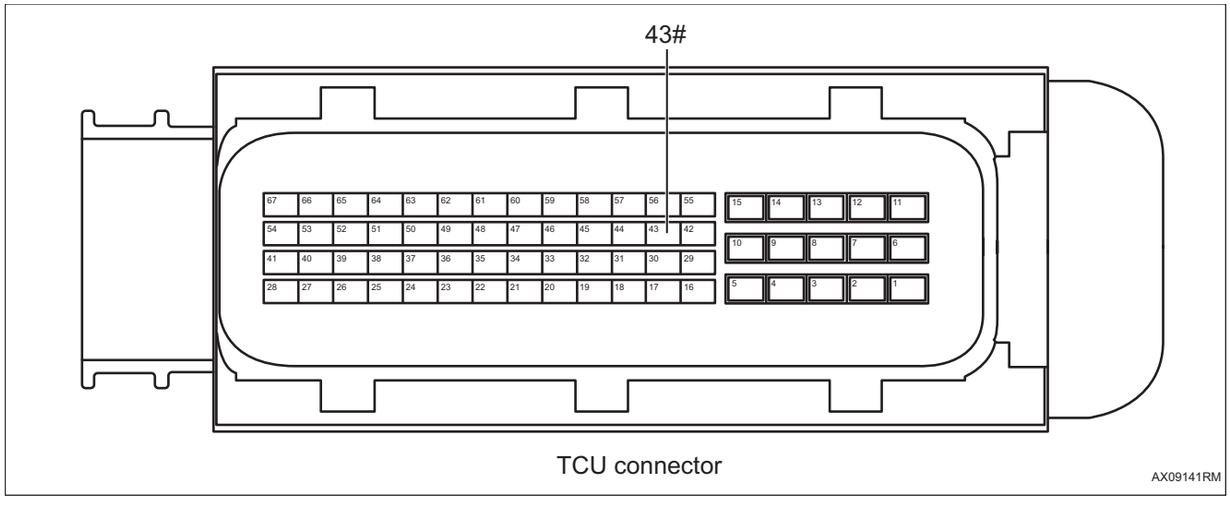
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 43# - body GND	Always connected	Greater than or equal to 10 kΩ

NG → **Repair or replace harness (TCU - odd - numbered input shaft speed sensor)**

OK

4	**Check harness and connector circuit shorted to power supply (TCU-replace odd-numbered input shaft speed sensor)**



TCU connector

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 43# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace harness (TCU - replace odd-numbered input shaft speed sensor)**

OK

5	**Replace the odd-numbered input shaft speed sensor (See page AX-232)**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

NG → **Replace the TCU (See page AX-224)**

OK

6	**End**

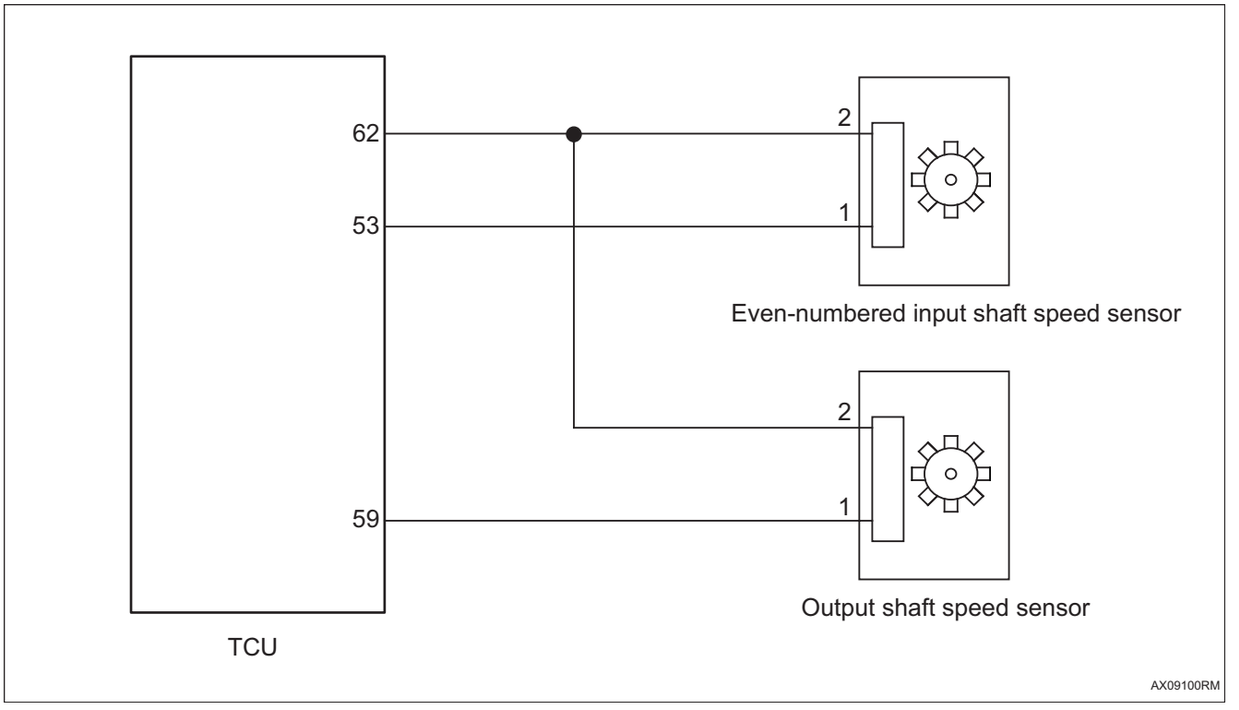
DTC	P1C2014	8v sensor bank 2 power supply SCG fault
DTC	P1C2112	8v sensor bank 2 power supply SCB fault
DTC	P1C2217	8v sensor bank 2 power supply undervoltage
DTC	P1C2316	8v sensor bank 2 power supply overvoltage

Description

When 8v sensor bank 2 power supply failure is detected, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1C2014	(a) 8v sensor bank 2 power supply SCG fault.	• Even-numbered input shaft speed sensor/output shaft speed sensor • TCU • Harness and connector
P1C2112	(a) 8v sensor bank 2 power supply SCB fault.	• Even-numbered input shaft speed sensor/output shaft speed sensor • TCU • Harness and connector
P1C2217	(a) 8v sensor bank 2 power supply undervoltage.	• Even-numbered input shaft speed sensor/output shaft speed sensor • TCU • Harness and connector
P1C2316	(a) 8v sensor bank 2 power supply overvoltage.	• Even-numbered input shaft speed sensor/output shaft speed sensor • TCU • Harness and connector

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

AX

NG → **Check connector fit and clean connector**

OK

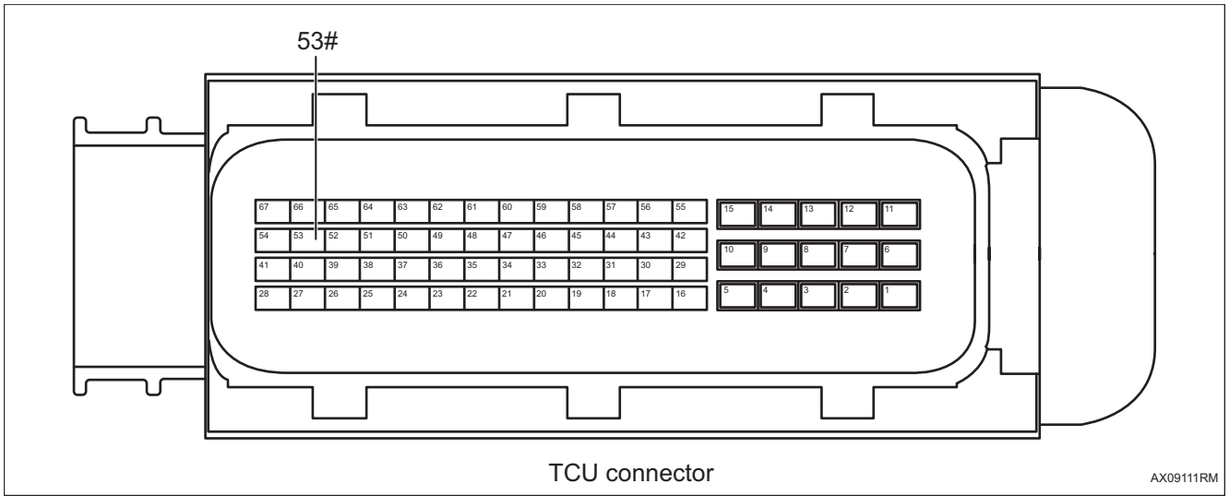
2	Check TCU harness and connector for circuit shorted to each other

(a) Check TCU harness and connector for circuit shorted to each other.

NG → **Repair or replace harness**

OK

3	**Check harness and connector for circuit shorted to ground (TCU-even-numbered input shaft speed sensor/output shaft speed sensor)**



TCU connector

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the even-numbered input shaft speed sensor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

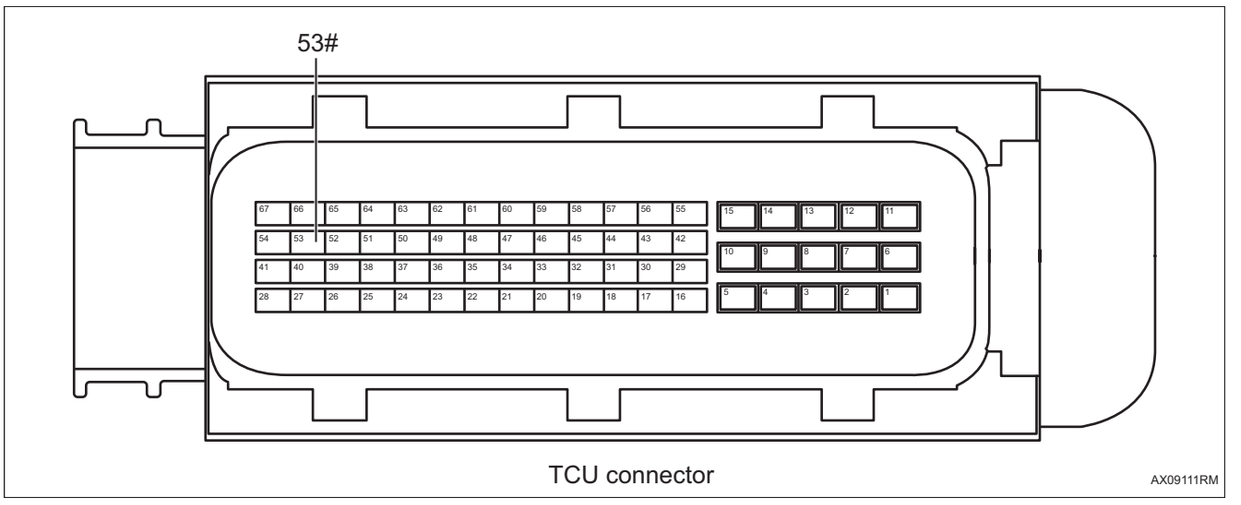
Detector connection	Detection conditions	Specified state
TCU connector 53# -body GND	Always connected	Greater than or equal to 10 kΩ

NG → **Repair or replace harness (TCU - even numbered input shaft speed sensor)**

AX

OK

4	**Check harness and connector circuit shorted to power supply (TCU-even-numbered input shaft speed sensor/output shaft speed sensor)**



TCU connector

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 53# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace harness (TCU-even input shaft speed sensor/output shaft speed sensor)**

OK

5	**Replace even-numbered input shaft speed sensor/output shaft speed sensor (See page AX-232)**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

NG → **Replace the TCU (See page AX-224)**

OK

6	**End**

AX

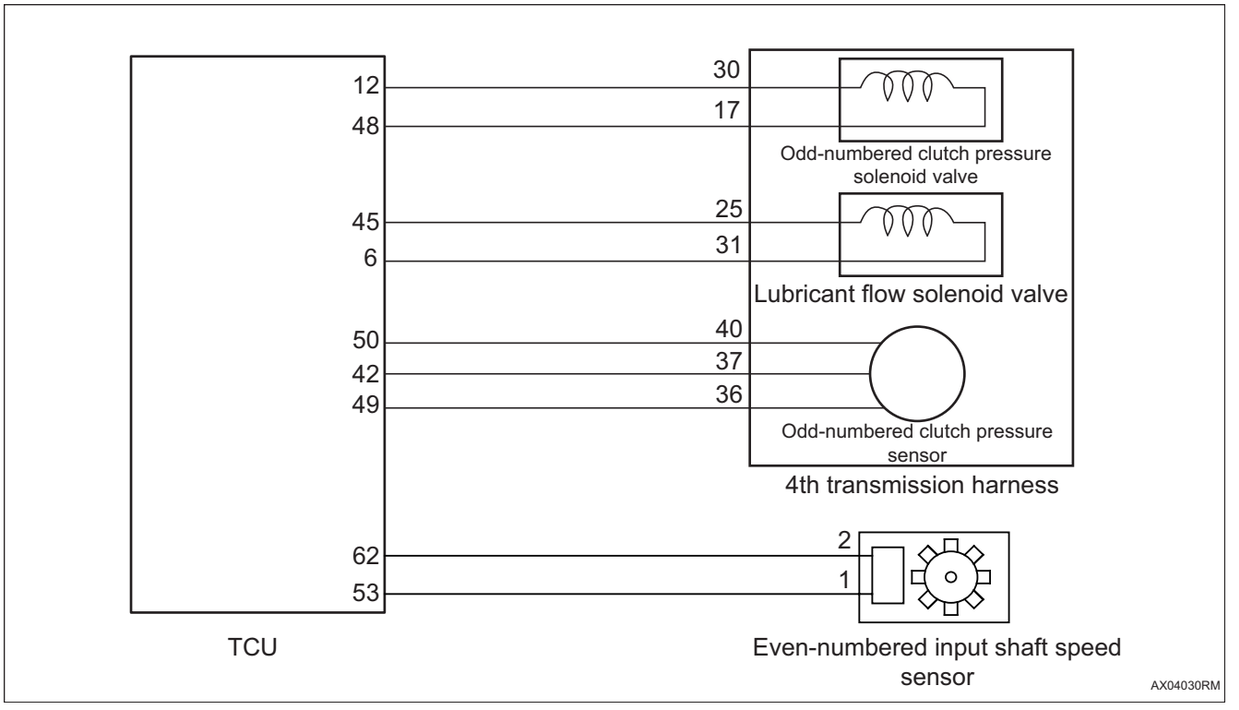
DTC	P1C244B	Odd-numbered clutch temperature high
DTC	P1C254B	Odd-numbered clutch temperature high
DTC	P27854B	Odd-numbered clutch temperature extremely high

Description

When abnormal odd-numbered clutch temperature is detected, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1C244B	(a) The clutch mating face temperature is high.	• Odd-numbered clutch pressure solenoid valve • Lubricant flow solenoid valve • Even-numbered input shaft speed sensor • Engine or ECM • Harness and connector
P1C254B	(a) The clutch mating face temperature is too high.	• Odd-numbered clutch pressure solenoid valve • Lubricant flow solenoid valve • Even-numbered input shaft speed sensor • Engine or ECM • Harness and connector
P27854B	(a) The clutch mating face temperature is extremely high.	• Odd-numbered clutch pressure solenoid valve • Lubricant flow solenoid valve • Even-numbered input shaft speed sensor • Engine or ECM • Harness and connector

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

AX

NG → **Check connector fit and clean connector**

OK

2	Check engine system

(a) Check the engine system for abnormalities.

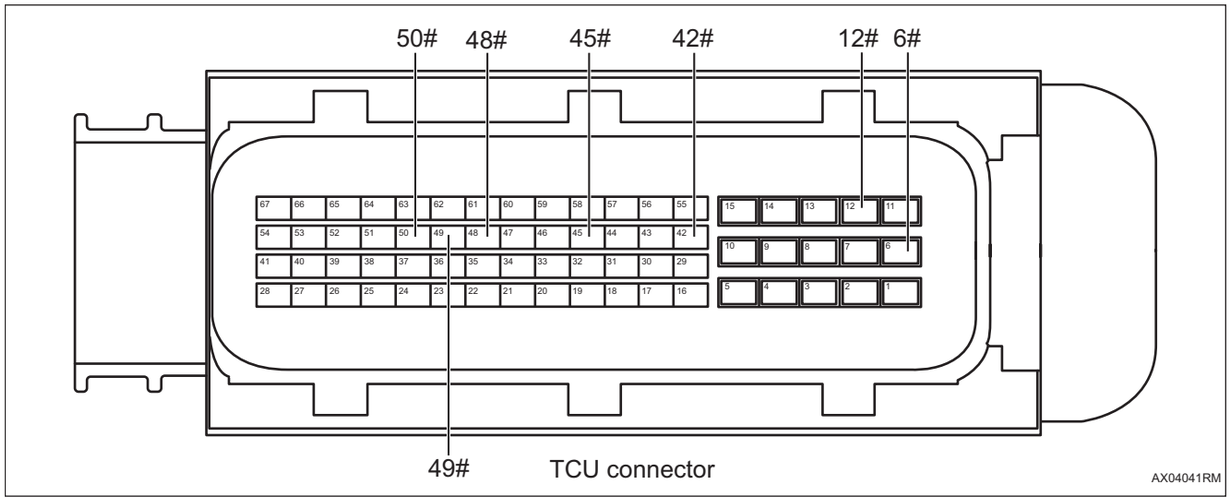
(b) Check the engine system for faults.

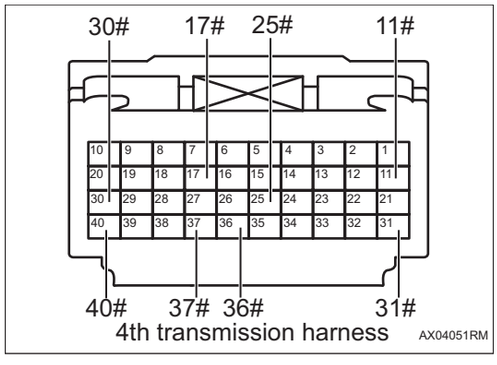
(c) Check whether the engine speed is normal.

NG → **Check and repair engine system**

OK

3	Check harness and connector for open circuit (TCU-4th transmission harness)





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

Standard value

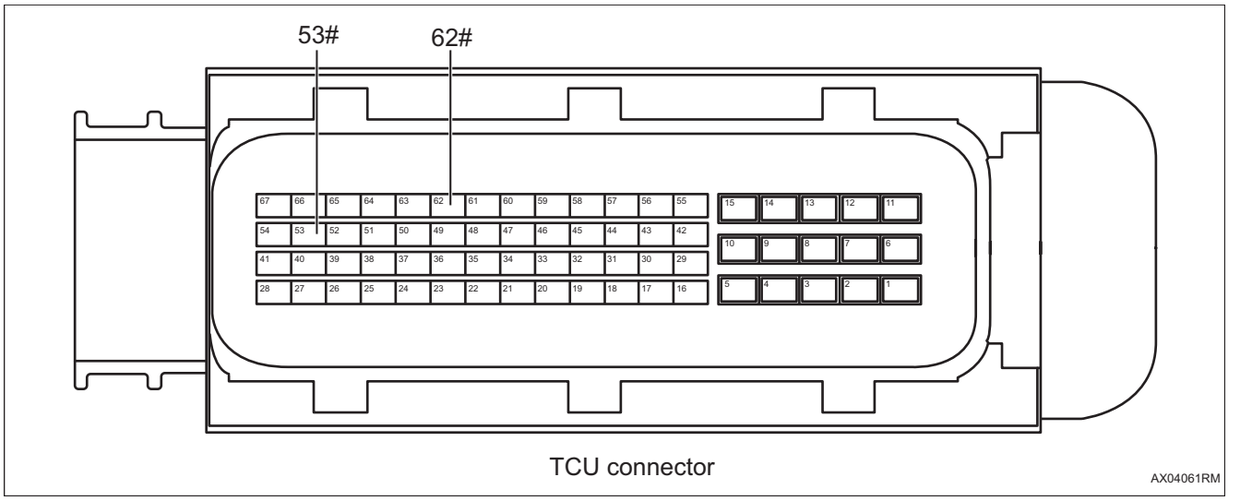
Detector connection	Detection conditions	Specified state
TCU connector 12# -4th transmission harness connector 30#	Always connected	Less than 1Ω
TCU connector 48# -4th transmission harness connector 17#	Always connected	Less than 1Ω
TCU connector 6# -4th transmission harness connector 31#	Always connected	Less than 1Ω
TCU connector 45# -4th transmission harness connector 25#	Always connected	Less than 1Ω
TCU connector 50# -4th transmission harness connector 40#	Always connected	Less than 1Ω
TCU connector 42# -4th transmission harness connector 37#	Always connected	Less than 1Ω
TCU connector 49# -4th transmission harness connector 36#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

AX

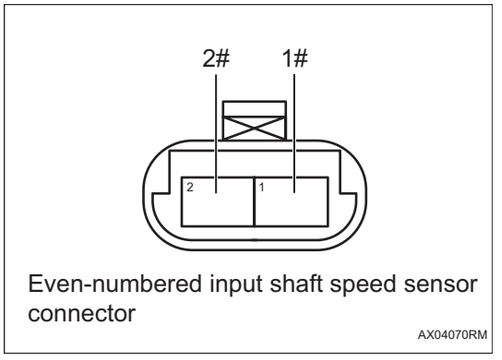
OK

4	Check harness and connector for open circuit (TCU - even-numbered input shaft speed sensor)



TCU connector

AX04061RM



Even-numbered input shaft speed sensor connector

AX04070RM

(a) Disconnect the even-numbered input shaft speed sensor connector.

(b) Measure the resistance according to the values in the table below.

Standard value

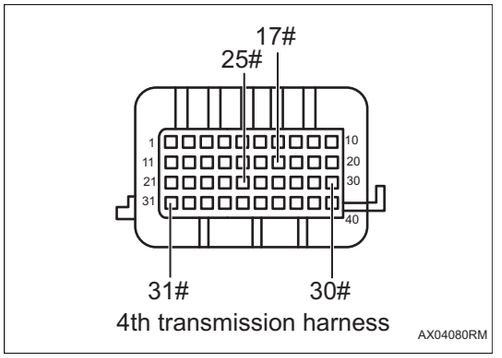
Detector connection	Detection conditions	Specified state
TCU connector 62# -even-numbered input shaft speed sensor connector 2#	Always connected	Less than 1Ω
TCU connector 53# -even-numbered input shaft speed sensor connector 1#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

AX

5	4th transmission harness side detection solenoid valve resistance



4th transmission harness

AX04080RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
4th transmission harness 30# -4th transmission harness 17#	22 ℃	4.95 ~ 5.35Ω
4th transmission harness 31# -4th transmission harness 25#	22 ℃	3.88 ~ 4.40Ω

NG → **Return transmission to factory for repair (See page AX-229)**

Caution:

If the problem occurred after the vehicle operated under high load conditions, and the cause of the problem is not found in the above troubleshooting process, the condition is considered normal.

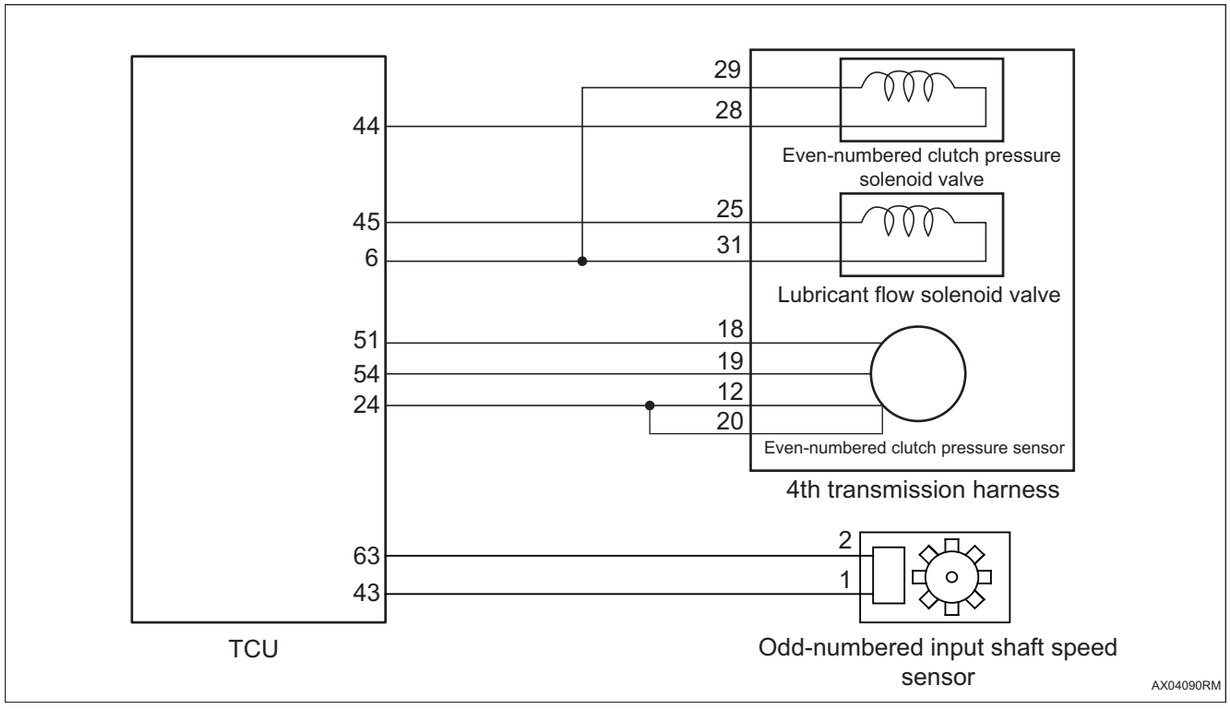
DTC	**P1C264B**	**Even-numbered clutch temperature extremely high**
DTC	**P1C274B**	**Even-numbered clutch temperature high**
DTC	**P27874B**	**Even-numbered clutch temperature extremely high**

Description

When an abnormal even-numbered clutch temperature is detected, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1C264B	(a) The clutch mating face temperature is high.	• Even-numbered clutch pressure solenoid valve • Lubricant flow solenoid valve • Odd-numbered input shaft speed sensor • Engine or ECM • Harness and connector
P1C274B	(a) The clutch mating face temperature is too high.	• Even-numbered clutch pressure solenoid valve • Lubricant flow solenoid valve • Odd-numbered input shaft speed sensor • Engine or ECM • Harness and connector
P27874B	(a) The clutch mating face temperature is extremely high.	• Even-numbered clutch pressure solenoid valve • Lubricant flow solenoid valve • Odd-numbered input shaft speed sensor • Engine or ECM • Harness and connector

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

AX

OK

2	Check engine system

(a) Check the engine system for abnormalities.

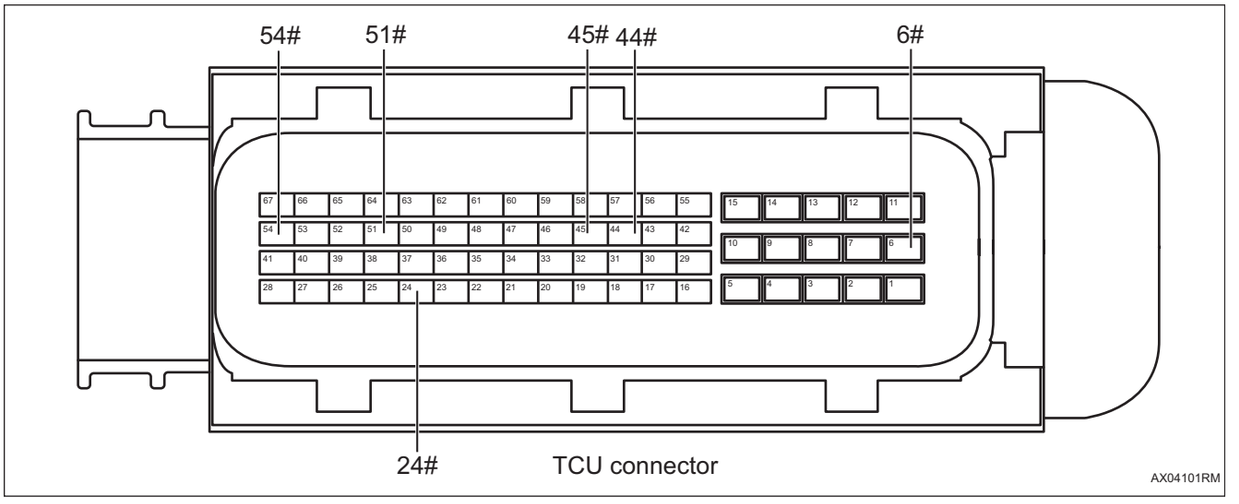
(b) Check the engine system for faults.

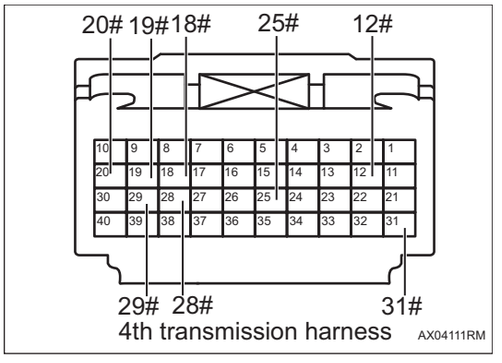
(c) Check whether the engine speed is normal.

NG → **Check and repair engine system**

OK

3	Check harness and connector for open circuit (TCU - 4th transmission harness)





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

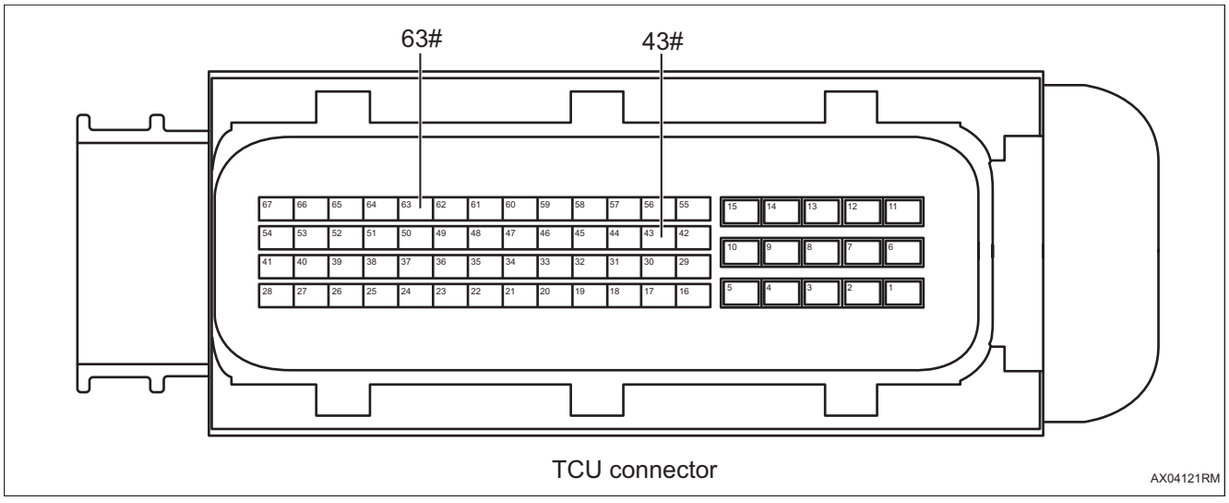
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 6# -4th transmission harness connector 29#	Always connected	Less than 1Ω
TCU connector 44# -4th transmission harness connector 28#	Always connected	Less than 1Ω
TCU connector 45# -4th transmission harness connector 25#	Always connected	Less than 1Ω
TCU connector 51# -4th transmission harness connector 18#	Always connected	Less than 1Ω
TCU connector 54# -4th transmission harness connector 19#	Always connected	Less than 1Ω
TCU connector 24# -4th transmission harness connector 12#(or 20#)	Always connected	Less than 1Ω
TCU connector 6# -4th transmission harness connector 31#	Always connected	Less than 1Ω

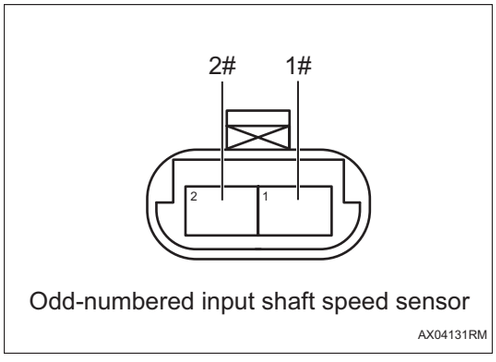
NG → **Repair or replace the harness and connector**

OK

4	Check harness and connector for open circuit (TCU - odd-numbered input shaft speed sensor)



TCU connector
AX04121RM



Odd-numbered input shaft speed sensor
AX04131RM

(a) Disconnect the odd-numbered input shaft speed sensor connector.

(b) Measure the resistance according to the values in the table below.

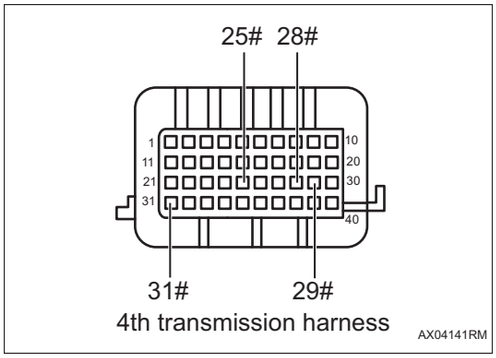
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 63# -odd-numbered input shaft speed sensor connector 2#	Always connected	Less than 1Ω
TCU connector 43# -odd-numbered input shaft speed sensor connector 1#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

5	4th transmission harness side detection solenoid valve resistance



4th transmission harness
AX04141RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
4th transmission harness 28# -4th transmission harness 29#	22 ℃	4.95 ~ 5.35Ω
4th transmission harness 31# -4th transmission harness 25#	22 ℃	3.88 ~ 4.40Ω

AX

NG → **Return transmission to factory for repair (See page AX-229)**

Caution:

If the problem occurred after the vehicle operated under high load conditions, and the cause of the problem is not found in the above troubleshooting process, the condition is considered normal.

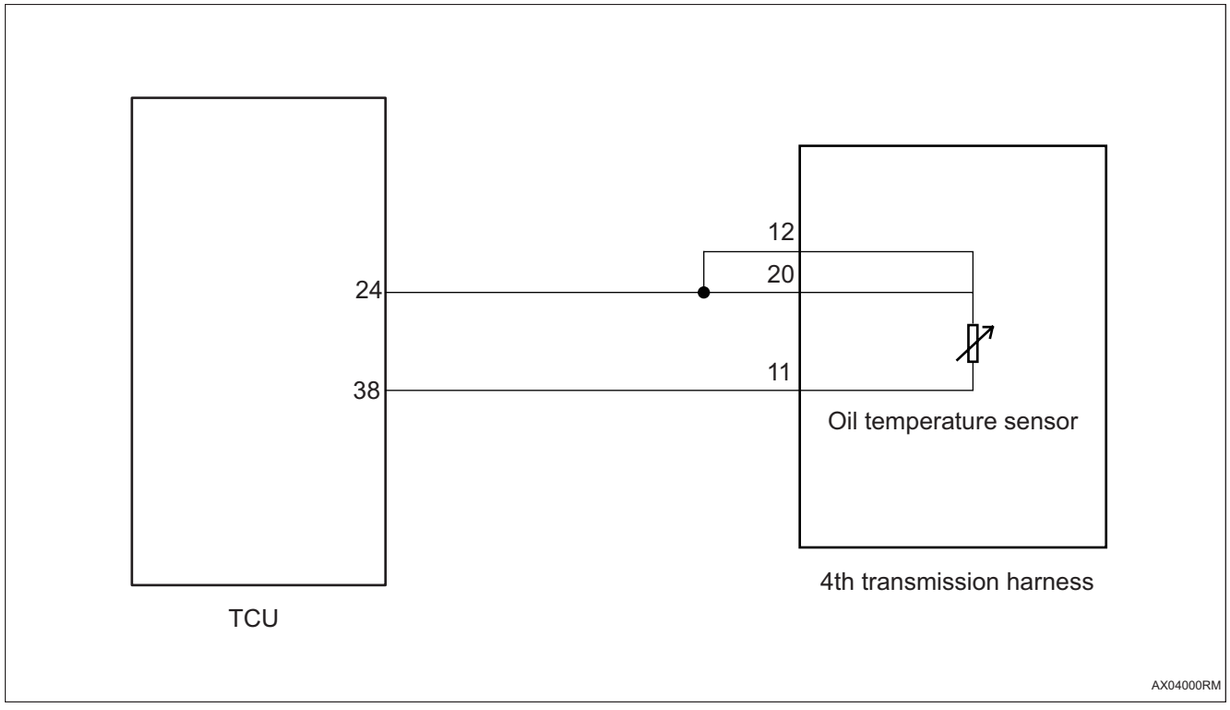
DTC	P1C284B	Oil temperature alarm
DTC	P1C294B	Oil overtemperature

Description

When the oil temperature exceeds the upper limit value, the TCU records DTC.

DTC	DTC detection conditions	Faulty location
P1C284B	(a) Oil temperature alarm.	• Radiator fan inoperative • Radiator blockage • Blockage of cooling oil circuit • TCU
P1C294B	(a) Oil overtemperature.	• Radiator fan inoperative • Radiator blockage • Blockage of cooling oil circuit • TCU

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

2	**Check whether the radiator is blocked**

(a) Check whether the radiator is blocked by foreign matters or dust.

(b) Check whether the radiator is deformed or damaged.

NG → **Repair according to the fault**

OK

3	**Check whether the radiator fan works**

(a) Connect the HQ-VDS and check the radiator fan with the active test.

NG → **Repair according to the fault**

OK

4	**Check whether the heat dissipation oil circuit is blocked**

(a) Remove the filter element and check whether there are too many iron filings and sundries attached.

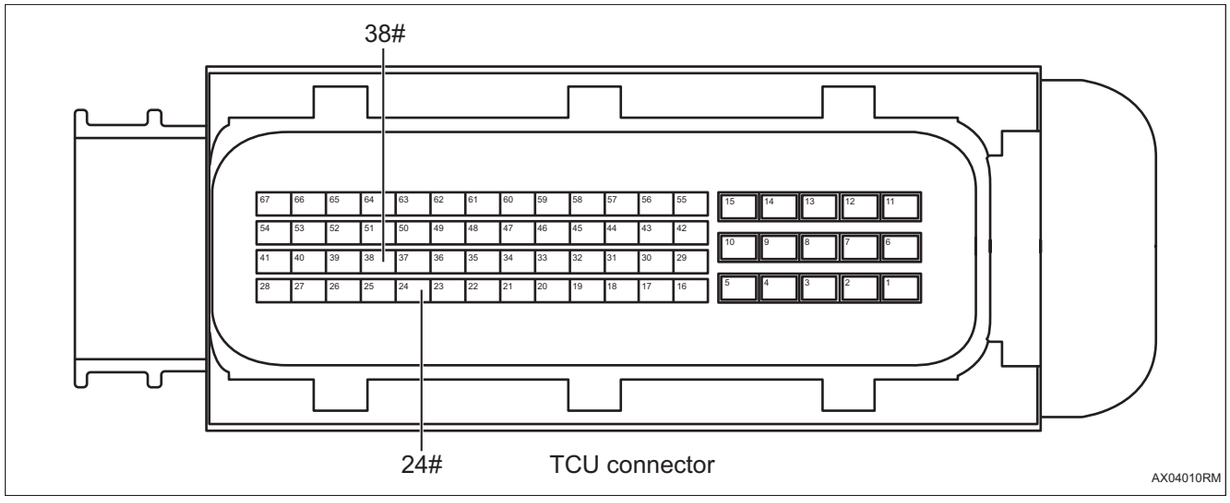
(b) Check the radiator oil pipe for damage and blockage.

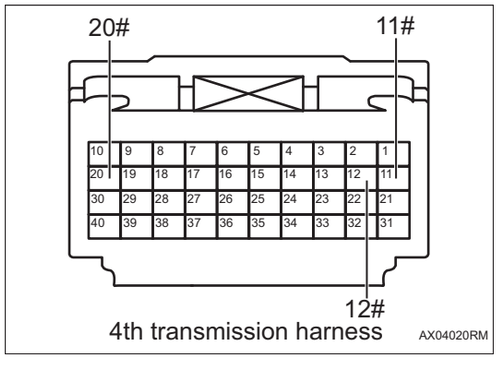
NG → **Repair according to the fault**

AX

OK

5	**Check harness and connector for open circuit (TCU-4th transmission harness)**





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 38# -4th transmission harness connector 11#	Always connected	Less than 1Ω
TCU connector 24# -4th transmission harness connector 12#(or 20#)	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

6	**Replace the TCU (See page AX-224)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Return transmission to factory for repair (See page AX-229)**

AX

OK

7	End

DTC	P1C4249	Main transmission fluid circuit solenoid valve accidental shutdown
DTC	P1C4649	Lubrication solenoid valve accidental shutdown
DTC	P1C4A49	Even-numbered clutch solenoid valve accidental shutdown
DTC	P1C4F49	Odd-numbered clutch solenoid valve accidental shutdown
DTC	P1C6249	Act1 solenoid valve accidental shutdown
DTC	P1C5449	Act2 solenoid valve accidental shutdown
DTC	P1C5849	Mul1 solenoid valve accidental shutdown
DTC	P1C5C49	Mul2 solenoid valve accidental shutdown
DTC	P1C0249	TCU hardware fault
DTC	P1C0349	SPI communication failure
DTC	P1C0449	Accidental shutdown
DTC	P1C0549	DN Test fault
DTC	P1C0649	EN Test fault
DTC	P1C0049	System IPT initialization failure
DTC	P1C0149	System OPS fault

Description

When a TCU internal fault or transmission fault is detected, the TCU records DTC.

DTC	DTC detection conditions	Faulty location
P1C4249	(a) Main transmission fluid circuit solenoid valve accidental shutdown.	• TCU
P1C4649	(a) Lubrication solenoid valve accidental shutdown.	
P1C4A49	(a) Even-numbered clutch solenoid valve accidental shutdown.	
P1C4F49	(a) Odd-numbered clutch solenoid valve accidental shutdown.	
P1C6249	(a) Act1 solenoid valve accidental shutdown.	
P1C5449	(a) Act2 solenoid valve accidental shutdown.	
P1C5849	(a) Mul1 solenoid valve accidental shutdown.	
P1C5C49	(a) Mul2 solenoid valve accidental shutdown.	
P1C0249	(a) TCU hardware fault.	
P1C0349	(a) SPI communication failure.	
P1C0449	(a) Accidental shutdown.	
P1C0549	(a) DN Test fault.	
P1C0649	(a) EN Test fault.	
P1C0049	(a) System IPT initialization failure.	
P1C0149	(a) System OPS failure.	

Inspection procedure

1 Re-read DTC

(a) Restart the engine and idle it.

(b) Wait for 5 minutes.

(c) Clear the DTC.

(d) Re-read the DTC.

OK → **Check all harness connectors**

NG

2 Check for other faults

(a) Check for high-level DTC.

Standard value

Results	Go to
Yes	Abnormal
NO	Normal

NG → **Select high-level DTC to process**

OK

3	**Replace the TCU (See page AX-224)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the transmission (See page AX-229)**

DTC	P1C6407	Odd-numbered gearshift shaft gear engagement failure
DTC	P1C6507	Odd-numbered gearshift shaft gear disengagement failure
DTC	P1C6607	Odd-numbered drive shaft inoperative
DTC	P1C6707	Odd-numbered gearshift shaft without valid gear position
DTC	P1C6807	Even-numbered gearshift shaft gear engagement failure
DTC	P1C6907	Even-numbered gearshift shaft gear disengagement failure
DTC	P1C6A07	Even-numbered gearshift shaft inoperative
DTC	P1C6B07	Even-numbered gearshift shaft without valid gear position

Description

When an odd and even-numbered shaft gear position fault is detected, the TCU records DTC.

DTC	DTC detection conditions	Faulty location
P1C6407	(a) Odd-numbered gearshift shaft gear engagement failure.	• Synchronizer, fork, multi-way valve and gearshift solenoid valve • Clutch and clutch pressure solenoid valve • Shift fork position sensor • TCU
P1C6507	(a) Odd-numbered gearshift shaft gear disengagement failure.	• Synchronizer, fork, multi-way valve and gearshift solenoid valve • Clutch and clutch pressure solenoid valve • Shift fork position sensor • TCU
P1C6607	(a) Odd-numbered drive shaft inoperative.	• Synchronizer, fork, multi-way valve and gearshift solenoid valve • Clutch and clutch pressure solenoid valve • Shift fork position sensor • TCU
P1C6707	(a) Odd-numbered gearshift shaft without valid gear position.	• Synchronizer, fork, multi-way valve and gearshift solenoid valve • Clutch and clutch pressure solenoid valve • Shift fork position sensor • TCU

DTC	DTC detection conditions	Faulty location
P1C6807	(a) Even-numbered gearshift shaft gear engagement failure.	• Synchronizer, fork, multi-way valve and gearshift solenoid valve • Clutch and clutch pressure solenoid valve • Shift fork position sensor • TCU
P1C6907	(a) Even-numbered gearshift shaft gear disengagement failure.	• Synchronizer, fork, multi-way valve and gearshift solenoid valve • Clutch and clutch pressure solenoid valve • Shift fork position sensor • TCU
P1C6A07	(a) Even-numbered gearshift shaft inoperative.	• Synchronizer, fork, multi-way valve and gearshift solenoid valve • Clutch and clutch pressure solenoid valve • Shift fork position sensor • TCU
P1C6B07	(a) Even-numbered gearshift shaft without valid gear position.	• Synchronizer, fork, multi-way valve and gearshift solenoid valve • Clutch and clutch pressure solenoid valve • Shift fork position sensor • TCU

Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Restart the engine, and idle it for 5 minutes.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

2	Check for high-level DTC

(a) Check for high-level DTC.

AX

Results

Results	Go to
No high-level DTC exists	Normal
High-level DTC exists	Abnormal

NG → **Repair according to the high-level DTC**

OK

3	**Replace the transmission (See page AX-229)**

(a) Replace the transmission.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the TCU (See page AX-224)**

DTC	P1C6C77	1st gear engagement failure
DTC	P1C6D76	1st gear travel jamming
DTC	P1C6E71	1st gear disengagement failure
DTC	P1C6F07	1st gear not available
DTC	P1C7007	1st gear disengagement failure
DTC	P1C7176	1st gear out of position
DTC	P1C7277	2nd gear engagement failure
DTC	P1C7376	2nd gear travel jamming
DTC	P1C7471	2nd gear disengagement failure
DTC	P1C7507	2nd gear not available
DTC	P1C7607	2nd gear disengagement failure
DTC	P1C7776	2nd gear out of position
DTC	P1C7877	3rd gear engagement failure
DTC	P1C7976	3rd gear travel jamming
DTC	P1C7A71	3rd gear disengagement failure
DTC	P1C7B07	3rd gear not available
DTC	P1C7C07	3rd gear disengagement failure
DTC	P1C7D76	3rd gear out of position
DTC	P1C7E77	4th gear engagement failure
DTC	P1C7F76	4th gear travel jamming
DTC	P1C8071	4th gear disengagement failure
DTC	P1C8107	4th gear not available
DTC	P1C8207	4th gear disengagement failure
DTC	P1C8376	4th gear out of position
DTC	P1C8477	5th gear engagement failure
DTC	P1C8576	5th gear travel jamming
DTC	P1C8671	5th gear disengagement failure
DTC	P1C8707	5th gear not available
DTC	P1C8807	5th gear disengagement failure

DTC	P1C8976	5th gear out of position
DTC	P1C8A77	6th gear engagement failure
DTC	P1C8B76	6th gear travel jamming
DTC	P1C8C71	6th gear disengagement failure
DTC	P1C8D07	6th gear not available
DTC	P1C8E07	6th gear disengagement failure
DTC	P1C8F76	6th gear out of position
DTC	P1C9077	7th gear engagement failure
DTC	P1C9176	7th gear travel jamming
DTC	P1C9271	7th gear disengagement failure
DTC	P1C9307	7th gear not available
DTC	P1C9407	7th gear disengagement failure
DTC	P1C9576	7th gear out of position
DTC	P1C9677	R gear engagement failure
DTC	P1C9776	R gear travel jamming
DTC	P1C9871	R gear disengagement failure
DTC	P1C9907	R gear not available
DTC	P1C9A07	R gear disengagement failure
DTC	P1C9B76	R gear out of position

Description

When no transmission gear ratio is detected, when a gear ratio error is detected, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1C6C77	(a) 1st gear engagement failure	• Synchronizer, fork, multi-way valve and gearshift solenoid valve • Clutch and clutch pressure solenoid valve • Shift fork position sensor • TCU
P1C6D76	(a) 1st gear travel jamming	
P1C6E71	(a) 1st gear disengagement failure	
P1C6F07	(a) 1st gear unavailable	
P1C7007	(a) 1st gear disengagement failure	
P1C7176	(a) 1st gear out of position	
P1C7277	(a) 2nd gear engagement failure	
P1C7376	(a) 2nd gear travel jamming	
P1C7471	(a) 2nd gear disengagement failure	

DTC	DTC detection conditions	Faulty location
P1C7507	(a) 2nd gear unavailable	• Synchronizer, fork, multi-way valve and gearshift solenoid valve • Clutch and clutch pressure solenoid valve • Shift fork position sensor • TCU
P1C7607	(a) 2nd gear disengagement failure	
P1C7776	(a) 2nd gear out of position	
P1C7877	(a) 3rd gear engagement failure	
P1C7976	(a) 3rd gear travel jamming	
P1C7A71	(a) 3rd gear disengagement failure	
P1C7B07	(a) 3rd gear unavailable	
P1C7C07	(a) 3rd geardisengagement failure	
P1C7D76	(a) 3rd gear out of position	
P1C7E77	(a) 4th gear engagement failure	
P1C7F76	(a) 4th gear travel jamming	
P1C8071	(a) 4th gear disengagement failure	
P1C8107	(a) 4th gear unavailable	
P1C8207	(a) 4th gear disengagement failure	
P1C8376	(a) 4th gear out of position	
P1C8477	(a) 5th gear engagement failure	
P1C8576	(a) 5th gear travel jamming	
P1C8671	(a) 5th gear disengagement failure	
P1C8707	(a) 5th gear unavailable	
P1C8807	(a) 5th gear disengagement failure	
P1C8976	(a) 5th gear out of position	
P1C8A77	(a) 6th gear engagement failure	
P1C8B76	(a) 6th gear travel jamming	
P1C8C71	(a) 6th gear disengagement failure	
P1C8D07	(a) 6th gear unavailable	
P1C8E07	(a) 6th gear disengagement failure	
P1C8F76	(a) 6th gear out of position	
P1C9077	(a) 7th gear engagement failure	
P1C9176	(a) 7th gear travel jamming	
P1C9271	(a) 7th gear disengagement failure	
P1C9307	(a) 7th gear unavailable	
P1C9407	(a) 7th gear disengagement failure	
P1C9576	(a) 7th gear out of position	
P1C9677	(a) R gear engagement failure	
P1C9776	(a) R gear travel jamming	
P1C9871	(a) R gear disengagement failure	
P1C9907	(a) R gear unavailable	
P1C9A07	(a) R gear disengagement failure	
P1C9B76	(a) R gear out of position	

Inspection procedure

1	Re-read DTC

(a) Start the engine and idle it.

(b) Wait for 5 minutes.

(c) Clear the DTC.

(d) Re-read the DTC.

OK → **Check valve body assembly connector and clean connector**

NG

2	Check transmission hydraulic system

(a) Check the transmission hydraulic system for oil leakage.

NG → **Return transmission to factory for repair**

OK

3	Rewrite shift fork position self-learning data

(a) Connect the HQ-VDS.

(b) Write the shift fork endpoint self-learning characteristic data.

Criteria:

Writing was successful and the DTC disappeared.

Results

Results	Go to
Writing is successful, but DTC did not disappear	Normal
HQ-VDS shows "Writing failed"	Abnormal

NG → **Check whether the written data is correct and check the connection of diagnostic scan tool**

OK

4	Shift fork position self-learning

(a) Connect the HQ-VDS.

AX

(b) Shift fork position pressure self-learning.

Results

Results	Go to
Self-learning failure	Normal
HQ-VDS feedback "self-learning condition not met" or "ECU no response"	Abnormal

NG → **Check the learning conditions and the connection of diagnostic scan tool**

OK

5	**Replace the transmission (See page AX-229)**

(a) Clear the DTC.

(b) Reread whether the DTC is present.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace the TCU (See page AX-224)**

OK

6	**End**

DTC	P1C9C00	Hydraulic data unwritten

Description

When the TCU has not been programmed with hydraulic data, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1C9C00	(a) Hydraulic data unwritten.	• Write hydraulic data

Inspection procedure

1	**Write the corresponding hydraulic data to complete the verification**

DTC	P1C9D00	Hydraulic data mismatch with current valve body

Description

When the hydraulic data does not match the current valve body, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1C9D00	(a) Hydraulic data mismatch with current valve body.	• Write the correct hydraulic data (source: QA Dept. of Powertrain Plant or Group)

Inspection procedure

1	Check hydraulic characteristic data

(a) Check whether the current valve body and hydraulic data type are of the same type.

NG → **Write the correct hydraulic data and complete the verification (technical support is required for correct hydraulic data)**

OK

2	End

DTC	P1C9E00	Pressure sensor type match failure

Description

When the pressure sensor fails and cannot be matched, the TCU records DTC.

DTC	DTC detection conditions	Faulty location
P1C9E00	(a) Pressure sensor match failure.	• Pressure sensor

Inspection procedure

1	**Return transmission to factory for repair (See page AX-229)**

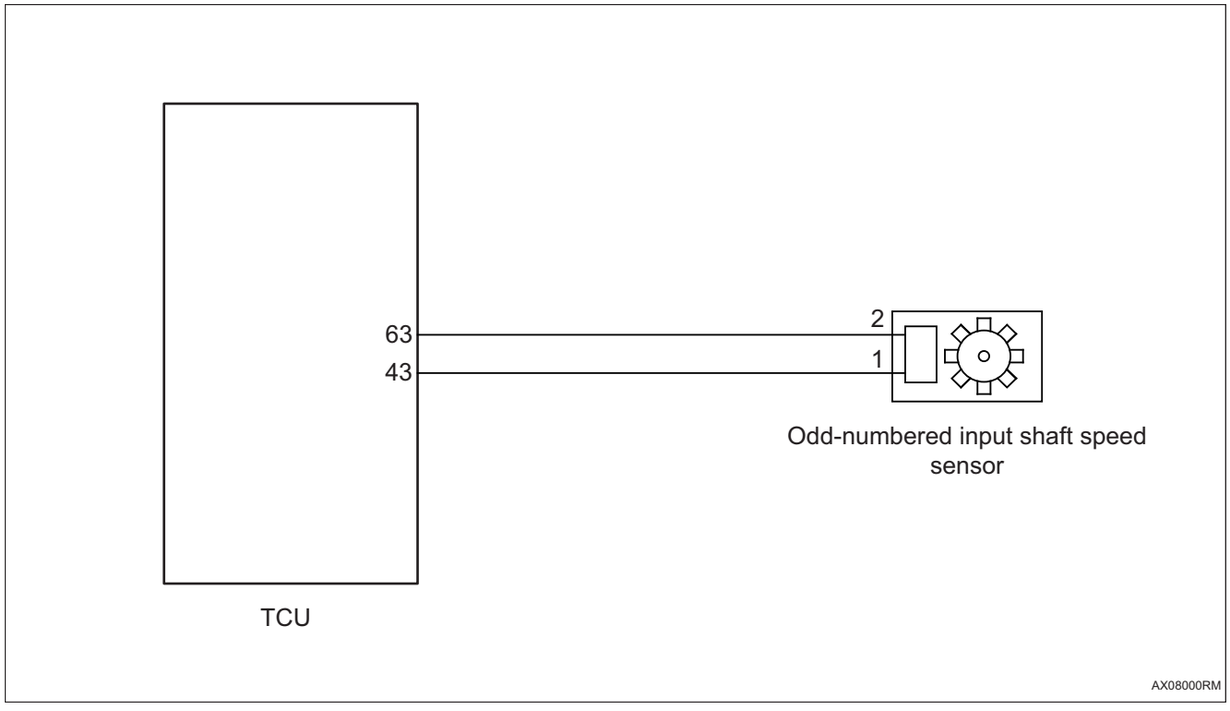
DTC	P276512	Even-numbered clutch speed sensor circuit shorted to power supply
DTC	P276614	Even-numbered clutch speed sensor circuit shorted to ground/open
DTC	P276829	Even-numbered clutch speed sensor implausible

Description

When odd-numbered input shaft speed sensor circuit is shorted to power supply, shorted to ground, or open, TCU records DTC.

DTC	DTC detection conditions	Faulty location
P276512	(a) Odd-numbered clutch speed sensor circuit shorted to power supply.	• TCU • Harness and connector • Odd-numbered input shaft speed sensor
P276614	(a) Odd-numbered clutch speed sensor circuit shorted to ground/open.	• TCU • Harness and connector • Odd-numbered input shaft speed sensor
P276829	(a) Odd-numbered clutch speed sensor implausible.	• TCU • Harness and connector • Odd-numbered input shaft speed sensor

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

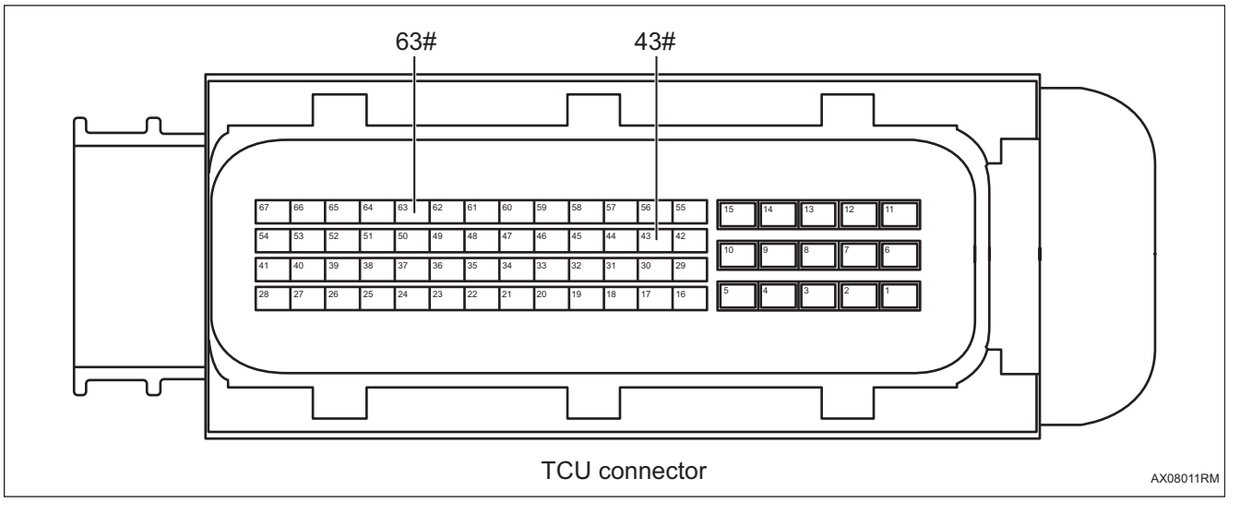
2	**Check harness and connector for circuit shorted to each other (TCU - odd-numbered shaft input speed sensor)**

(a) Check whether the harness and connector are shorted to each other.

NG → **Repair or replace harness (TCU- odd numbered shaft input speed sensor)**

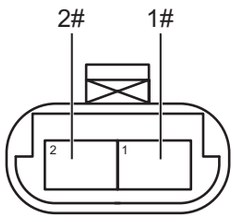
OK

3	**Check harness and connector for open circuit (TCU - odd-numbered shaft input speed sensor)**



TCU connector

AX



Odd-numbered input shaft speed sensor connector

AX08021RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the odd-numbered shaft input speed sensor connector.

(e) Measure the resistance according to the values in the table below.

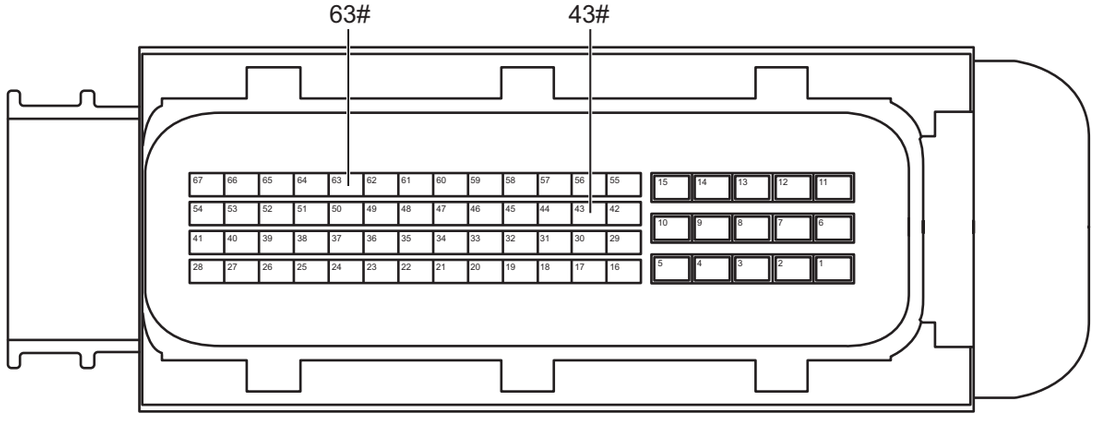
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 63# -odd-numbered shaft input speed sensor connector 2#	Always connected	Less than 1Ω
TCU connector 43# -odd-numbered shaft input speed sensor connector 1#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

4	**Check harness and connector for circuit shorted to ground (TCU - odd-numbered shaft input speed sensor)**



TCU connector

AX08011RM

(a) Measure the resistance according to the values in the table below.

Standard value

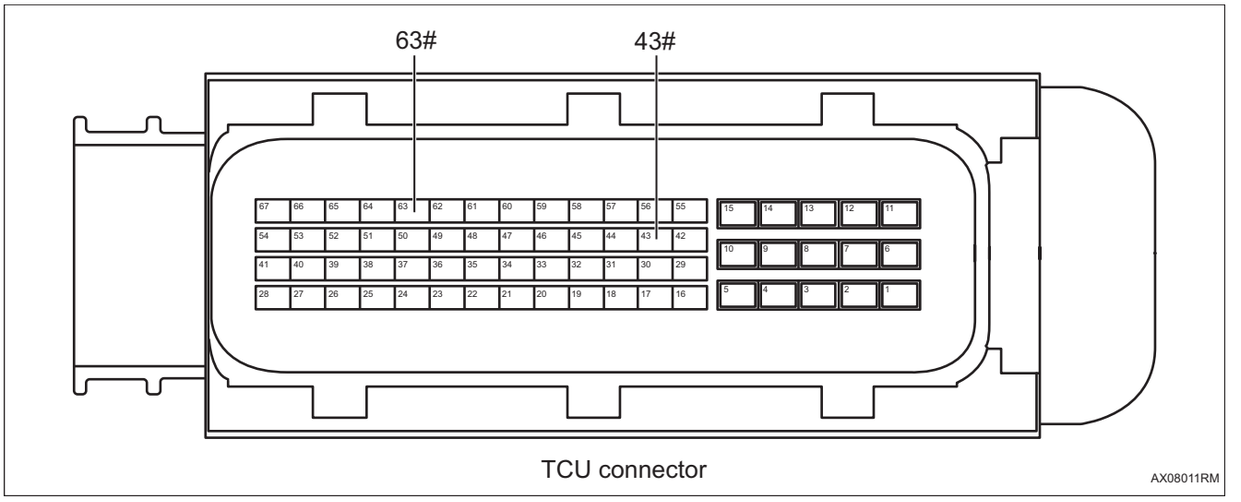
Detector connection	Detection conditions	Specified state
TCU connector 63# - body GND	Always connected	10 KΩ or greater
TCU connector 43# - body GND	Always connected	10 KΩ or greater

AX

NG → **Repair or replace the harness and connector**

OK

5	**Check harness and connector for circuit shorted to power supply (TCU - odd-numbered shaft input speed sensor)**



TCU connector

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 63# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 43# - body GND	Set the ignition switch to "ON"	Less than 1 V

AX

NG → **Repair or replace the harness and connector**

OK

6	**Replace the odd-numbered shaft input speed sensor (See page AX-232)**

(a) Replace the odd-numbered shaft input speed sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the TCU (See page AX-224)**

OK

7	**End**

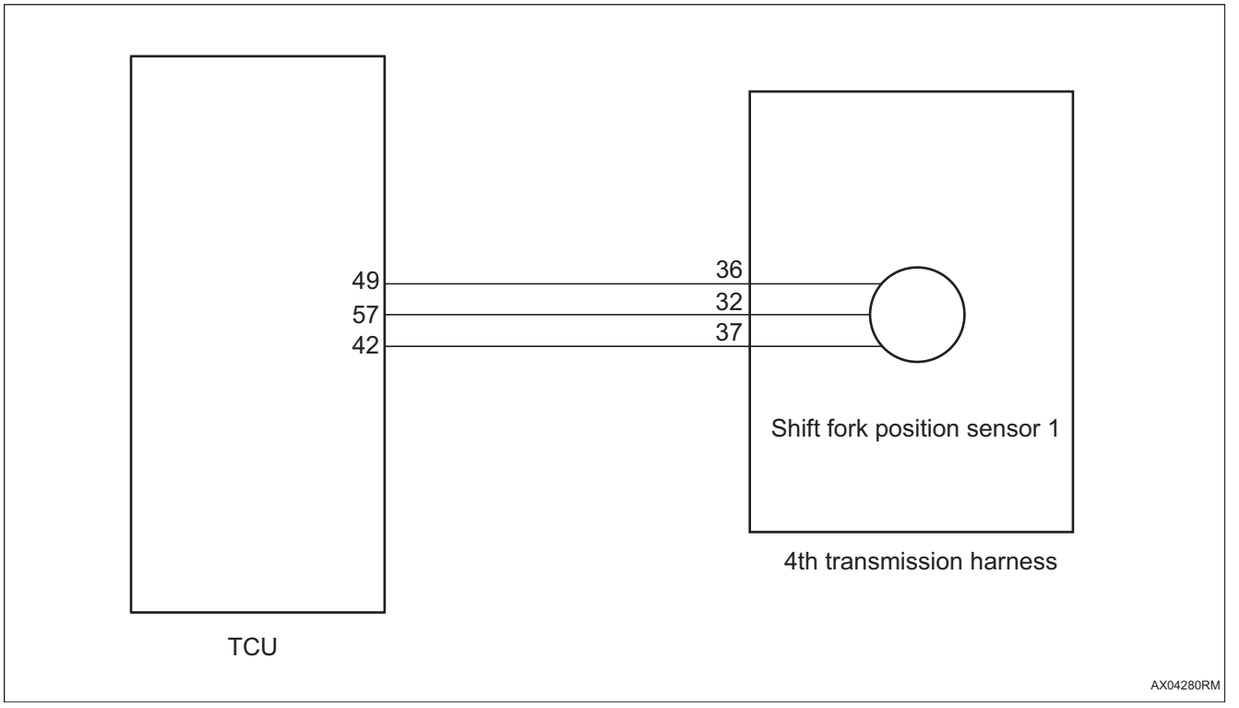
DTC	P283417	5th-1st shift fork position sensor 1 sampling overvoltage
DTC	P283316	5th-1st shift fork position sensor 1 sampling undervoltage

Description

When it is detected that the 5th-1st gear fork position sensor 1 sampling voltage is abnormal, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P283417	(a) 5th-1st shift fork position sensor 1 sampling overvoltage.	• Harness and connector • 5th-1st shift fork position sensor • TCU
P283316	(a) 5th-1st shift fork position sensor 1 sampling undervoltage.	• Harness and connector • 5th-1st shift fork position sensor • TCU

Circuit diagram



AX

Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

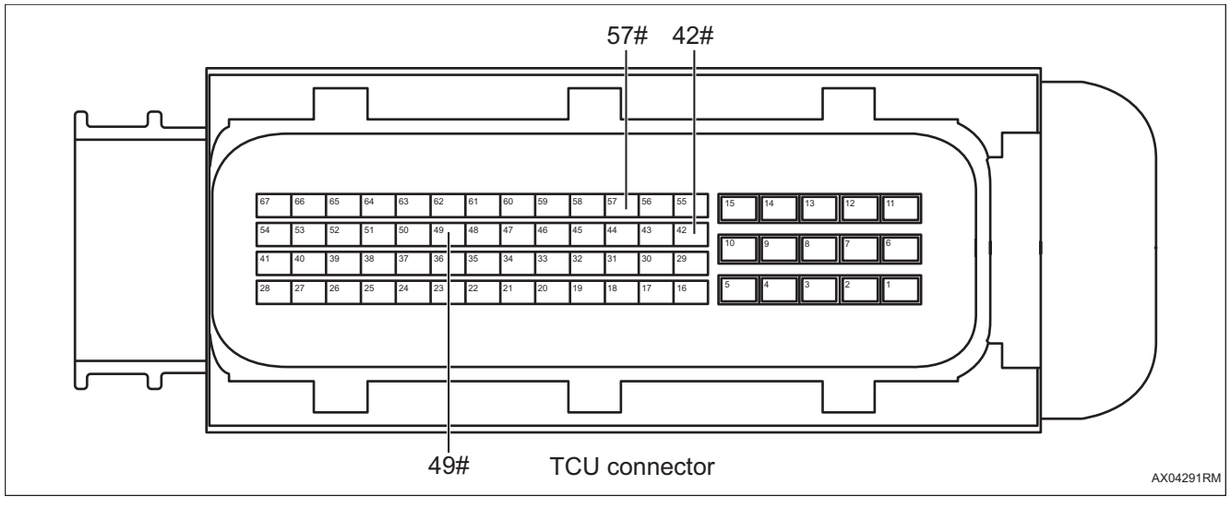
2	Check harness and connector for circuit shorted to each other (TCU-4th transmission harness harness)

(a) Check whether the harness and connector are shorted to each other.

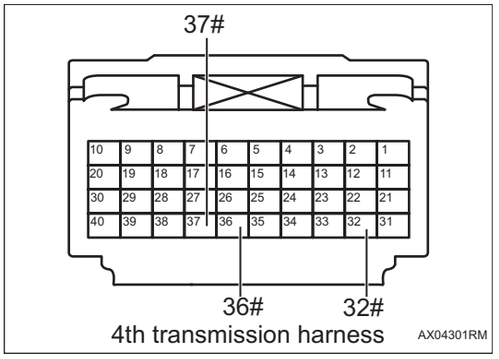
NG → **Repair or replace the harness and connector**

OK

3	Check harness and connector for open circuit (TCU-4th transmission harness)



AX



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

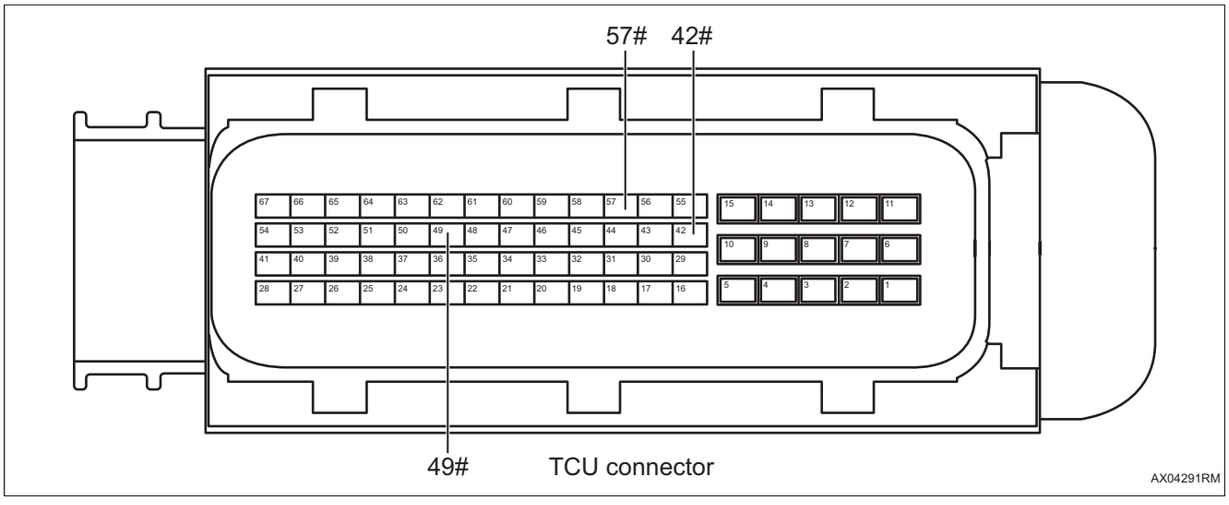
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 57# -4th transmission harness connector 32#	Always connected	Less than 1Ω
TCU connector 42# -4th transmission harness connector 37#	Always connected	Less than 1Ω
TCU connector 49# -4th transmission harness connector 36#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

4	Check harness and connector for circuit shorted to ground (TCU-4th transmission harness)



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 57# - body GND	Always connected	10 KΩ or greater

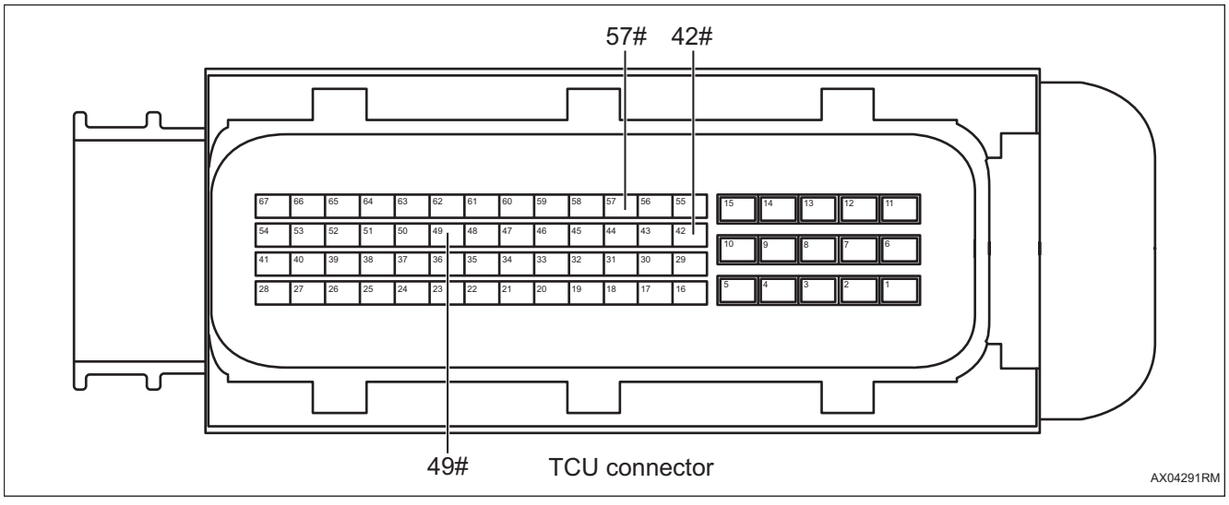
AX

Detector connection	Detection conditions	Specified state
TCU connector 42# -body GND	Always connected	10 KΩ or greater
TCU connector 49# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5 **Check harness and connector for circuit shorted to power supply (TCU-4th transmission harness)**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 57# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 42# -body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 49# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

AX

OK

6	**Replace the TCU (See page AX-224)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Return transmission to factory for repair (hydraulic module) (See page AX-229)**

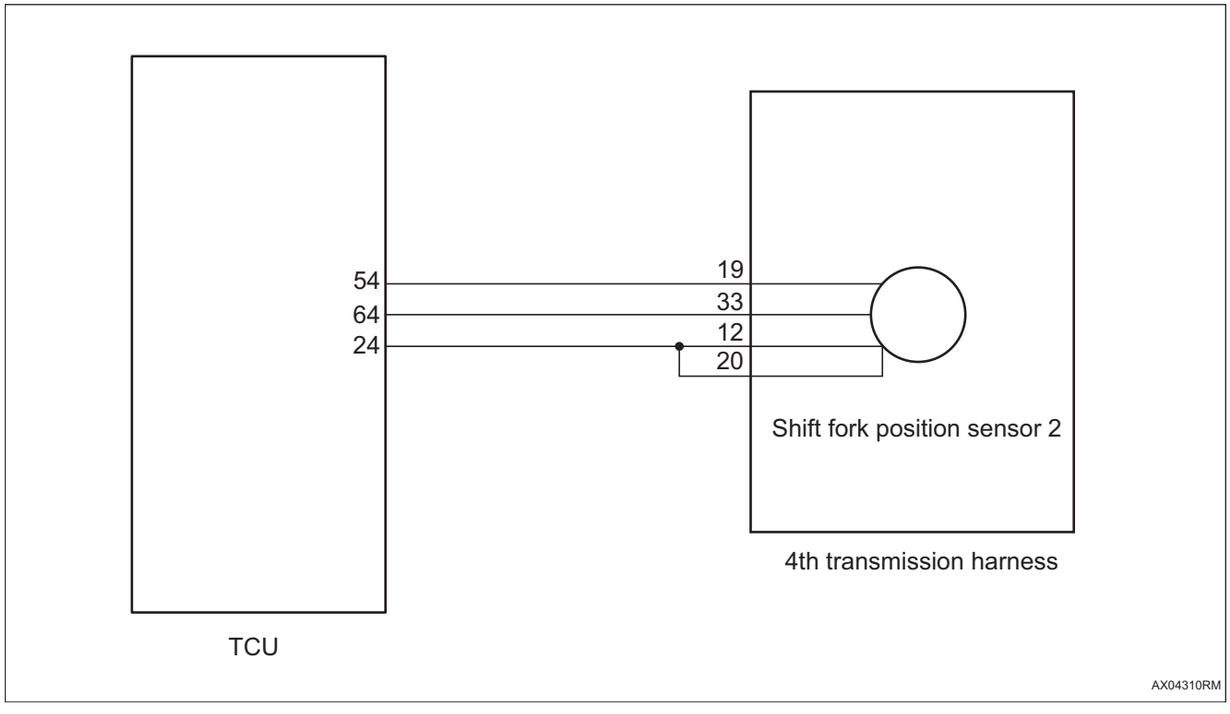
DTC	P283917	2nd-4th shift fork position sensor 2 sampling overvoltage
DTC	P283816	2nd-4th shift fork position sensor 2 sampling undervoltage

Description

When it is detected that the 4th-2nd gear fork position sensor 2 sampling voltage is abnormal, the TCU records DTC.

DTC	DTC detection conditions	Faulty location
P283917	(a) 2nd-4th shift fork position sensor 2 sampling overvoltage.	• Harness and connector • 2nd-4th shift fork position sensor • TCU
P283816	(a) 2nd-4th shift fork position sensor 2 sampling undervoltage.	• Harness and connector • 2nd-4th shift fork position sensor • TCU

Circuit diagram



AX

Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

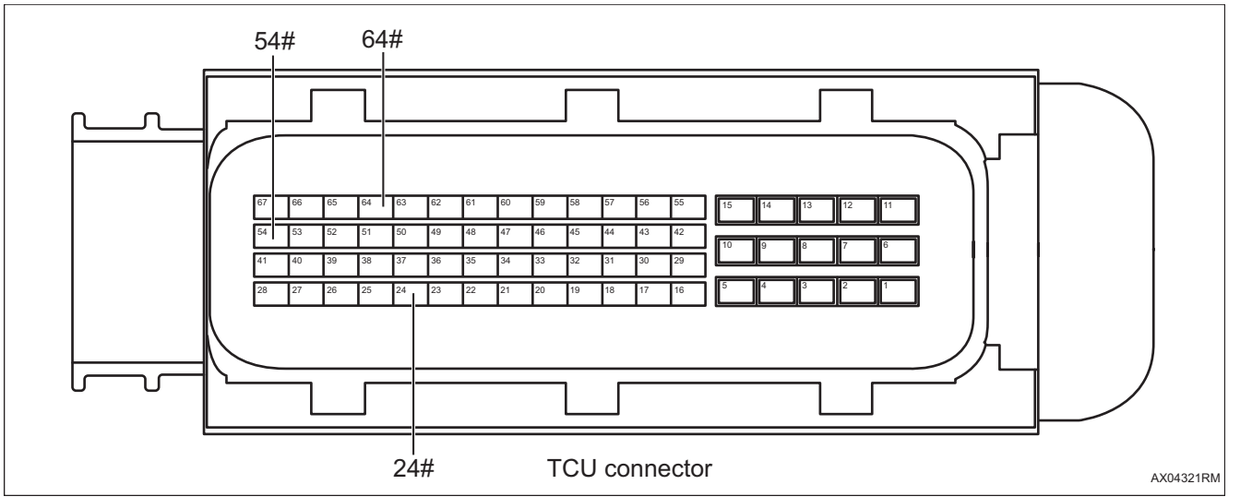
2	Check harness and connector for circuit shorted to each other (TCU-4th transmission harness harness)

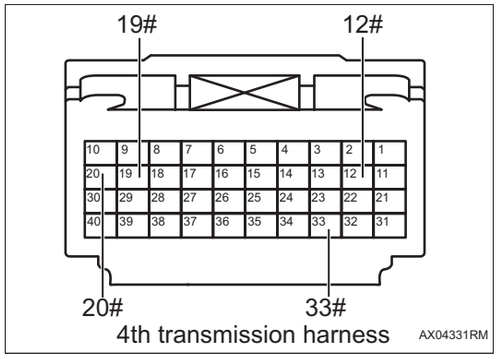
(a) Check whether the harness and connector are shorted to each other.

NG → **Repair or replace harness (TCU-4th transmission harness)**

OK

3	Check harness and connector for open circuit (TCU-4th transmission harness)





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

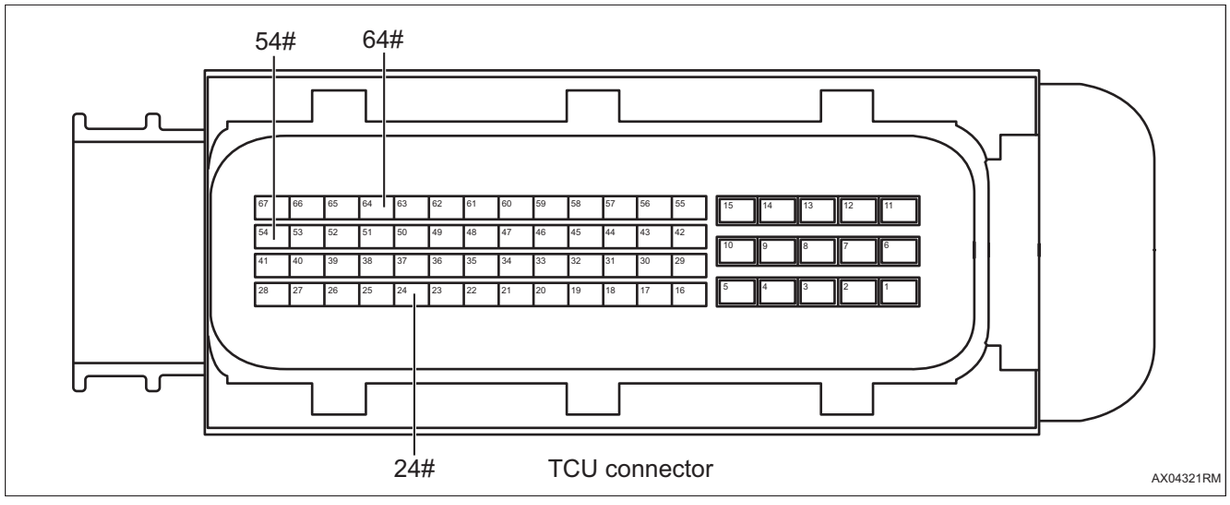
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 64# -4th transmission harness connector 33#	Always connected	Less than 1Ω
TCU connector 54# -4th transmission harness connector 19#	Always connected	Less than 1Ω
TCU connector 24# -4th transmission harness connector 12#(or 20#)	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

4	Check harness and connector for circuit shorted to ground (TCU-4th transmission harness)



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 64# - body GND	Always connected	10 KΩ or greater

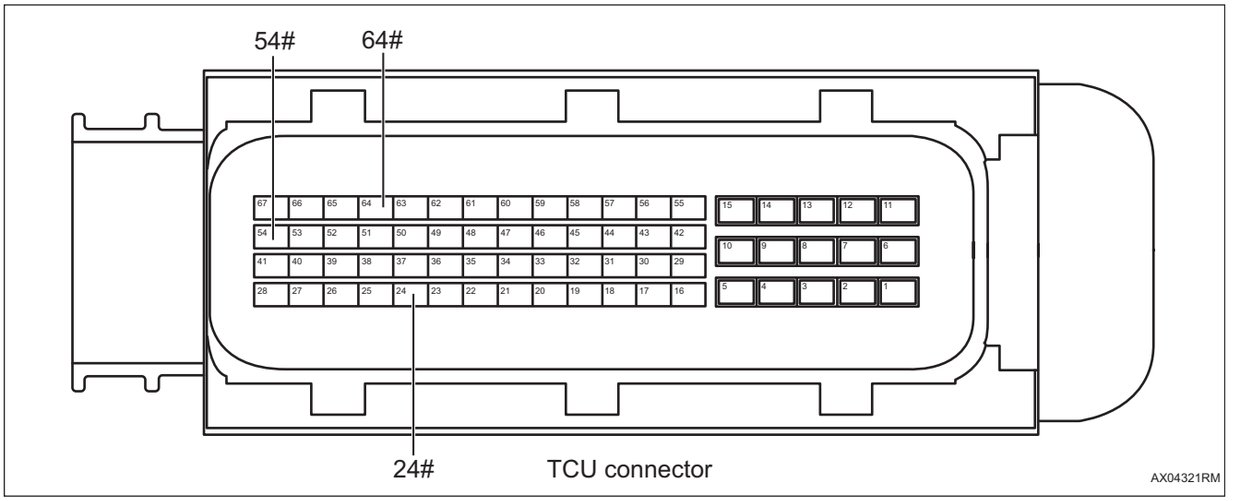
AX

Detector connection	Detection conditions	Specified state
TCU connector 54# - body GND	Always connected	10 KΩ or greater
TCU connector 24# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	**Check harness and connector for circuit shorted to power supply (TCU-4th transmission harness)**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 64# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 54# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 24# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Replace the TCU (See page AX-224)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Return transmission to factory for repair (hydraulic module) (See page AX-229)**

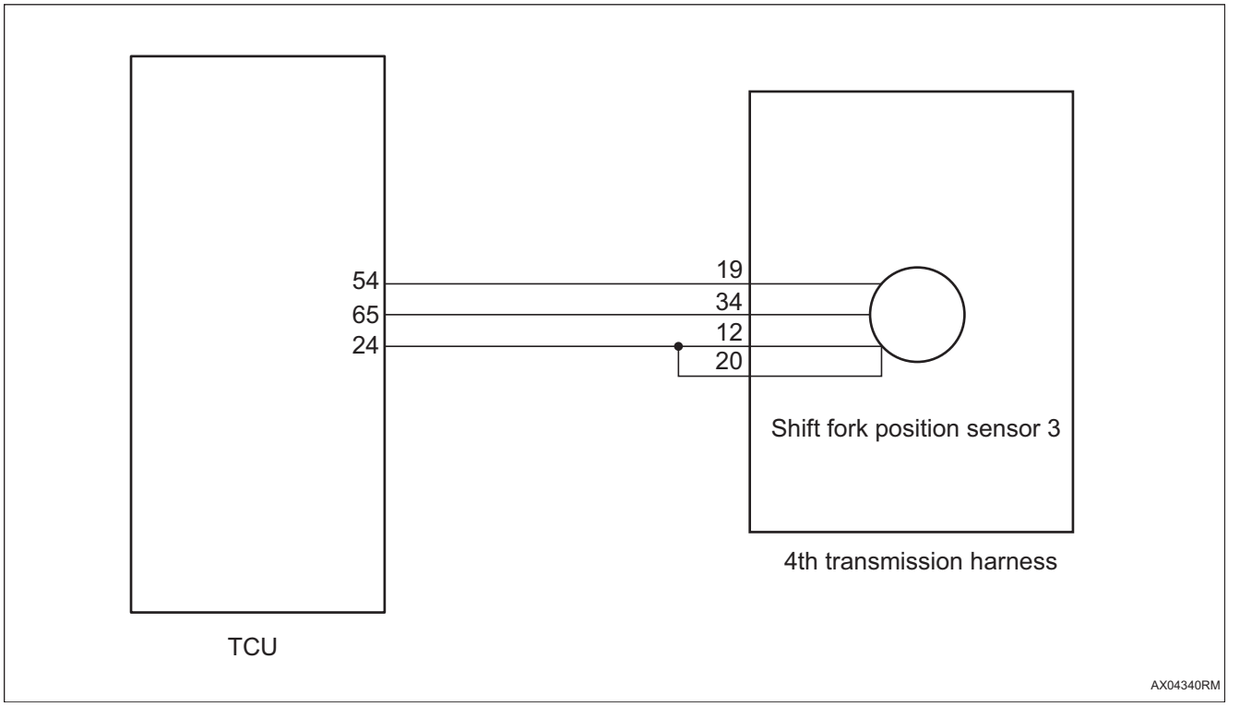
DTC	P283E17	R-6th shift fork position sensor 3 sampling overvoltage
DTC	P283D16	R-6th shift fork position sensor 3 sampling undervoltage

Description

When it is detected that the R-6th gear fork position sensor 3 sampling voltage is abnormal, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P283E17	(a) R-6th shift fork position sensor 3 sampling overvoltage.	• Harness and connector • R-6th shift fork position sensor • TCU
P283D16	(a) R-6th shift fork position sensor 3 sampling undervoltage.	• Harness and connector • R-6th shift fork position sensor • TCU

Circuit diagram



AX

Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

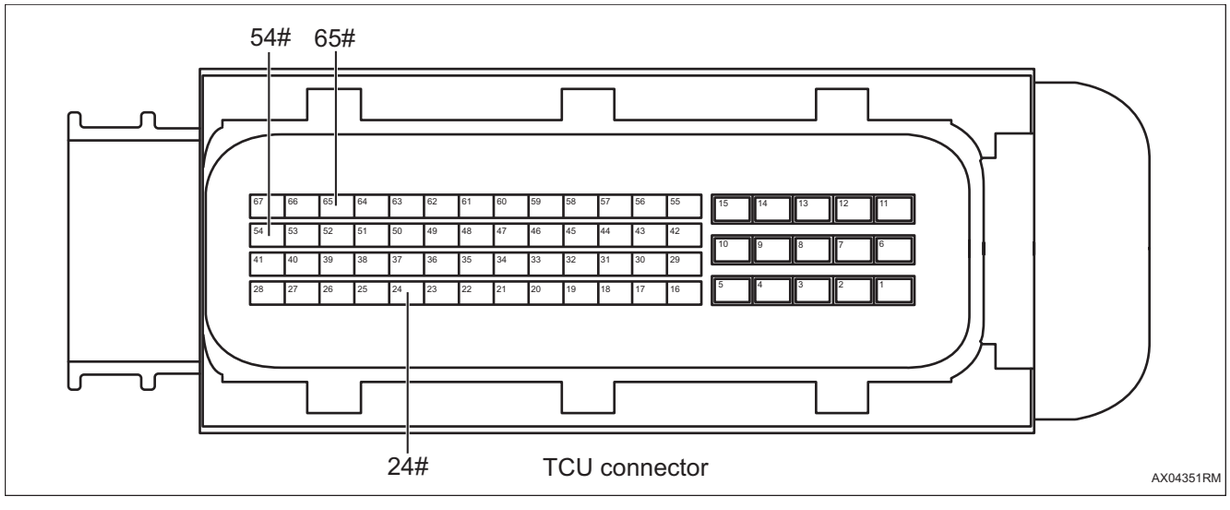
2	Check harness and connector for circuit shorted to each other (TCU-4th transmission harness harness)

(a) Check whether the harness and connector are shorted to each other.

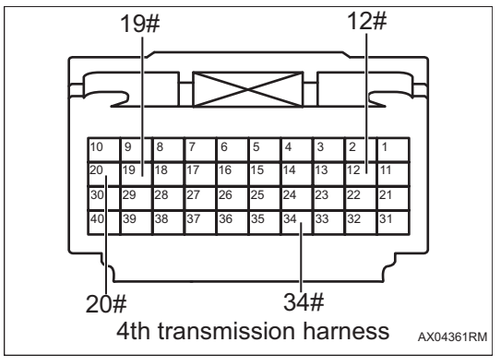
NG → **Repair or replace harness (TCU-4th transmission harness)**

OK

3	Check harness and connector for open circuit (TCU-4th transmission harness)



AX



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

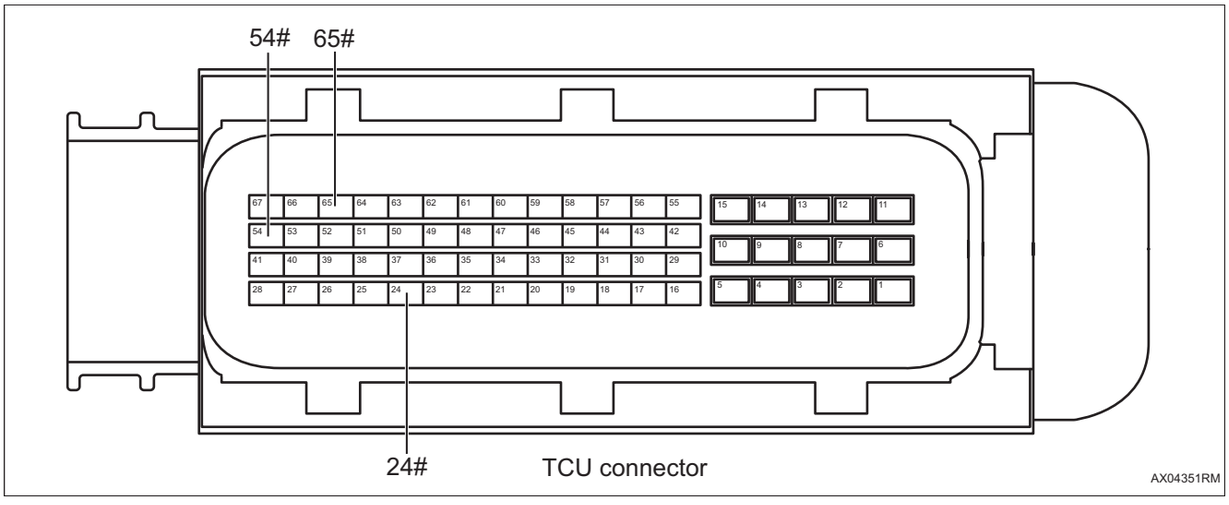
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 65# -4th transmission harness connector 34#	Always connected	Less than 1Ω
TCU connector 54# -4th transmission harness connector 19#	Always connected	Less than 1Ω
TCU connector 24# -4th transmission harness connector 12#(or 20#)	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check harness and connector for circuit shorted to ground (TCU-4th transmission harness)**



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 65# - body GND	Always connected	10 KΩ or greater

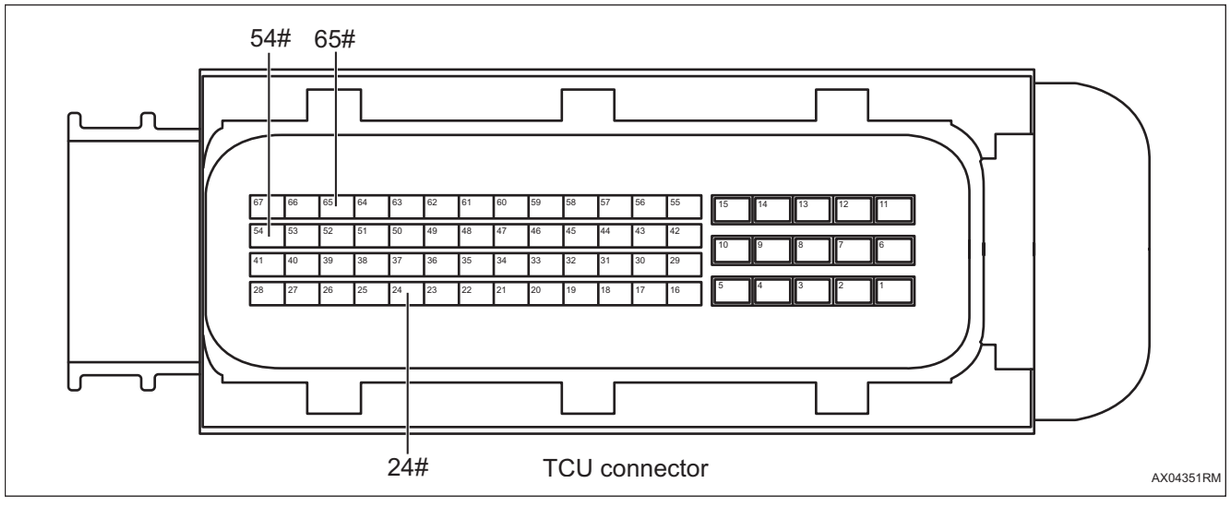
AX

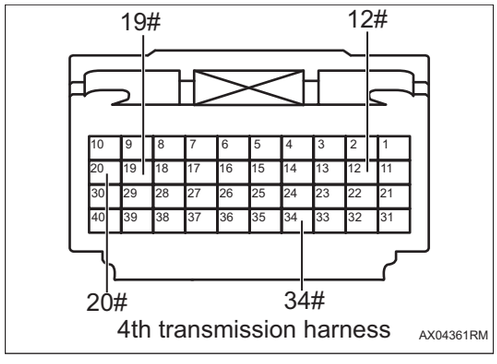
Detector connection	Detection conditions	Specified state
TCU connector 54# - body GND	Always connected	10 KΩ or greater
TCU connector 24# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5 **Check harness and connector for circuit shorted to power supply (TCU-4th transmission harness)**





(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 65# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 54# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 24# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

AX

OK

6	**Replace the TCU (See page AX-224)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Return transmission to factory for repair (hydraulic module) (See page AX-229)**

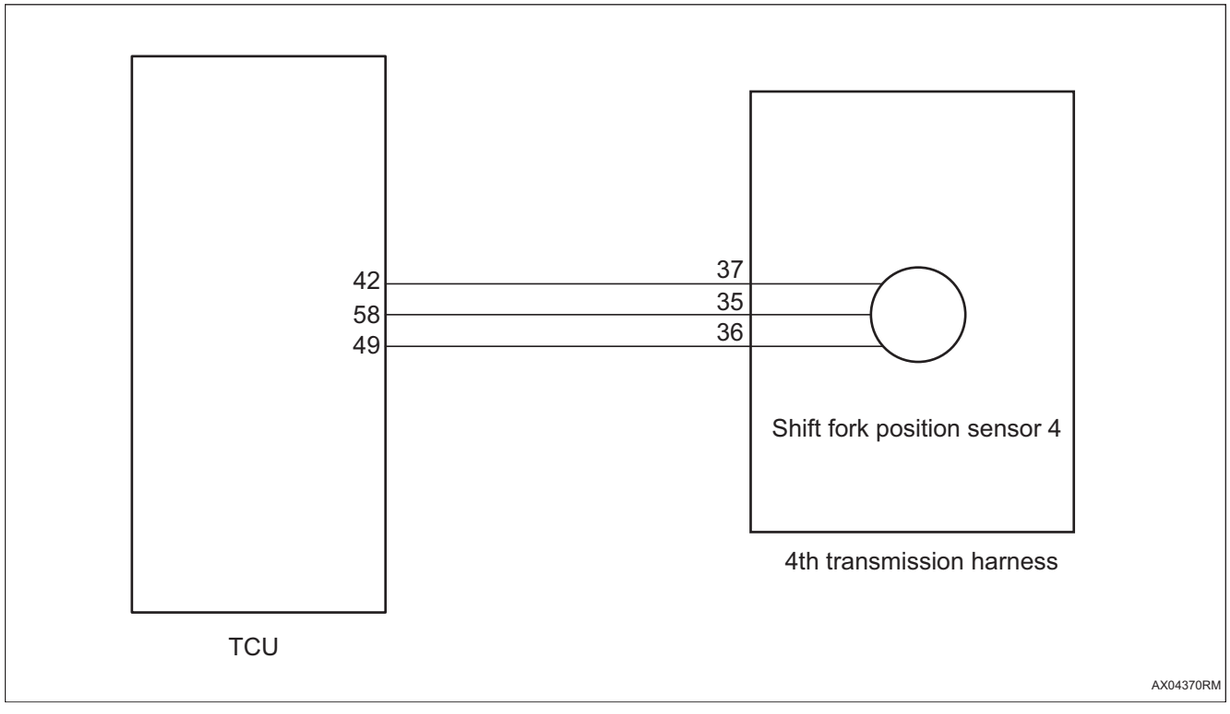
DTC	P284317	7th-3rd shift fork position sensor 4 sampling overvoltage
DTC	P284216	7th-3rd shift fork position sensor 4 sampling undervoltage

Description

When it is detected that the 7th-3rd gear fork position sensor 4 sampling voltage is abnormal, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P284317	(a) 7th-3rd shift fork position sensor 4 sampling overvoltage.	• Harness and connector • 7th-3rd shift fork position sensor • TCU
P284216	(a) 7th-3rd shift fork position sensor 4 sampling undervoltage.	• Harness and connector • 7th-3rd shift fork position sensor • TCU

Circuit diagram



AX

Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

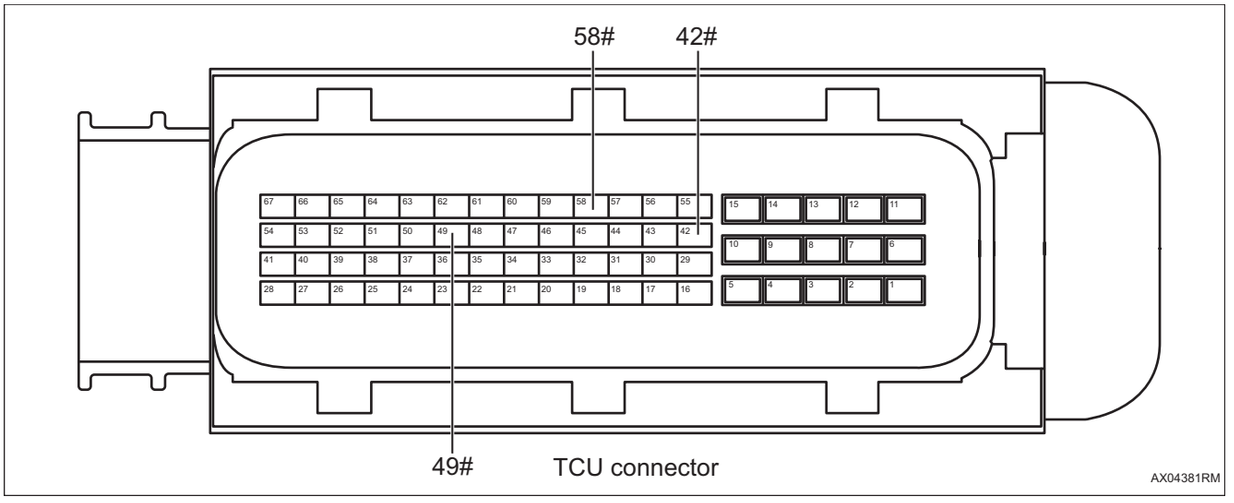
2	Check harness and connector for circuit shorted to each other (TCU-4th transmission harness harness)

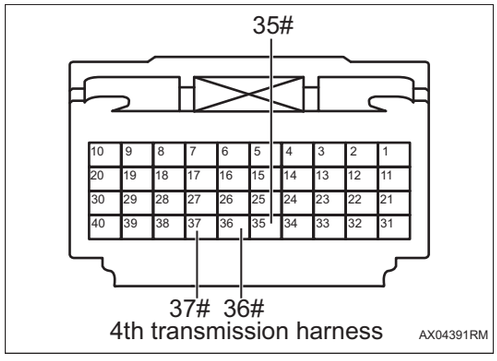
(a) Check whether the harness and connector are shorted to each other.

NG → **Repair or replace the harness and connector**

OK

3	Check harness and connector for open circuit (TCU-4th transmission harness)





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

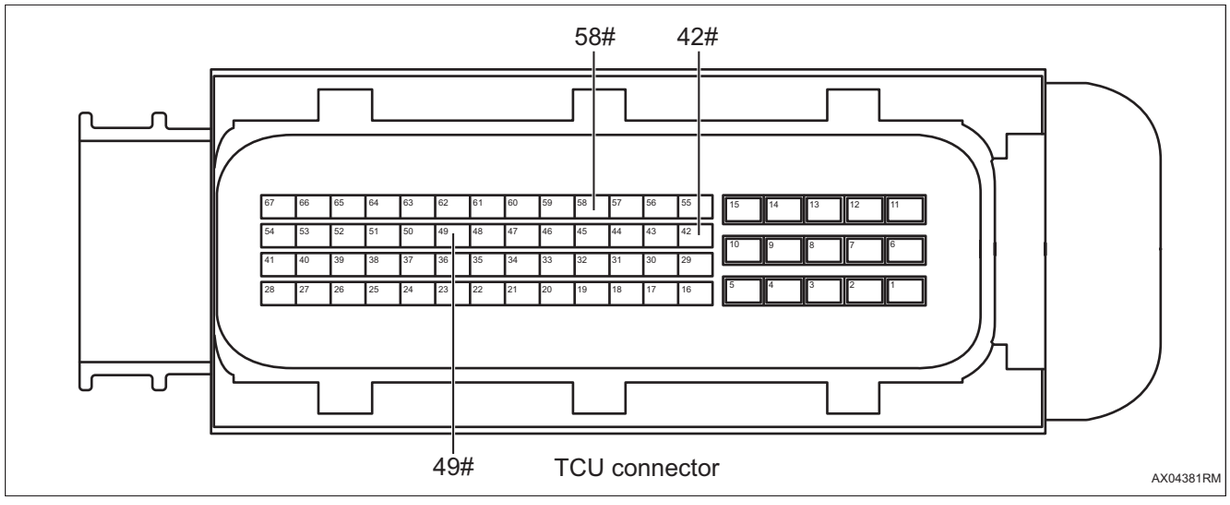
Standard value

Detector connection	Detection conditions	Specified state
TCU connector 58# -4th transmission harness connector 35#	Always connected	Less than 1Ω
TCU connector 42# -4th transmission harness connector 37#	Always connected	Less than 1Ω
TCU connector 49# -4th transmission harness connector 36#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

4	Check harness and connector for circuit shorted to ground (TCU-4th transmission harness)



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 58# - body GND	Always connected	10 KΩ or greater

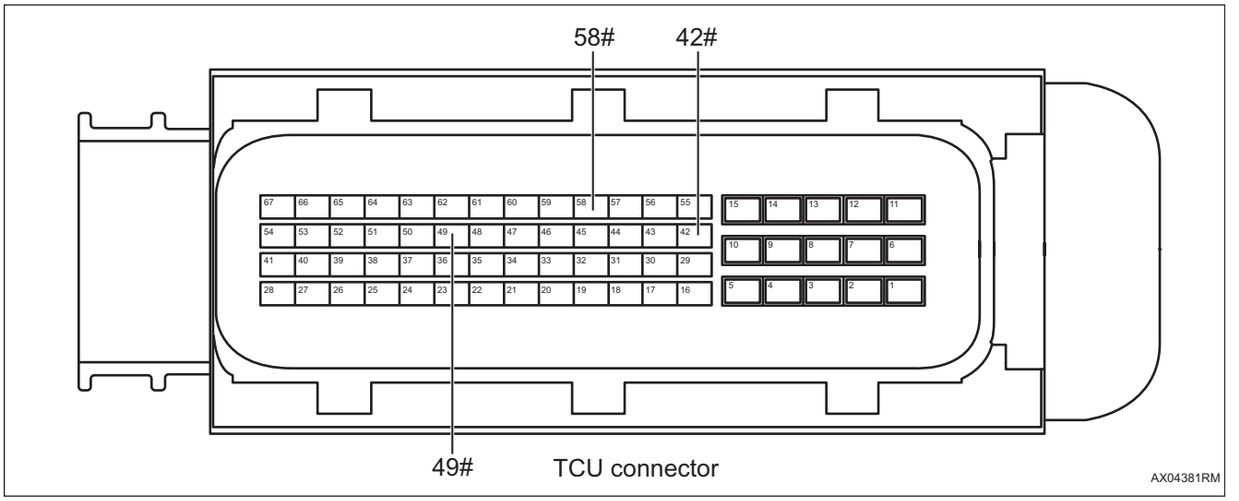
AX

Detector connection	Detection conditions	Specified state
TCU connector 42# -body GND	Always connected	10 KΩ or greater
TCU connector 49# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	**Check harness and connector for circuit shorted to power supply (TCU-4th transmission harness)**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 58# - body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 42# -body GND	Set the ignition switch to "ON"	Less than 1 V
TCU connector 49# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Replace the TCU (See page AX-224)**

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Return transmission to factory for repair (hydraulic module) (See page AX-229)**

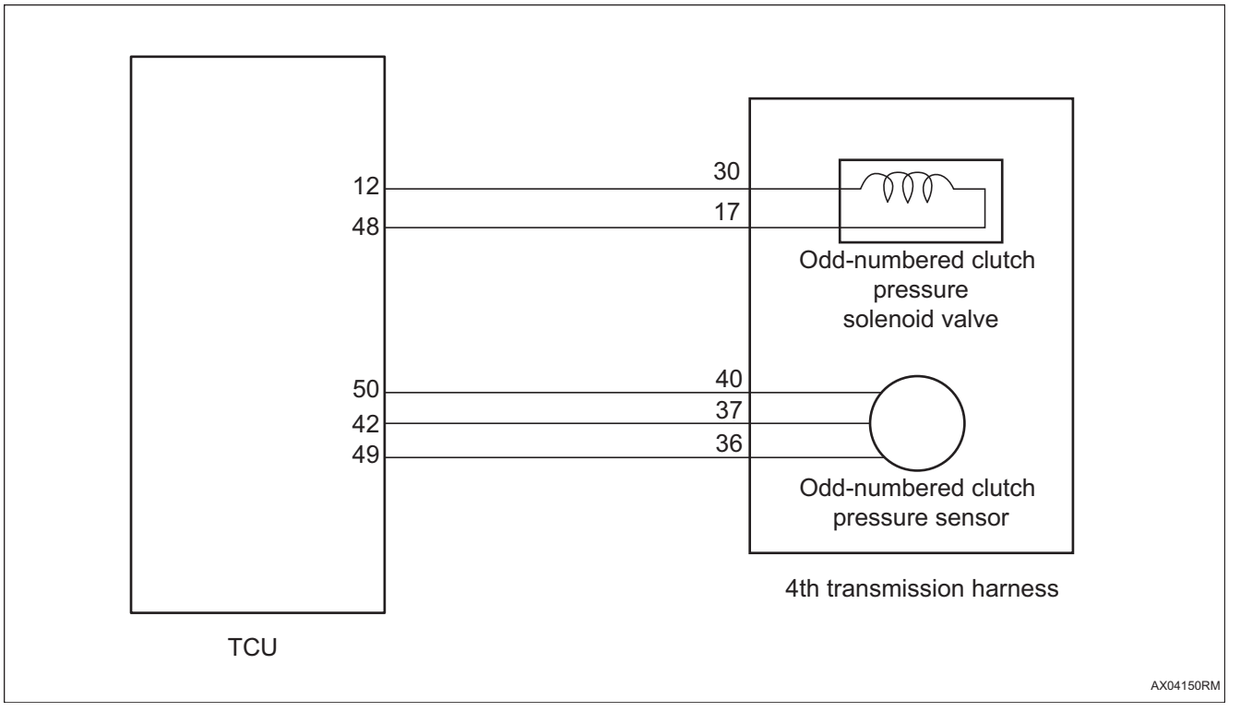
DTC	**P285723**	**Odd-numbered clutch actual pressure far below estimated pressure**
DTC	**P286B24**	**Odd-numbered clutch actual pressure far above estimated pressure**

Description

When an odd-numbered clutch pressure failure is detected, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P285723	(a) Odd-numbered clutch pressure failure.	• Odd-numbered clutch pressure solenoid valve • Transmission • Harness and connector • Odd-numbered clutch oil pressure sensor • TCU
P286B24	(a) Odd-numbered clutch pressure failure.	• Odd-numbered clutch pressure solenoid valve • Transmission • Harness and connector • Odd-numbered clutch oil pressure sensor • TCU

Circuit diagram



Inspection procedure

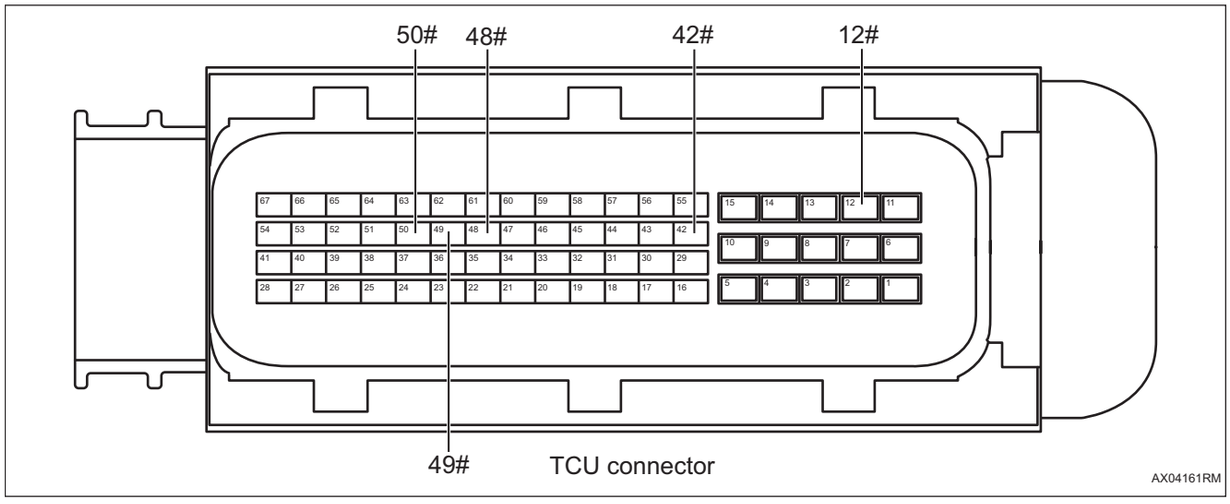
1	**Check the transmission hydraulic system for oil leakage.**

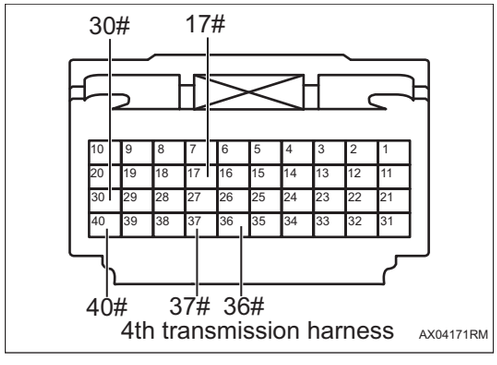
(a) Lift the vehicle to check whether the transmission hydraulic system leaks oil.

NG → **Return transmission to factory for repair**

OK

2 Check harness and connector for open circuit (TCU-4th transmission harness)





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 12# -4th transmission harness connector 30#	Always connected	Less than 1Ω
TCU connector 48# -4th transmission harness connector 17#	Always connected	Less than 1Ω
TCU connector 50# -4th transmission harness connector 40#	Always connected	Less than 1Ω
TCU connector 42# -4th transmission harness connector 37#	Always connected	Less than 1Ω
TCU connector 49# -4th transmission harness connector 36#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

AX

OK

3	Rewrite clutch pressure self-learning data

(a) Connect the HQ-VDS.

(b) Write the clutch pressure self-learning characteristic data.

Results

Results	Go to
HQ-VDS shows "Writing failed"	Abnormal
Problem unsolved	Normal

NG → **Check whether the written data is correct and check the connection of diagnostic scan tool**

OK

4	Clutch pressure self-learning

(a) Connect the HQ-VDS.

(b) Carry out the clutch pressure self-learning.

Results

Results	Go to
HQ-VDS feedback "self-learning condition not met" or "ECU no response"	Abnormal
HQ-VDS shows "Self-learning failed"	Normal

NG → **Check the learning conditions and the connection of diagnostic scan tool**

OK

5	Replace the transmission (See page AX-229)

(a) Replace the transmission.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the TCU (See page AX-224)**

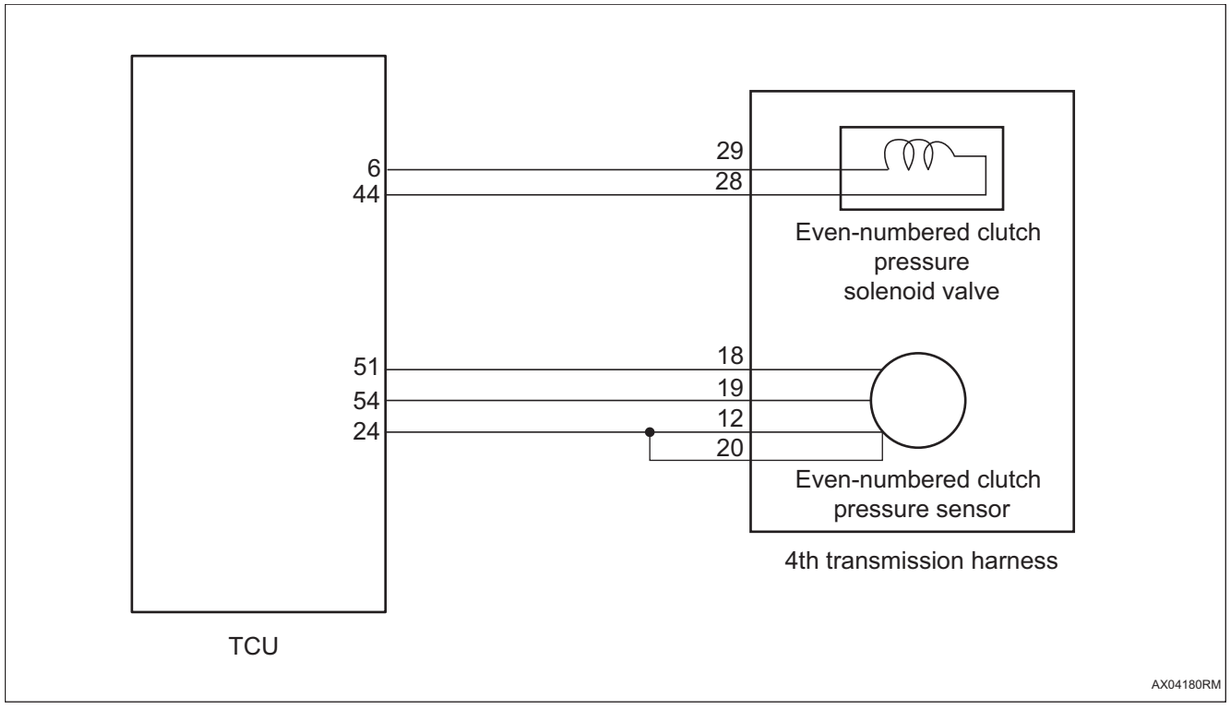
DTC	**P285823**	**Even-numbered clutch actual pressure far below estimated pressure**
DTC	**P287324**	**Even-numbered clutch actual pressure far above estimated pressure**

Description

When an even-numbered clutch pressure failure is detected, the TCU records the DTC.

DTC	DTC detection conditions	Faulty location
P285823	(a) Even-numbered clutch pressure failure.	• Even-numbered clutch pressure solenoid valve • Transmission • Harness and connector • Even-numbered clutch oil pressure sensor • TCU
P287324	(a) Even-numbered clutch pressure failure.	• Even-numbered clutch pressure solenoid valve • Transmission • Harness and connector • Even-numbered clutch oil pressure sensor • TCU

Circuit diagram



Inspection procedure

1	**Check the transmission hydraulic system for oil leakage.**

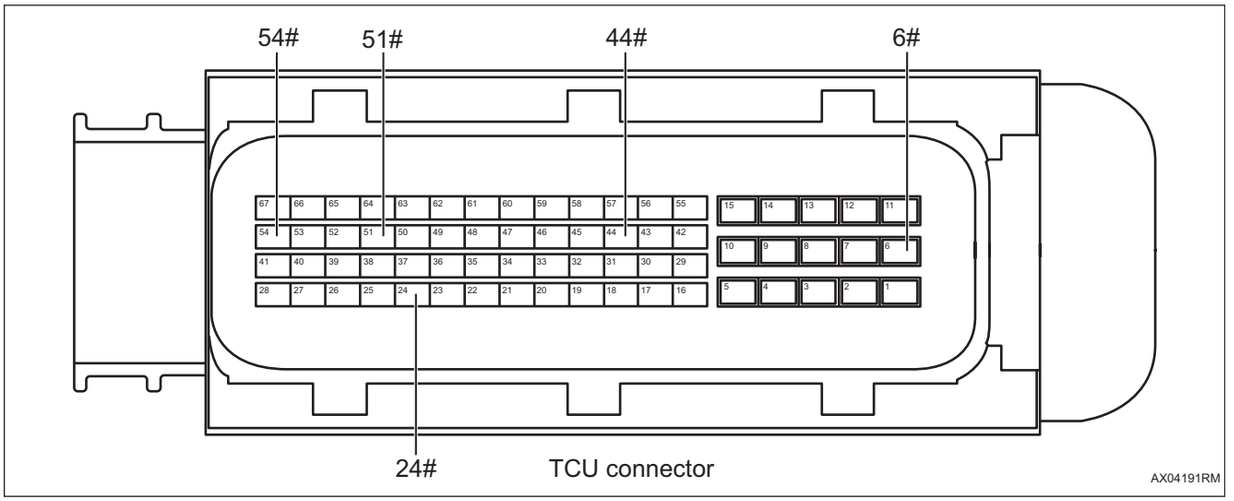
AX

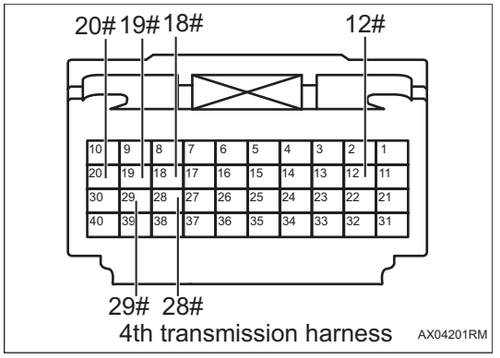
(a) Lift the vehicle to check whether the transmission hydraulic system leaks oil.

NG → **Return transmission to factory for repair**

OK

2	Check harness and connector for open circuit (TCU-4th transmission harness)





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the TCU connector.

(d) Disconnect the 4th transmission harness connector.

(e) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU connector 6# -4th transmission harness connector 29#	Always connected	Less than 1Ω
TCU connector 44# -4th transmission harness connector 28#	Always connected	Less than 1Ω
TCU connector 51# -4th transmission harness connector 18#	Always connected	Less than 1Ω
TCU connector 54# -4th transmission harness connector 19#	Always connected	Less than 1Ω
TCU connector 24# -4th transmission harness connector 12#(or 20#)	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

AX

OK

3	Rewrite clutch pressure self-learning data

(a) Connect the HQ-VDS.

(b) Write the clutch pressure self-learning characteristic data.

Results

Results	Go to
HQ-VDS shows "Writing failed"	Abnormal
Problem unsolved	Normal

NG → **Check whether the written data is correct and check the connection of diagnostic scan tool**

OK

4	Clutch pressure self-learning

(a) Connect the HQ-VDS.

(b) Carry out the clutch pressure self-learning.

Results

Results	Go to
HQ-VDS feedback "self-learning condition not met" or "ECU no response"	Abnormal
HQ-VDS shows "Self-learning failed"	Normal

NG → **Check the learning conditions and the connection of diagnostic scan tool**

OK

5	Replace the transmission (See page AX-229)

(a) Replace the transmission.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the TCU (See page AX-224)**

DTC	U000188	Bus-off fault
DTC	U010087	TCU and EMS communication loss
DTC	U040182	EMS message count error
DTC	U040183	EMS checksum error
DTC	U040186	EMS core signal invalid
DTC	U112187	ESP node timeout
DTC	U041582	ESP message count error
DTC	U041583	ESP checksum error
DTC	U041586	ESP core signal invalid
DTC	U010387	EGSM node timeout
DTC	U040486	EGSM core signal invalid
DTC	U029187	ACM node timeout
DTC	U059286	ACM core signal invalid
DTC	U0592F0	ACM No Connection fault
DTC	U014687	GW node timeout
DTC	U115587	TCU and IC communication loss

Description

When the communication between the TCU and other systems is abnormal or interrupted, the TCU will record the DTC.

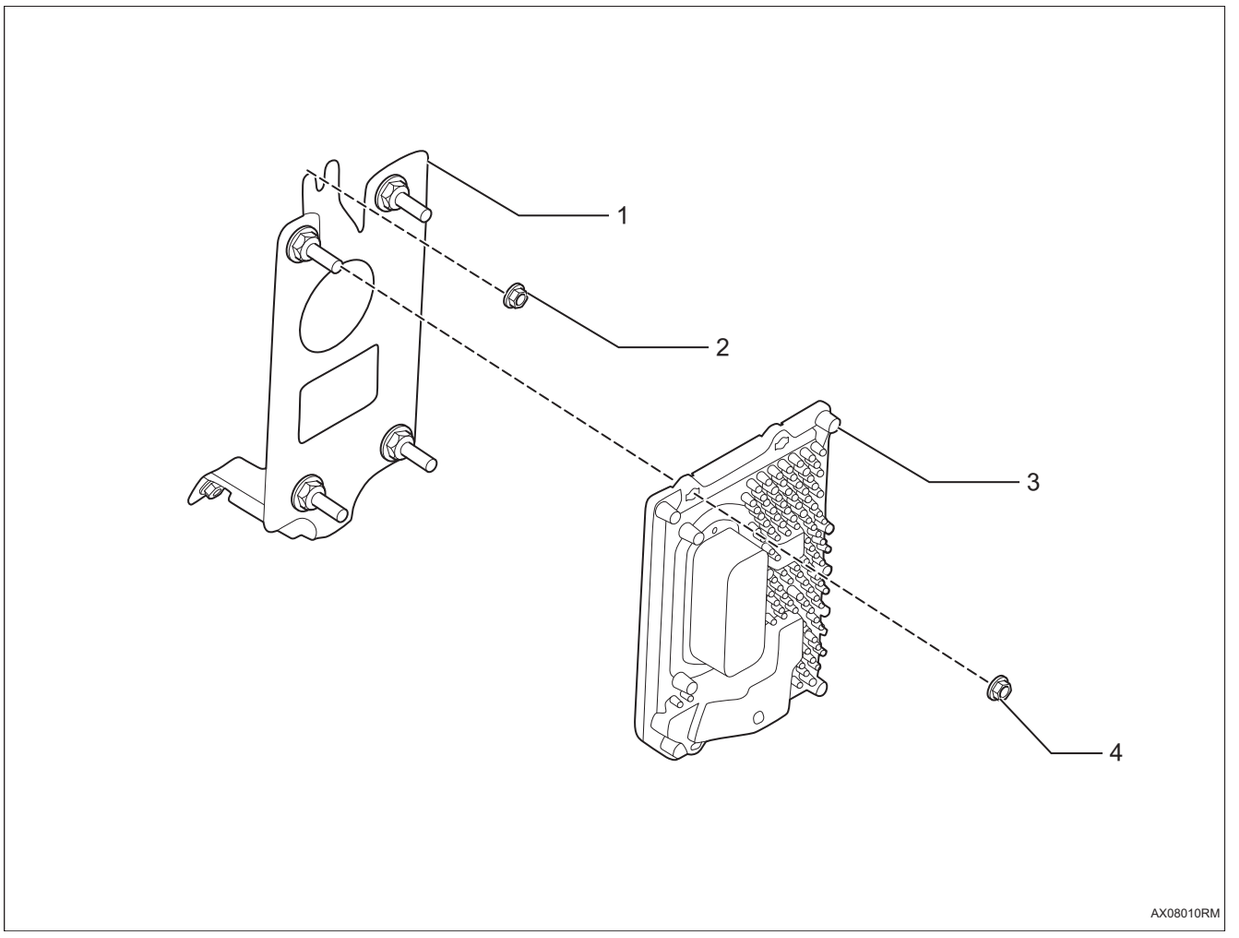
DTC	DTC detection conditions	Faulty location
U000188	(a) Abnormal or interrupted communication.	• Relevant system control unit • Harness and connector
U010087	(a) Abnormal or interrupted communication.	
U040182	(a) Abnormal or interrupted communication.	
U040183	(a) Abnormal or interrupted communication.	
U040186	(a) Abnormal or interrupted communication.	
U112187	(a) Abnormal or interrupted communication.	
U041582	(a) Abnormal or interrupted communication.	
U041583	(a) Abnormal or interrupted communication.	
U041586	(a) Abnormal or interrupted communication.	
U010387	(a) Abnormal or interrupted communication.	
U040486	(a) Abnormal or interrupted communication.	
U029187	(a) Abnormal or interrupted communication.	
U059286	(a) Abnormal or interrupted communication.	
U0592F0	(a) Abnormal or interrupted communication.	
U014687	(a) Abnormal or interrupted communication.	
U115587	(a) Abnormal or interrupted communication.	

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

TCU assembly

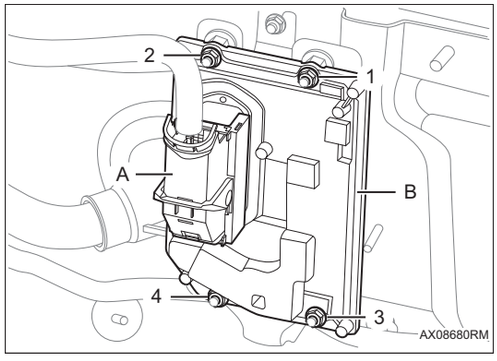
Parts



1. **TCU bracket**
2. **Hexagon flange nut**
   - X2
   - Torque: 7~9 N · m
3. **TCU**
4. **Hexagon flange nut**
   - X4
   - Torque: 7~9 N · m

Removal

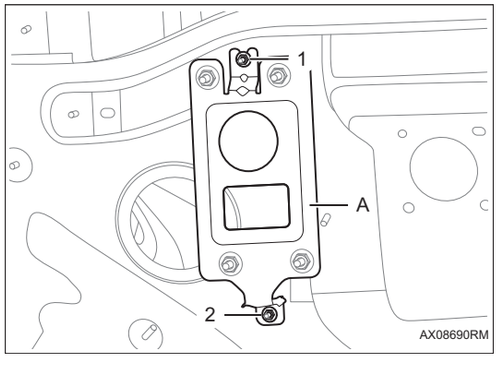
1. **Disconnect the battery negative terminal (See page CH-17)**
2. **Remove left lower guard plate assembly (See page IP-1)**
3. **Remove the IVI assembly (See page AV-49)**
4. **Remove TCU assembly**



(a) Disconnect the harness connector-A-.

(b) Remove the nut -1-4-, and remove the TCU assembly -B-.

5. **Remove the TCU assembly bracket**



(a) Remove the nut -1-2-, and remove the TCU assembly bracket-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

ATF

Drain

1. ATF

Caution:

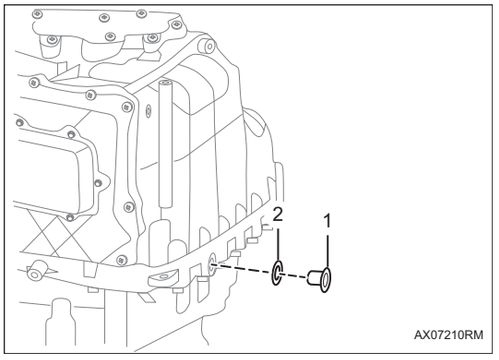
Dispose of the drained transmission fluid properly. One drop of transmission fluid can contaminate 600 L of drinking water.

2. Drain ATF

(a) Park the vehicle on a lifting platform or assembling service pit, in a horizontal position, with the shift lever in "P" gear position.

(b) Read the transmission fluid temperature which should be between 35 ℃ -45 ℃ . If the fluid temperature is too low, preheat the transmission fluid to this temperature.

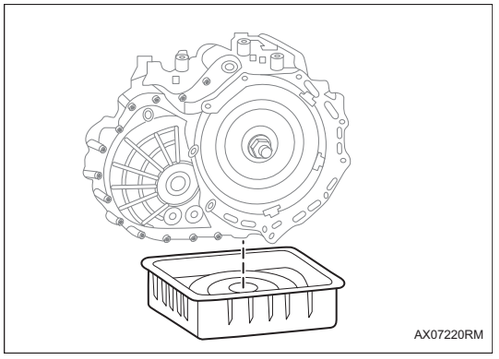
(c) Remove oil drain plug assembly -1- and gasket -2-.



Hint:

After removal, all oil in the transmission case will flow out, and the container shall be prepared in advance to collect oil.

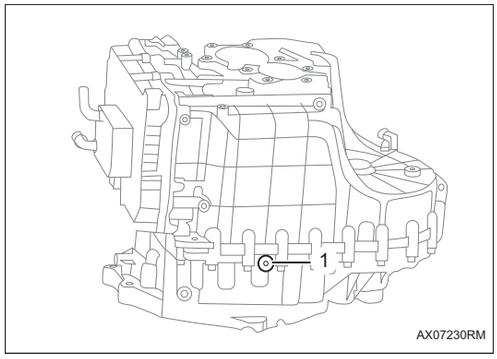
(d) Drain the transmission fluid and condition the transmission until no transmission fluid flows out or for 10 min.



Hint:

The discharged oil volume is about 5.5 L. Please prepare a container with appropriate capacity to receive the oil.

Due to the structural characteristics of the DCT, there is still a certain amount of transmission fluid inside the transmission that cannot be discharged, which is normal and does not need to be discharged completely.

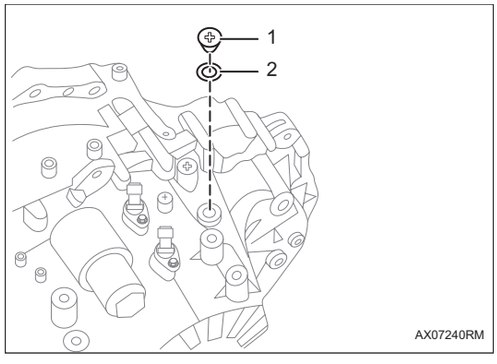


(e) Install the gasket and oil drain plug assembly -1-.

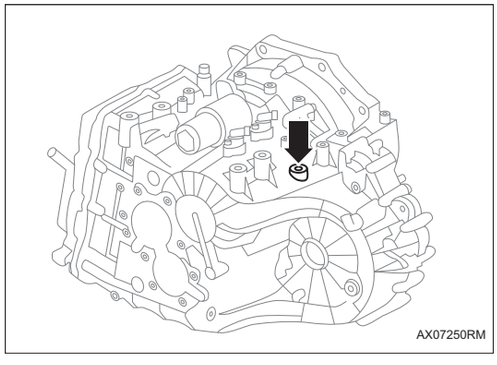
Torque: 19 ~ 29 N·m

Add

1. Add ATF



(a) Remove oil filler plug-1- and gasket)-2-.



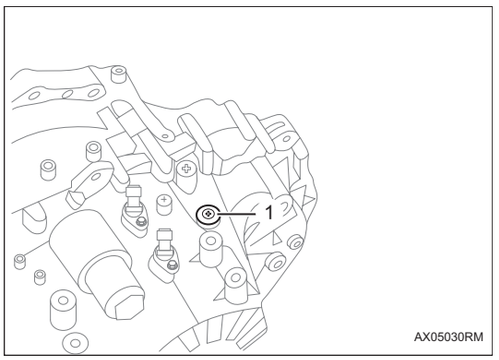
(b) Add ATF with the ATF filling tool.

(c) Standard capacity:

Transmission fluid model:	Castrol BOT 351 C4	
Transmission fluid capacity (Initial filling volume)	**Filling volume after replacement of transmission fluid and pressure filter element**	**Filling volume after transmission fluid change only**
7.2 L	5.7 L	5.5 (L)

If the filter cover is also removed and the pressure filter element is replaced during oil draining, 5.7 L transmission fluid shall be filled.

If the filter cover is not removed, 5.5 L transmission fluid shall be filled.



(d) Install the gasket and oil filler plug -1-.

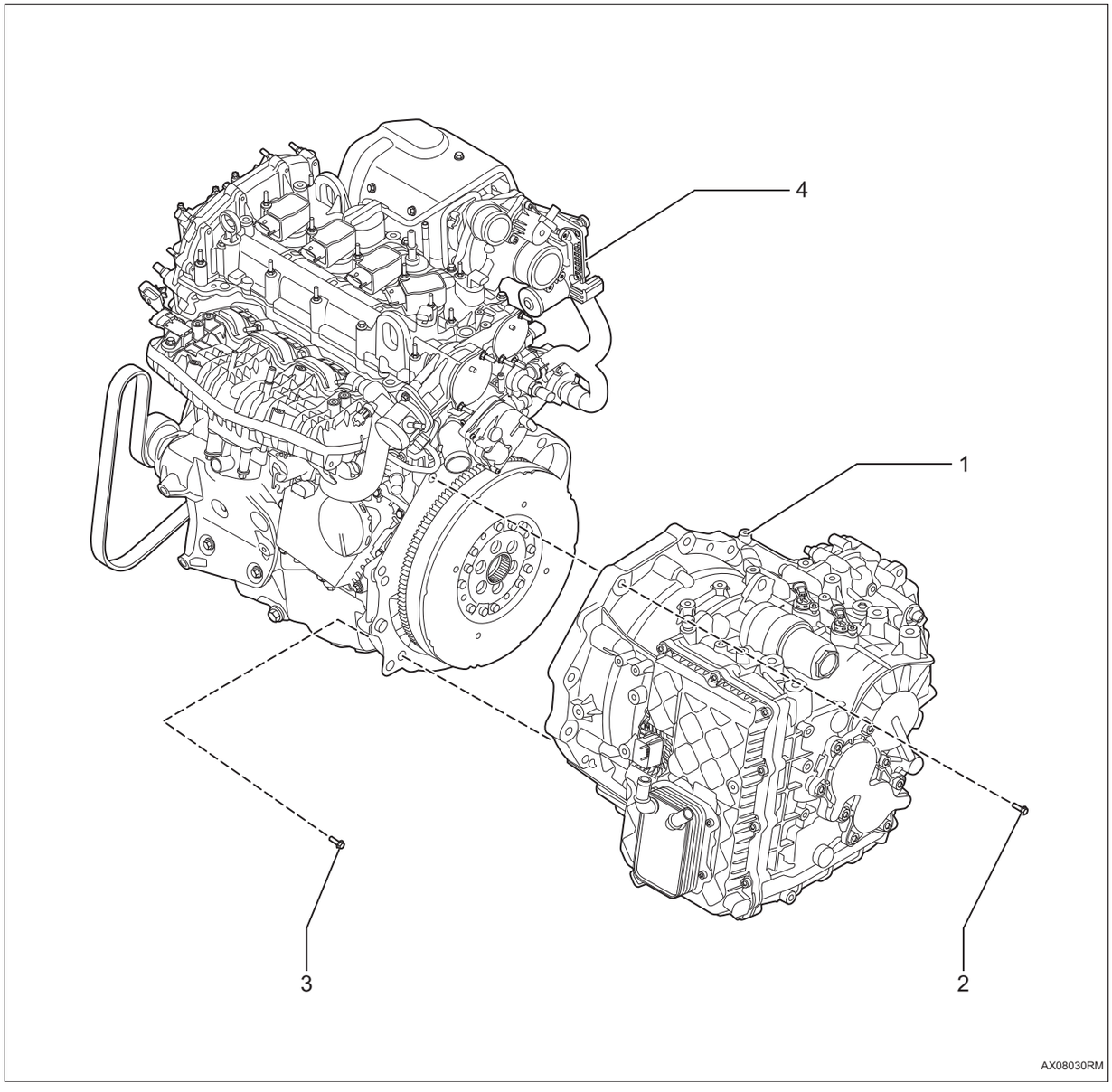
Torque: 19 ~ 29 N·m Note:

Caution:

Determine whether to renew the gasket according to the actual situation. If there is aging, damage and deformation, it must be replaced.

AT

Parts

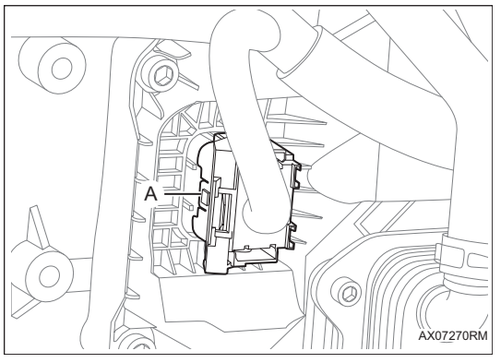


1. **Dual clutch transmission**
2. **Hexagon flange bolt**
   - X4
   - Torque: 72~88 N · m
3. **Hexagon flange bolt**
   - X3
   - Torque: 72~88 N · m
4. **Engine assembly**

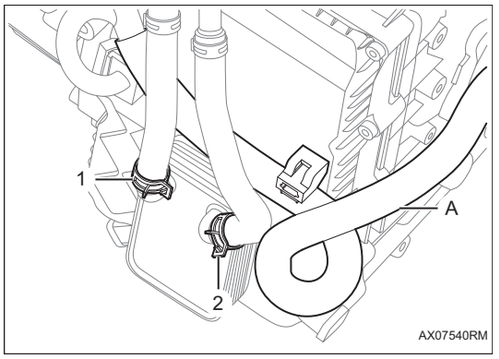
Removal

1. **Disconnect the battery negative terminal (See page CH-17)**
2. **Remove the engine assembly (See page EM-8)**
3. **Remove the starter assembly (See page ST-3)**
4. **Remove the ACM assembly (See page AM-31)**
5. **Remove AT assembly**

(a) Disconnect the harness connector-A-.

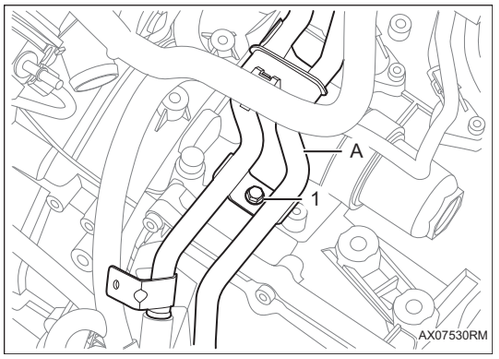


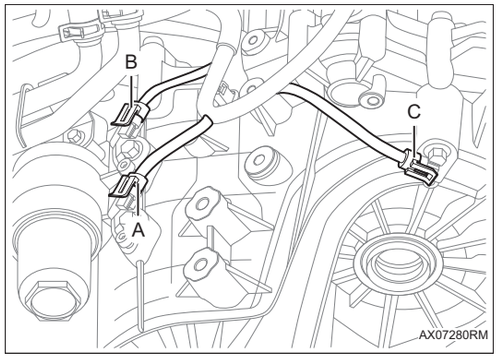
(b) Disconnect the coolant pipes-1-2 of AT assembly.



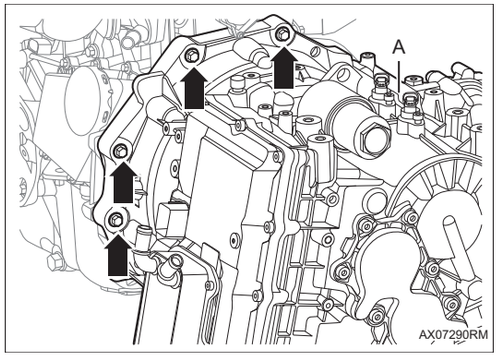
(c) Detach the harness fixtures -A-.

(d) Remove the bolt -1- and detach the coolant pipe -A- of the AT assembly.

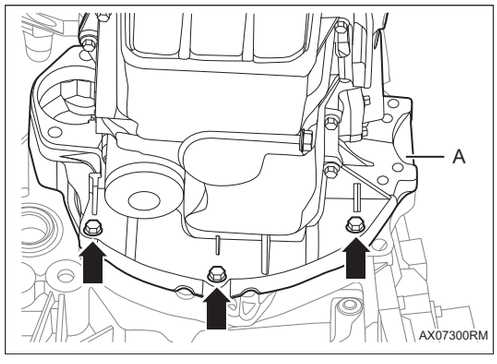




(e) Disconnect the sensor harness connector-A-C-.



(f) Remove the fixing bolt as arrowed of the AT assembly A.



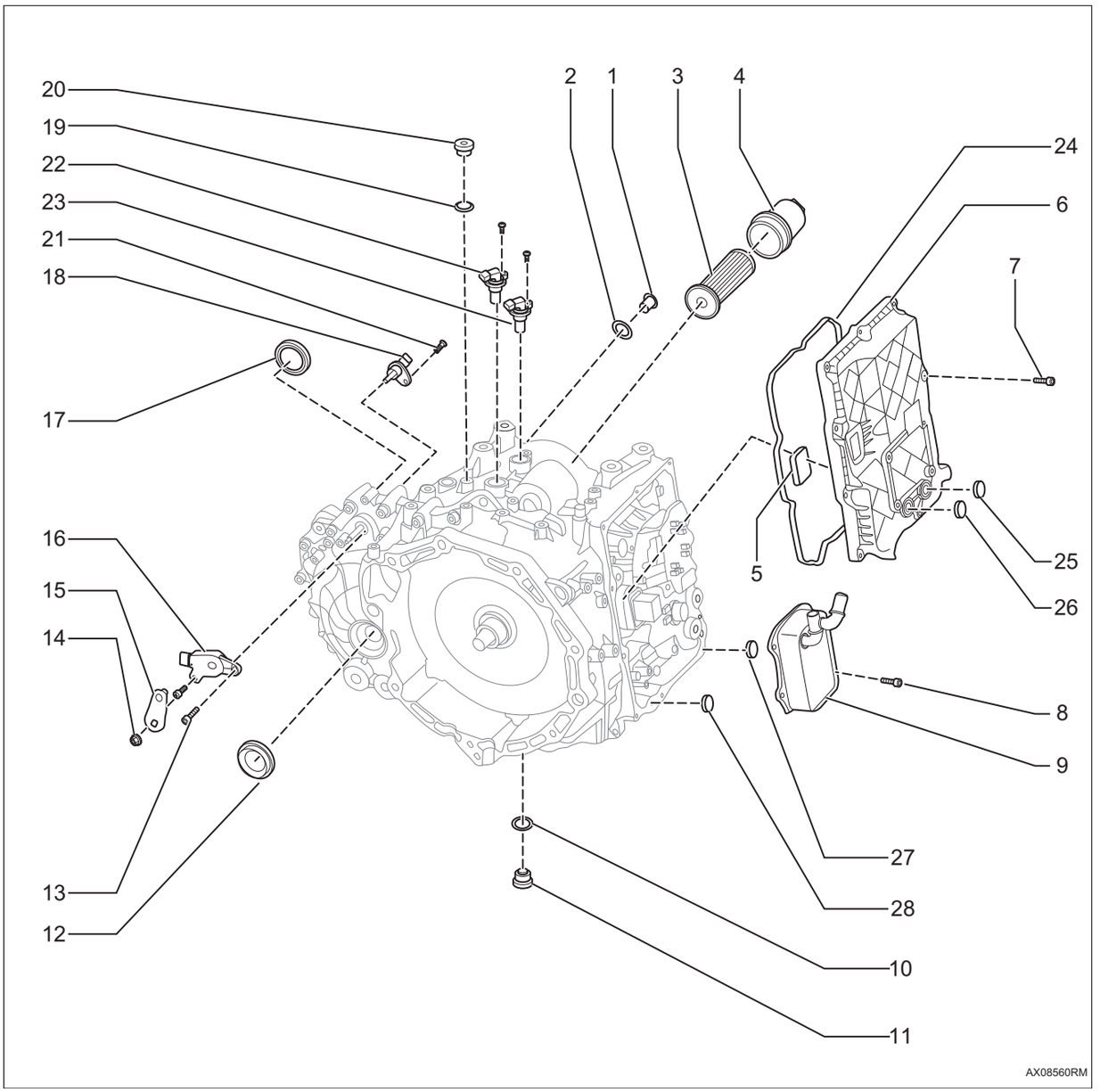
(g) Remove the bolt -arrow- and the AT assembly-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

AT assembly unit

Parts



AX

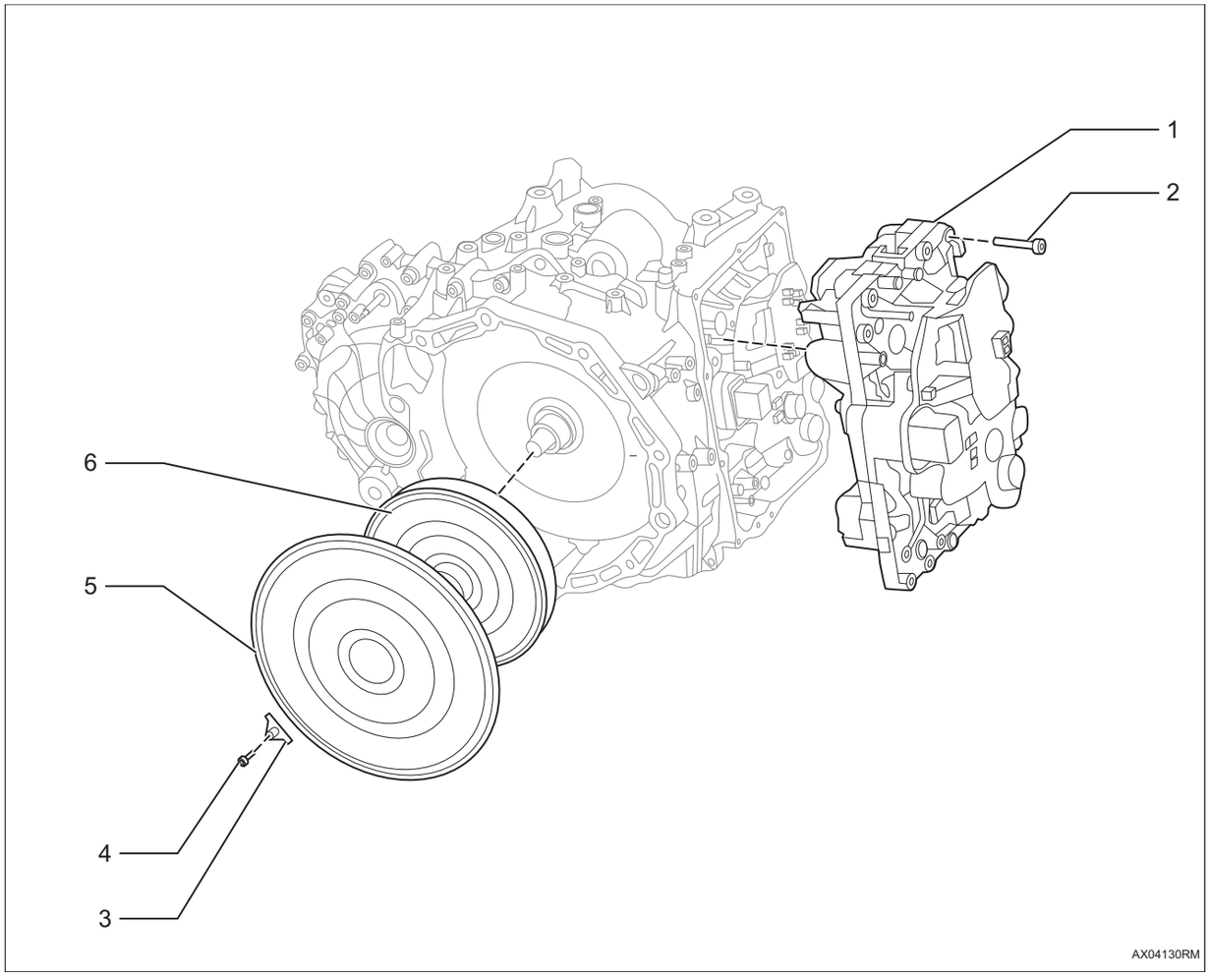
1. **Oil filler and drain plug**
2. **Gasket**
   - Disposable part.
3. **Pressure filter element assembly**
   - Disposable part.
4. **Pressure filter cover assembly**
5. **Valve body seal ring**
   - Disposable part.

6. **Side cover assembly**
7. **Bolt**
   - X11
   - Torque: 9~11 N · m
8. **Bolt**
   - X5
   - Torque: 8~12 N · m
9. **Cooler assembly**
10. **Gasket**
    - Disposable part.
11. **Oil drain plug assembly**
    - Torque: 19~29 N · m
12. **Oil seal - front housing, rear housing**
13. **Hexagon socket head cap screw**
    - X2
    - Torque: 6.8~9.2 N · m
14. **Hexagon head flange locking nut**
    - Torque: 23~27 N · m
15. **Gearshift arm assembly**
16. **PRNDS position sensor assembly**
17. **Oil seal-front housing and rear housing**
18. **Output shaft speed sensor assembly**
19. **Gasket**
    - Disposable part.
20. **Filler and drain plugs**
    - Torque: 19~29 N · m
21. **Hexagon socket head cap screw**
    - X3
    - Torque: 6.8~9.2 N · m
22. **Odd-numbered input shaft speed sensor assembly**
23. **Even-numbered input shaft speed sensor assembly**
24. **Side cover sealing strip**
25. **Cooler seal ring**
    - Disposable part.
26. **Cooler seal ring**
    - Disposable part.
27. **Side cover seal ring**
    - Disposable part.

28. Side cover seal ring

- Disposable part.

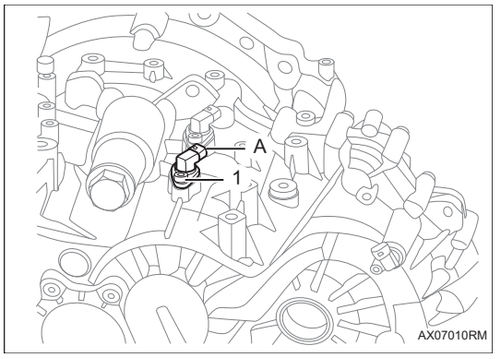
Parts



1. **Valve body assembly**
2. **Hexagon socket head cap bolt**
   - X8
   - Torque: 9~11 N · m
   - Disposable part.
3. **Retainer**
   - X6
   - Disposable part.
4. **Hexagon socket head cap bolt**
   - X6
   - Torque: 9~11 N · m
   - Disposable part.
5. **Clutch seal cover assembly**
   - Disposable part.
6. **Wet dual clutch assembly**

Removal

1. Remove the even-numbered input shaft speed sensor assembly

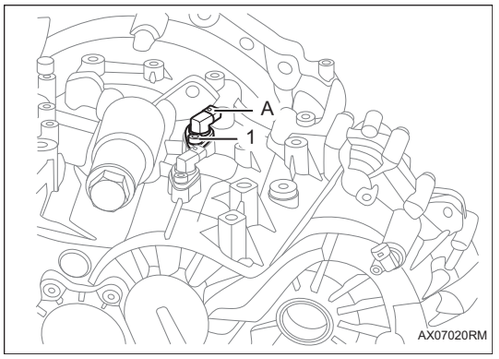


(a) Remove the bolt -1- and remove the even-numbered input shaft speed sensor assembly-A-.

Notice:

Do not damage the speed sensor.

2. Remove the odd-numbered input shaft speed sensor assembly

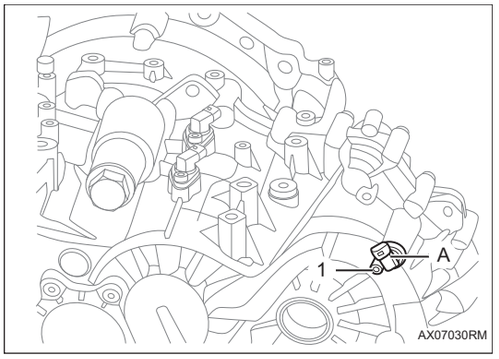


(a) Remove the bolt -1- and remove the odd-numbered input shaft speed sensor assembly-A-.

Notice:

Do not damage the speed sensor.

3. Remove the output shaft speed sensor assembly

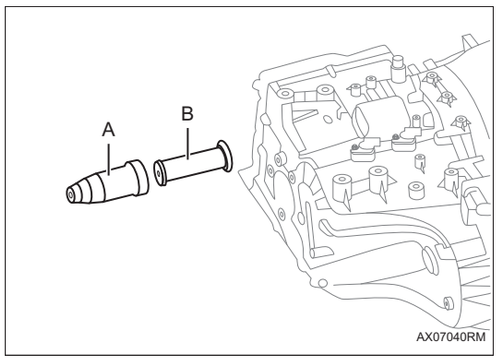


(a) Remove the bolt -1- and output shaft speed sensor assembly-A-.

Notice:

Do not damage the speed sensor.

4. Remove pressure filter element assembly

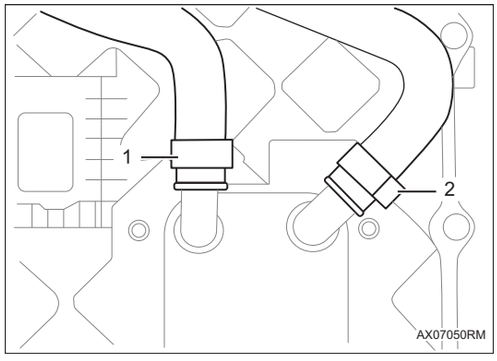


(a) Remove the pressure filter cover-A- with a special tool, and take out the pressure filter element assembly-B-.

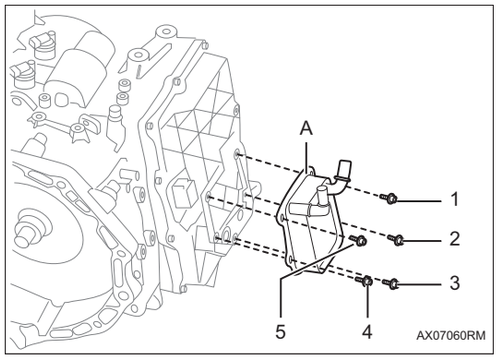
Hint:

About 200 ml of transmission fluid will flow out during the removal.

5. Remove cooler assembly

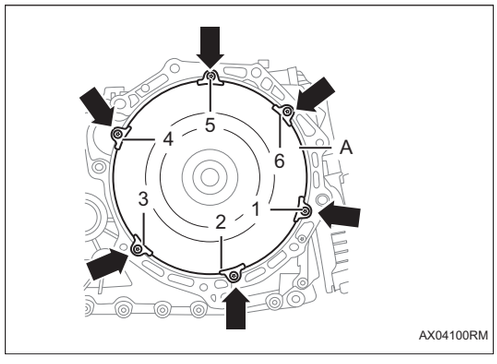


(a) Disconnect the cooler assembly connecting water pipe -1-2-.



(b) Remove the bolt -1-5- and cooler assembly-A-.

6. Remove clutch seal cover assembly



(a) Remove the bolt -1-6- and retainer -arrow-, and pull out the clutch seal cover -A- with a suction cup.

Caution:

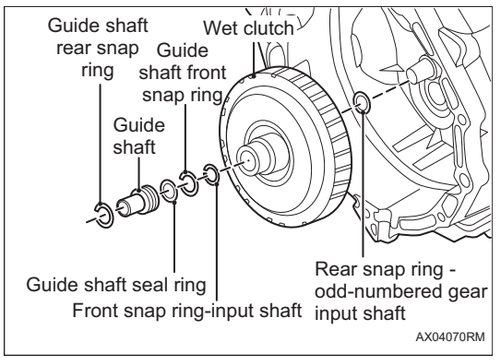
Drain the oil before removal, and part of the oil at the clutch position will flow out after removing the clutch seal cover assembly.

The removed clutch seal cover assembly cannot be reused and shall be replaced with a new one.

All fastening screws and retainers after removal shall not be reused.

7. Remove the wet double clutch assembly

(a) Place the transmission horizontally.



(b) First, remove the guide shaft rear snap ring with snap ring pliers as shown in the figure, take out the guide shaft and seal ring, and remove the guide shaft front snap ring.

(c) Remove the front snap ring-input shaft.

(d) Take out the wet dual clutch carefully and slowly.

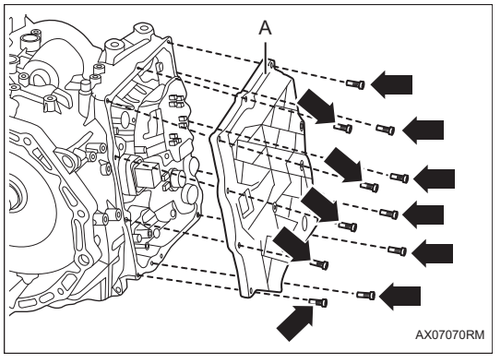
(e) Remove the rear snap ring - odd-numbered gear input shaft (with profile on the inner side).

Caution:

Take out the wet dual clutch carefully and slowly to avoid damage to the oil pump driven gear and the clutch bushing. All removed snap rings and seal rings cannot be reused and shall be replaced with new ones.

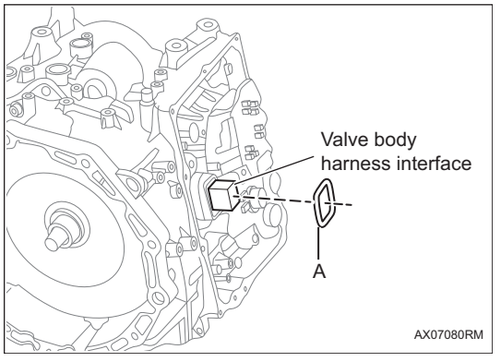
Do not drop the wet dual clutch assembly.

8. Remove the side cover assembly



(a) Remove the fixing bolt -arrow- of transmission side cover assembly -A-.

9. Remove the valve body seal ring



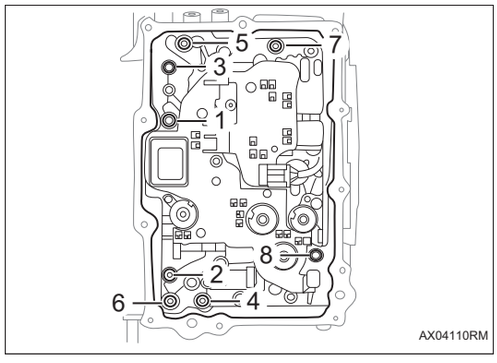
(a) Remove the valve body seal ring -A- at the valve body harness interface position.

10. Remove valve body assembly

Caution:

Before touching the valve body, touch the ground parts such as water pipe or lifting platform first, and do not touch the plug contact directly with hands to avoid static electricity failure.

Do not strain or bend the harness.



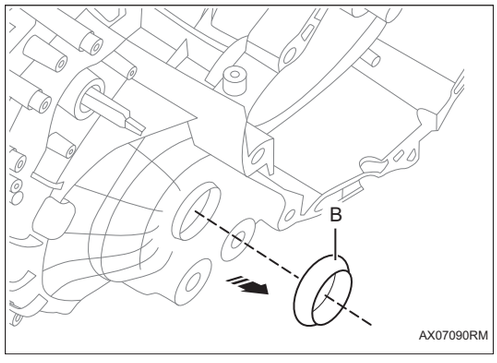
(a) As shown in the figure, remove the -1-8 bolt and remove the valve body assembly in sequence.

Caution:

Part of oil from the valve body will flow out after removing the valve body assembly.

All fastening bolts after removal shall not be reused and shall be replaced with new bolts.

11. Remove output shaft seal

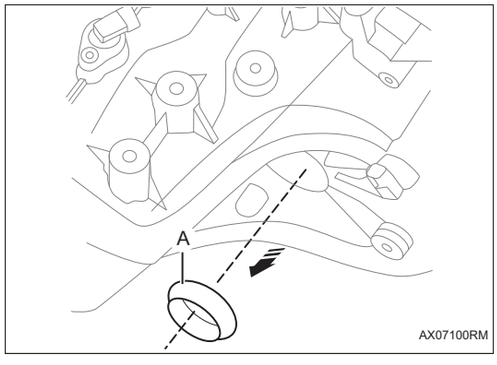


(a) Use a screwdriver to pry the transmission case as arrowed and remove the left output shaft seal-B-.

Caution:

Stick adhesive tape on the tip of the screwdriver before use.

Take care not to damage the oil seal and contact surfaces.



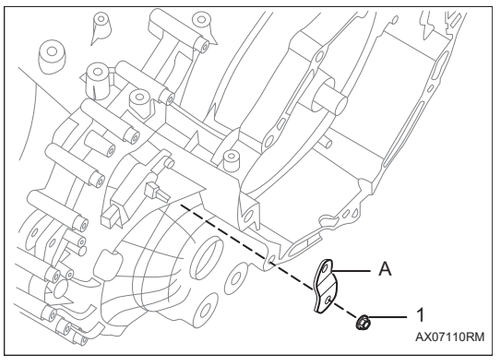
(b) Use a screwdriver to pry the transmission case as arrowed and remove the right output shaft seal-A-.

Caution:

Stick adhesive tape on the tip of the screwdriver before use.

Take care not to damage the oil seal and contact surfaces.

12. Remove gearshift arm assembly

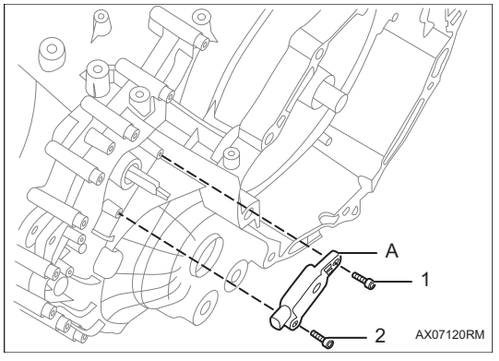


(a) Remove the gearshift arm flange locking nut -1- and the gearshift arm assembly -A-.

Caution:

Keep PRNDS shaft in P gear position during removal.

The locking nut is damaged after removal and cannot be reused. Renew the locking nut.



(b) Remove the bolts -1-2-, and remove the PRNDS position sensor -A-.

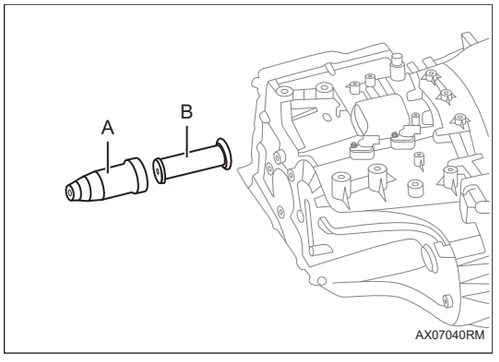
Caution:

Keep PRNDS shaft in P gear position during removal.

Installation

1. The installation procedure is the reverse of removal procedure, and the following points apply:

2. Install the pressure filter element assembly



(a) Install the pressure filter element assembly-B-, and install the pressure filter cover-A with special tool.**Torque: 20 ~ 24 N · m**

Caution:

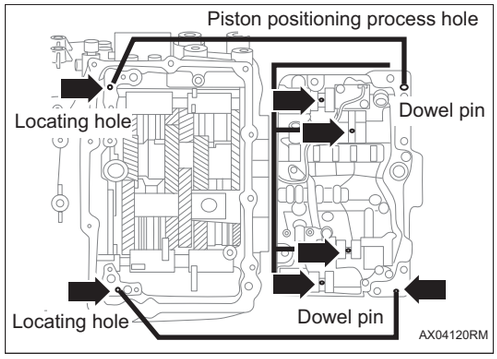
Apply an appropriate amount of DCTF to the seal ring and ensure that it is clean. Install the seal ring end in the housing inward.

3. Install the valve body assembly

Caution:

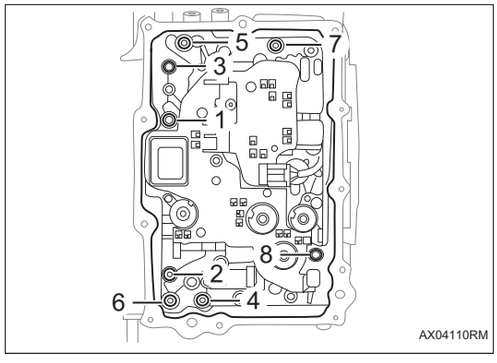
Before touching the valve body, touch the ground parts such as water pipe or lifting platform first, and do not directly touch the plug contact with your hands to avoid static electricity failure.

(a) Clean valve body and housing mating face.



(b) Place all shift forks of the transmission in the neutral position and insert the four process pins into the piston positioning process holes on the back of the valve body.

(c) After aligning the two dowel pins on the valve body with the housing locating holes, install the valve body.



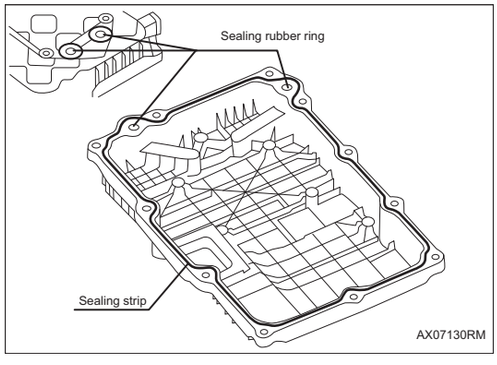
(d) Install the new bolt -1-8- according to the label sequence shown in the figure, and then pull out the process pin.

Torque: 9 ~ 11 N·m

Caution:

The control software must be upgraded to the latest version to replace parts on the valve body or valve body.

4. Install side cover assembly

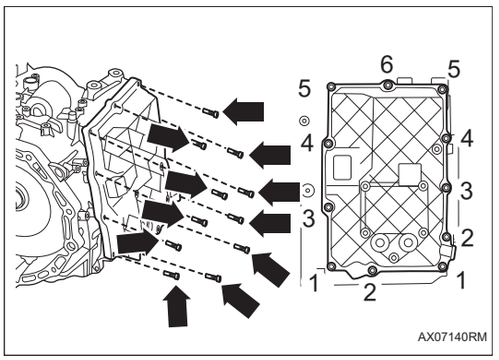


(a) A ring of sealing strip is pre-installed at the joint surface of the side cover assembly, and four seal rings are pre-installed at the oil passages on the front and back. Before installing a new side cover assembly, check whether the sealing strip and the four seal rings are in the correct position in the groove, and whether the surface is flat, free of deformation, damage and foreign matter. If the position is incorrect or uneven, gently press the sealing strip or seal ring into the groove in the correct position and ensure that the seal position is clean.

Caution:

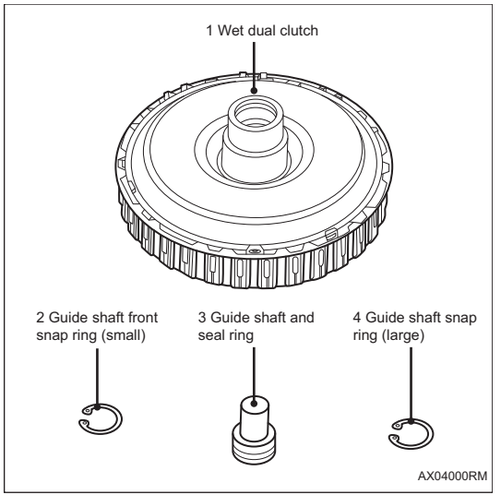
do not touch the position of the side cover assembly seal at will, and ensure that the surface of the seal is clean and free of foreign matter, so as to avoid oil leakage here during use.

Wipe the joint surface with alcohol before installation to ensure that the mating face is free of oil and then install the side cover assembly.

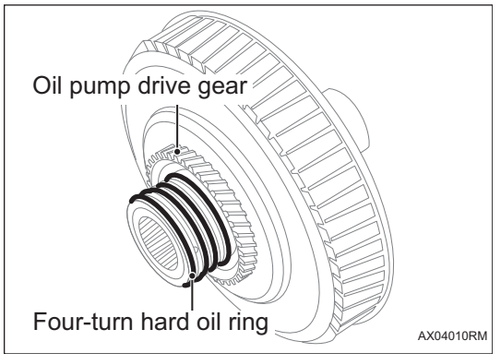


(b) Apply thread locking adhesive on the bolt as arrowed and then tighten the bolts, in the order shown in the figure.**Torque: 9 ~ 11 N·m**

5. Preparations for installing wet dual clutch assembly



(a) A set of wet dual clutch assembly includes -1- wet dual clutch, -2- guide shaft front snap ring (smaller size), -3- guide shaft and seal ring, and -4- guide shaft rear snap ring (larger size).

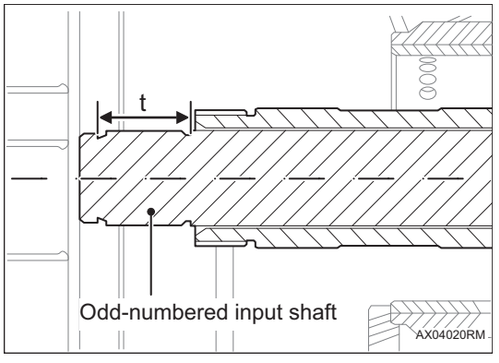


(b) Rotate -4- hard oil rings smoothly for one turn respectively. The hard oil ring must be flexible and not allowed to get stuck.

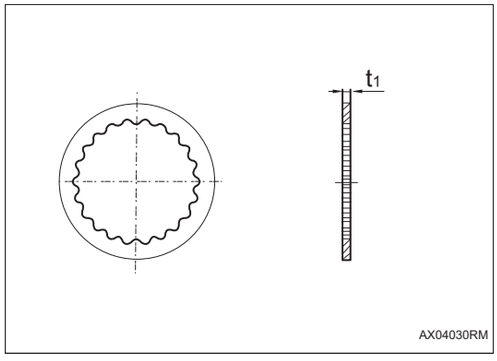
Caution:

The wet dual clutch assembly shall be carefully removed from the package without scratching the hard oil ring and the clutch oil pump drive gear.

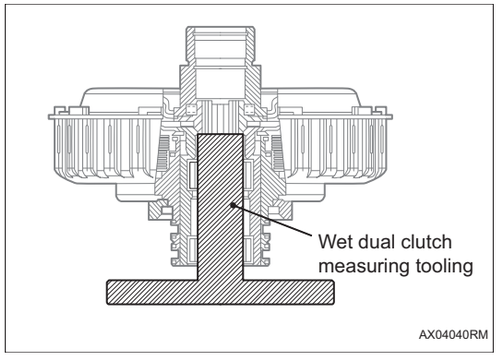
6. Selection of front snap ring input shaft



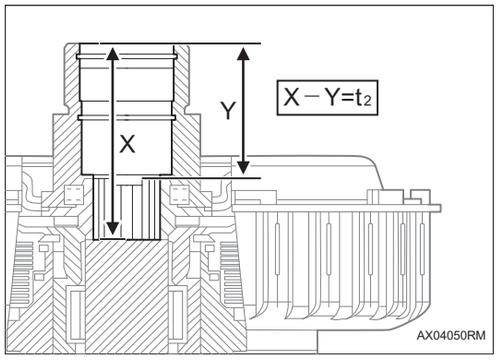
(a) Measure and record the dimension t of the odd-numbered input shaft end as shown in the figure, in mm, accurate to two decimal places.



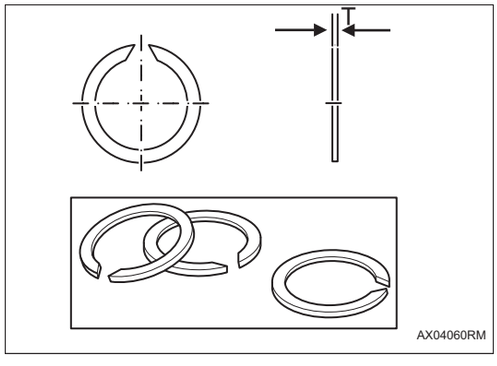
(b) Measure and record the thickness t1 of the rear snap ring - odd-numbered input shaft as shown in the figure, in mm, accurate to two decimal places.



(c) Place the wet dual clutch vertically on the measuring rig as shown in the figure, and measure the dimensions X and Y with a depth gauge, in mm, and accurate to two decimal places. Subtract and record the dimension t2.



(d) Calculate Δ = t-t1-t2.

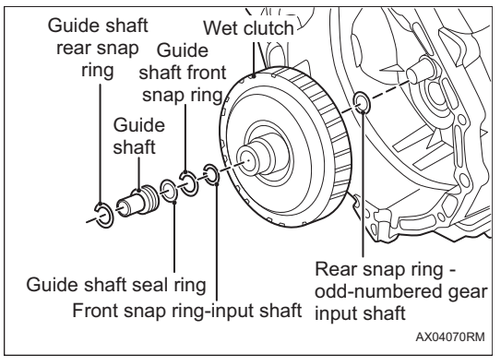


(e) Take one of the three snap rings in the table below, measure and record the thickness T of the three front snap rings - input shaft in mm, accurate to two decimal places as shown in the figure. Find the one with thickness T ≤ Δ and closest to Δ.

Front snap ring-input shaft	Thickness T
1701101-A2U	1.56±0.01mm
1701103-A2U	1.66±0.01mm
1701104-A2U	1.76±0.01mm

7. Install the wet double clutch assembly

AX



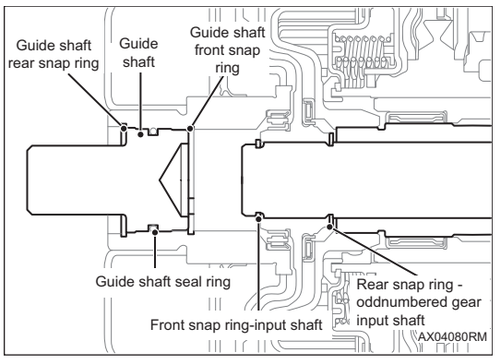
(a) Install the rear snap ring-odd-numbered input shaft (with teeth on the inner side) at the shaft end of the odd-numbered input shaft.

(b) Apply transmission fluid to the inner wall of the hard oil ring and clutch bushing of the wet dual clutch and ensure that they are clean.

(c) Place the wet dual clutch in the transmission carefully and slowly. The wet dual clutch can be shaken and turned slightly.

Caution:

Install the wet dual clutch carefully and do not let it fall. Avoid bumping between the oil pump drive gear and the oil pump driven gear, as well as the hard oil ring and clutch bushing.



(d) Apply the transmission fluid onto the guide shaft seal ring and install it on the guide shaft.

(e) Install the front snap ring-input shaft with the snap ring pliers as shown in the figure, then install the guide shaft front snap ring (with a smaller size), put the guide shaft and sealing ring, and then install the guide shaft rear snap ring with the snap ring pliers (with a larger size).

Caution:

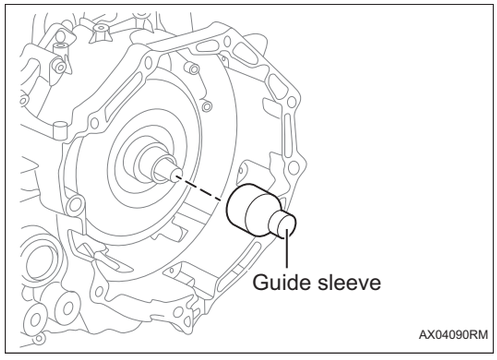
The guide shaft front snap ring (small) and guide shaft rear snap ring (large) are of different sizes, and thus shall be installed correctly.

The front snap ring-input shaft is only allowed to be installed once. After installation, use the snap ring pliers to rotate it for one turn to ensure that it is installed in place.

8. Install the clutch seal cover assembly

(a) Apply transmission fluid to the clutch shaft end, guide sleeve and housing mating surfaces and ensure that they are clean.

(b) Apply transmission fluid to the outer edges of the clutch seal cover, and grease the inner sealing lips and the space between them, and keep them clean.



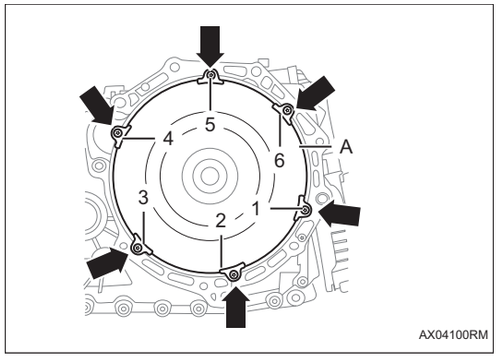
(c) Install the guide sleeve on the end of the transmission shaft.

Caution:

Clean the guide sleeve before use, and do not use scratched guide sleeve.

(d) Place the clutch seal cover in front of the guide sleeve and evenly press it to the limit position of the housing.

(e) Pull out the guide sleeve.



(f) Install retainer -arrow- and bolts -1-6-.

Torque: 9~11 N · m

Caution:

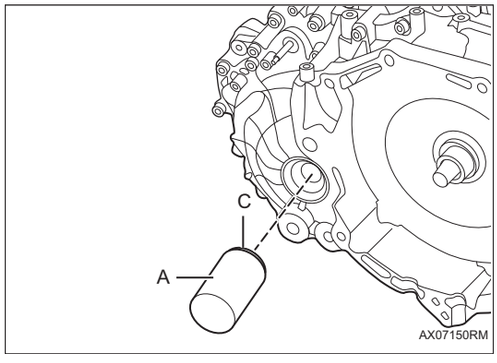
The transmission shall be placed horizontally.

Clutch seal cover and retainer are only allowed to be installed once.

All fastening bolts after removal shall not be reused and shall be replaced with new bolts.

Carefully remove the thread lock compound residue from the thread hole with a thread tap, otherwise the bolt may break when removed again.

9. Install the output shaft seal



(a) Install the new oil seal -C- to the transmission case by using SST -A-.

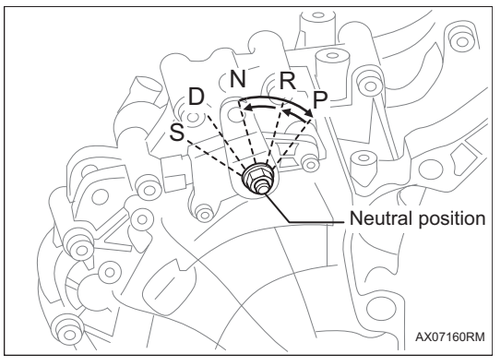
Hint:

Apply grease to the oil seal outer ring.

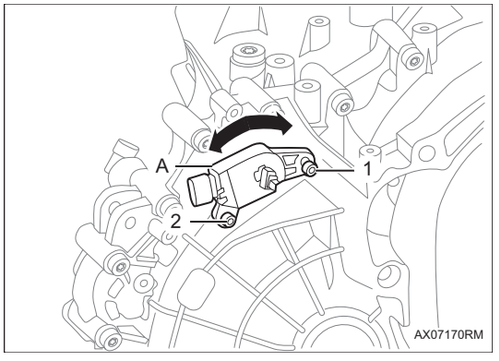
Install it until the oil seal end face is flush with the case end face.

Oil seal cannot be reused.

10. Install the PRNDS position sensor assembly



(a) With a special tool, turn the PRNDS shaft to the rightmost "P" gear position as shown in the figure, and then turn it in the opposite direction (that is, counterclockwise as shown in the figure) 2 grids to the "N" gear position.

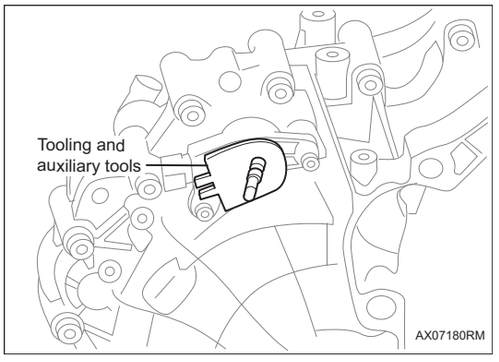


(b) Install the position sensor -A- onto the PRNDS shaft and install the bolt -1-2-.

Hint:

Please apply thread locking adhesive to the bolt before installation.

The bolts are not tightened temporarily, and the PRNDS position sensor can rotate slightly around the shaft.



(c) Install the jig on the PRNDS shaft, adjust the position sensor, and install the two hooks of the jig into the two pits of the position sensor.

Hint:

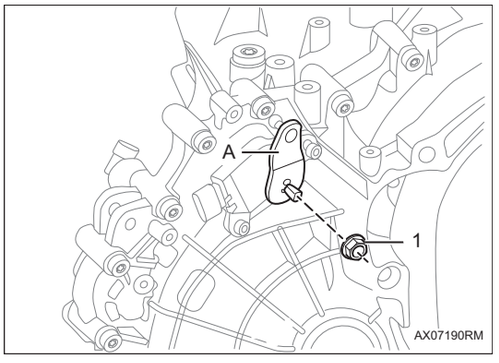
Please apply thread locking adhesive to the bolt before installation.

The bolts are not tightened temporarily, and the PRNDS position sensor can rotate slightly around the shaft.

(d) Fasten the bolt, and remove the assistant tools.

Torque: 6.8~9.2 N·m

11. Install the gearshift arm assembly



(a) Install gearshift arm assembly -A- onto the PRNDS shaft and install a new nut -1-.

Torque: 23 ~ 27 N·m

Hint:

The flange lock nut is not reusable.

ACM system

ACM AM-1
Precautions AM-1
Location of parts AM-2
System diagram AM-3
System description AM-3
Symptom chart AM-5
Data recorder/freeze frame data AM-6
ECU terminal AM-9
DTC chart AM-9
P190D49 ..... AM-11
P194016 ..... AM-13
P194017 ..... AM-13
P194129 ..... AM-16
P194229 ..... AM-16
P194109 ..... AM-16
P194209 ..... AM-16
P194271 ..... AM-17
P194277 ..... AM-17
P194274 ..... AM-20
P195119 ..... AM-20
P194213 ..... AM-20
P195249 ..... AM-23
U000188 ..... AM-24
U014687 ..... AM-24
U010087 ..... AM-24
U010187 ..... AM-24
U010387 ..... AM-24
U015187 ..... AM-24
U110087 ..... AM-24
U110187 ..... AM-24
U112187 ..... AM-24
U114687 ..... AM-24
U115587 ..... AM-24
U114087 ..... AM-24
U119987 ..... AM-24
U124387 ..... AM-24
U041582 ..... AM-24
U041583 ..... AM-24
U041586 ..... AM-24

U040182 ..... AM-24
U040183 ..... AM-24
U040186 ..... AM-24
U040282 ..... AM-24
U040283 ..... AM-24
U040286 ..... AM-24
U054482 ..... AM-24
U054483 ..... AM-24
U040482 ..... AM-24
U040483 ..... AM-24
U040486 ..... AM-24
U045282 ..... AM-24
U045283 ..... AM-25
U045286 ..... AM-25
U042286 ..... AM-25
P195252 ..... AM-27
P195352 ..... AM-28
P195452 ..... AM-28
ACM AM-29
Parts AM-29
Removal AM-31
Installation AM-31

ACM

Precautions

1. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

2. Removal and installation of battery terminal

(a) Before removal and repair of electrical components, disconnect the battery negative (-) terminal to prevent the system from short circuit.

(b) Before disconnecting or reconnecting the battery cable, first turn off the ignition and lighting switch, and then completely loosen or tighten the battery cable terminal nut.

(c) When reconnecting after disconnecting the battery cable, some systems need to be initialized.

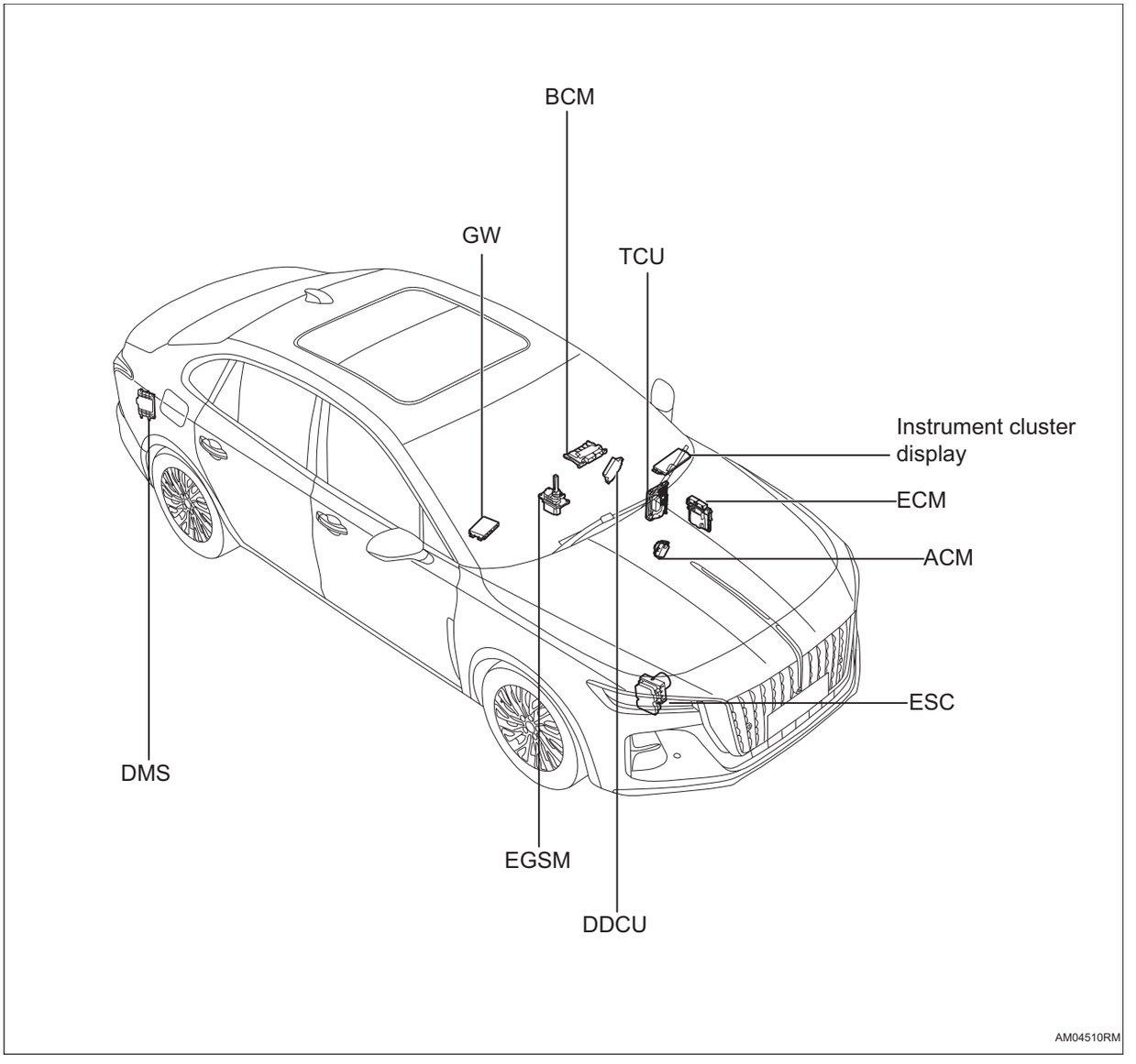
3. General repair instructions

(a) During maintenance, take and place electronic component (ECU, sensor, etc.) carefully to avoid injuries caused by impact and static electricity.

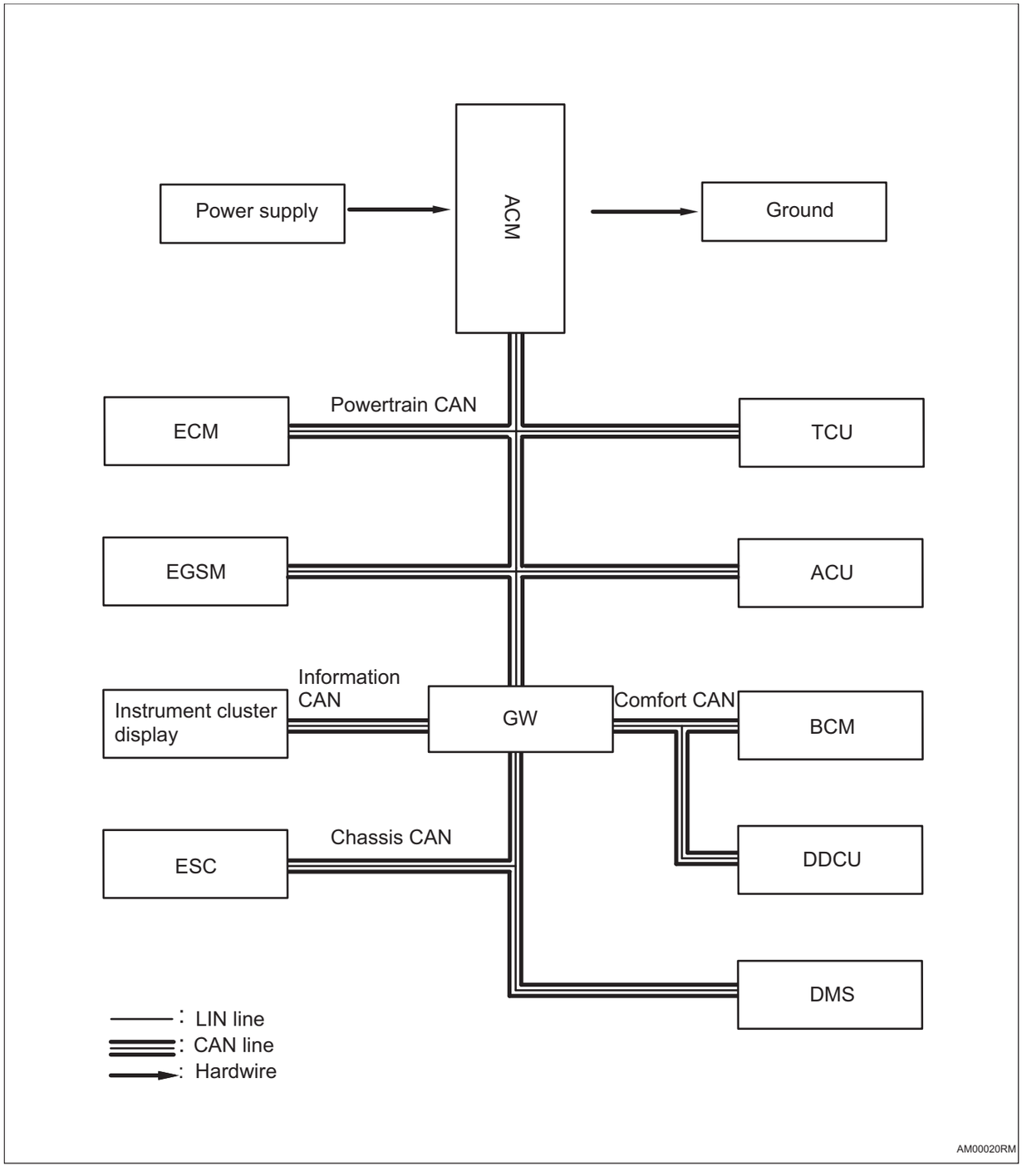
(b) Establish awareness of environmental protection and effectively dispose of wastes generated during maintenance.

(c) It is not recommended to use the method of piercing the wire skin to detect the electrical signals input and output of the part, so as to avoid harness short circuit.

Location of parts



System diagram



System description

1. ACM overview

(a) The ACM receives the shift information through the CAN to complete the shift action.

(b) The ACM has a diagnostic function.

2. Description of ACM anti-theft function

(a) After the ignition switch is turned on, the ACM performs anti-theft authentication communication with the BCM. If the anti-theft authentication is passed, gear shifting is allowed; If the anti-theft authentication is not passed, gear shifting is not allowed, and authentication failure information is sent to the BCM and ECM.

Symptom chart

Fault	Possible location
Failure to shift gears	• Battery • Related harness and connector • ACM • BCM • EGSM • ECM • GW

Data recorder/freeze frame data

1. Data recorder

Hint:

Using the HQ-VDS reading data recorder, the values or status of switch, sensor, actuator and other items can be read without removing any parts. This detection method can be used to find intermittent failure or signals. Reading the data recorder information can save diagnostic time when troubleshooting.

Item	Item description	Check conditions	Reference value
ACM power supply voltage	ACM power supply voltage	IG ON	3~25.5 V
ACM current gear position (ACM gear position)	ACM current gear position	IG ON	0x00:P 0x01:RND 0x0F: Not engaged Others undefined Initialization value: 0x00
ACM motor current status (ACM motor status)	Actuator motor current status	IG ON	0 x 00: Normal 0x01: stalling 0x 02: drive axle overcurrent Others reserved Initialization value: 0x00
Angle sensor power supply voltage	Angle sensor power supply voltage	IG ON	0 ~ 25.5V
Angle sensor PWM output	Angle sensor PWM output	IG ON	Valid value: 0~32767 Undefined: 32768~65535
ACM current status (ACM status)	ACM current status	IG ON	bit0: KL30 undervoltage Bit 1 : KL30 overvoltage Bit 2: angle sensor overvoltage Bit 3: angle sensor undervoltage Bit4: angle sensor signal low stuck Bit5: angle sensor signal high stuck Others undefined
Transmission actual gear position (TCU_LeverInfo)	Transmission actual gear position	IG ON	0x0: P 0x1: R 0x2:N 0x3:D 0x5:M 0xE: no connection 0xF:invalid Others: undefined Initialization value: 0xE

Item	Item description	Check conditions	Reference value
Driving direction (ABS_1 driving direction)	Current driving direction of the vehicle	IG ON	0x1: Forward 0x2: Backward 0 x 0: stop 0x3: invalid value Initialization value: 0x0
ABS_2 master cylinder pressure	Used to judge the braking state when the brake pedal signal is faulty	IG ON	Valid value: 0~00 Invalid value: Other Initialization value: 0x7FE
EMS _2 acceleration pedal position	Judging gear shifting operation.	IG ON	Valid value: 0~250 Initialization value: 254 Invalid value: 255 Undefined: 32768~65535
EMS_3 brake state (EMS_3 brake switch)	Judging gear shifting operation.	IG ON	0x0: Not depressed 0x1: Depressed 0x3: invalid value Others undefined Initialization value: 0x0
EGSM_1 gear position information (EGSM_1 lever position)	EGSM gear position		0 x 0: Position 0 0 x 1: Position +1 0 x 2: Position +2 0 x 3: Position -1 0 x 4: Position -2 0x7: invalid value Others undefined Initialization value: 0x0
EGSM_1 automatic or manual position (EGSM_1 auto or manual position)	EGSM manual/automatic position		0 x 0: Automatic 0 x 1: Manual Others undefined Initialization value: 0x0
EGSM park button status	EGSM park button status		0x0: Not pressed 0x1: Pressed Initialization value: 0x0
EGSM unlocking button status (EGSM security button status)	EGSM unlocking button status		0x0: Not pressed 0x1: Pressed Initialization value: 0x0
ACM communication status (ACM Communication status)	Read ACM communication status		bit0: EGSM lost bit1: GW lost bit2: TCU lost bit3: EMS lost bit4: powertrain CAN Bus-off Others undefined Initialization value: 0x0
ACM P gear setting value (ACM P set-point value)	Read the ACM P-gear setting value for manufacturer analysis		Valid value: 2000~31000 Initialization value: 4000 (0x0-FA0)

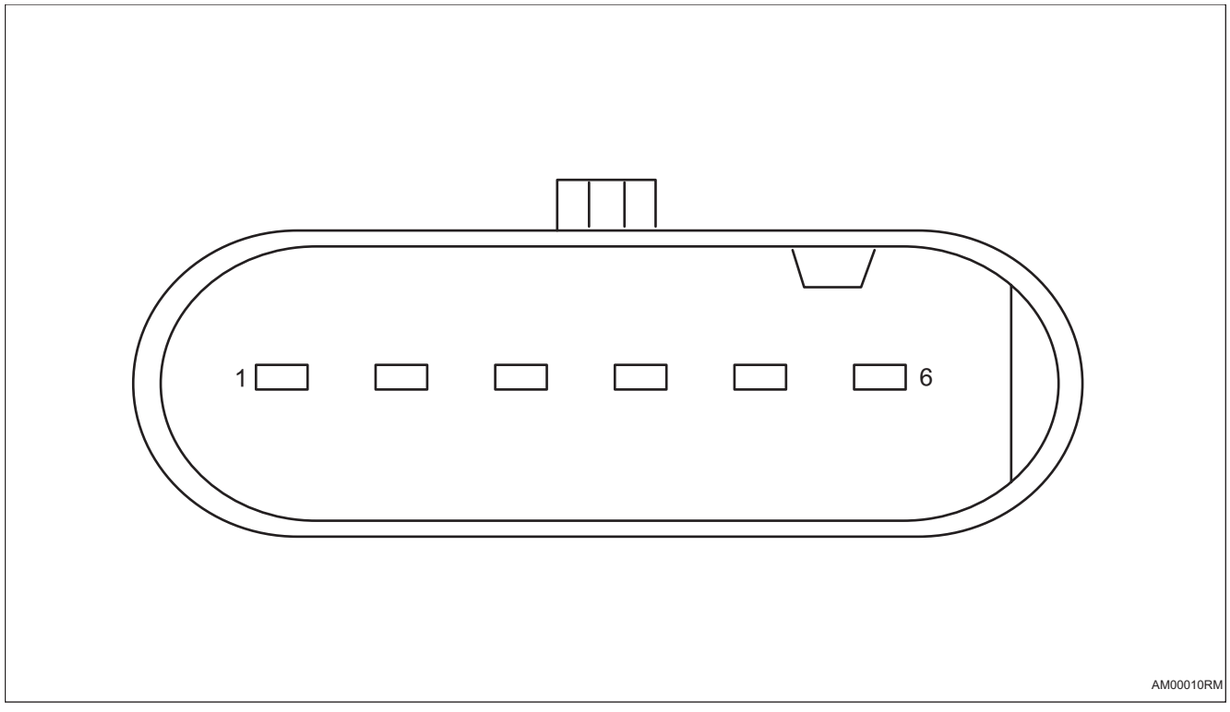
Item	Item description	Check conditions	Reference value
ACM RND gear setting value (ACM RND set-point value)	Read ACM RND-gear setting value for manufacturer analysis		Valid value: 2000~31000 Initialization value: 18434 (0x4802)

2. Freeze frame data

Hint:

Reading freeze frame data by using the HQ-VDS, the values or status of switch, sensor, actuator and other faulty items when the faults occurred can be read. This detection method can be used to find the data information when the fault occurs. Reading information from the freeze frame data can save diagnostic time when troubleshooting.

ECU terminal



ACM	
Pin No.	**DEFINITIONS**
1	KL30
2	KL15
3	CAN_H
4	CAN_I
5	—
6	Ground

DTC chart

DTC	Description	Reference page
P194016	KL30 voltage Low	(See page AM-13)
P194017	KL30 high voltage	(See page AM-13)
P194129	Position sensor output duty cycle failure	(See page AM-16)
P194229	Position sensor output frequency failure	(See page AM-16)
P194271	Actuator jamming	(See page AM-17)
P194274	Drive failure	(See page AM-20)
P194277	Gear shifting timeout	(See page AM-17)
P195119	Overcurrent	(See page AM-20)
P194213	Motor circuit open	(See page AM-20)
P190D49	Ignition signal fault	(See page AM-11)
P195249	Immobilizer authentication failure	(See page AM-23)

DTC	Description	Reference page
P194109	High side Mosfet failure	(See page AM-16)
P194209	Low side Mosfet failure	(See page AM-16)
U000188	CAN bus off	(See page AM-25)
U014687	GW node lost	(See page AM-25)
U010087	ECM node lost	(See page AM-25)
U010187	TCU node lost	(See page AM-25)
U010387	EGSM node lost	(See page AM-25)
U015187	ACU node lost	(See page AM-25)
U110087	ECM message lost	(See page AM-25)
U110187	Transmission control unit message lost	(See page AM-25)
U112187	ESP message lost	(See page AM-25)
U114687	GW message lost	(See page AM-25)
U115587	Instrument cluster control unit message lost	(See page AM-25)
U114087	BCM 1 message lost	(See page AM-25)
U119987	Driver door module message lost	(See page AM-25)
U124387	ADV message lost	(See page AM-25)
U041582	ESP message content error	(See page AM-25)
U041583	ESP message content error	(See page AM-25)
U041586	ESP message content error	(See page AM-25)
U040182	ECM message content error	(See page AM-25)
U040183	ECM message content error	(See page AM-25)
U040186	ECM message content error	(See page AM-25)
U040282	TCU message content error	(See page AM-25)
U040283	TCU message content error	(See page AM-25)
U040286	TCU message content error	(See page AM-25)
U054482	ADV message content error	(See page AM-25)
U054483	ADV message content error	(See page AM-25)
U040482	EGSM message content error	(See page AM-25)
U040483	EGSM message content error	(See page AM-25)
U040486	EGSM message content error	(See page AM-25)
U045282	ACU message content error	(See page AM-25)
U045283	ACU message content error	(See page AM-25)
U045286	ACU message content error	(See page AM-25)
U042286	BCM 1 message content error	(See page AM-25)
P195252	Anti-theft function shutdown	(See page AM-27)
P195352	Critical MCU fault	(See page AM-28)
P195452	Latent MCU fault	(See page AM-28)

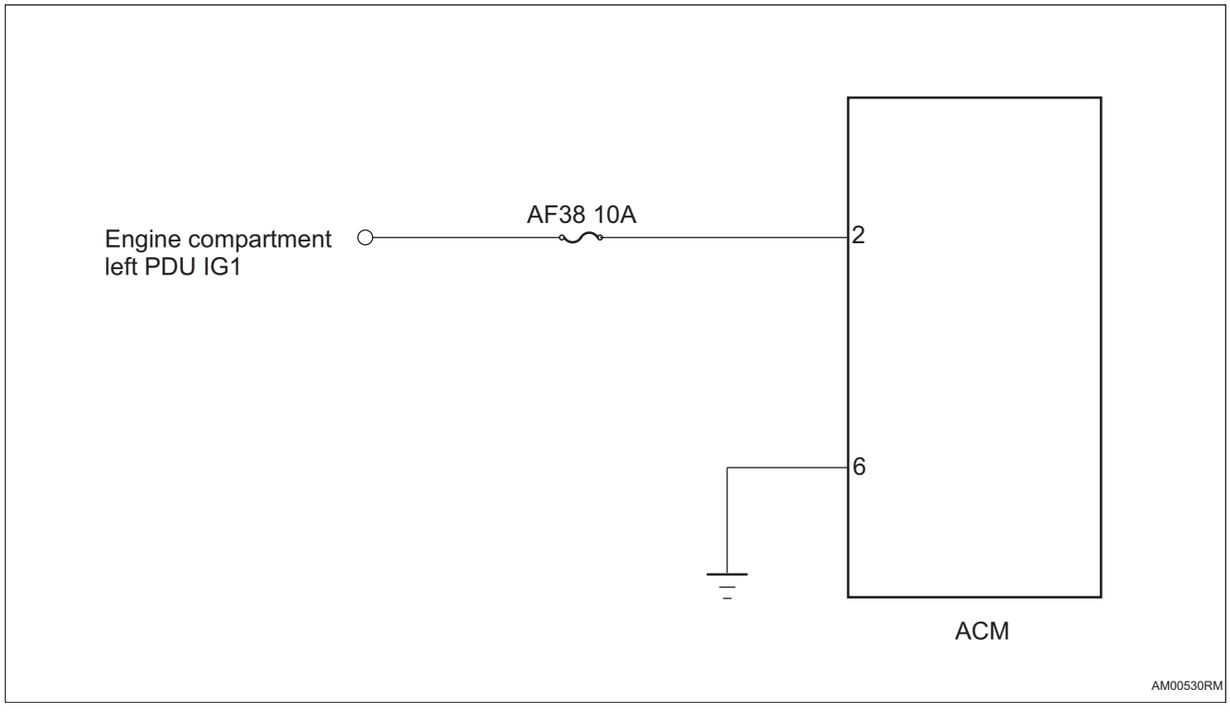
DTC	P190D49	Ignition signal fault

Description

When the IG power supply fails, the ACM records DTC.

DTC	DTC detection conditions	Faulty location
P190D49	(a) IG fault.	• Harness and connector • ACM

Circuit diagram



Inspection procedure

1	Check ACM fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the ACM fuse.

(d) Measure the resistance according to the values in the table below.

Standard value

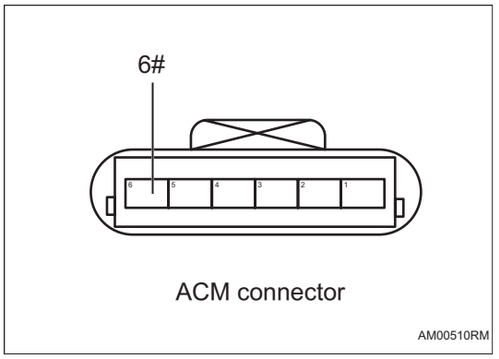
Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG	Replace fuse

AM

OK

2	Check ACM ground



(a) Disconnect the ACM connector.

(b) Measure the resistance according to the values in the table below.

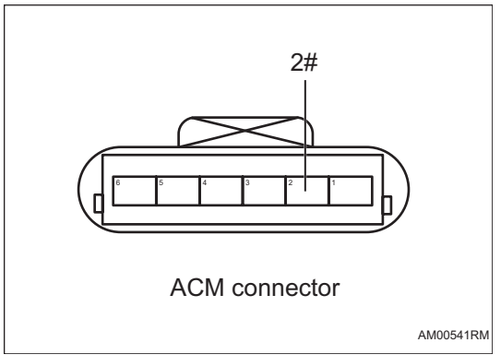
Standard value

Detector connection	Detection conditions	Specified state
ACM connector 6# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check ACM power supply



(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACM connector 2# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

AM

OK

4	Replace the ACM (See page AM-29)

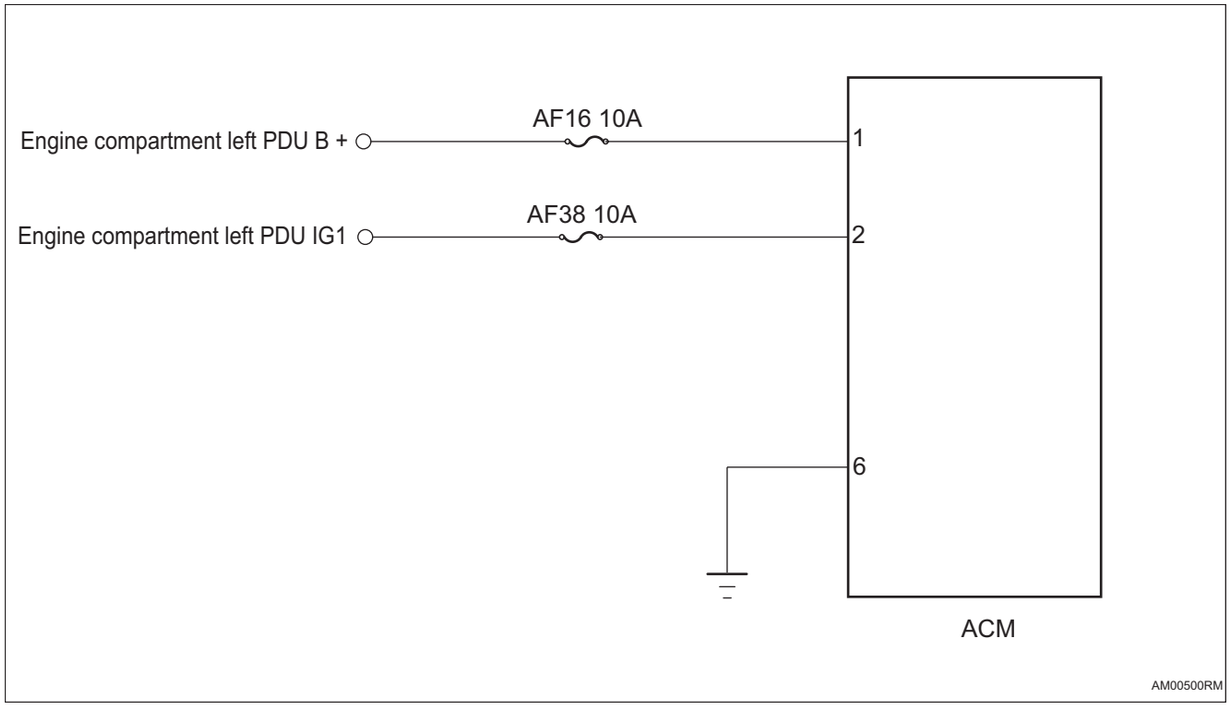
DTC	P194016	KL30 voltage Low
DTC	P194017	KL30 high voltage

Description

When the ACM power supply voltage exceeds the normal operating range, ACM records DTC.

DTC	DTC detection conditions	Faulty location
P194016	(a) The power supply voltage is outside the normal range.	• ACM • Harness and connector • Charging system
P194017	(a) The power supply voltage is outside the normal range.	• ACM • Harness and connector • Charging system

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Start the engine and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG	Overhaul the charging system

AM

OK

2	Check ACM fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the ACM fuse.

(d) Measure the resistance according to the values in the table below.

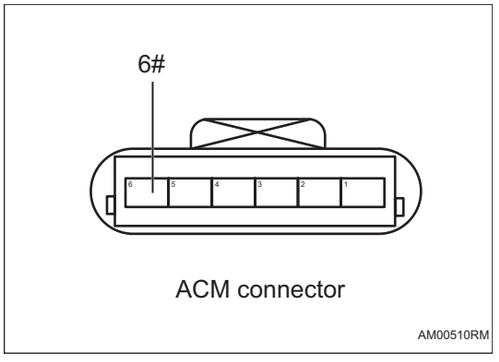
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3	Check ACM ground



(a) Disconnect the ACM connector.

(b) Measure the resistance according to the values in the table below.

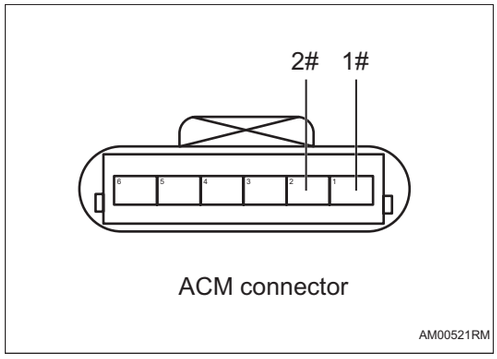
Standard value

Detector connection	Detection conditions	Specified state
ACM connector 6# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	Check ACM power supply



ACM connector

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACM connector 1# - body GND	The ignition switch is set to "ON"	Battery voltage
ACM connector 2# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace the ACM (See page AM-29)**

DTC	P194129	Position sensor output duty cycle failure
DTC	P194229	Position sensor output frequency failure
DTC	P194109	High side Mosfet failure
DTC	P194209	Low side Mosfet failure

Description

When there is a fault inside the actuator, the ACM records DTC.

DTC	DTC detection conditions	Faulty location
P194129	(a) Position sensor output duty cycle failure.	• ACM
P194229	(a) Position sensor output frequency failure.	• ACM
P194109	(a) High side Mosfet failure.	• ACM
P194209	(a) Low side Mosfet failure.	• ACM

Inspection procedure

1	**Clear DTC**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ACM (See page AM-29)**

OK

2	**End**

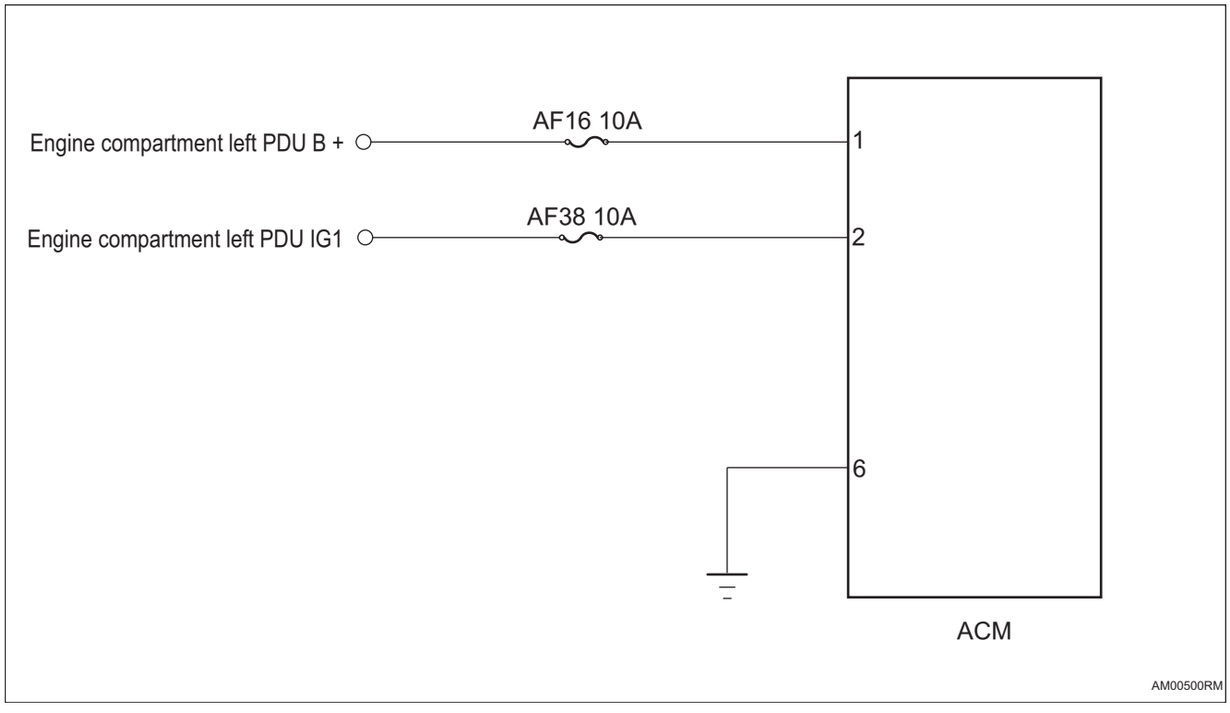
DTC	P194271	Actuator jamming
DTC	P194277	Gear shifting timeout

Description

When the ACM is stuck, has internal failure or gear shifting timeout failure, the ACM will record the DTC.

DTC	DTC detection conditions	Faulty location
P194271	(a) Actuator jamming.	• ACM • Harness and connector • TCU
P194277	(a) Gear shifting timeout.	• ACM • Harness and connector • TCU

Circuit diagram



Inspection procedure

1	Check ACM

(a) Check the ACM for foreign matter.

(b) Check whether the ACM is damaged.

NG	Repair according to the fault

AM

OK

2	Check TCU

(a) Check whether the transmission control system is faulty.

NG → **Repair according to the fault**

OK

3	Check ACM fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the ACM fuse.

(d) Measure the resistance according to the values in the table below.

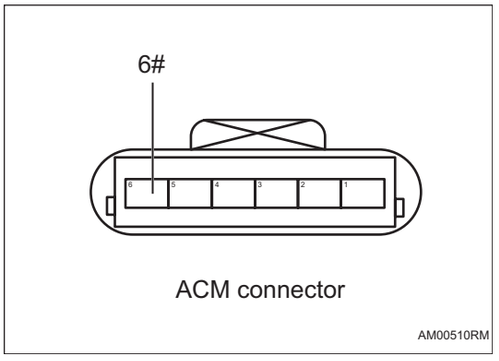
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

4	Check ACM ground



(a) Disconnect the ACM connector.

(b) Measure the resistance according to the values in the table below.

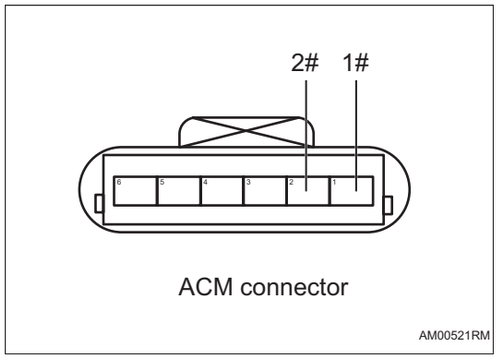
Standard value

Detector connection	Detection conditions	Specified state
ACM connector 6# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

5	**Check ACM power supply**



(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACM connector 1# - body GND	The ignition switch is set to "ON"	Battery voltage
ACM connector 2# - body GND	The ignition switch is set to "ON"	Battery voltage

NG **Repair or replace the harness and connector**

OK

6	**Replace the ACM (See page AM-29)**

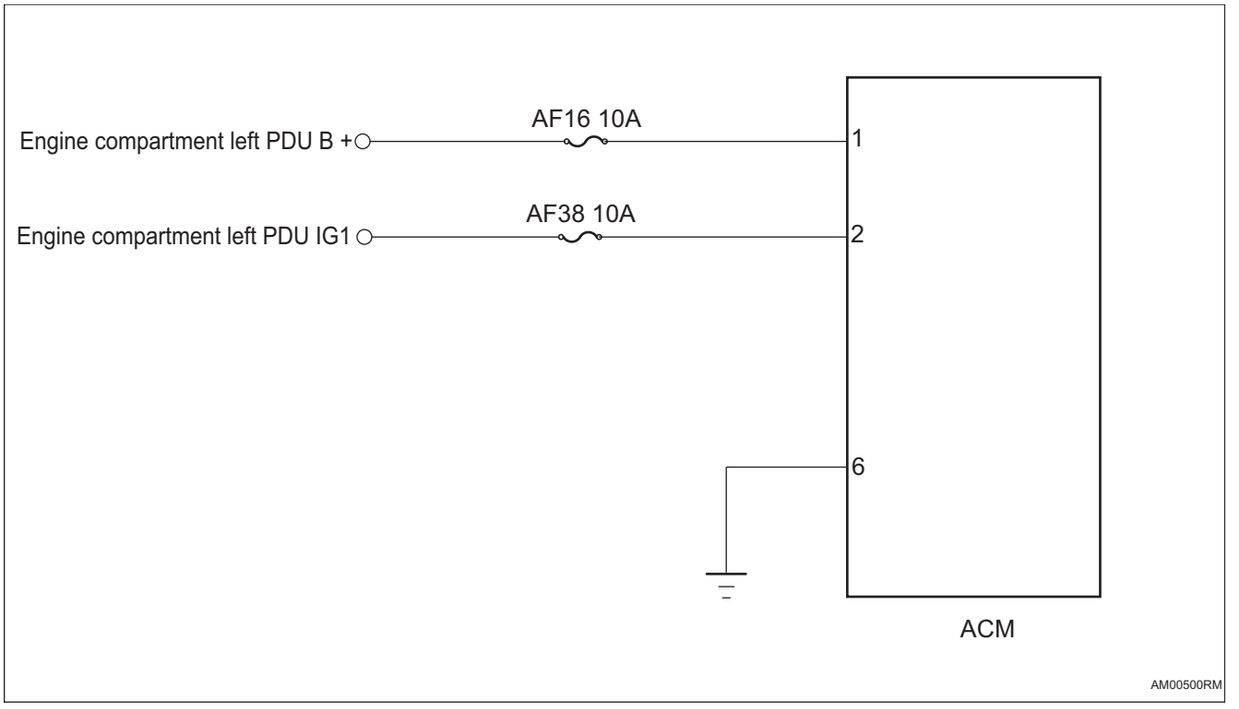
DTC	P194274	Drive failure
DTC	P195119	Overcurrent
DTC	P194213	Motor circuit open

Description

In case of ACM overcurrent or open circuit, drive failure, the ACM will record the DTC.

DTC	DTC detection conditions	Faulty location
P194274	(a) Drive failure.	• Harness and connector • ACM
P195119	(a) Overcurrent.	• Harness and connector • ACM
P194213	a) Motor circuit open.	• Harness and connector • ACM

Circuit diagram



Inspection procedure

AM

1	Check ACM

(a) Check the ACM for foreign matter.

(b) Check whether the ACM is damaged.

NG	Repair according to the fault

OK

2	Check ACM fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the ACM fuse.

(d) Measure the resistance according to the values in the table below.

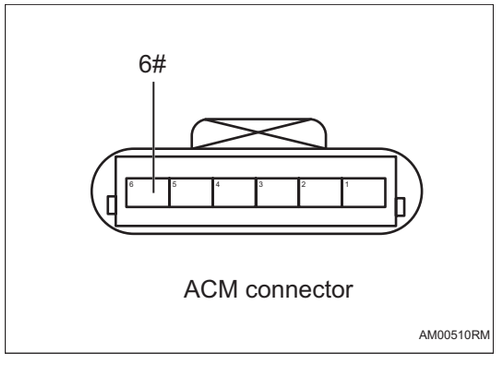
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3	Check ACM ground



(a) Disconnect the ACM connector.

(b) Measure the resistance according to the values in the table below.

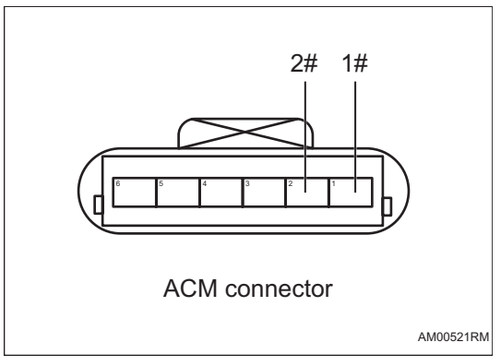
Standard value

Detector connection	Detection conditions	Specified state
ACM connector 6# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	Check ACM power supply



(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACM connector 1# - body GND	The ignition switch is set to "ON"	Battery voltage
ACM connector 2# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace the ACM (See page AM-29)**

DTC	P195249	Immobilizer authentication failure

Description

When the verification between ACM and BCM fails, the ACM will record the DTC.

DTC	DTC detection conditions	Faulty location
P195249	(a) Immobilizer authentication error.	• ACM • BCM

Inspection procedure

1	Peform IMMO matching again

(a) Peform IMMO matching again.

(b) Connect the HQ-VDS.

(c) Set the ignition switch to "ON".

(d) Clear the DTC.

(e) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ACM (See page AM-29)**

OK

2	Replace the BCM (See page BM-114)

DTC	U000188	CAN bus off
DTC	U014687	GW node lost
DTC	U010087	ECM node lost
DTC	U010187	TCU node lost
DTC	U010387	EGSM node lost
DTC	U015187	ACU node lost
DTC	U110087	ECM message lost
DTC	U110187	Transmission control unit message lost
DTC	U112187	ESP message lost
DTC	U114687	GW message lost
DTC	U115587	Instrument cluster control unit message lost
DTC	U114087	BCM 1 message lost
DTC	U119987	Driver door module message lost
DTC	U124387	ADV message lost
DTC	U041582	ESP message content error
DTC	U041583	ESP message content error
DTC	U041586	ESP message content error
DTC	U040182	ECM message content error
DTC	U040183	ECM message content error
DTC	U040186	ECM message content error
DTC	U040282	TCU message content error
DTC	U040283	TCU message content error
DTC	U040286	TCU message content error
DTC	U054482	ADV message content error
DTC	U054483	ADV message content error
DTC	U040482	EGSM message content error
DTC	U040483	EGSM message content error
DTC	U040486	EGSM message content error
DTC	U045282	ACU message content error

DTC	**U045283**	**ACU message content error**
DTC	**U045286**	**ACU message content error**
DTC	**U042286**	**BCM 1 message content error**

Description

When the communication between the ACM and other systems is abnormal or interrupted, the ACM will record the DTC.

DTC	DTC detection conditions	Faulty location
U000188	(a) Abnormal or interrupted communication.	
U014687	(a) Abnormal or interrupted communication.	
U010087	(a) Abnormal or interrupted communication.	
U010187	(a) Abnormal or interrupted communication.	
U010387	(a) Abnormal or interrupted communication.	
U015187	(a) Abnormal or interrupted communication.	
U110087	(a) Abnormal or interrupted communication.	
U110187	(a) Abnormal or interrupted communication.	
U112187	(a) Abnormal or interrupted communication.	
U114687	(a) Abnormal or interrupted communication.	
U115587	(a) Abnormal or interrupted communication.	
U114087	(a) Abnormal or interrupted communication.	
U119987	(a) Abnormal or interrupted communication.	
U124387	(a) Abnormal or interrupted communication.	
U041582	(a) Abnormal or interrupted communication.	
U041583	(a) Abnormal or interrupted communication.	• Relevant system control unit • Harness and connector
U041586	(a) Abnormal or interrupted communication.	
U040182	(a) Abnormal or interrupted communication.	
U040183	(a) Abnormal or interrupted communication.	
U040186	(a) Abnormal or interrupted communication.	
U040282	(a) Abnormal or interrupted communication.	
U040283	(a) Abnormal or interrupted communication.	
U040286	(a) Abnormal or interrupted communication.	
U054482	(a) Abnormal or interrupted communication.	
U054483	(a) Abnormal or interrupted communication.	
U040482	(a) Abnormal or interrupted communication.	
U040483	(a) Abnormal or interrupted communication.	
U040486	(a) Abnormal or interrupted communication.	
U045282	(a) Abnormal or interrupted communication.	
U045283	(a) Abnormal or interrupted communication.	
U045286	(a) Abnormal or interrupted communication.	
U042286	(a) Abnormal or interrupted communication.	

AM

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

DTC	P195252	Anti-theft function shutdown

Description

When the ACM anti-theft function is turned off, the ACM will record the DTC.

DTC	DTC detection conditions	Faulty location
P195252	(a) The anti-theft function is turned off.	• ACM

Inspection procedure

1	Clear DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ACM (See page AM-29)**

OK

2	End

DTC	P195352	Critical MCU fault
DTC	P195452	Latent MCU fault

Description

When the ACM motor fails, the ACM will record the DTC.

DTC	DTC detection conditions	Faulty location
P195352	(a) Actuator motor failure.	• ACM
P195452	(a) Actuator motor failure.	• ACM

Inspection procedure

1	Clear DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

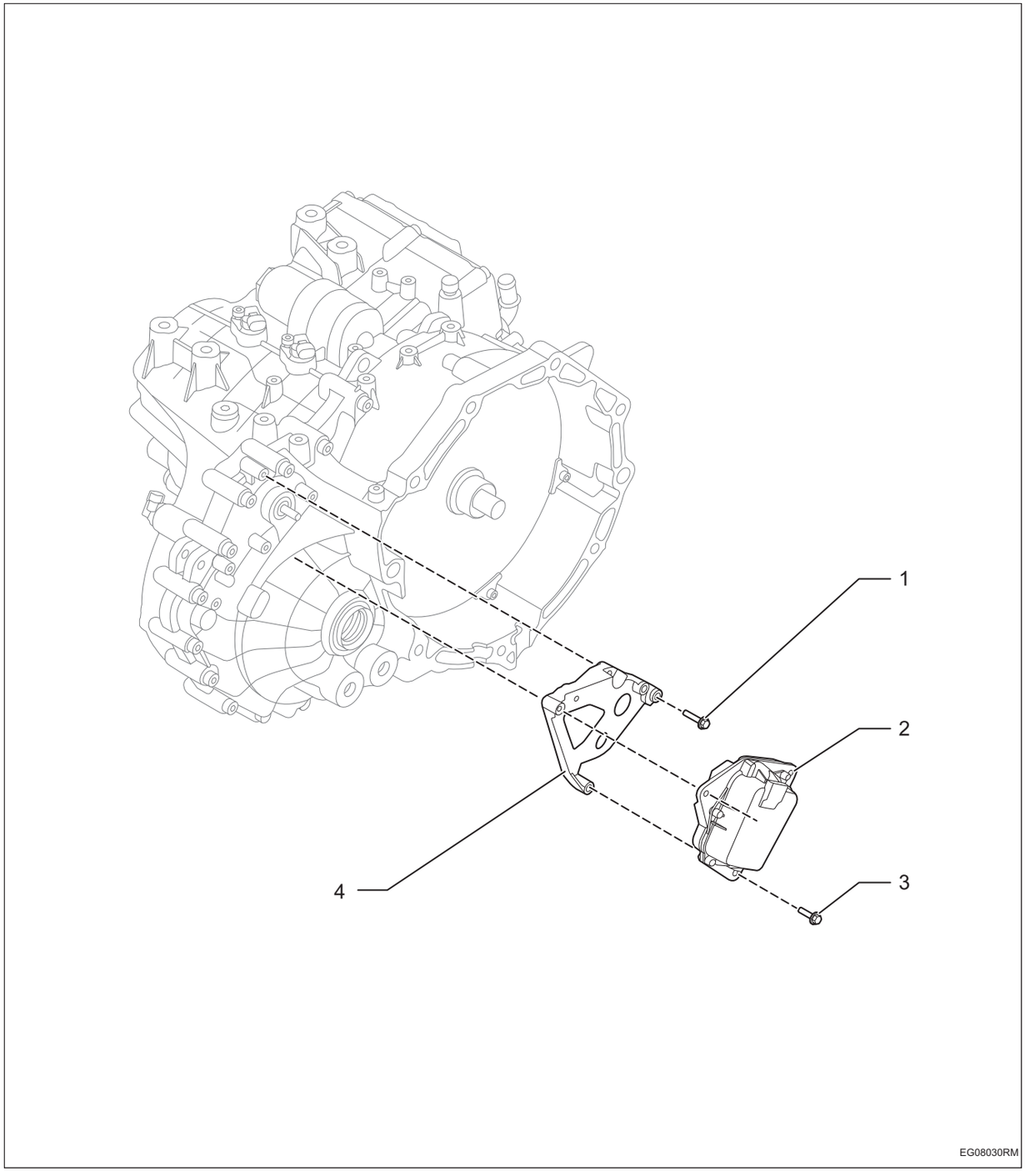
NG → **Replace the ACM (See page AM-29)**

OK

2	End

ACM

Parts



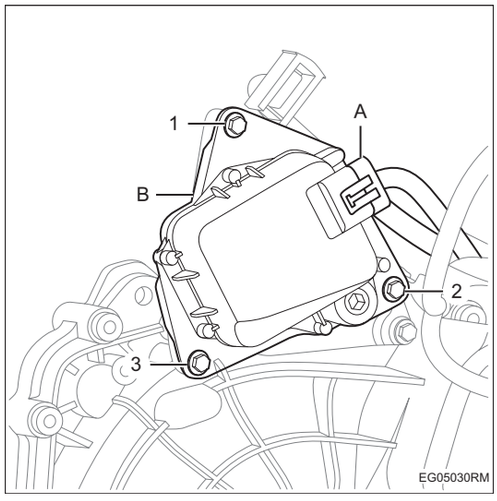
1. **Hexagon flange bolt**
   - X3
   - Torque: 8~12 N · m
2. **ACM**
3. **Hexagon flange bolt**

- X3
- Torque: 8~12 N · m

4. ACM bracket

Removal

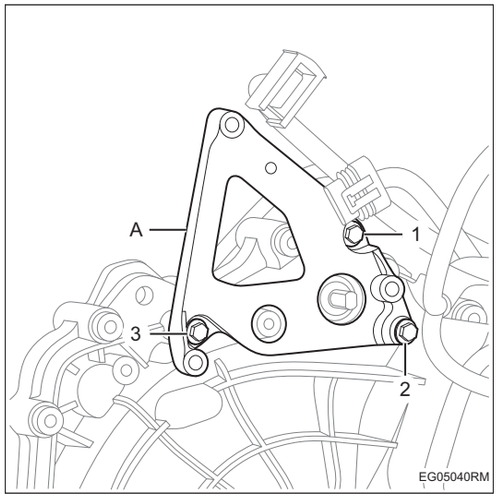
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove ACM**



(a) Disconnect the harness connector-A-.

(b) Remove the bolts -1-3- and remove the ACM.

3. **Remove the ACM bracket**



(a) Remove the bolts -1-3- and remove the ACM bracket -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

EGSM control system

EGSM EG-1
Precautions EG-1
Location of parts EG-3
System diagram EG-5
System description EG-5
Symptom chart EG-7
Data recorder/freeze frame data EG-8
ECU terminal EG-9
DTC chart EG-9
P190016 .....EG-11
P190017 .....EG-11
P190129 .....EG-14
P190229 .....EG-14
P190329 .....EG-14
P190429 .....EG-14
P190529 .....EG-14
P190629 .....EG-14
P190729 .....EG-14
P190816 .....EG-17
P190817 .....EG-17
P190929 .....EG-21
P190A29 .....EG-21
P190B29 .....EG-22
P190D49 .....EG-24
P191049 .....EG-26
P191149 .....EG-26
P191249 .....EG-26
P191429 .....EG-26
P191529 .....EG-26
U000188 .....EG-27
U014687 .....EG-27
U010187 .....EG-27
U112187 .....EG-27
U124587 .....EG-27
U115587 .....EG-27
U014087 .....EG-27
U041586 .....EG-27
U041583 .....EG-27
U041582 .....EG-27

U040286 ..... EG-27
U040283 ..... EG-27
U040282 ..... EG-27
U101C88 ..... EG-28
U131086 ..... EG-28
U02F787 ..... EG-28
P191629 ..... EG-30
P191729 ..... EG-30
EGSM assembly EG-31
Parts EG-31
Removal EG-33
Installation EG-33

EGSM

Precautions

1. ENGINESTART/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

2. Removal and installation of battery terminal

(a) Before removal and repair of electrical components, disconnect the battery negative (-) terminal to prevent the system from short circuit.

(b) Before disconnecting or reconnecting the battery cable, first turn off the ignition and lighting switch, and then completely loosen or tighten the battery cable terminal nut.

(c) When reconnecting after disconnecting the battery cable, some systems need to be initialized.

3. General repair instructions

(a) During maintenance, take and place electronic component (ECU, sensor, etc.) carefully to avoid injuries caused by impact and static electricity.

(b) Establish awareness of environmental protection and effectively dispose of wastes generated during maintenance.

(c) It is not recommended to use the method of piercing the wire skin to detect the electrical signals input and output of the part, so as to avoid harness short circuit.

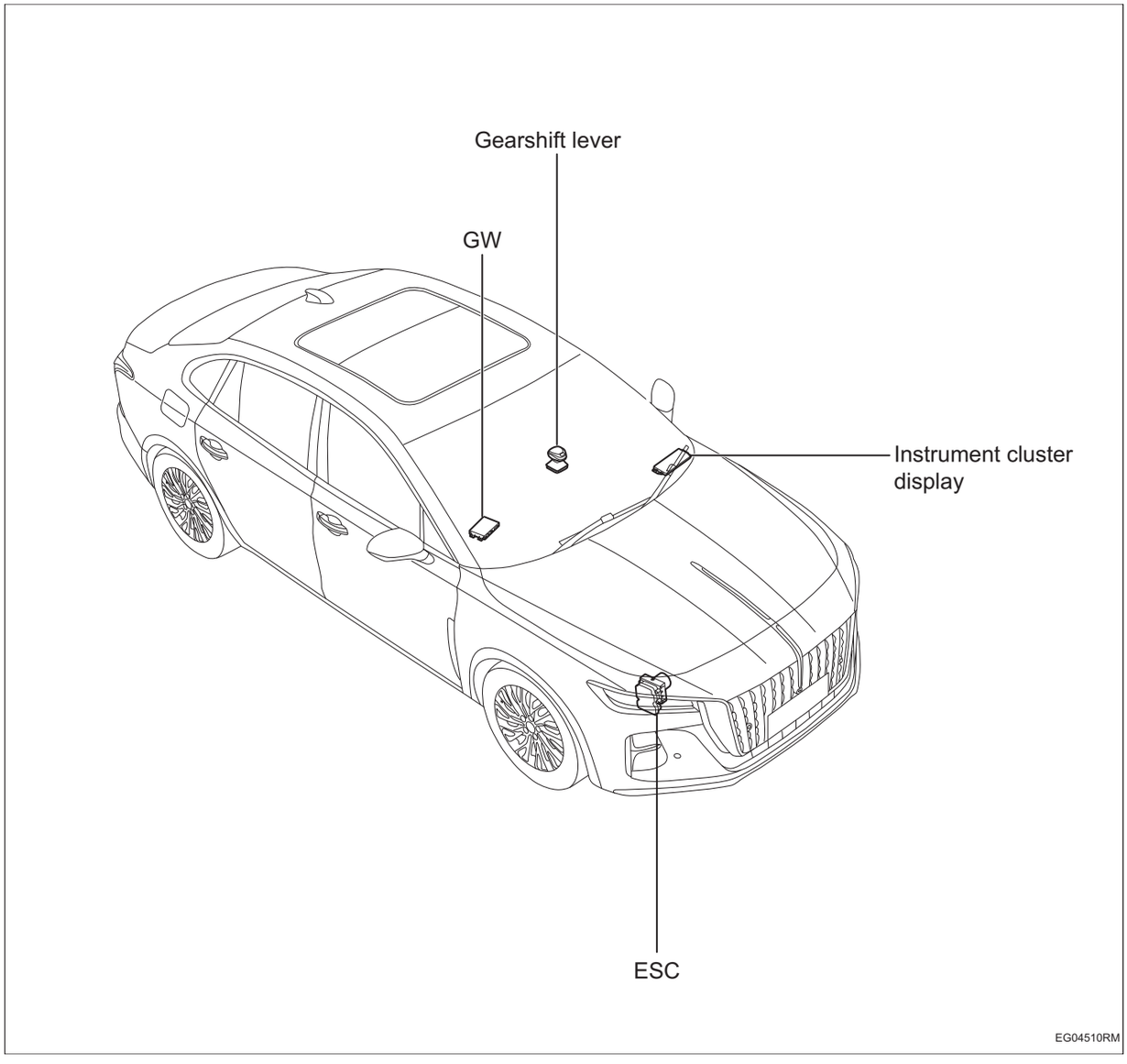
4. Precautions for gear shifting

(a) Gently operate the gearshift lever and ensure that the gear shifting is correct.

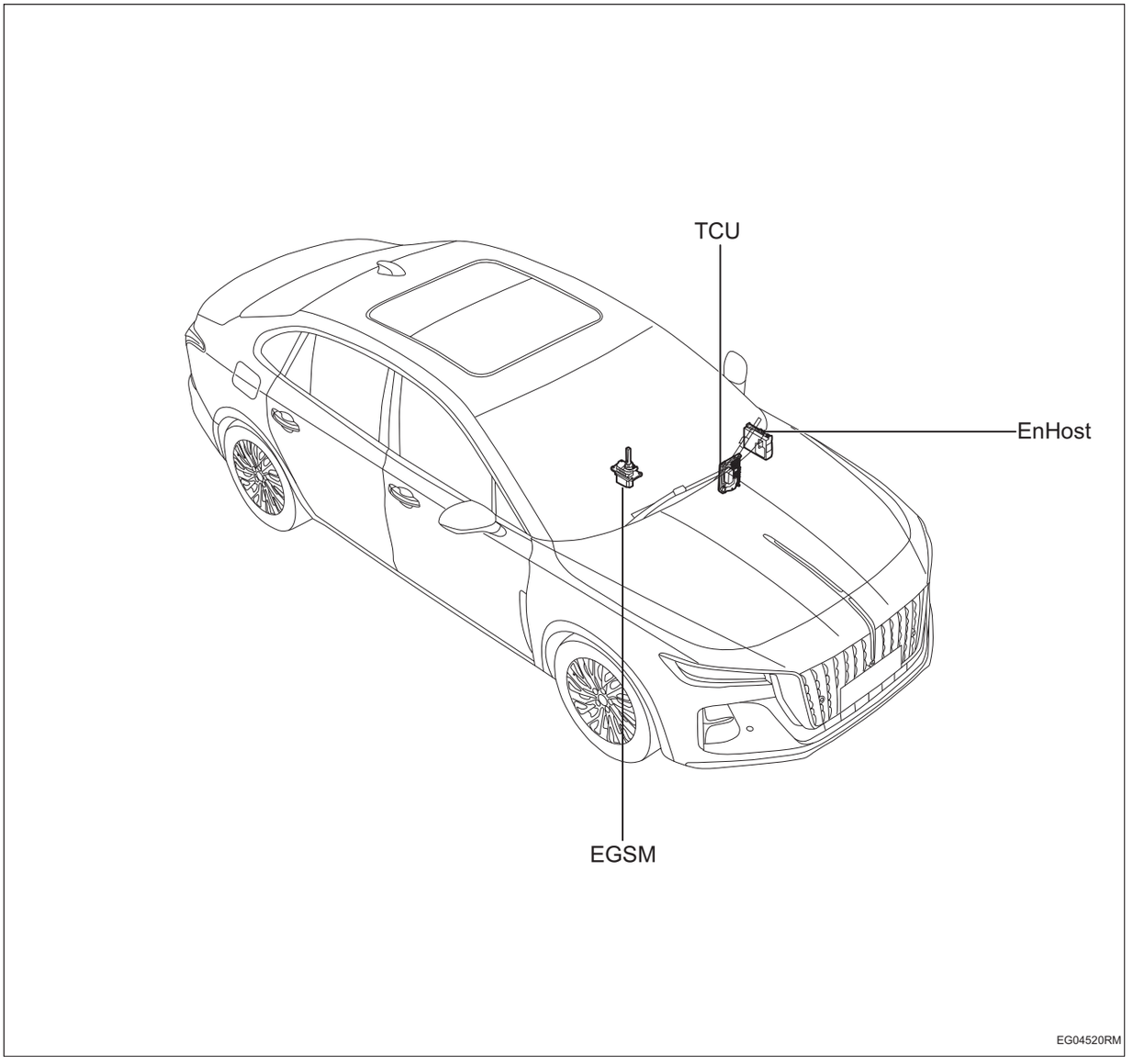
(b) Release the gearshift lever to reset after each gear shifting.

(c) The vehicle adopts an electronic shift mechanism, which needs to be operated according to the gear position indication information on the instrument cluster and information display.

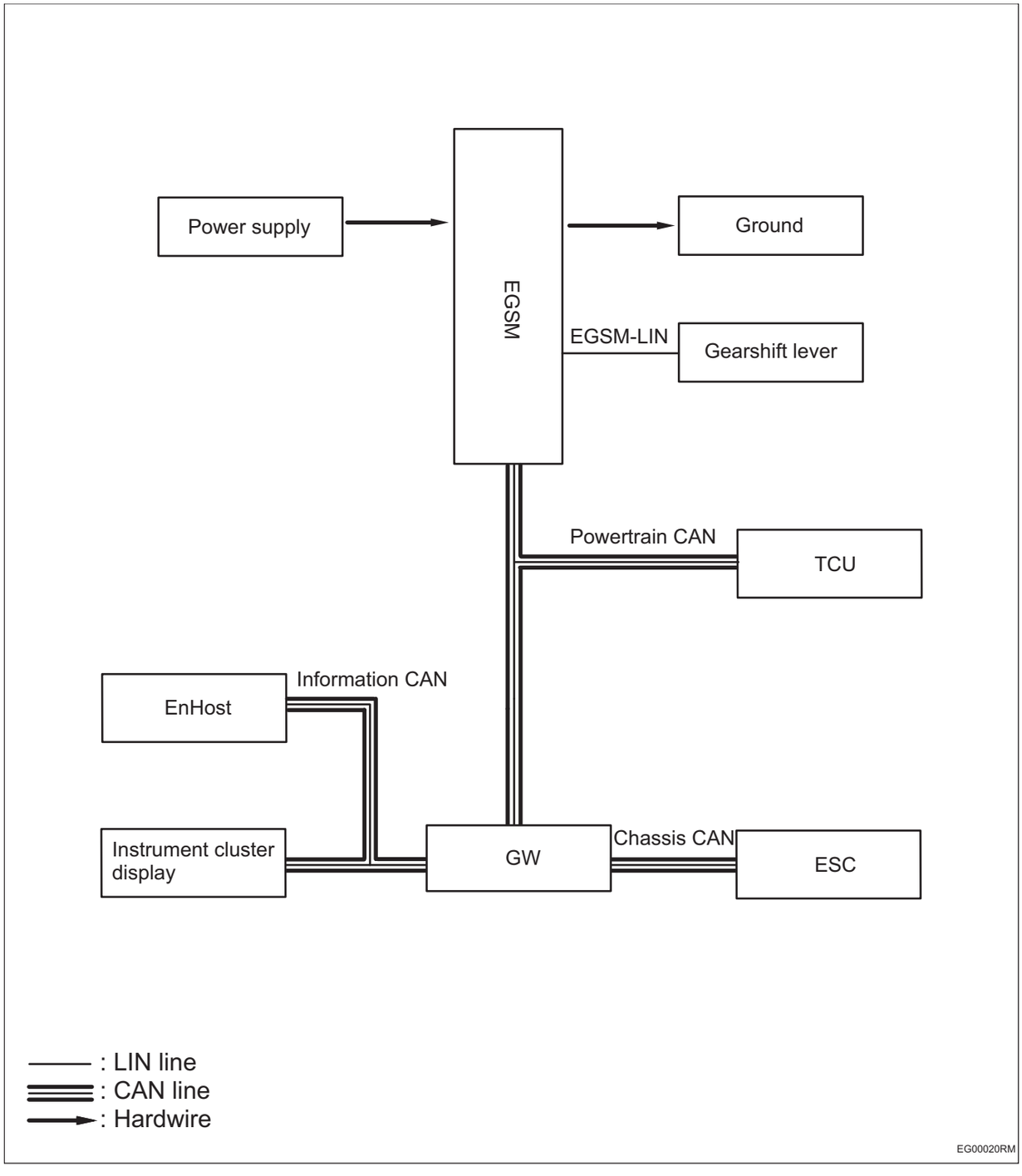
Location of parts



Location of parts



System diagram



System description

1. EGSM overview

(a) The EGSM sends the shift information to the relevant control unit through CAN to complete the shift action.

(b) The EGSM has a diagnostic function.

2. Function description of P gear button

(a) Gear shifting to P gear can be achieved through the P gear button.

Symptom chart

Fault	Possible location
Failure to shift gears	• Battery • Related harness and connector • ACM • BCM • EGSM • ECM • GW

Data recorder/freeze frame data

1. Data recorder

Hint:

Using the HQ-VDS reading data recorder, the values or status of switch, sensor, actuator and other items can be read without removing any parts. This detection method can be used to find intermittent failure or signals. Reading the data recorder information can save diagnostic time when troubleshooting.

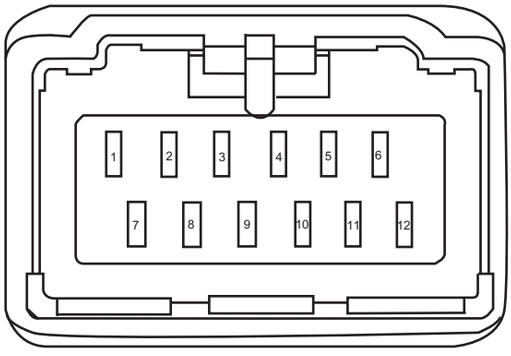
Item	Item description	Check conditions	Reference value
EGSM gear position	EGSM gear position	IG 0N	0 x 0: Position 0 0 x 1: Position +1 0 x 2: Position +2 0 x 3: Position -1 0 x 4: Position -2 0x7: invalid value Others undefined
EGSM park button status	EGSM park button status	IG 0N	0 x 0: Automatic 0 x 1: Manual
EGSM park button status	EGSM park button status	IG 0N	0x0: Not pressed 0x1: Pressed
EGSM unlocking button status	EGSM unlocking button status	IG 0N	0x0: Not pressed 0x1: Pressed
EGSM KL30 voltage	EGSM KL30 voltage	IG 0N	3 ~ 25.5V
Handle power supply voltage	Handle power supply voltage	IG 0N	0 ~ 65.534V
Vehicle speed	Current speed of the vehicle	IG ON	0 ~ 327.65km/h

2. Freeze frame data

Hint:

Reading freeze frame data by using the HQ-VDS, the values or status of switch, sensor, actuator and other faulty items when the faults occurred can be read. This detection method can be used to find the data information when the fault occurs. Reading information from the freeze frame data can save diagnostic time when troubleshooting.

ECU terminal



EG00010RM

EGSM	
Pin No.	**DEFINITIONS**
1	—
2	CAN_L
3	CAN_H
4	—
5	IG
6	B+
7	—
8	—
9	Ground
10	—
11	—
12	—

DTC chart

DTC	Description	Reference page
P190016	KL30 voltage Low	(See page EG-11)
P190017	KL30 voltage high	(See page EG-11)
P190129	F2 sensor error	(See page EG-14)
P190229	F1 sensor error	(See page EG-14)
P190329	X0 sensor error	(See page EG-14)
P190429	R1 sensor error	(See page EG-14)
P190529	R2 sensor error	(See page EG-14)
P190629	M sensor error	(See page EG-14)

DTC	Description	Reference page
P190729	A sensor error	(See page EG-14)
P190816	Knob voltage Low	(See page EG-17)
P190817	Knob voltage high	(See page EG-17)
P190929	Knob P button error	(See page EG-21)
P190A29	Knob unlock button error	(See page EG-21)
P190B29	Gearshift lever position detection error	(See page EG-22)
U000188	CAN bus off	(See page EG-27)
U014687	GW lost	(See page EG-27)
U010187	TCU lost	(See page EG-27)
U101C88	LIN physical error	(See page EG-28)
U131086	SKA LIN communication error	(See page EG-28)
U02F787	SKA lost	(See page EG-28)
U112187	ESP message lost	(See page EG-27)
U124587	EnHost/IVI message lost	(See page EG-27)
U115587	Instrument cluster control unit message lost	(See page EG-27)
U014087	BCM 1 node lost	(See page EG-27)
U041586	ESP message content error	(See page EG-27)
U041583	ESP message content error	(See page EG-27)
U041582	ESP message content error	(See page EG-27)
U040286	TCU message content error	(See page EG-27)
U040283	TCU message content error	(See page EG-27)
U040282	TCU message content error	(See page EG-27)
P190D49	IG error	(See page EG-24)
P191049	SKA short circuit	(See page EG-26)
P191149	Gear position indicator lamp error	(See page EG-26)
P191249	Display lamp LED error	(See page EG-26)
P191429	Knob P button stuck	(See page EG-26)
P191529	Knob unlock button stuck	(See page EG-26)
P191629	Critical MCU fault	(See page EG-30)
P191729	Latent MCU fault	(See page EG-30)

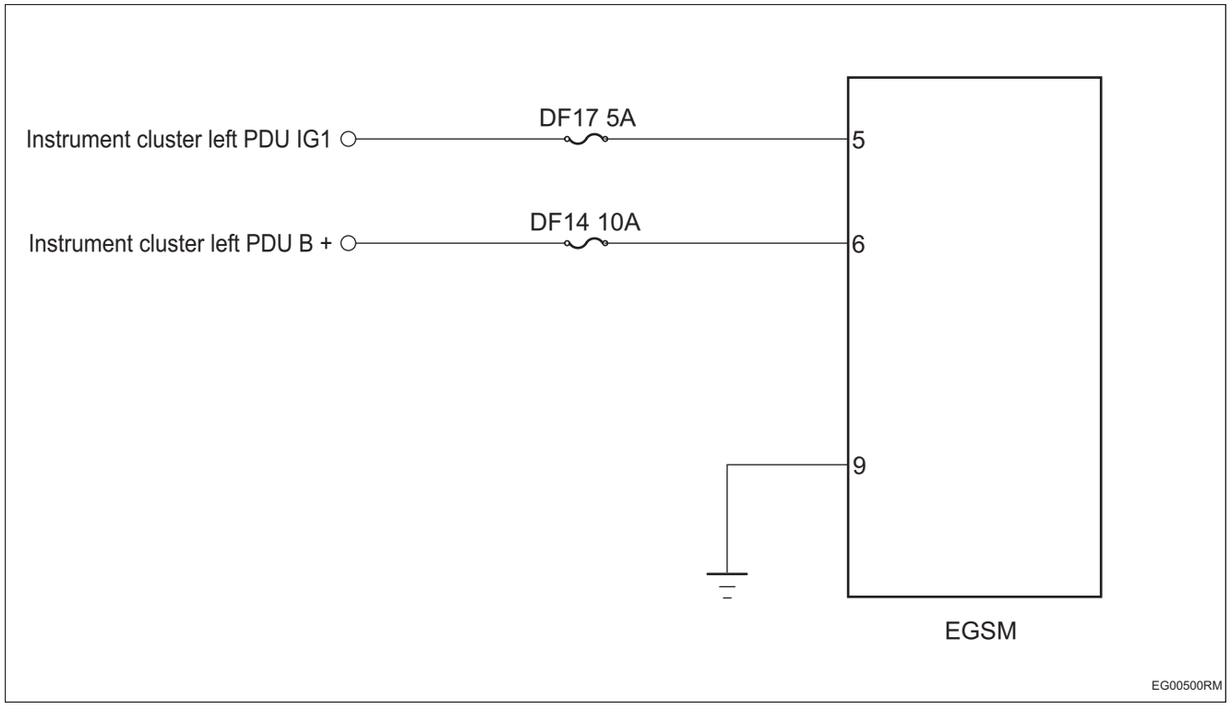
DTC	P190016	KL30 voltage Low
DTC	P190017	KL30 voltage high

Description

When the EGSM power supply voltage exceeds the normal operating range, EGSM records DTC.

DTC	DTC detection conditions	Faulty location
P190016	(a) The power supply voltage is outside the normal range.	• EGSM • Harness and connector • Charging system
P190017	(a) The power supply voltage is outside the normal range.	• EGSM • Harness and connector • Charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the engine and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11 ~ 14V

NG → **Overhaul the charging system**

EG

OK

2	Check EGSM fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the EGSM fuse.

(d) Measure the resistance according to the values in the table below.

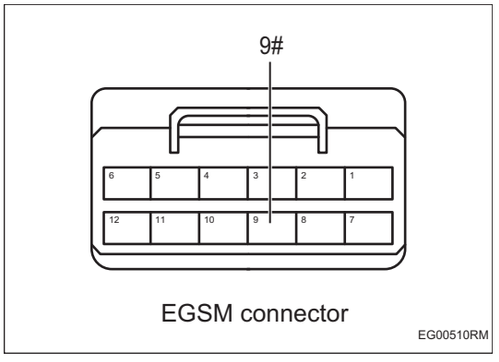
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3	Check EGSM ground



EGSM connector

EG00510RM

(a) Disconnect the EGSM connector.

(b) Measure the resistance according to the values in the table below.

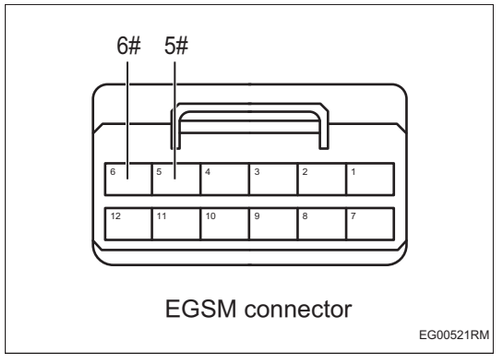
Standard value

Detector connection	Detection conditions	Specified state
EGSM connector 9# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	Check EGSM power supply



(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
EGSM connector 6# - body GND	The ignition switch is set to "ON"	Battery voltage
EGSM connector 5# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace the EGSM (See page EG-31)**

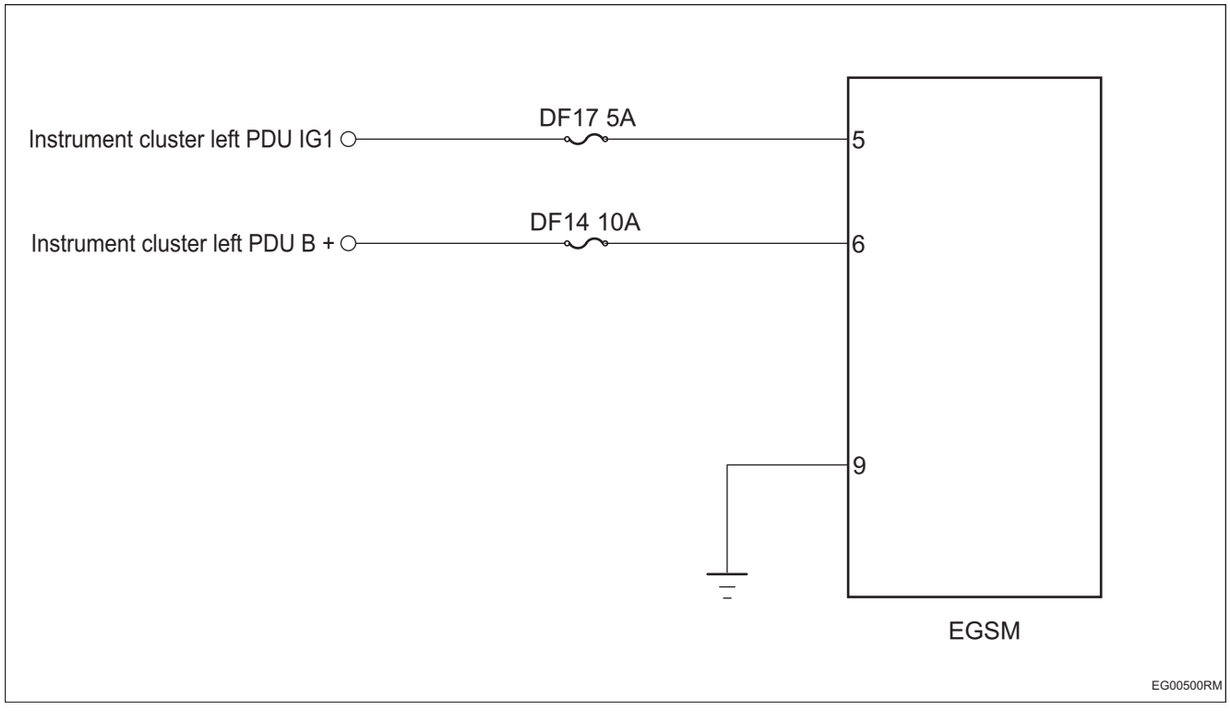
DTC	P190129	F2 sensor error
DTC	P190229	F1 sensor error
DTC	P190329	X0 sensor error
DTC	P190429	R1 sensor error
DTC	P190529	R2 sensor error
DTC	P190629	M sensor error
DTC	P190729	A sensor error

Description

When the EGSM detects a failure of the position sensor, the EGSM records the DTC.

DTC	DTC detection conditions	Faulty location
P190129	(a) F2 sensor error.	• EGSM • Harness and connector
P190229	(a) F1 sensor error.	• EGSM • Harness and connector
P190329	(a) X0 sensor error.	• EGSM • Harness and connector
P190429	(a) R1 sensor error.	• EGSM • Harness and connector
P190529	(a) R2 sensor error.	• EGSM • Harness and connector
P190629	(a) M sensor error.	• EGSM • Harness and connector
P190729	(a) A sensor error.	• EGSM • Harness and connector

Circuit diagram



Inspection procedure

1	Check EGSM fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the EGSM fuse.

(d) Measure the resistance according to the values in the table below.

Standard value

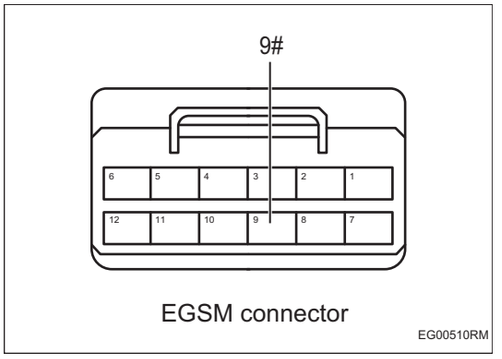
Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

2	Check EGSM ground

EG



(a) Disconnect the EGSM connector.

(b) Measure the resistance according to the values in the table below.

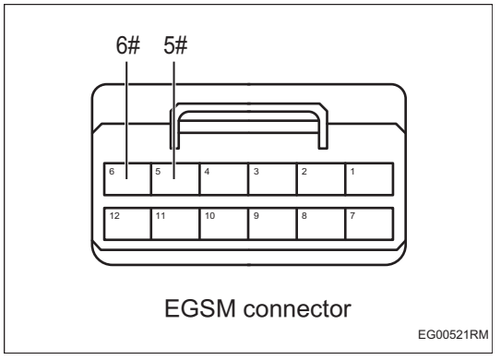
Standard value

Detector connection	Detection conditions	Specified state
EGSM connector 9# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check EGSM power supply



(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
EGSM connector 6# - body GND	The ignition switch is set to "ON"	Battery voltage
EGSM connector 5# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

4	Replace the EGSM (See page EG-31)

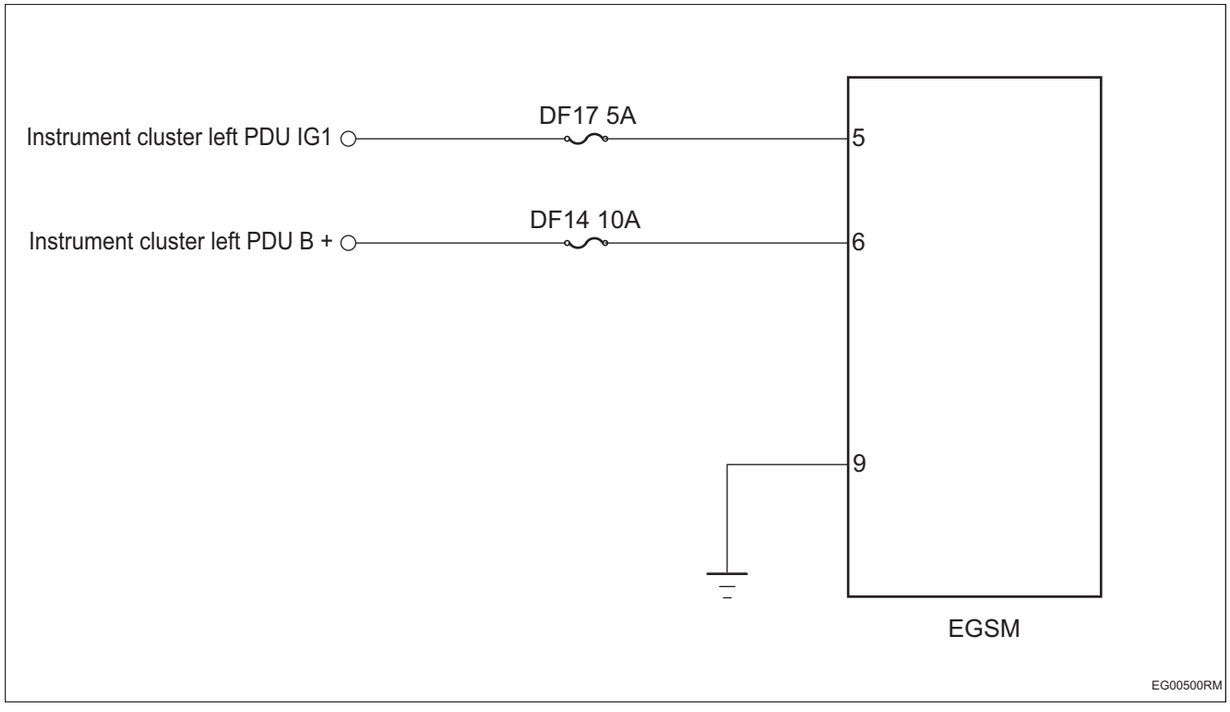
DTC	P190816	Knob voltage Low
DTC	P190817	Knob voltage high

Description

When the SKA power supply voltage is outside the normal range, the EGSM will record the DTC.

DTC	DTC detection conditions	Faulty location
P190816	(a) SKA power supply undervoltage.	• SKA • EGSM • Harness and connector • Charging system
P190817	(a) SKA power supply overvoltage.	• SKA • EGSM • Harness and connector • Charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the engine and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

EG

NG → **Overhaul the charging system**

OK

2 Check EGSM fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the EGSM fuse.

(d) Measure the resistance according to the values in the table below.

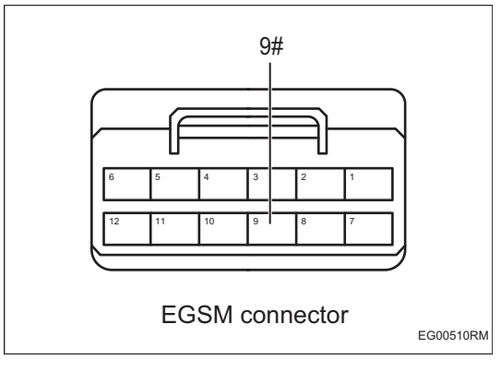
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3 Check EGSM ground



EGSM connector

EG00510RM

(a) Disconnect the EGSM connector.

(b) Measure the resistance according to the values in the table below.

Standard value

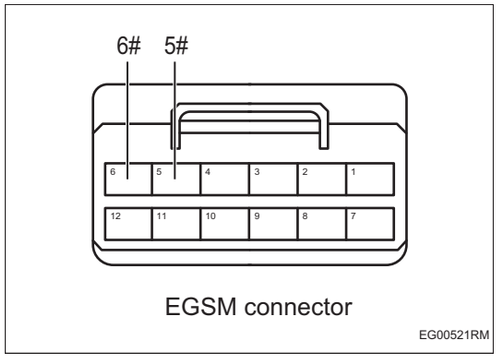
Detector connection	Detection conditions	Specified state
EGSM connector 9# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

EG

OK

4 Check EGSM power supply



(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
EGSM connector 6# - body GND	The ignition switch is set to "ON"	Battery voltage
EGSM connector 5# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	Check SKA harness and connector

(a) Check whether the SKA connector is connected tightly.

(b) Check whether SKA harness and connector are damaged.

(c) Check whether the SKA harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

6	Replace the SKA (See page EG-31)

(a) Replace the SKA.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the EGSM (See page EG-31)**

OK

7	End

DTC	P190929	Knob P button error
DTC	P190A29	Knob unlock button error

Description

When the SKA park button or unlocking button is invalid, the EGSM will record the DTC.

DTC	DTC detection conditions	Faulty location
P190929	(a) Park button void.	• SKA • EGSM
P190A29	(a) Unlocking button void.	• SKA • EGSM

Inspection procedure

1	Replace the SKA (See page EG-31)

(a) Replace the SKA.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the EGSM (See page EG-31)**

OK

2	End

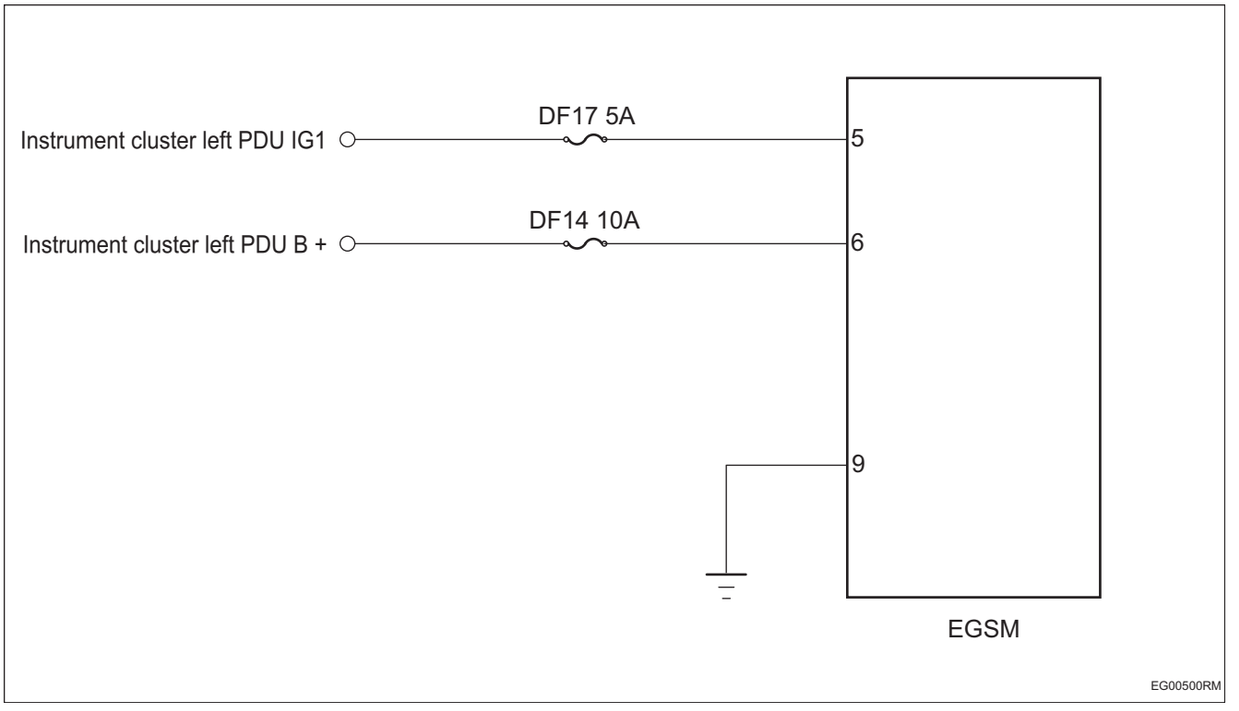
DTC	P190B29	Gearshift lever position detection error

Description

When the EGSM detects abnormal position, the EGSM will record the DTC.

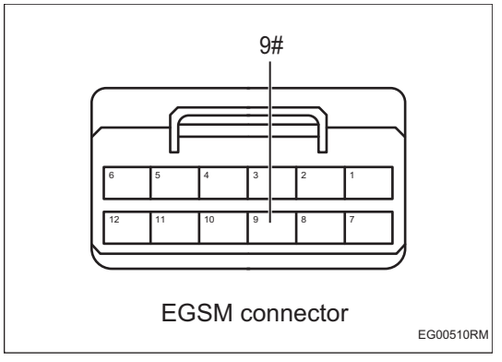
DTC	DTC detection conditions	Faulty location
P190B29	(a) Gearshift lever position detection error	• EGSM

Circuit diagram



Inspection procedure

1	Check EGSM ground



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the EGSM connector.

(d) Measure the resistance according to the values in the table below.

Standard value

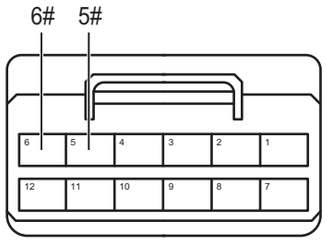
Detector connection	Detection conditions	Specified state
EGSM connector 9# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

EG

OK

2	Check EGSM power supply



EGSM connector

EG00521RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
EGSM connector 6# - body GND	The ignition switch is set to "ON"	Battery voltage
EGSM connector 5# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

3	Replace the EGSM (See page EG-31)

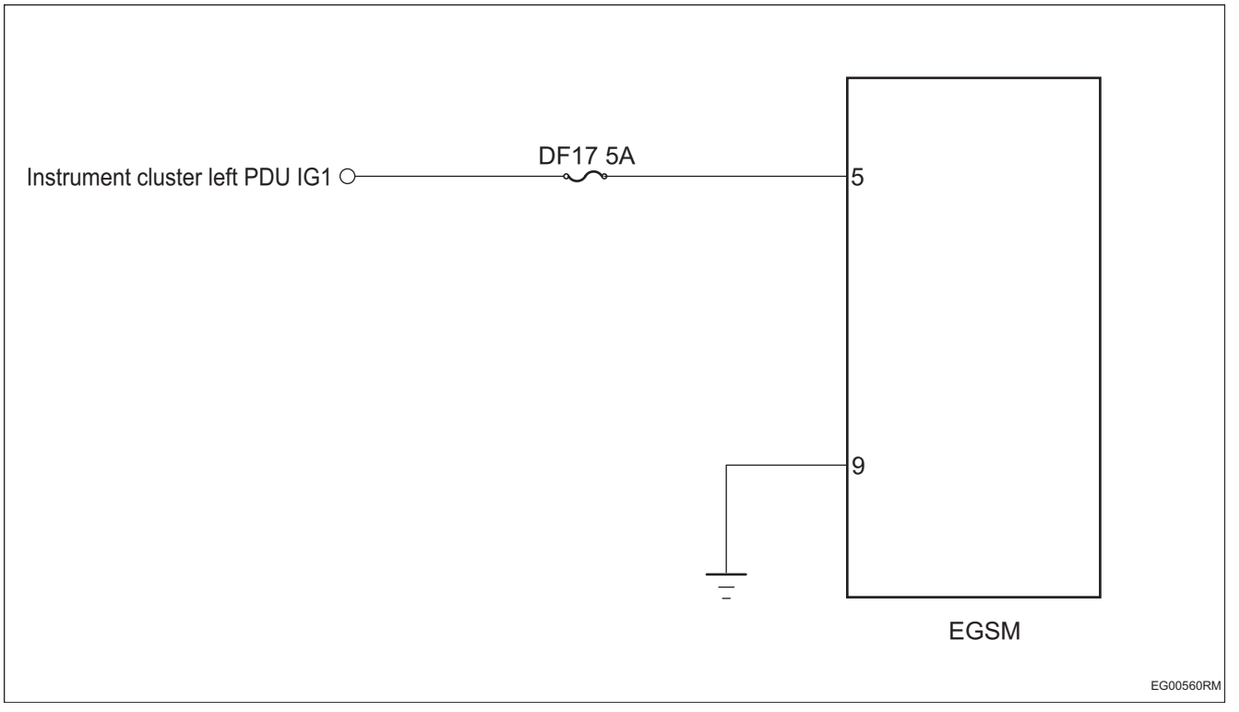
DTC	P190D49	IG error

Description

When the IG power supply fails, the EGSM records DTC.

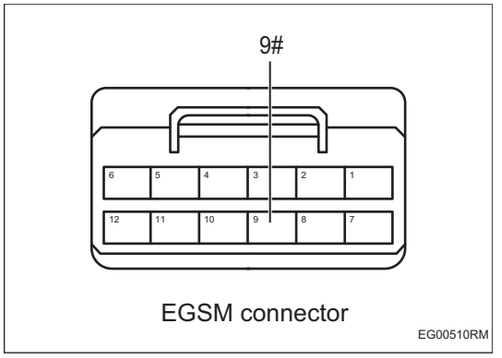
DTC	DTC detection conditions	Faulty location
P190D49	(a) IG fault.	• Harness and connector • EGSM

Circuit diagram



Inspection procedure

1	Check EGSM ground



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the EGSM connector.

(d) Measure the resistance according to the values in the table below.

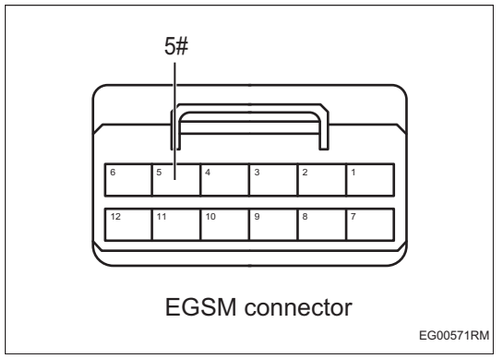
Standard value

Detector connection	Detection conditions	Specified state
EGSM connector 9# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check EGSM power supply (IG)



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
EGSM connector 5# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

3	Replace the EGSM (See page EG-31)

DTC	P191049	SKA short circuit
DTC	P191149	Gear position indicator lamp error
DTC	P191249	Display lamp LED error
DTC	P191429	Knob P button stuck
DTC	P191529	Knob unlock button stuck

Description

When there is a fault inside the SKA, the EGSM will record the DTC.

DTC	DTC detection conditions	Faulty location
P191049	(a) SKA short circuit.	• SKA • EGSM
P191149	(a) Gear position indicator lamp error.	• SKA • EGSM
P191249	(a) Display lamp LED error.	• SKA • EGSM
P191429	(a) P button stuck.	• SKA • EGSM
P191529	(a) Unlock button stuck.	• SKA • EGSM

Inspection procedure

1	**Replace the SKA (See page EG-31)**

(a) Replace the SKA.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the EGSM (See page EG-31)**

OK

2	**End**

DTC	U000188	CAN bus off
DTC	U014687	GW lost
DTC	U010187	TCU lost
DTC	U112187	ESP message lost
DTC	U124587	EnHost/IVI message lost
DTC	U115587	Instrument cluster control unit message lost
DTC	U014087	BCM 1 node lost
DTC	U041586	ESP message content error
DTC	U041583	ESP message content error
DTC	U041582	ESP message content error
DTC	U040286	TCU message content error
DTC	U040283	TCU message content error
DTC	U040282	TCU message content error

Description

When the communication between the EGSM and other systems is abnormal or interrupted, the EGSM will record the DTC.

DTC	DTC detection conditions	Faulty location
U000188	(a) Abnormal or interrupted communication.	• Relevant system control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	
U010187	(a) Abnormal or interrupted communication.	
U112187	(a) Abnormal or interrupted communication.	
U124587	(a) Abnormal or interrupted communication.	
U115587	(a) Abnormal or interrupted communication.	
U014087	(a) Abnormal or interrupted communication.	
U041586	(a) Abnormal or interrupted communication.	
U041583	(a) Abnormal or interrupted communication.	
U041582	(a) Abnormal or interrupted communication.	
U040286	(a) Abnormal or interrupted communication.	
U040283	(a) Abnormal or interrupted communication.	
U040282	(a) Abnormal or interrupted communication.	

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

DTC	U101C88	LIN physical error
DTC	U131086	SKA LIN communication error
DTC	U02F787	SKA lost

Description

When the communication between the SKA and the EGSM is abnormal or interrupted, the EGSM will record the DTC.

DTC	DTC detection conditions	Faulty location
U101C88	(a) Physical bus error.	• SKA • LIN line • EGSM
U131086	(a) LIN communication error.	• SKA • LIN line • EGSM
U02F787	(a) Node lost.	• SKA • LIN line • EGSM

Inspection procedure

1	**Check LIN line (EGSM-SKA)**

(a) Check whether the LIN line connector is connected tightly.

(b) Check whether the LIN line harness and connector are short-circuited or open-circuited

NG → **Repair or replace the harness and connector**

OK

2	**Replace the SKA (See page EG-31)**

(a) Replace the SKA.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the EGSM (See page EG-31)**

OK

3	End

DTC	P191629	Critical MCU fault
DTC	P191729	Latent MCU fault

Description

When there is a fault inside the EGSM, EGSM records the DTC.

DTC	DTC detection conditions	Faulty location
P191629	(a) EGSM internal fault.	• EGSM
P191729	(a) EGSM internal fault.	• EGSM

Inspection procedure

1	Clear DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON"

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

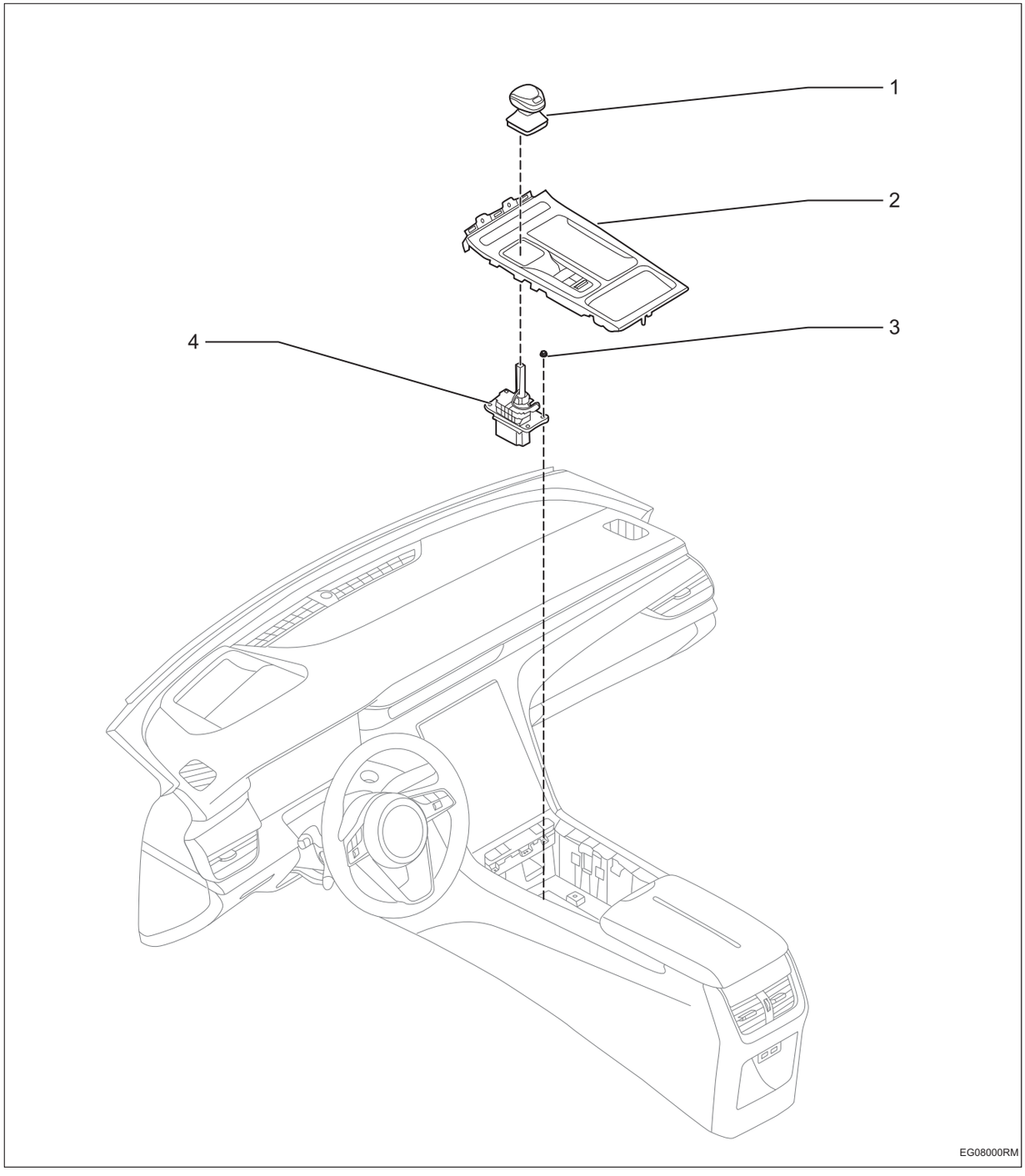
NG → **Replace the EGSM (See page EG-31)**

OK

2	End

EGSM assembly

Parts

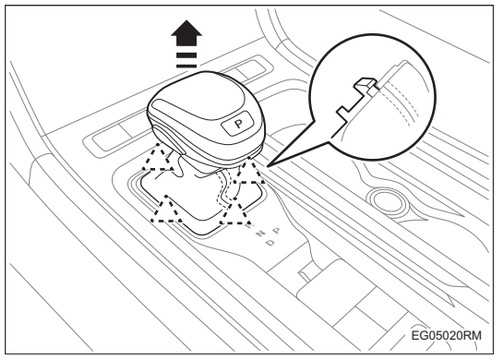


1. **Gearshift lever assembly**
2. **Upper cover plate assembly**

3. **Hexagon flange nut**
   - X4
   - Torque: 8~10 N · m
4. **EGSM assembly**

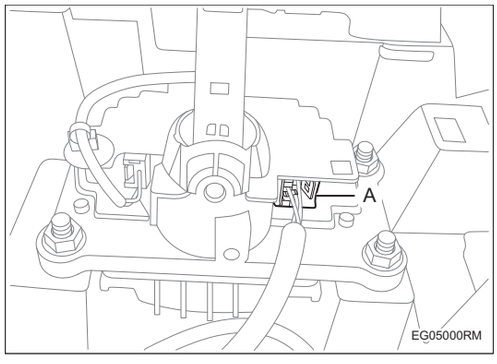
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove gearshift lever assembly**

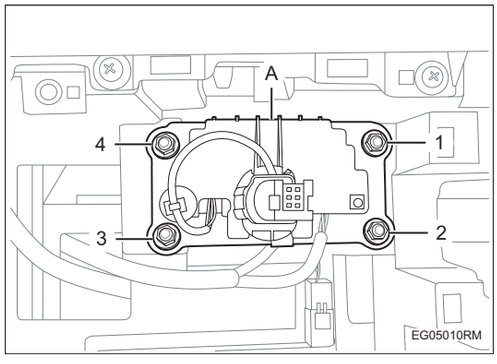


(a) Detach the claw and pull up gearshift lever assembly -A- in the direction of the movement arrow.

3. **Remove upper cover plate assembly (See page IP-17)**
4. **Remove EGSM assembly**



(a) Disconnect the EGSM assembly harness connector-A-.



(b) Remove the nuts -1-4- and remove the EGSM assembly -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

EG

Supplemental restraint system

Supplemental restraint RS-1
Precautions RS-1
Location of parts RS-4
System diagram RS-12
System description RS-14
Symptom chart RS-16
ECU terminal RS-17
DTC chart RS-18
B000111 ..... RS-23
B000112 ..... RS-23
B00011A RS-23
B00011B RS-23
B000156 ..... RS-23
B001011 ..... RS-34
B001012 ..... RS-34
B00101A RS-34
B00101B RS-34
B001056 ..... RS-34
B001311 ..... RS-44
B001312 ..... RS-44
B00131A RS-44
B00131B RS-44
B001356 ..... RS-44
B002011 ..... RS-54
B002012 ..... RS-54
B00201A RS-54
B00201B RS-54
B002056 ..... RS-54
B002111 ..... RS-64
B002112 ..... RS-64
B00211A RS-64
B00211B RS-64
B002156 ..... RS-64
B002811 ..... RS-71
B002812 ..... RS-71
B00281A RS-71
B00281B RS-71
B002856 ..... RS-71
B002911 ..... RS-81

B002912 .....RS-81
B00291A RS-81
B00291B RS-81
B002956 .....RS-81
B003011 .....RS-88
B003012 .....RS-88
B00301A RS-88
B00301B RS-88
B003056 .....RS-88
B003811 .....RS-95
B003812 .....RS-95
B00381A RS-95
B00381B RS-95
B003856 .....RS-95
B005012 .....RS-102
B005212 .....RS-104
B005312 .....RS-106
B1A0812 .....RS-106
B005412 .....RS-109
B1A0912 .....RS-109
B005512 .....RS-112
B1A0A12 .....RS-112
B007011 .....RS-115
B007012 .....RS-115
B00701A RS-115
B00701B RS-115
B007056 .....RS-115
B007211 .....RS-125
B007212 .....RS-125
B00721A RS-125
B00721B RS-125
B007256 .....RS-125
B007311 .....RS-135
B007312 .....RS-135
B00731A RS-135
B00731B RS-135
B007356 .....RS-135
B007511 .....RS-142
B007512 .....RS-142
B00751A RS-142
B00751B RS-142
B007556 .....RS-142
B007911 .....RS-149

B007912 ..... RS-149
B00791A RS-149
B00791B RS-149
B007956 ..... RS-149
B007A11 ..... RS-156
B007A12 ..... RS-156
B007A1A RS-156
B007A1B RS-156
B007A56 ..... RS-156
B009049 ..... RS-163
B009087 ..... RS-163
B009086 ..... RS-163
B009056 ..... RS-163
B009149 ..... RS-169
B009187 ..... RS-169
B009186 ..... RS-169
B009156 ..... RS-169
B009249 ..... RS-174
B009287 ..... RS-174
B009286 ..... RS-174
B009256 ..... RS-174
B009549 ..... RS-180
B009587 ..... RS-180
B009586 ..... RS-180
B009556 ..... RS-180
B009649 ..... RS-186
B009687 ..... RS-186
B009686 ..... RS-186
B009656 ..... RS-186
B009749 ..... RS-192
B009787 ..... RS-192
B009786 ..... RS-192
B009756 ..... RS-192
B1A0614 ..... RS-198
B1A0612 ..... RS-198
B1A0712 ..... RS-209
B1A0B00 ..... RS-211
B1A0C00 ..... RS-211
B1A0D00 ..... RS-211
B1A0E00 ..... RS-211
B1A0F00 ..... RS-211
B1A1000 ..... RS-211
B1A1149 ..... RS-211

B1A1100 .....RS-211
B1A1249 .....RS-211
B1A1209 .....RS-211
B1A1296 .....RS-211
B1A1200 .....RS-211
B1A1417 .....RS-213
B1A1516 .....RS-213
U000188 .....RS-216
U014687 .....RS-216
U010087 .....RS-216
U010187 .....RS-216
U029387 .....RS-216
U112187 .....RS-216
U114087 .....RS-216
U115587 .....RS-216
U124587 .....RS-216
U123587 .....RS-216
U113187 .....RS-216
U114687 .....RS-216
B1A1356 .....RS-217

ACU assembly RS-218
Parts RS-218
Removal RS-219
Installation RS-219

Side curtain airbag assembly RS-220
Parts RS-220
Removal RS-221
Installation RS-222

Front seat airbag RS-223
Parts RS-223
Removal RS-225
Installation RS-225

Front passenger airbag assembly RS-226
Parts RS-226
Removal RS-228
Installation RS-228

Acceleration impact sensor assembly RS-229
Parts RS-229
Remova RS-231
Installation RS-232

Driver knee airbag RS-233
Parts RS-233

Removal RS-234
Installation RS-234
Driver airbag assembly RS-235
Parts RS-235
On-board inspection RS-236
Removal RS-236
Installation RS-237
Rear seat airbag RS-238
Parts RS-238
Removal RS-239
Installation RS-239
Pressure side impact sensor assembly RS-240
Parts RS-240
Removal RS-241
Installation RS-241

Supplemental restraint

Precautions

1. ENGINE START/STOP button (ignition switch) representation:

Representation	Ignition switch (location)	ENGINE START/ STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON position	ON	On (IG)
Engine start	START	On (start)

2. Some systems require initialization when reconnecting after disconnecting the battery cable.

3. When repairing the SRS, it is necessary to pay attention to the cleaning of harnesses and connectors of electrical components. When disconnecting the connector, the connector and electrical components shall be protected to prevent foreign matters from entering and affecting the normal operation of the system. (For example, abnormal airbag resistance is caused)

4. General precautions

(a) The airbag assembly and pretensioner shall not be removed at will. If necessary, they shall be disassembled and assembled by professional maintenance personnel.

(b) Do not change the airbag assembly and pretensioner and their surrounding layout without authorization.

(c) Disconnect the battery negative terminal.

(1) First check the DTC, then turn off the ignition switch, and disconnect the negative terminal of the battery and wait for 90 seconds before starting the operation.

(d) When removing and installing the airbag assembly, the upper surface (marked side) of the airbag shall face upward. Do not place the airbag on another airbag during storage. (If the metal surface of the airbag is placed upward, once the airbag accidentally explodes, it will lead to a serious accident)

(e) The battery negative terminal shall be disconnected for more than 90 seconds before electric welding operations.

(f) Eliminate SRS faults in time, otherwise serious consequences will occur. One is that when the car is in a serious collision and the airbag needs to be deployed for protection, it cannot work; The other is that in the normal operation of the vehicle, the airbag should not work, but suddenly deploy, causing undue accidental injuries to the driver and passengers, and even safety accidents.

(g) It is prohibited to measure the resistance of SRS parts. (It may cause the airbag to deploy accidentally, which is very dangerous)

(h) Do not apply butter to the airbag assembly and do not wash it with any type of detergent.

(i) Avoid accidental bumps and vibrations. Airbag assembly sensor and other components are sensitive to collision and impact, thus collision and impact shall be avoided as much as possible to avoid unnecessary sudden deployment of airbag assembly and pretensioner.

(j) Keep airbag assembly components in strict accordance with the specifications. Inflammable and explosive materials such as gunpowder and detonator in the airbag assembly must be transported and stored in strict accordance with the specifications, otherwise serious consequences will be caused.

(k) When the vehicle is abandoned or the airbag is abandoned separately, the airbag shall first be deployed with a special tool:

  (1) It is strictly forbidden to discard it without opening.

  (2) Be sure to deploy the airbag and pretensioner in a safe and flat place outdoors. Try not to do it in residential areas.

  (3) The explosion sound when the airbag and pretensioner are deployed is very loud, so the surrounding people must be informed in advance.

(l) Pay attention to daily check. Mainly check whether each fixed impact sensor is firm, whether the ground wires are clean, whether the connection is reliable, etc.

(m) The airbag must be used in conjunction with the seat belt. Airbags are passive safety devices and can only be used in conjunction with seat belts to achieve satisfactory safety protection, so you must wear your seat belt when the car is running.

5. Precautions for clock spring

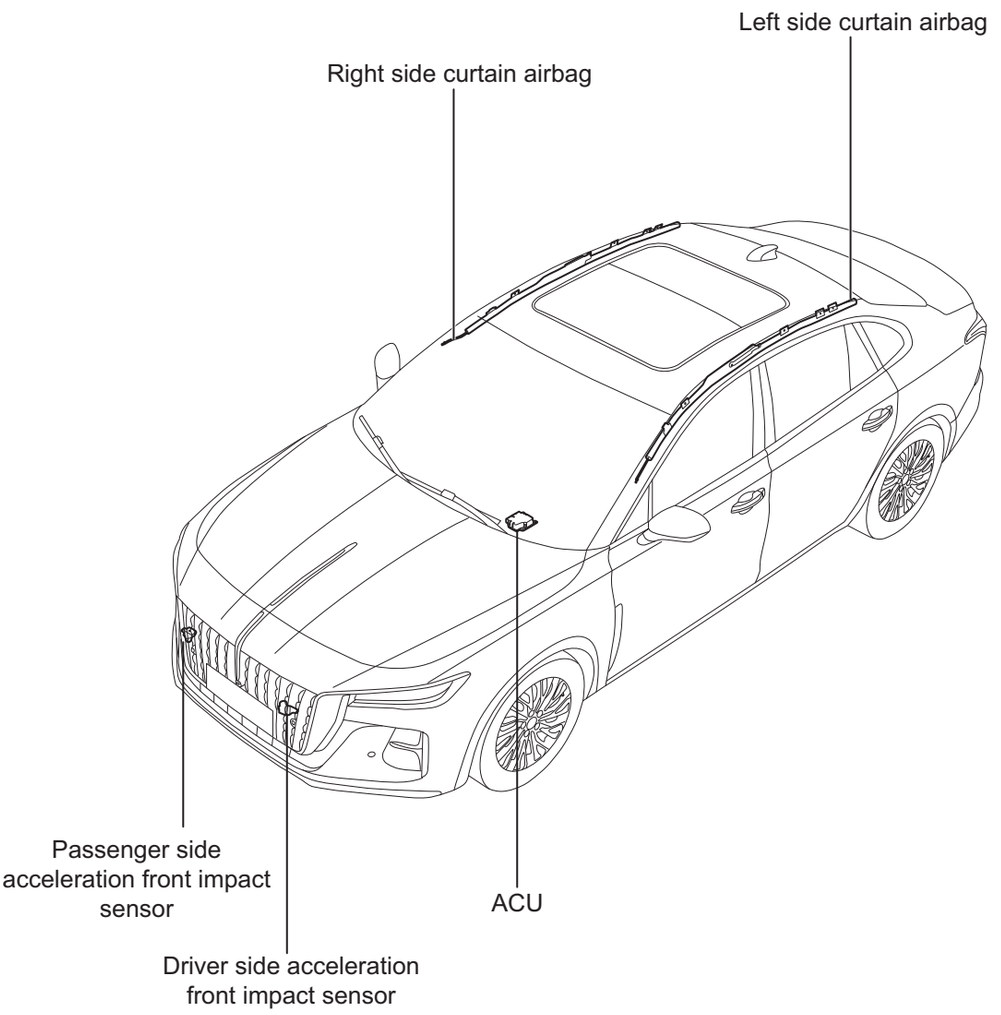
(a) When installing the clock spring and removing the steering wheel body, align the center point of the clock spring.

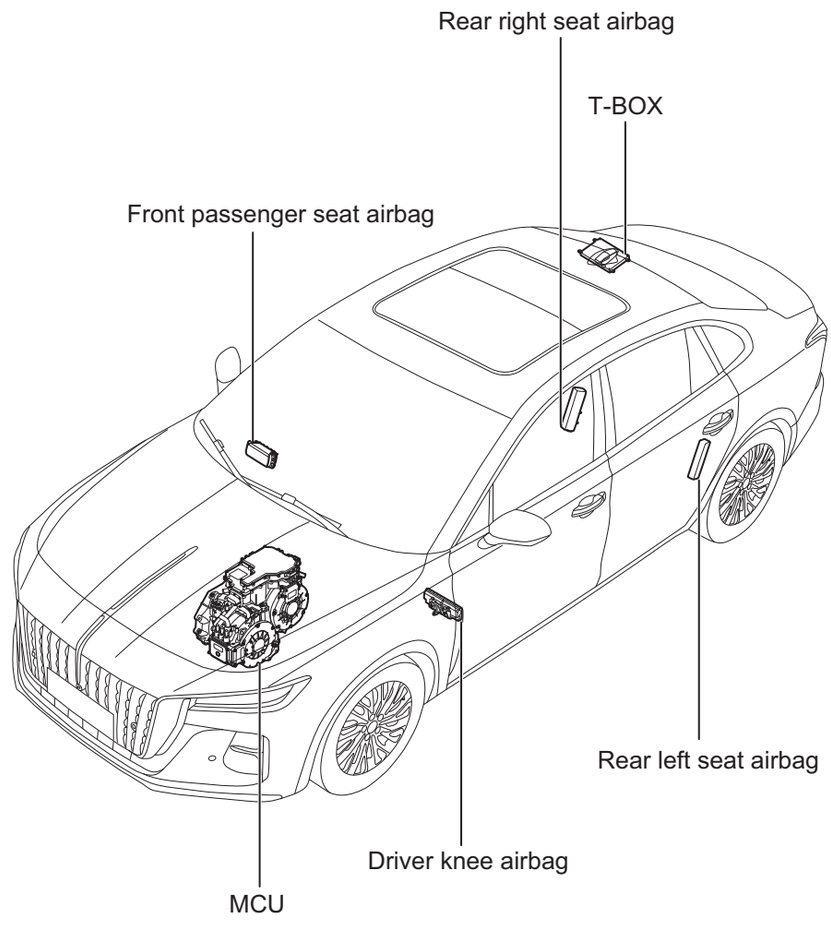
Caution:

If the steering wheel body is installed or removed at the wrong center point, it may cause open circuit of the clock spring.

Location of parts

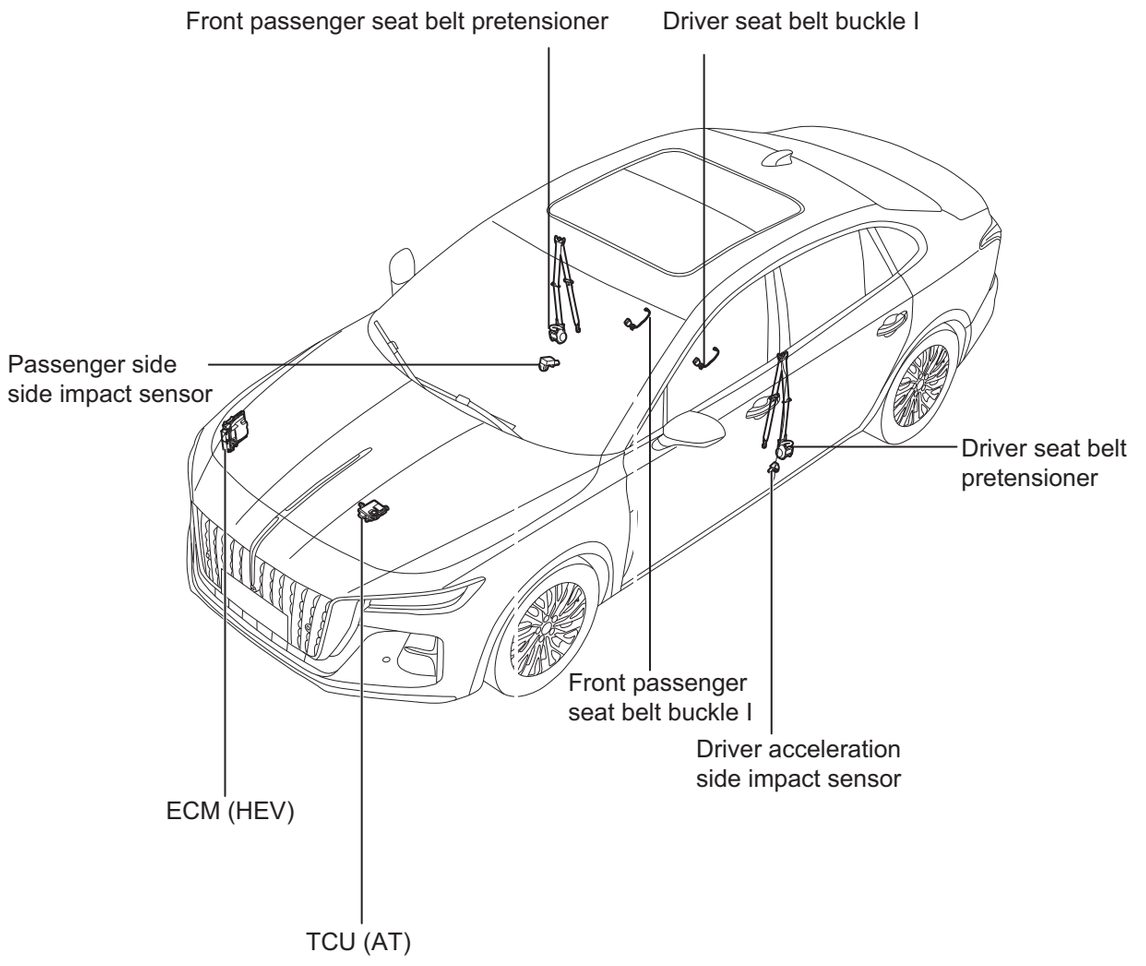
RS

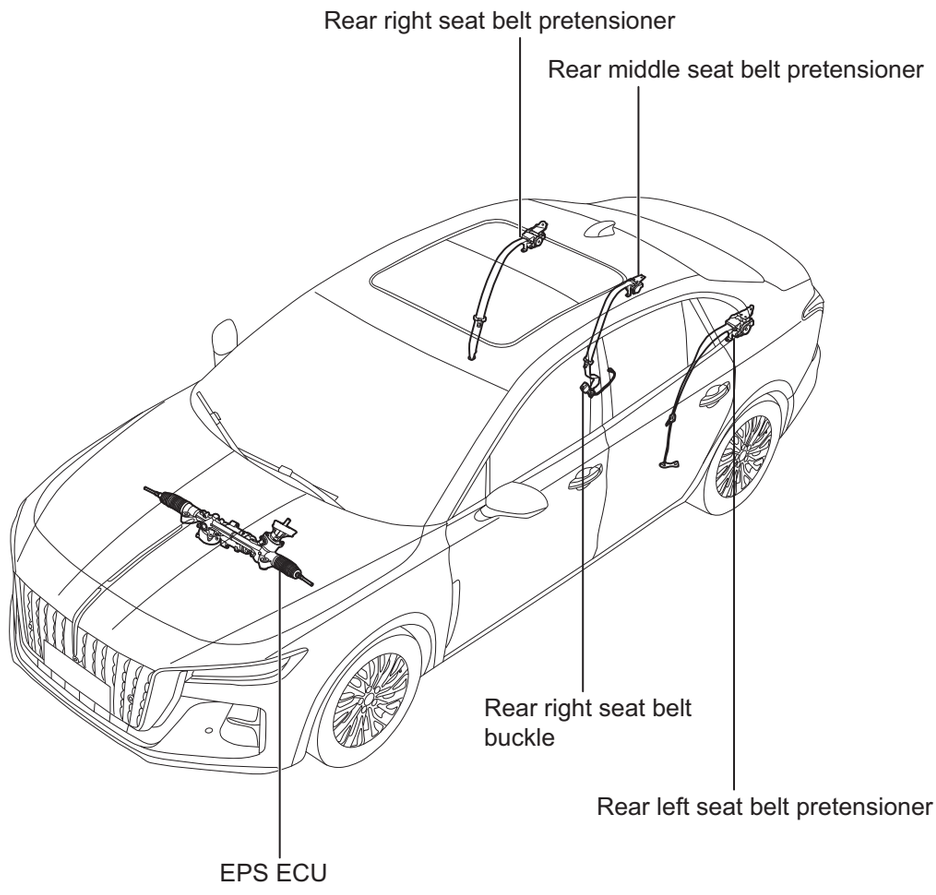



Rear right seat airbag
T-BOX
Front passenger seat airbag
Rear left seat airbag
Driver knee airbag
MCU

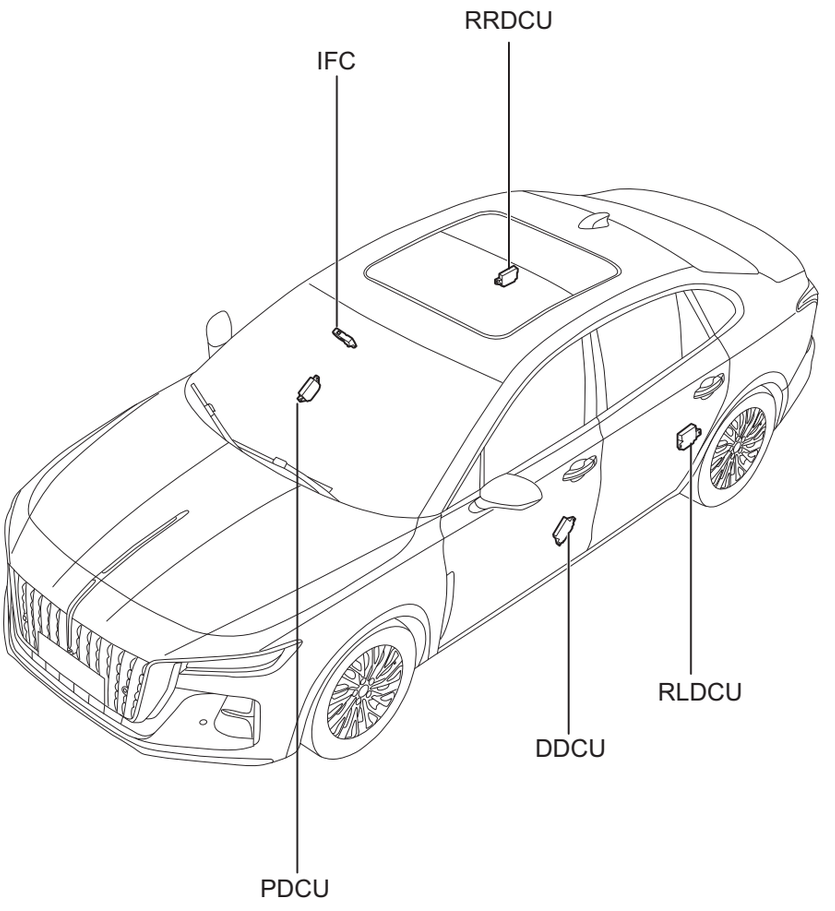
RS04520RM

RS

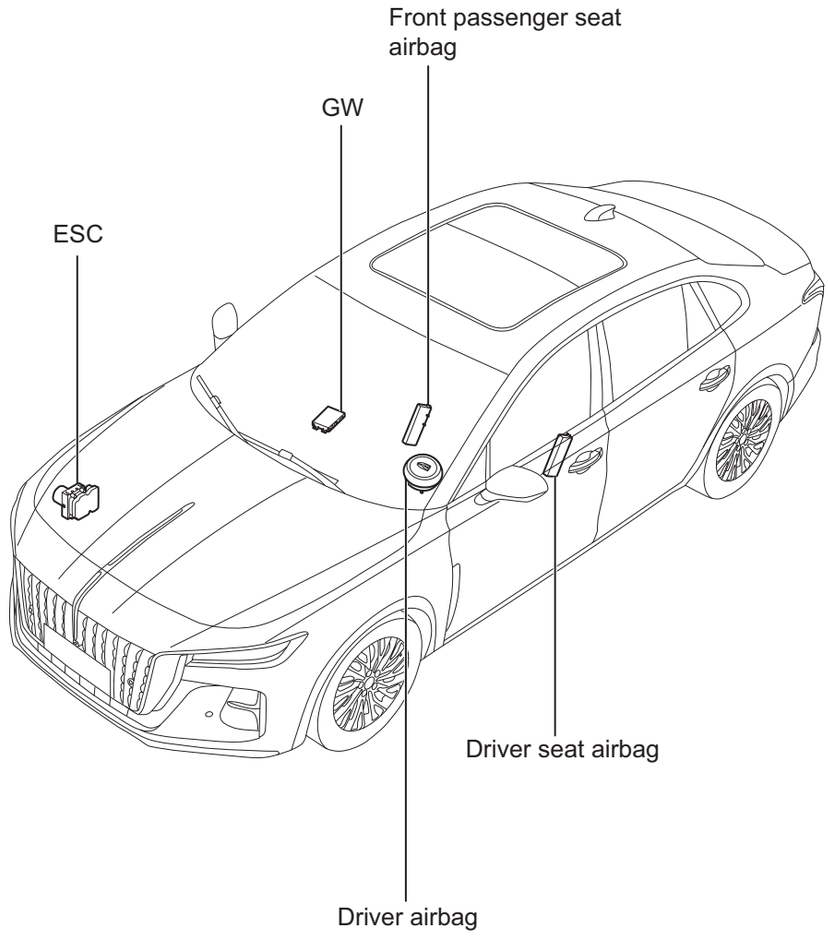

Front passenger seat belt pretensioner
Driver seat belt buckle I
Passenger side
side impact sensor
Driver seat belt
pretensioner
Front passenger
seat belt buckle I
Driver acceleration
side impact sensor
ECM (HEV)
TCU (AT)
RS04530RM


Rear right seat belt pretensioner
Rear middle seat belt pretensioner
Rear right seat belt buckle
Rear left seat belt pretensioner
EPS ECU

RS04540RM

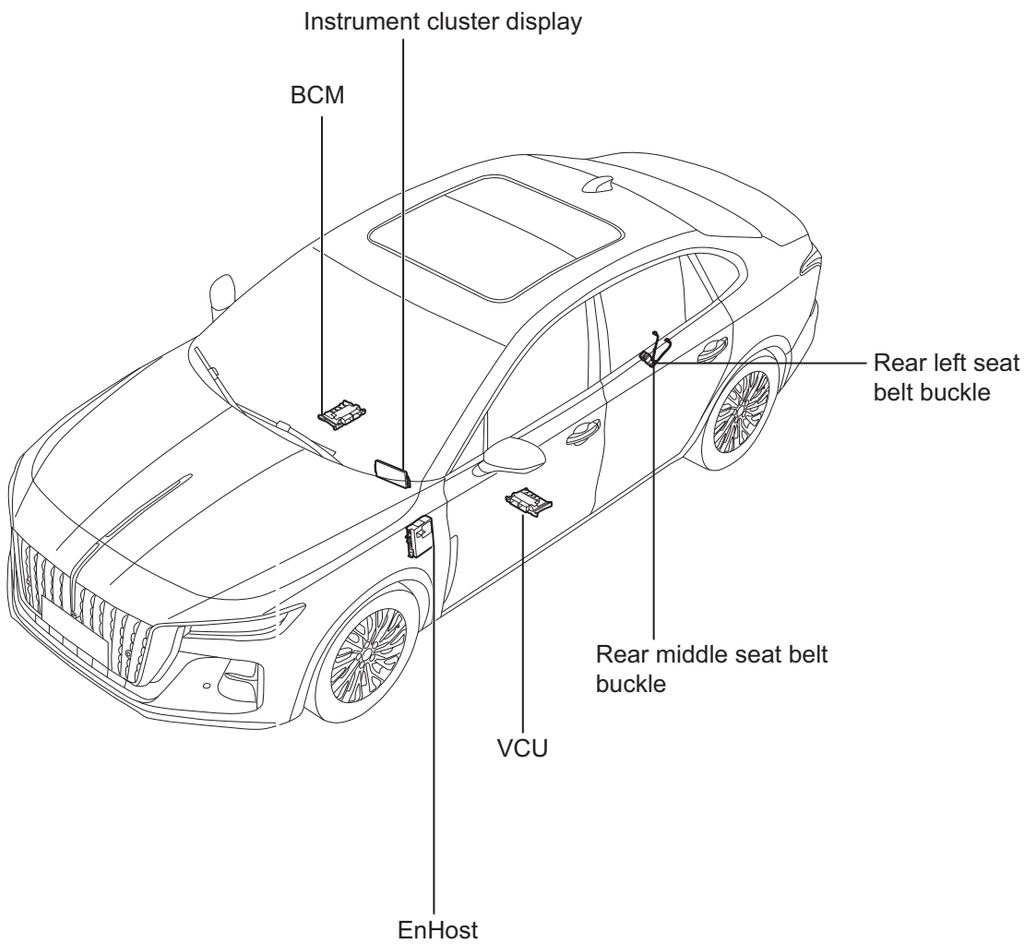


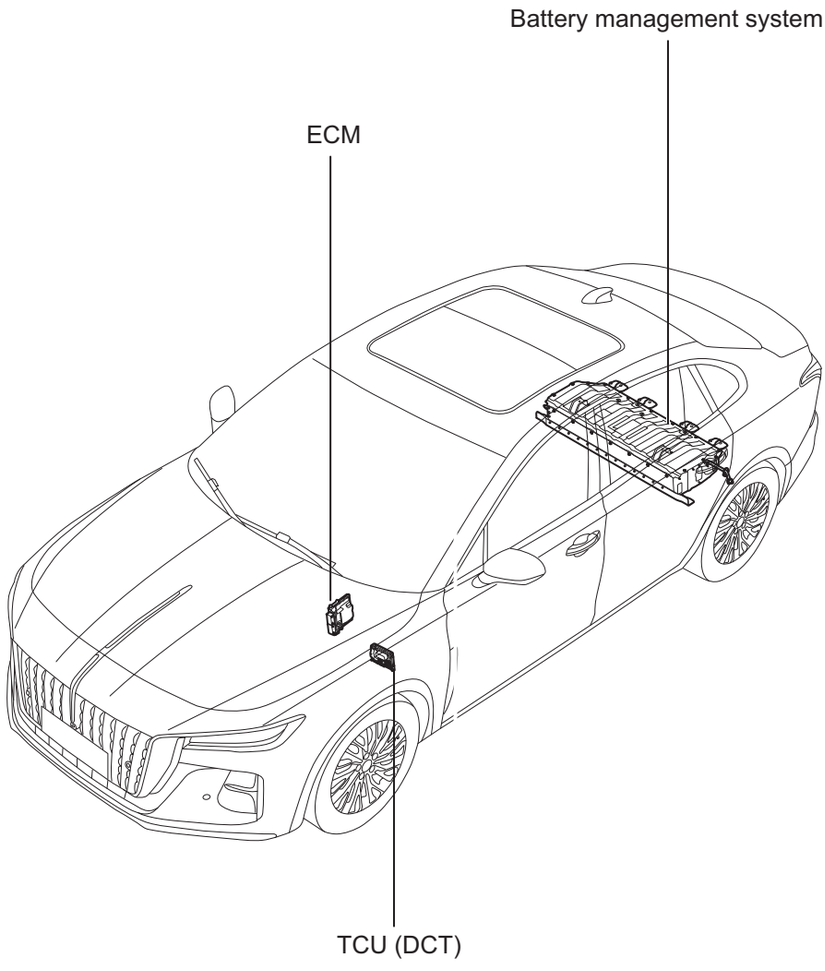
RS04550RM


Front passenger seat airbag
GW
ESC
Driver seat airbag
Driver airbag

RS04560RM

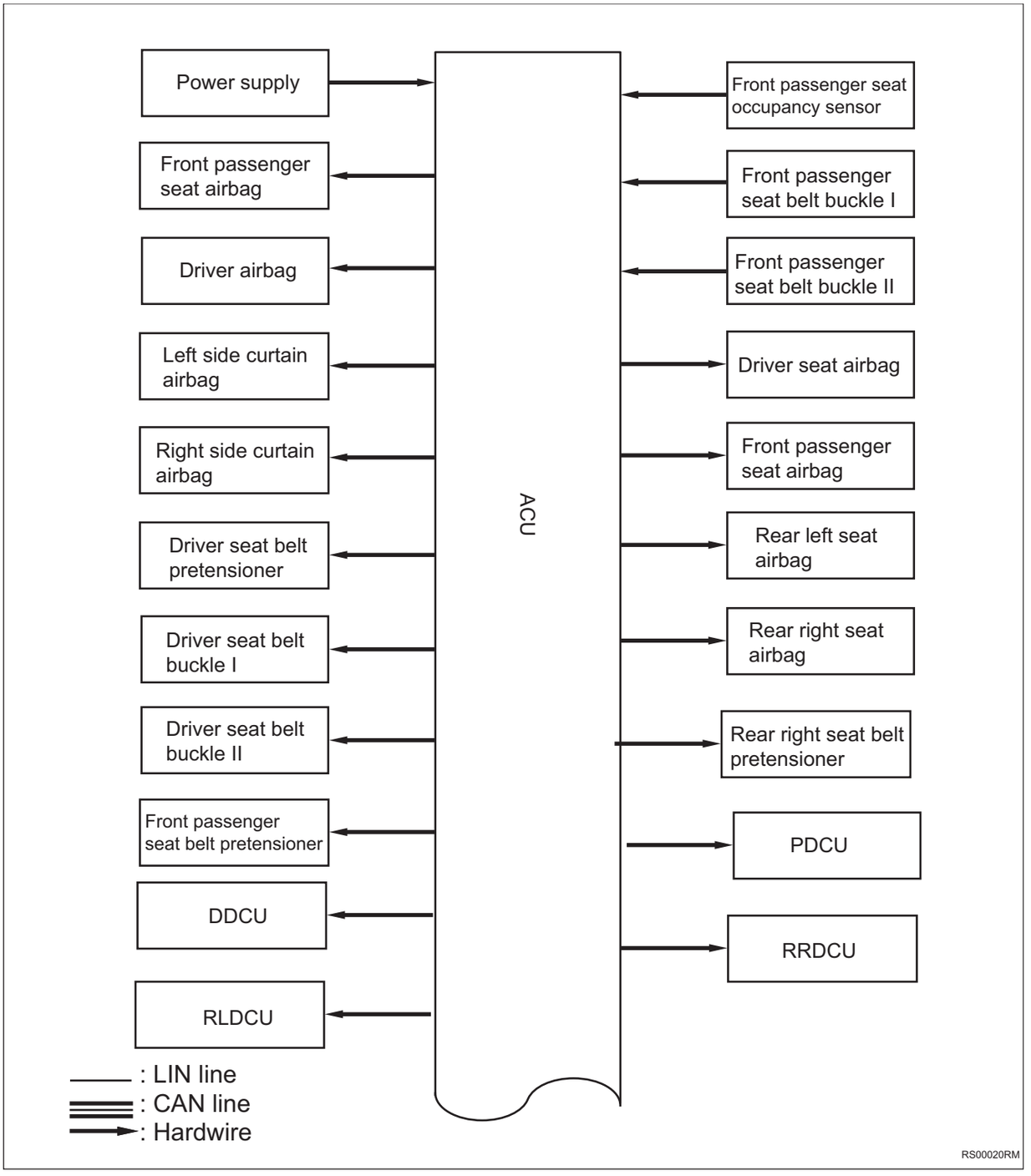
RS


Instrument cluster display
BCM
Rear left seat belt buckle
Rear middle seat belt buckle
VCU
EnHost
RS04570RM

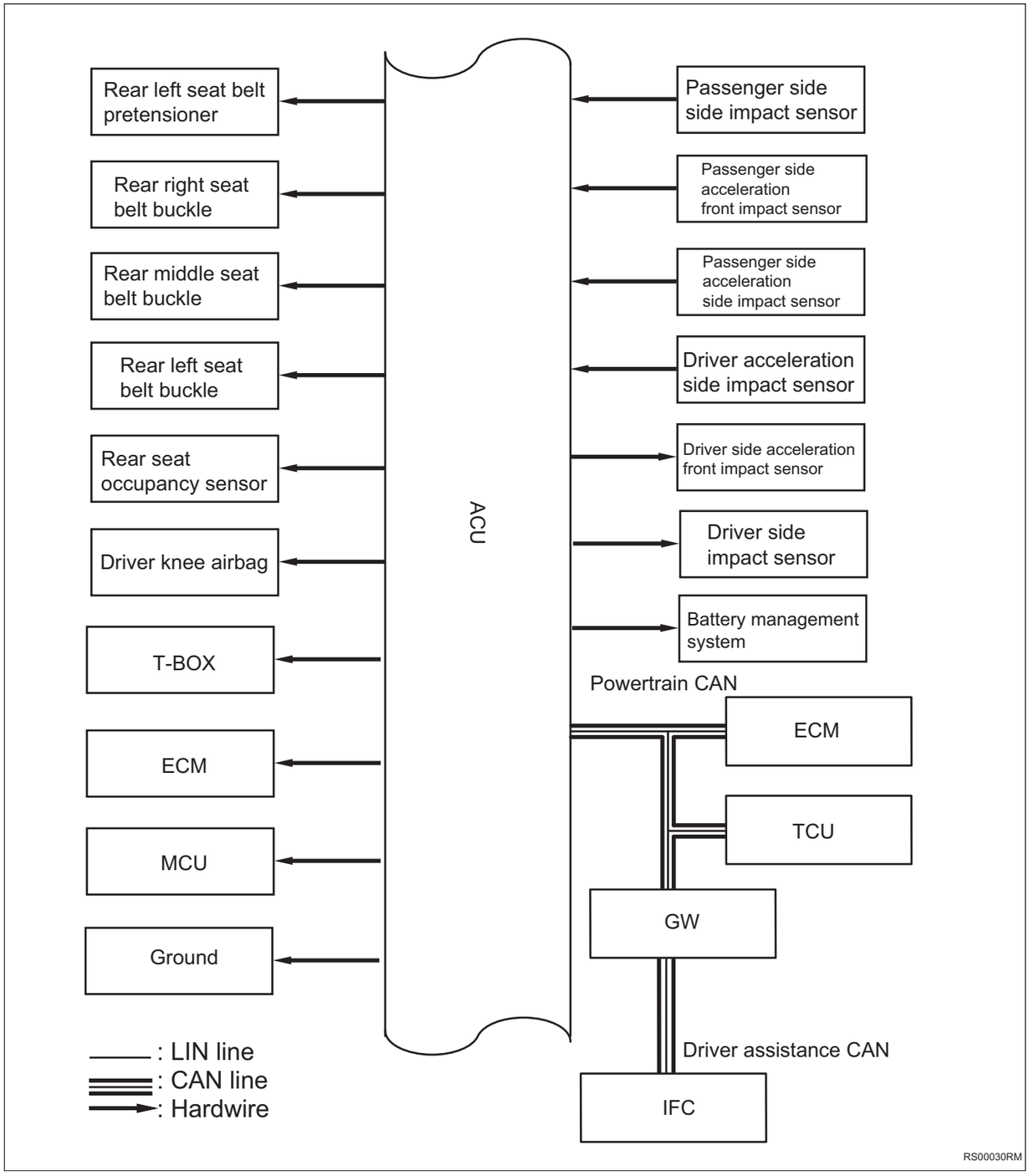

Battery management system
ECM
TCU (DCT)
RS04580RM

System diagram

RS

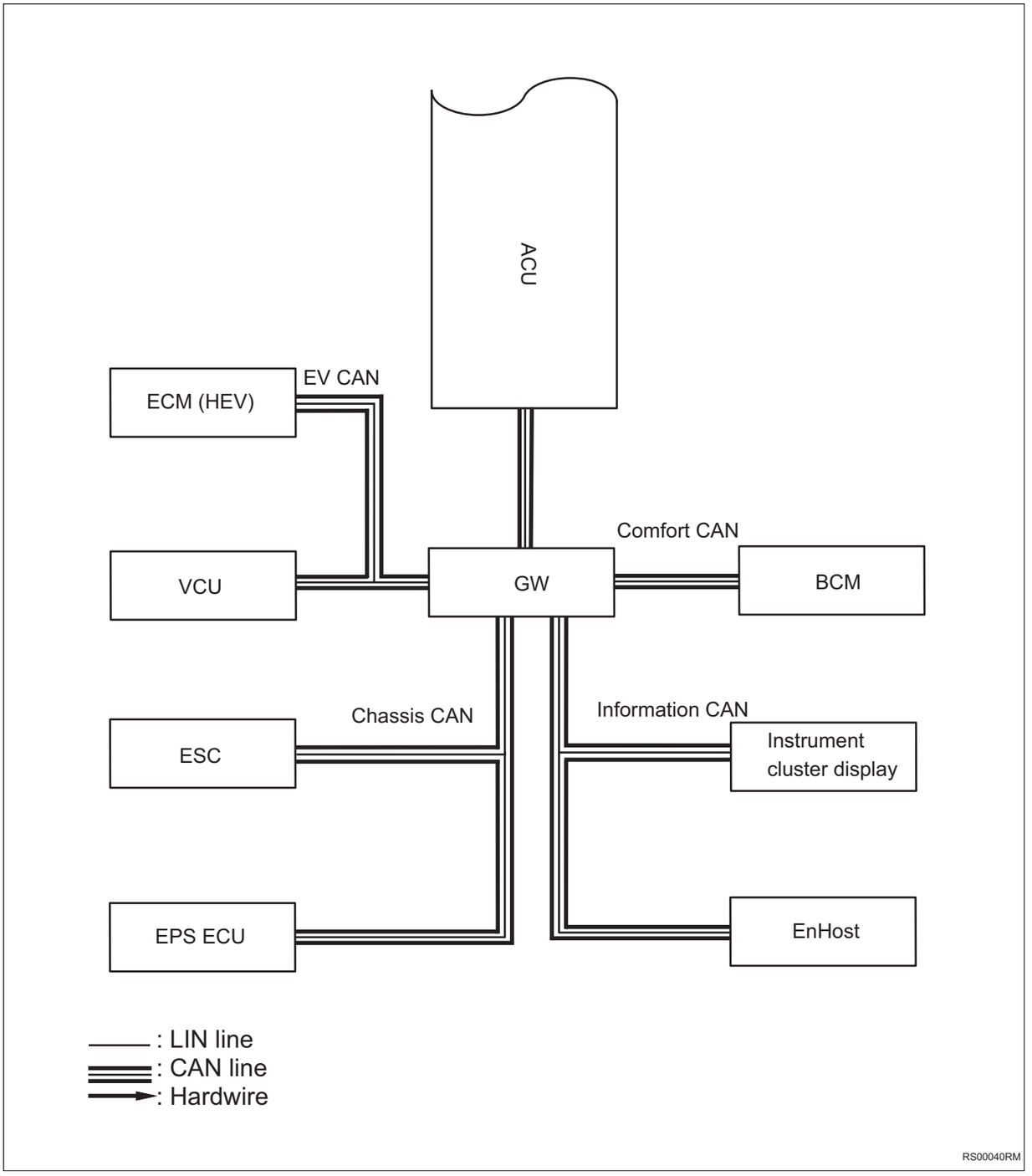


System diagram



System diagram

RS



System description

1. ACU function overview

(a) The ACU is the center of the entire restraint system. It can sense the acceleration changes of the vehicle during the frontal and side impact, and then control the corresponding detonating components. Minimize the injuries of the driver and passengers in the vehicle to achieve the purpose of protecting the occupants in the vehicle.

2. System fault warning function

(a) The SRS fault warning lamp is located inside the IPC. The drive current of the system fault warning lamp is provided by the pull-up power supply inside the IPC. The ACU airbag control unit does not provide this voltage.

3. Vehicle speed signal receiving function

(a) The ACU obtains vehicle speed signal related information through the CAN bus. The ACU will sample this signal at the time of impact and will record this signal in the EDR (event data record).

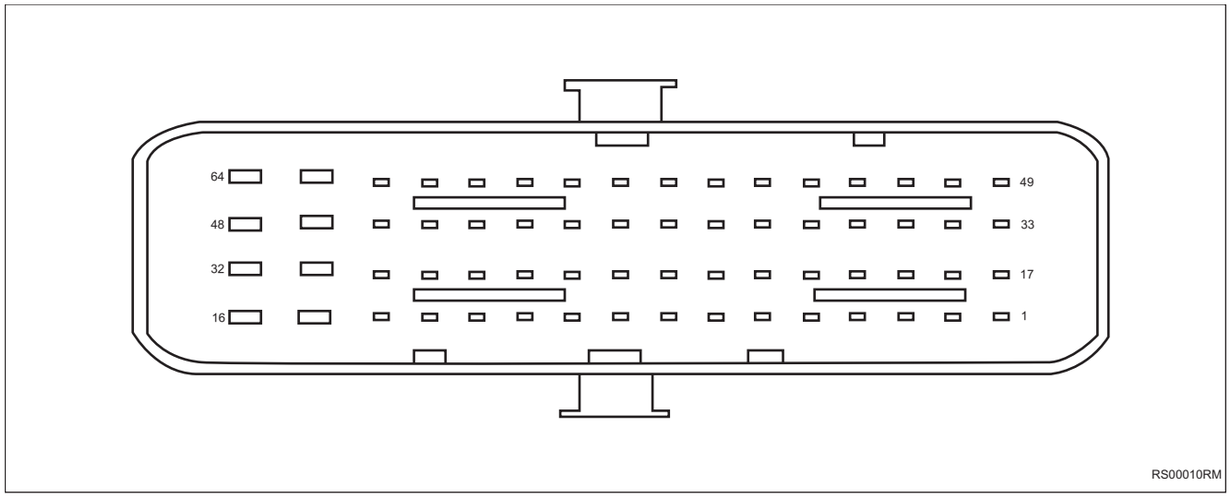
4. Collision output

(a) When the ACU senses an impact signal and deploys any safety device, the ACU shall send an impact signal to BCM and EMS to unlock the door lock and cut off the fuel circuit for the safety of personnel in the vehicle.

Symptom chart

Fault	Possible location
When the ignition switch is turned on (IG), the SRS fault indicator lamp does not light up	• SRS fault indicator lamp circuit fault
Failure to read DTC	• Diagnostic circuit
The SRS fault indicator lamp is always on even if no DTC is output	• SRS fault indicator lamp circuit fault

ECU terminal



ACU			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	CAN high	33	Driver airbag low
2	Driver knee airbag high	34	Driver seat belt end plate pretensioner low
3	Left side impact acceleration sensor (-)	35	Driver seat belt retractor pretensioner low
4	Left pressure side impact sensor (+)	36	Left side curtain airbag low
5	Left pressure side impact sensor (-)	37	Front passenger airbag low
6	Right pressure side impact sensor (+)	38	Right side curtain airbag low
7	Right pressure side impact sensor (-)	39	Front passenger side airbag low
8	Left front impact acceleration sensor (+)	40	Rear left seat belt pretensioner low
9	Left front impact acceleration sensor (-)	41	Rear left side airbag low
10	—	42	Front passenger seat belt end plate pre-tensioner low
11	—	43	Rear right side seat belt pretensioner low
12	Driver seat belt buckle switch	44	Driver side airbag low
13	Rear middle seat belt buckle switch	45	Front passenger seat belt retractor pre-tensioner low
14	Rear right seat belt buckle switch	46	Rear right side airbag low
15	—	47	—
16	Ground	48	—
17	CAN low	49	Driver airbag high
18	Driver knee airbag low	50	Driver seat belt end plate pretensioner high
19	Left side impact acceleration sensor (+)	51	Driver seat belt retractor pretensioner high
20	Right side impact acceleration sensor (-)	52	Left side curtain airbag high

ACU			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
21	Right side impact acceleration sensor (+)	53	Front passenger airbag high
22	Rear right seat occupancy sensor	54	Right side curtain airbag high
23	Rear middle seat occupancy sensor	55	Front passenger side airbag high
24	Front passenger seat occupancy sensor	56	Rear left seat belt pretensioner high
25	Rear left seat occupancy sensor	57	Rear left side airbag high
26	Right front impact acceleration sensor (+)	58	Front passenger seat belt end plate pretensioner high
27	Right front impact acceleration sensor (-)	59	Rear right seat belt pretensioner high
28	Front passenger seat belt buckle switch	60	Driver side airbag high
29	Rear left seat belt buckle switch	61	Front passenger seat belt retractor pretensioner high
30	—	62	Rear right side airbag high
31	—	63	—
32	Impact signal hardwire output	64	KL15

DTC chart

DTC	Description	Reference page
B000111	Driver frontal airbag -circuit shorted to ground	(See page RS-23)
B000112	Driver frontal airbag -circuit shorted to battery	(See page RS-23)
B00011A	Driver frontal airbag -low resistance	(See page RS-23)
B00011B	Driver frontal airbag -high resistance	(See page RS-23)
B000156	Driver frontal airbag -configuration error	(See page RS-23)
B001011	Front passenger frontal airbag -circuit shorted to ground	(See page RS-34)
B001012	Front passenger frontal airbag -circuit shorted to battery	(See page RS-34)
B00101A	Front passenger frontal airbag-too low resistance	(See page RS-34)
B00101B	Front passenger frontal airbag- too high resistance	(See page RS-34)
B001056	Front passenger frontal airbag-configuration error	(See page RS-34)
B002011	Left side airbag -circuit shorted to ground	(See page RS-54)
B002012	Left side airbag-shorted to battery	(See page RS-54)
B00201A	Left side airbag-too low resistance	(See page RS-54)
B00201B	Left side airbag-too high resistance	(See page RS-54)
B002056	Left side airbag-configuration error	(See page RS-54)
B002811	Right side airbag -circuit shorted to ground	(See page RS-71)

DTC	Description	Reference page
B002812	Right side airbag-shorted to battery	(See page RS-71)
B00281A	Right side airbag-too low resistance	(See page RS-71)
B00281B	Right side airbag-too high resistance	(See page RS-71)
B002856	Right side airbag -configuration error	(See page RS-71)
B003011	Rear left side airbag -circuit shorted to ground	(See page RS-88)
B003012	Rear left side airbag- shorted to battery	(See page RS-88)
B00301A	Rear left side airbag-low resistance	(See page RS-88)
B00301B	Rear left side airbag- high resistance	(See page RS-88)
B003056	Rear left side airbag-configuration error	(See page RS-88)
B003811	Rear right side airbag -circuit shorted to ground	(See page RS-95)
B003812	Rear right side airbag- shorted to battery	(See page RS-95)
B00381A	Rear right side airbag-low resistance	(See page RS-95)
B00381B	Rear right side airbag-high resistance	(See page RS-95)
B003856	Rear right side airbag-configuration error	(See page RS-95)
B002111	Left side curtain airbag - circuit shorted to ground	(See page RS-64)
B002112	Left side curtain airbag-shorted to battery	(See page RS-64)
B00211A	Left side curtain airbag-too low resistance	(See page RS-64)
B00211B	Left side curtain airbag - high resistance	(See page RS-64)
B002156	Left side curtain airbag - configuration error	(See page RS-64)
B002911	Right side curtain airbag -circuit shorted to ground	(See page RS-81)
B002912	Right side curtain airbag-shorted to battery	(See page RS-81)
B00291A	Right side curtain airbag-too low resistance	(See page RS-81)
B00291B	Right side curtain airbag - high resistance	(See page RS-81)
B002956	Right side curtain airbag -configuration error	(See page RS-81)
B001311	Driver knee airbag-circuit shorted to ground	(See page RS-44)
B001312	Driver knee airbag-circuit shorted to battery	(See page RS-44)
B00131A	Driver knee airbag-low resistance	(See page RS-44)
B00131B	Driver knee airbag-high resistance	(See page RS-44)
B001356	Driver knee airbag-configuration error	(See page RS-44)
B007911	Driver pretensioner seat belt retractor-circuit shorted to ground	(See page RS-149)
B007912	Driver pretensioner seat belt retractor-circuit shorted to battery	(See page RS-149)
B00791A	Driver pretensioner seat belt retractor-resistance low	(See page RS-149)
B00791B	Driver pretensioner seat belt retractor-resistance high	(See page RS-149)
B007956	Driver pretensioner seat belt retractor-configuration error	(See page RS-149)

DTC	Description	Reference page
B007011	Driver pretensioner seat belt anchor-circuit shorted to ground	(See page RS-115)
B007012	Driver pretensioner seat belt anchor-circuit shorted to battery	(See page RS-115)
B00701A	Driver pretensioner seat belt anchor-resistance too low	(See page RS-115)
B00701B	Driver pretensioner seat belt anchor-resistance too high	(See page RS-115)
B007056	Driver pretensioner seat belt anchor-configuration error	(See page RS-115)
B007A11	Front passenger pretensioner seat belt retractor-circuit shorted to ground	(See page RS-156)
B007A12	Front passenger pretensioner seat belt retractor-circuit shorted to battery	(See page RS-156)
B007A1A	Front passenger pretensioner seat belt retractor- resistance low	(See page RS-156)
B007A1B	Front passenger pretensioner seat belt retractor- resistance too high	(See page RS-156)
B007A56	Front passenger pretensioner seat belt retractor- configuration error	(See page RS-156)
B007211	Front passenger pretensioner seat belt anchor -circuit shorted to ground	(See page RS-125)
B007212	Front passenger pretensioner seat belt anchor -circuit shorted to battery	(See page RS-125)
B00721A	Front passenger pretensioner seat belt anchor - resistance too low	(See page RS-125)
B00721B	Front passenger pretensioner seat belt anchor - resistance too high	(See page RS-125)
B007256	Front passenger pretensioner seat belt anchor- configuration error	(See page RS-125)
B007311	Rear left pretensioner seat belt retractor -circuit shorted to ground	(See page RS-135)
B007312	Rear left pretensioner seat belt retractor- circuit shorted to battery	(See page RS-135)
B00731A	Rear left pretensioner seat belt retractor-resistance low	(See page RS-135)
B00731B	Rear left pretensioner seat belt retractor-resistance high	(See page RS-135)
B007356	Rear left pretensioner seat belt retractor-configuration error	(See page RS-135)
B007511	Rear right pretensioner seat belt retractor retractor- short circuit to ground	(See page RS-142)
B007512	Rear right pretensioner seat belt retractor -circuit shorted to battery	(See page RS-142)
B00751A	Rear right pretensioner seat belt retractor-resistance low	(See page RS-142)
B00751B	Rear right pretensioner seat belt retractor-resistance high	(See page RS-142)
B007556	Rear right pretensioner seat belt retractor-configuration error	(See page RS-142)

DTC	Description	Reference page
B009049	Left front impact sensor-internal fault	(See page RS-163)
B009087	Left front impact sensor-communication loss	(See page RS-163)
B009086	Left front impact sensor-data transmission failure	(See page RS-163)
B009056	Left front impact sensor-configuration error	(See page RS-163)
B009549	Right front impact sensor-internal fault	(See page RS-180)
B009587	Right front impact sensor-communication loss	(See page RS-180)
B009586	Right front impact sensor-data transmission failure	(See page RS-180)
B009556	Right front impact sensor-configuration error	(See page RS-180)
B009149	Left side impact sensor-internal fault	(See page RS-169)
B009187	Left side impact sensor-communication loss	(See page RS-169)
B009186	Left side impact sensor-data transmission failure	(See page RS-169)
B009156	Left side impact sensor-configuration error	(See page RS-169)
B009649	Right side impact sensor-internal fault	(See page RS-186)
B009687	Right side impact sensor-communication loss	(See page RS-186)
B009686	Right side impact sensor-data transmission failure	(See page RS-186)
B009656	Right side impact sensor-configuration error	(See page RS-186)
B009249	Left side pressure sensor-internal fault	(See page RS-174)
B009287	Left side pressure impact sensor-communication loss	(See page RS-174)
B009286	Left side pressure impact sensor-data transmission failure	(See page RS-174)
B009256	Left side pressure sensor-configuration error	(See page RS-174)
B009749	Right side pressure sensor-internal fault	(See page RS-192)
B009787	Right side pressure sensor-communication loss	(See page RS-192)
B009786	Right side pressure sensor-data transmission failure	(See page RS-192)
B009756	Right side pressure sensor-configuration error	(See page RS-192)
B1A0614	Hardwire crash output - circuit shorted to ground or open circuit	(See page RS-198)
B1A0612	Hardwire collision output - shorted to battery	(See page RS-198)
B005012	Driver side seat belt buckle circuit shorted to power supply	(See page RS-102)
B005212	Front passenger side seat belt buckle circuit shorted to power supply	(See page RS-104)
B005312	Rear left seat belt buckle circuit shorted to power supply	(See page RS-106)
B005412	Rear middle seat belt buckle circuit shorted to power supply	(See page RS-109)

DTC	Description	Reference page
B005512	Rear right seat belt buckle circuit shorted to power supply	(See page RS-112)
B1A0712	Front passenger occupancy sensor circuit shorted to power supply	(See page RS-209)
B1A0812	Rear left occupant detection sensor circuit shorted to power supply	(See page RS-106)
B1A0912	(a) Rear middle occupant detection sensor circuit shorted to power supply.	(See page RS-109)
B1A0A12	Rear right occupant detection sensor circuit shorted to power supply	(See page RS-112)
B1A0B00	Deployment data record full: no writable space	(See page RS-211)
B1A0C00	Existence of front deployment data record	(See page RS-211)
B1A0D00	Existence of side deployment data record	(See page RS-211)
B1A0E00	Existence of side deployment data record	(See page RS-211)
B1A0F00	Existence of rear deployment data record	(See page RS-211)
B1A1000	Existence of pedestrian protection deployment data record	(See page RS-211)
B1A1149	SDM internal IMU fault	(See page RS-211)
B1A1100	SDM internal IMU EOL fault	(See page RS-211)
B1A1249	SDM internal power failure	(See page RS-211)
B1A1209	SDM internal fault -acceleration sensor	(See page RS-211)
B1A1296	SDM internal fault - ignition circuit	(See page RS-211)
B1A1200	SDM internal fault-control function module	(See page RS-211)
B1A1417	Battery voltage high	(See page RS-213)
B1A1516	Battery voltage low	(See page RS-213)
U000188	Powertrain CAN bus off	(See page RS-216)
U014687	GW node lost	(See page RS-216)
U010087	ECM node lost	(See page RS-216)
U010187	TCU node lost	(See page RS-216)
U029387	HCU node lost	(See page RS-216)
U112187	ESP message lost	(See page RS-216)
U114087	BCM 1 message lost	(See page RS-216)
U115587	Instrument cluster control unit message lost	(See page RS-216)
U124587	IVI message lost	(See page RS-216)
U123587	IFC message lost	(See page RS-216)
U113187	EPS ECU message lost	(See page RS-216)
U114687	GW message lost	(See page RS-216)
B1A1356	Internal system configuration mismatch	(See page RS-216)

DTC	**B000111**	**Driver frontal airbag -circuit shorted to ground**
DTC	**B000112**	**Driver frontal airbag -circuit shorted to battery**
DTC	**B00011A**	**Driver frontal airbag -low resistance**
DTC	**B00011B**	**Driver frontal airbag -high resistance**
DTC	**B000156**	**Driver frontal airbag -configuration error**

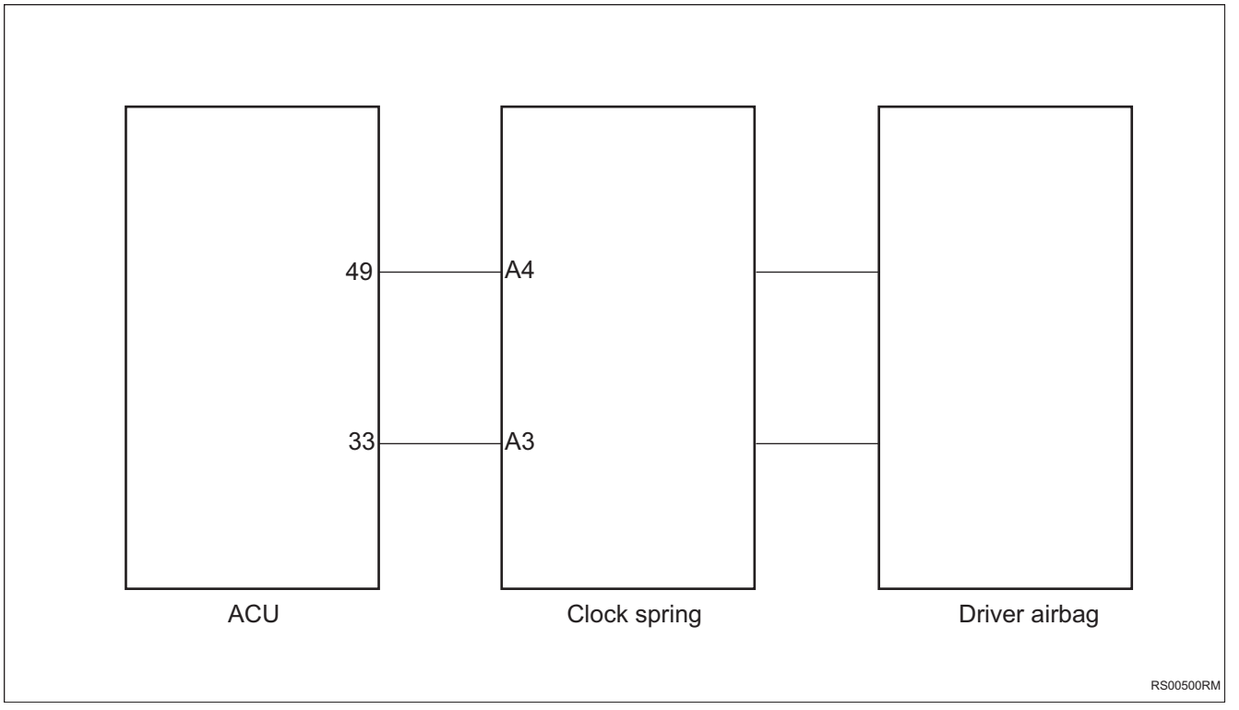
Description

When the driver frontal airbag ignition circuit is open, shorted, has configuration error, too high or too low resistance, the ACU will record the DTC.

DTC	DTC detection conditions	Faulty location
B000111	(a) Driver frontal airbag circuit shorted to ground.	• Clock spring • Driver airbag • ACU • Harness and connector
B000112	(a) Driver frontal airbag circuit shorted to power supply.	• Clock spring • Driver airbag • ACU • Harness and connector
B00011A	(a) The driver frontal airbag circuit resistance is less than lower limit.	• Clock spring • Driver airbag • ACU • Harness and connector
B00011B	(a) The driver frontal airbag circuit resistance is higher than the upper limit.	• Clock spring • Driver airbag • ACU • Harness and connector
B000156	(a) Driver frontal airbag configuration error.	• Clock spring • Driver airbag • ACU • Harness and connector

RS

Circuit diagram



Inspection procedure

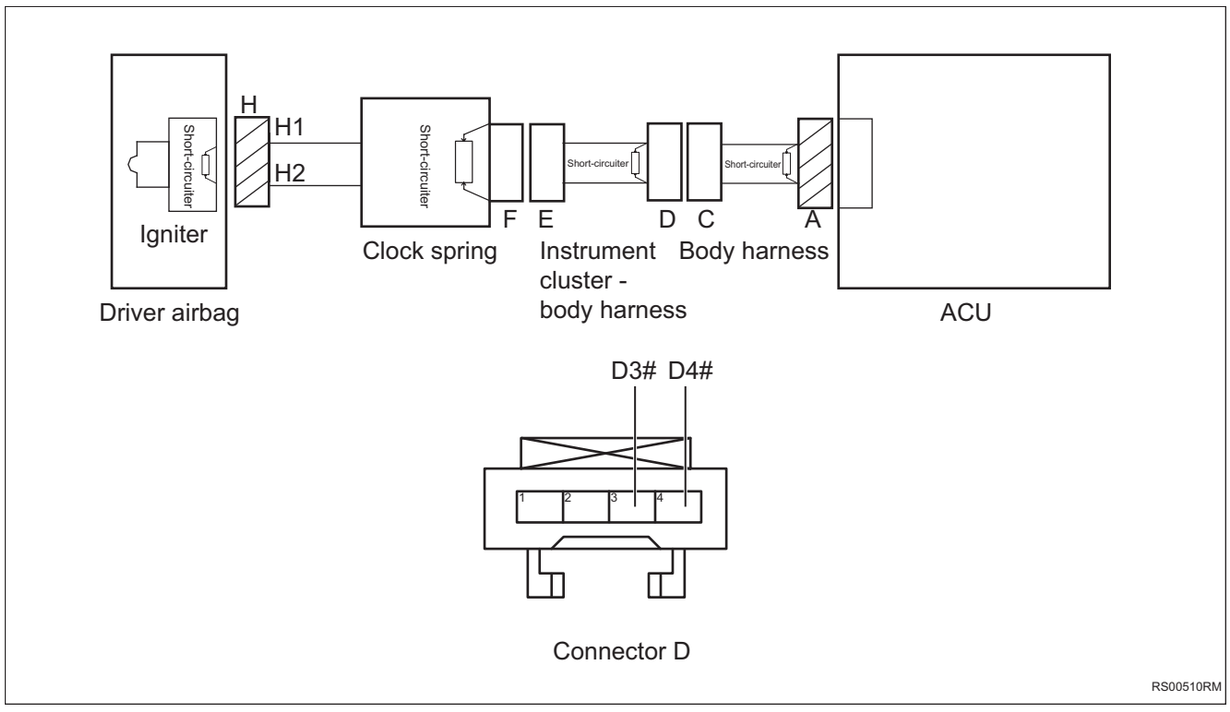
1	**Check the part number of the driver airbag**

(a) Check if the part number of the driver airbag is correct.

NG → **Replace the airbag with one of the correct model**

OK

2	**Check driver airbag harness and connector for circuit shorted to each other (instrument cluster-body harness)**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors D, E.

(d) Release the internal short-circuiter of connector D.

(e) Measure the resistance according to the values in the table below.

Standard value

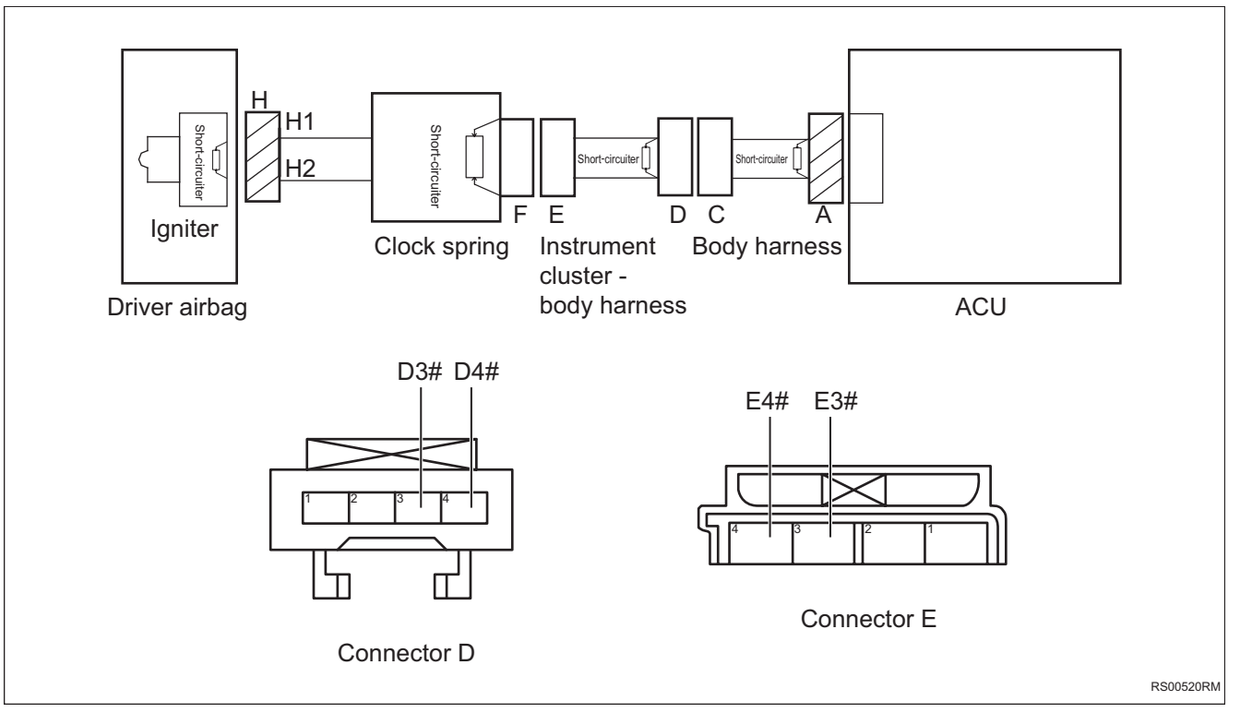
Detector connection	Detection conditions	Specified state
Connector D3#-connector D4#	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

3	**Check driver airbag harness and connector for open circuit (instrument cluster-body harness)**

RS



(a) Measure the resistance according to the values in the table below.

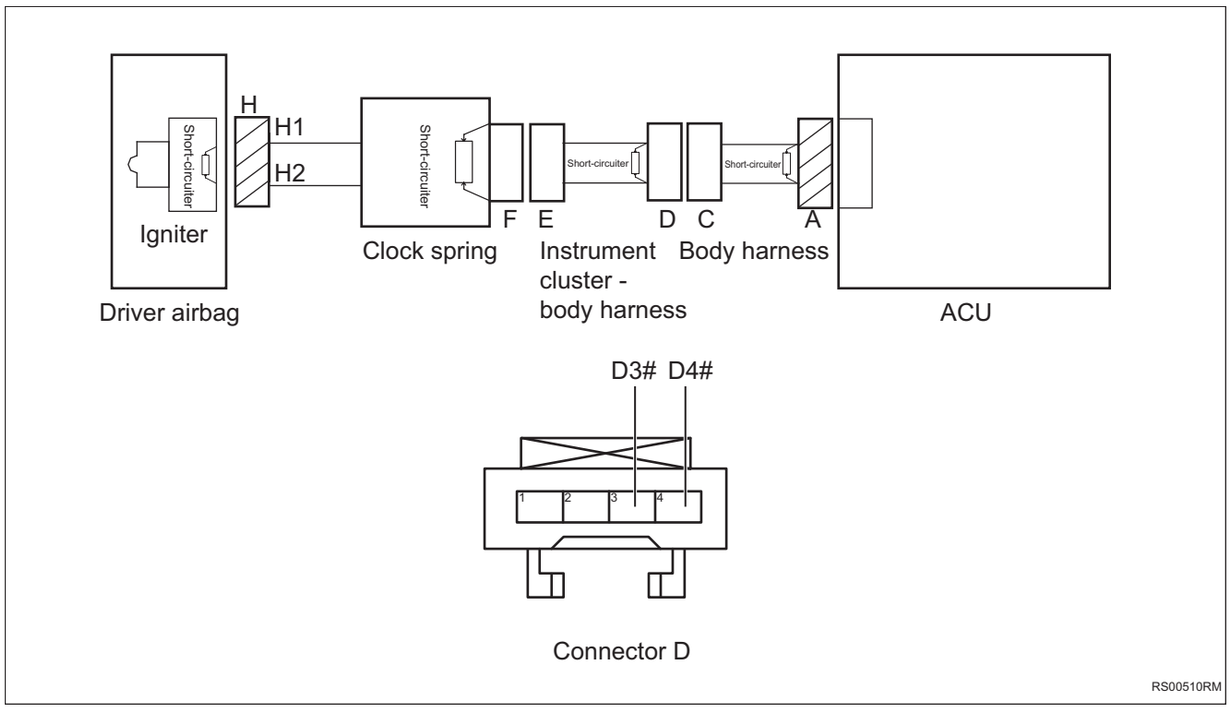
Standard value

Detector connection	Detection conditions	Specified state
Connector E4#-connector D3#	Always connected	Less than 1Ω
Connector E3#-connector D4#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check driver airbag harness and connector for circuit shorted to ground (instrument cluster-body harness)**



(a) Measure the resistance according to the values in the table below.

Standard value

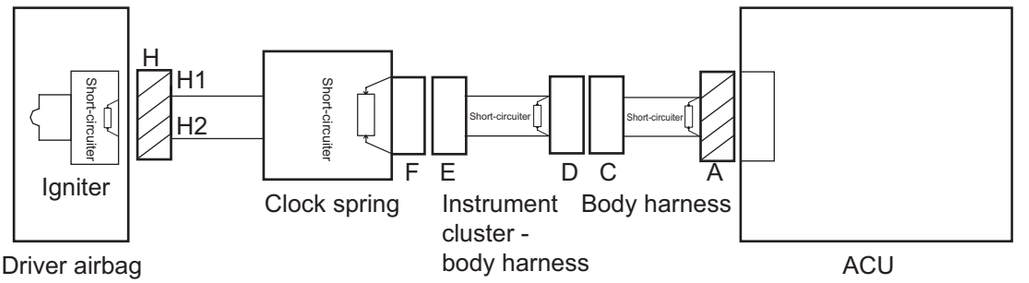
Detector connection	Detection conditions	Specified state
Connector D3#-body GND	Always connected	10 KΩ or greater
Connector D4#-body GND	Always connected	10 KΩ or greater

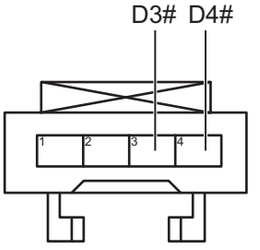
NG → **Repair or replace the harness and connector**

OK

5	**Check driver airbag harness and connector for circuit shorted to power supply (instrument cluster-body harness)**

RS





Connector D

RS00510RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

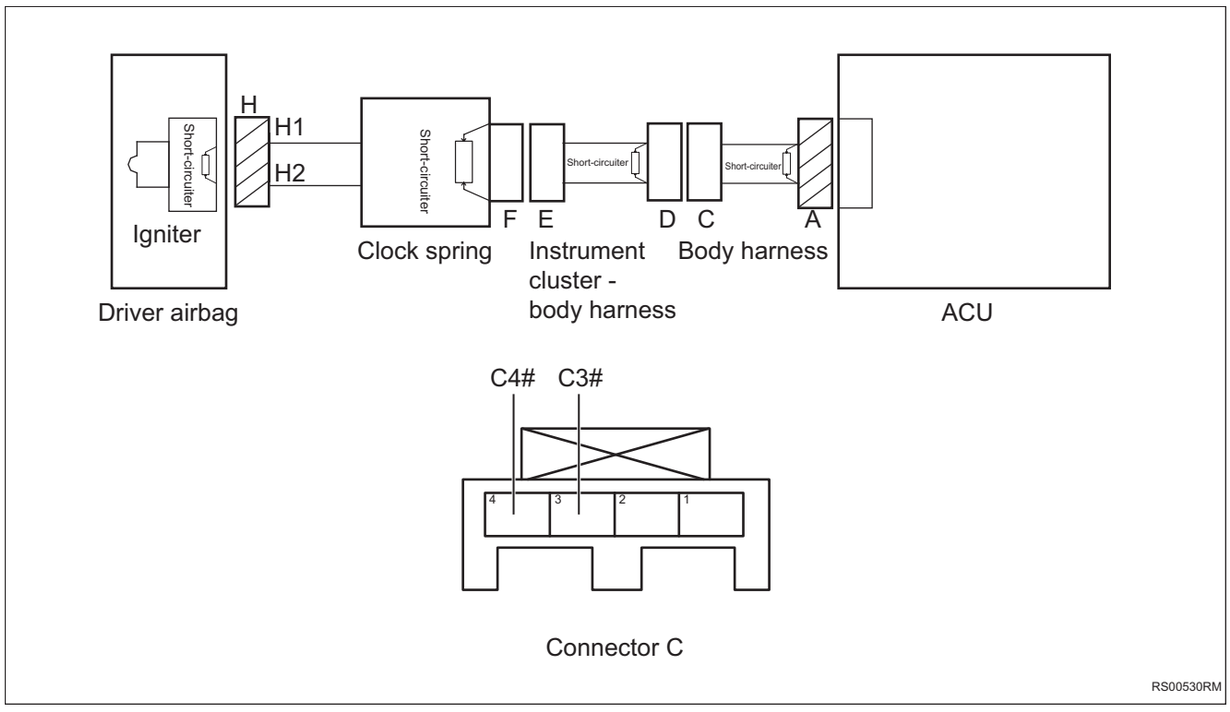
Standard value

Detector connection	Detection conditions	Specified state
Connector D3#-body GND	The ignition switch is set to "ON"	Less than 1 V
Connector D4#-body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Check driver airbag harness and connector for circuit shorted to each other (body harness)**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors A, C.

(d) Release the internal short-circuiter of connector A.

(e) Measure the resistance according to the values in the table below.

Standard value

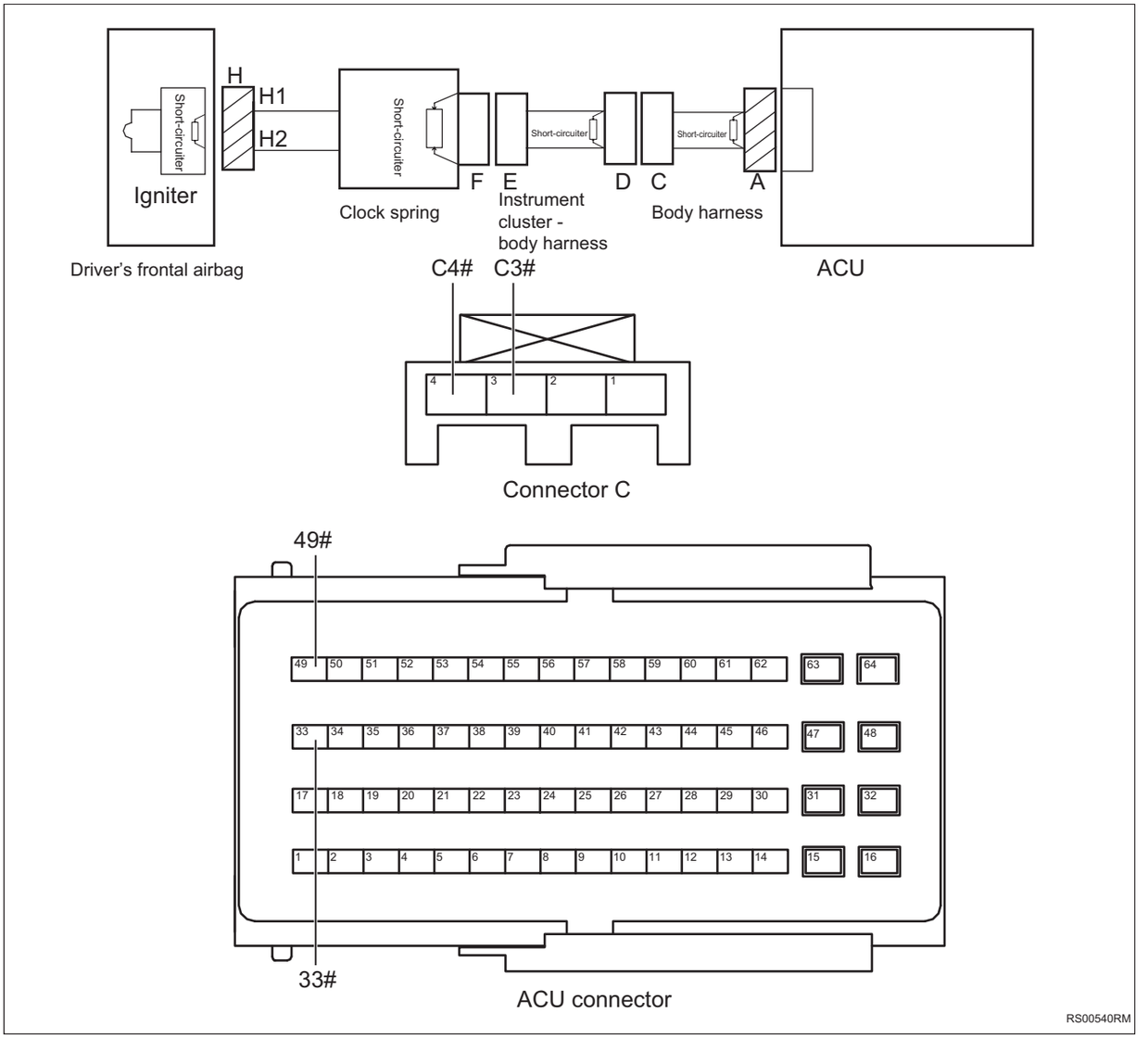
Detector connection	Detection conditions	Specified state
Connector C3#-connector C4#	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

7	**Check driver airbag harness and connector for open circuit (body harness)**

RS



(a) Measure the resistance according to the values in the table below.

Standard value

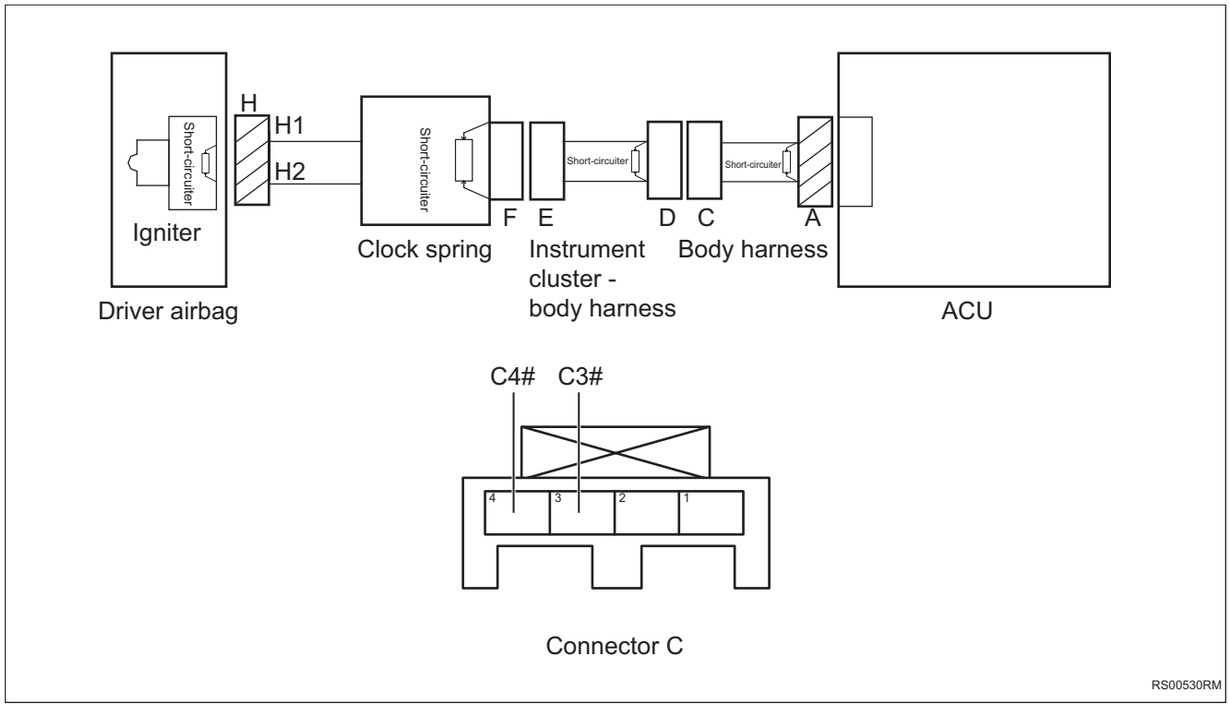
Detector connection	Detection conditions	Specified state
Connector C3# - ACU connector 49#	Always connected	Less than 1Ω
Connector C4# - ACU connector 33#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

8	**Check driver airbag harness and connector for circuit shorted to ground (body harness)**

RS



(a) Measure the resistance according to the values in the table below.

Standard value

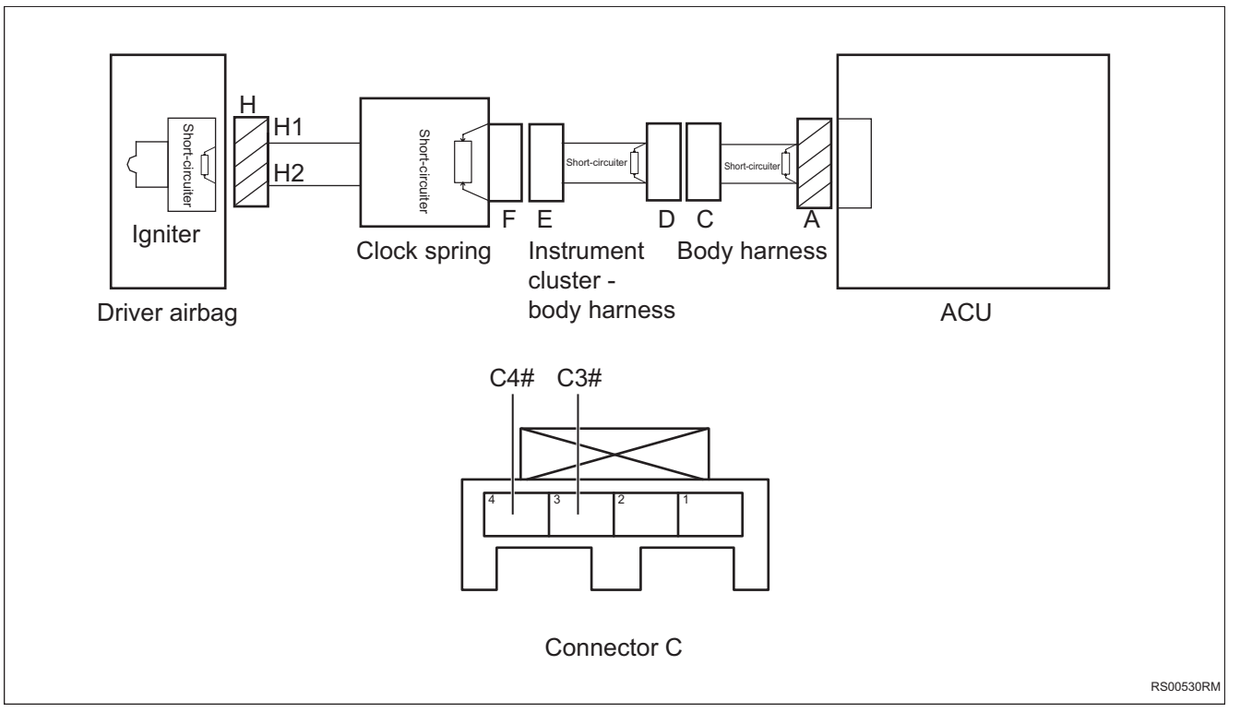
Detector connection	Detection conditions	Specified state
Connector C3#-body GND	Always connected	10 KΩ or greater
Connector C4#-body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

9	**Check driver airbag harness and connector for circuit shorted to power supply (body harness)**

RS



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Connector C3#-body GND	The ignition switch is set to "ON"	Less than 1 V
Connector C4#-body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

10	**Check the clock spring**

(a) Check whether the clock spring harness and connector are open-circuited or short-circuited.

(b) Check whether the clock spring is damaged.

NG → **Replace the clock spring (See page SR-5)**

OK

11	**Replace the driver airbag (See page RS-235)**

(a) Replace the driver airbag.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace ACU (See page RS-218)**

OK

12	**End**

RS

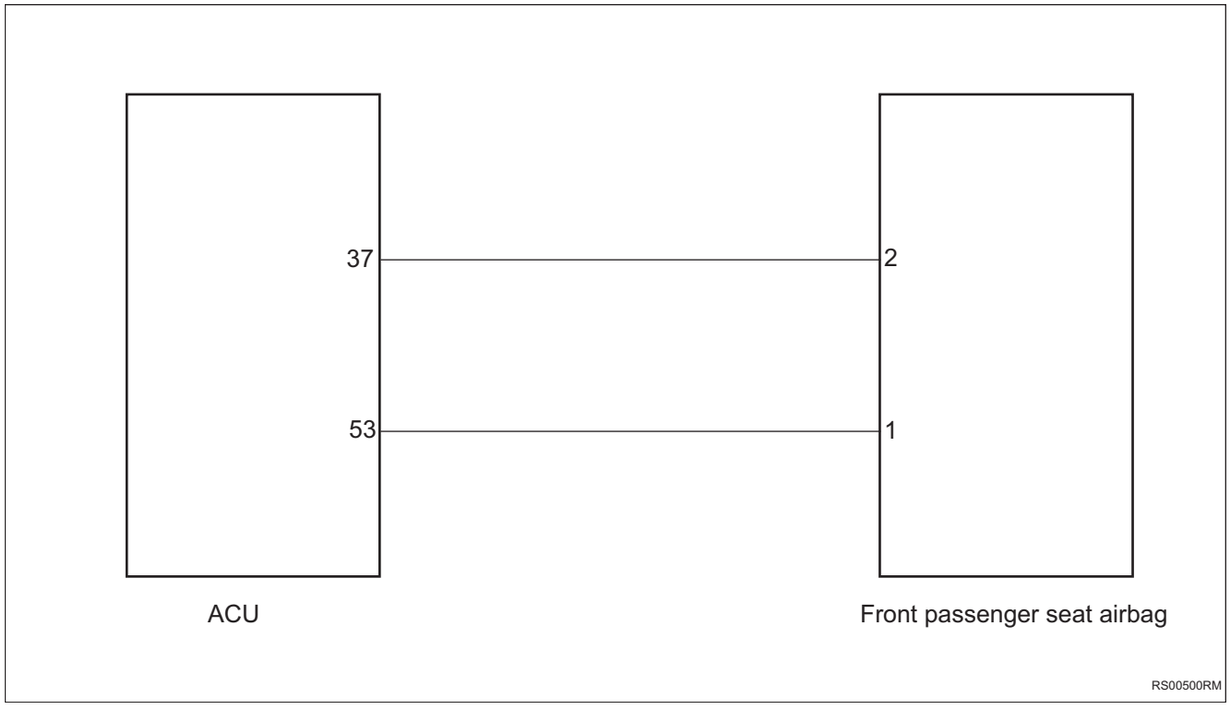
DTC	**B001011**	**Front passenger frontal airbag -circuit shorted to ground**
DTC	**B001012**	**Front passenger frontal airbag -circuit shorted to battery**
DTC	**B00101A**	**Front passenger frontal airbag-too low resistance**
DTC	**B00101B**	**Front passenger frontal airbag- too high resistance**
DTC	**B001056**	**Front passenger frontal airbag-configuration error**

Description

When the front passenger seat airbag ignition circuit is open, shorted, has configuration error, too high or too low resistance, the ACU will record the DTC.

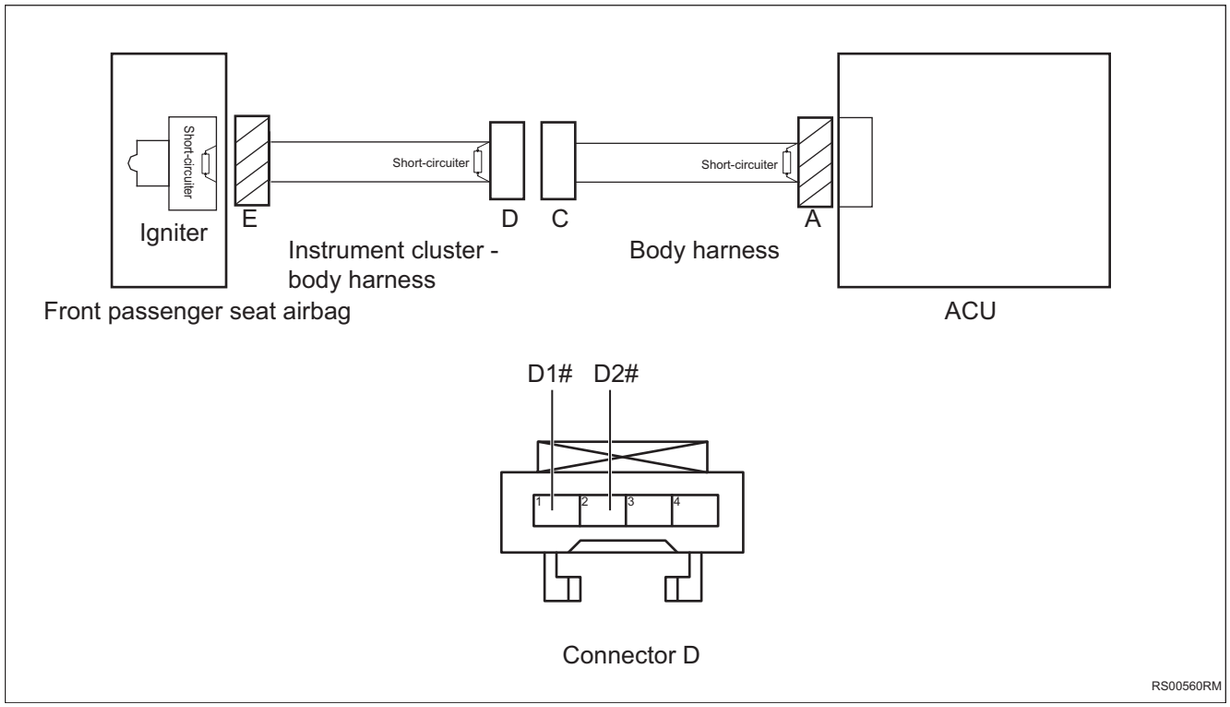
DTC	DTC detection conditions	Faulty location
B001011	(a) Front passenger frontal airbag circuit is shorted to ground.	• Front passenger seat airbag • ACU • Harness and connector
B001012	(a) Front passenger frontal airbag circuit is shorted to power supply.	• Front passenger seat airbag • ACU • Harness and connector
B00101A	(a) The front passenger frontal airbag circuit resistance is less than lower limit.	• Front passenger seat airbag • ACU • Harness and connector
B00101B	(a) The front passenger frontal airbag circuit resistance is higher than the upper limit.	• Front passenger seat airbag • ACU • Harness and connector
B001056	(a) Front passenger frontal airbag configuration error.	• Front passenger seat airbag • ACU • Harness and connector

Circuit diagram



Inspection procedure

1	**Check front passenger seat airbag harness and connector for circuit shorted to each other (instrument clusterbody harness)**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors D, E.

RS

(d) Release the internal short-circuiter of connector D.

(e) Measure the resistance according to the values in the table below.

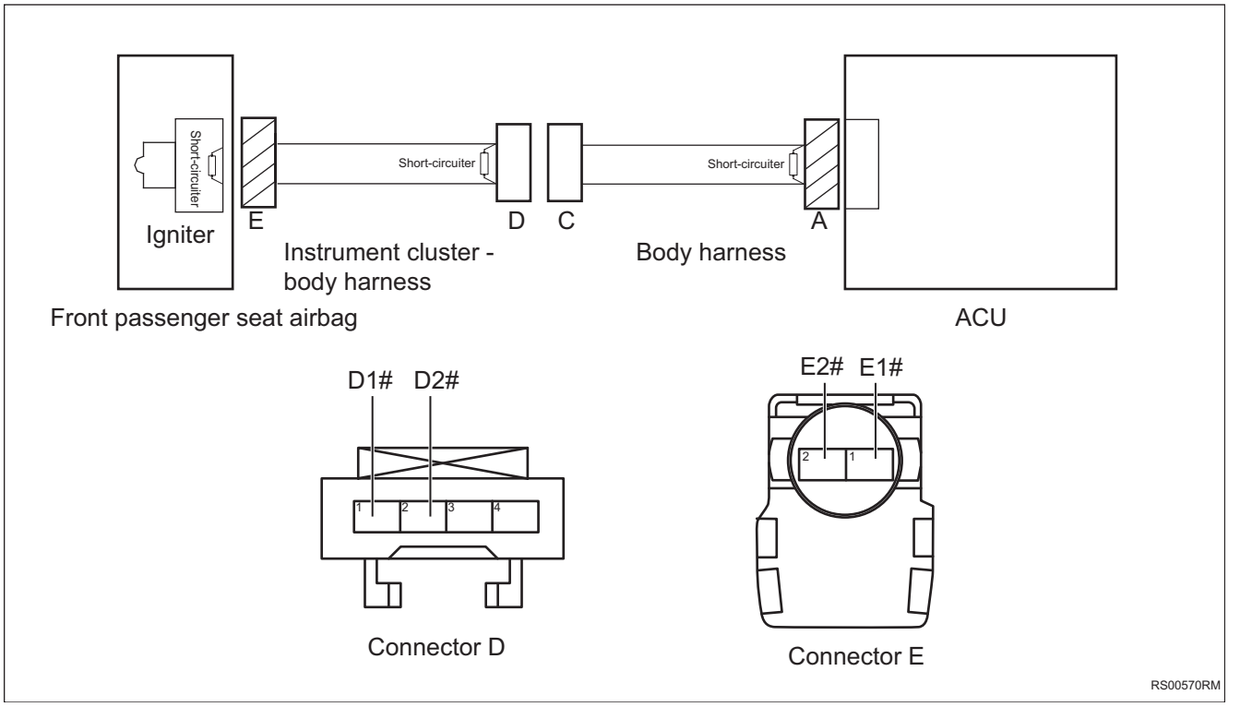
Standard value

Detector connection	Detection conditions	Specified state
Connector D1#-connector D2#	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

2	**Check front passenger seat airbag harness and connector for open circuit (instrument cluster-body harness)**



(a) Measure the resistance according to the values in the table below.

Standard value

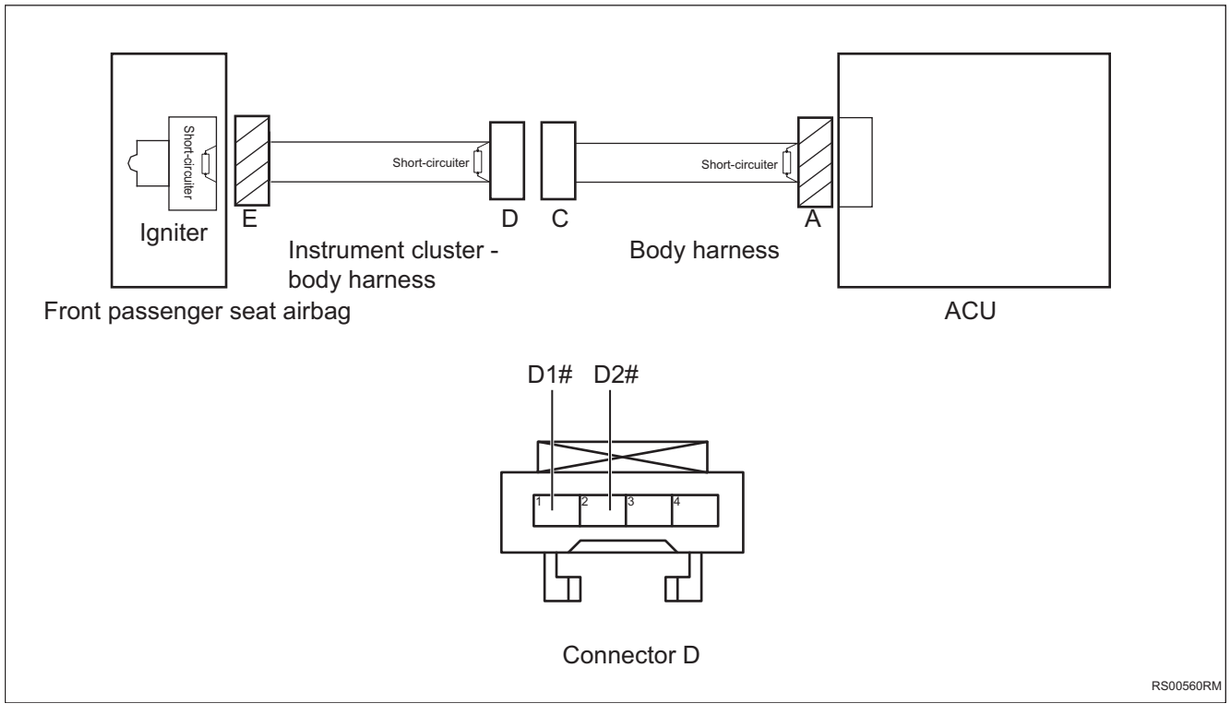
Detector connection	Detection conditions	Specified state
Connector E1#-connector D1#	Always connected	Less than 1Ω
Connector E2#-connector D2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

RS

OK

3	**Check front passenger seat airbag harness and connector for circuit shorted to ground (instrument clusterbody harness)**



(a) Measure the resistance according to the values in the table below.

Standard value

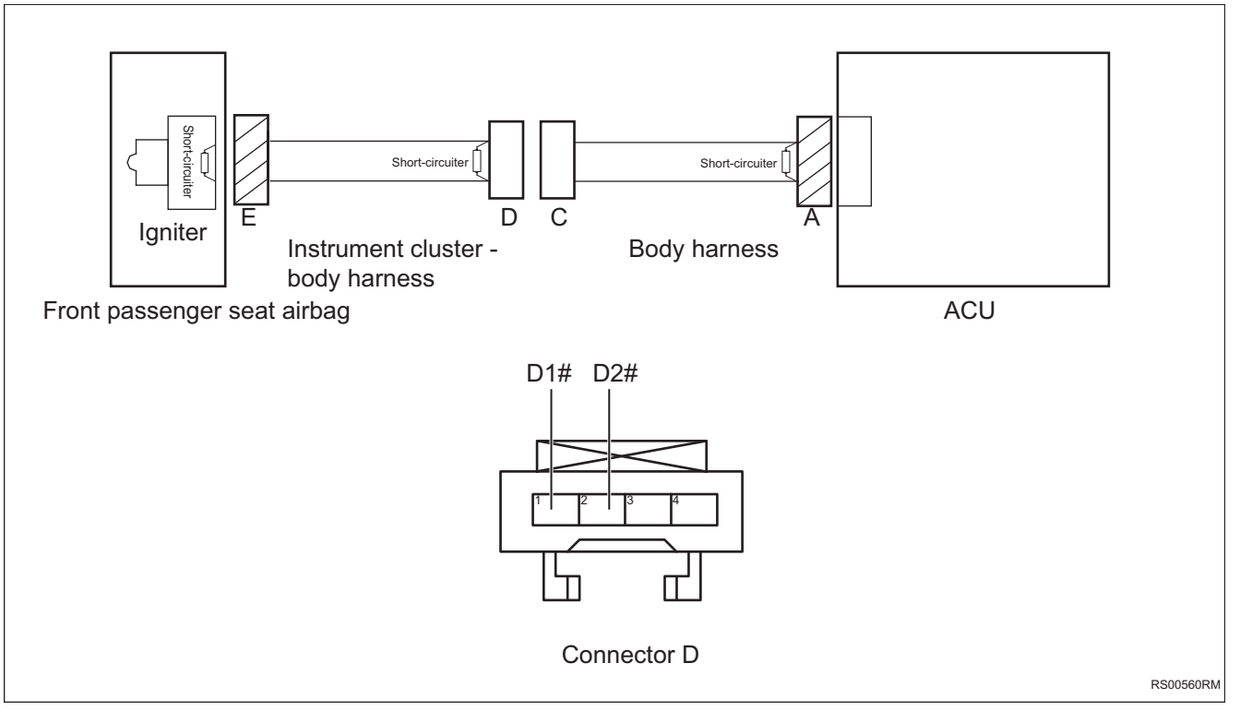
Detector connection	Detection conditions	Specified state
Connector D1#-body GND	Always connected	10 KΩ or greater
Connector D2#-body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check front passenger seat airbag harness and connector for circuit shorted to power supply (instrument cluster-body harness)**

RS



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

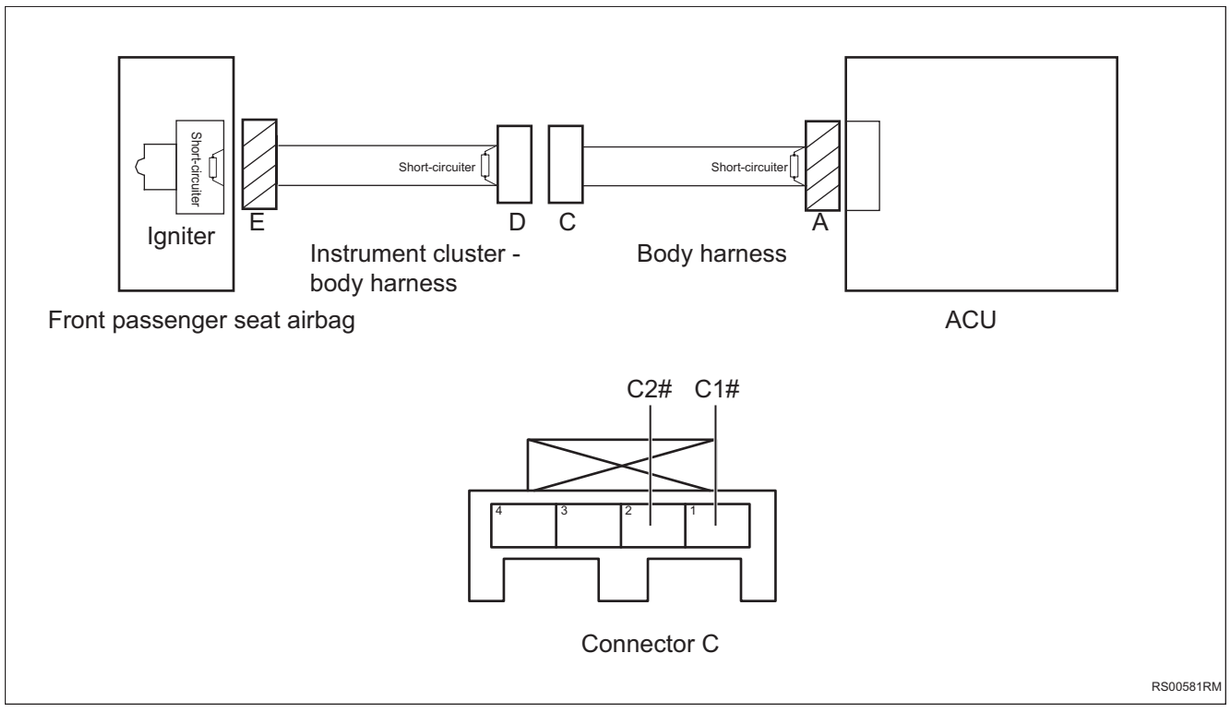
Standard value

Detector connection	Detection conditions	Specified state
Connector D1#-body GND	The ignition switch is set to "ON"	Less than 1 V
Connector D2#-body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Check front passenger seat airbag harness and connector for circuit shorted to each other (body harness)**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors A, C.

(d) Release the internal short-circuiter of connector A.

(e) Measure the resistance according to the values in the table below.

Standard value

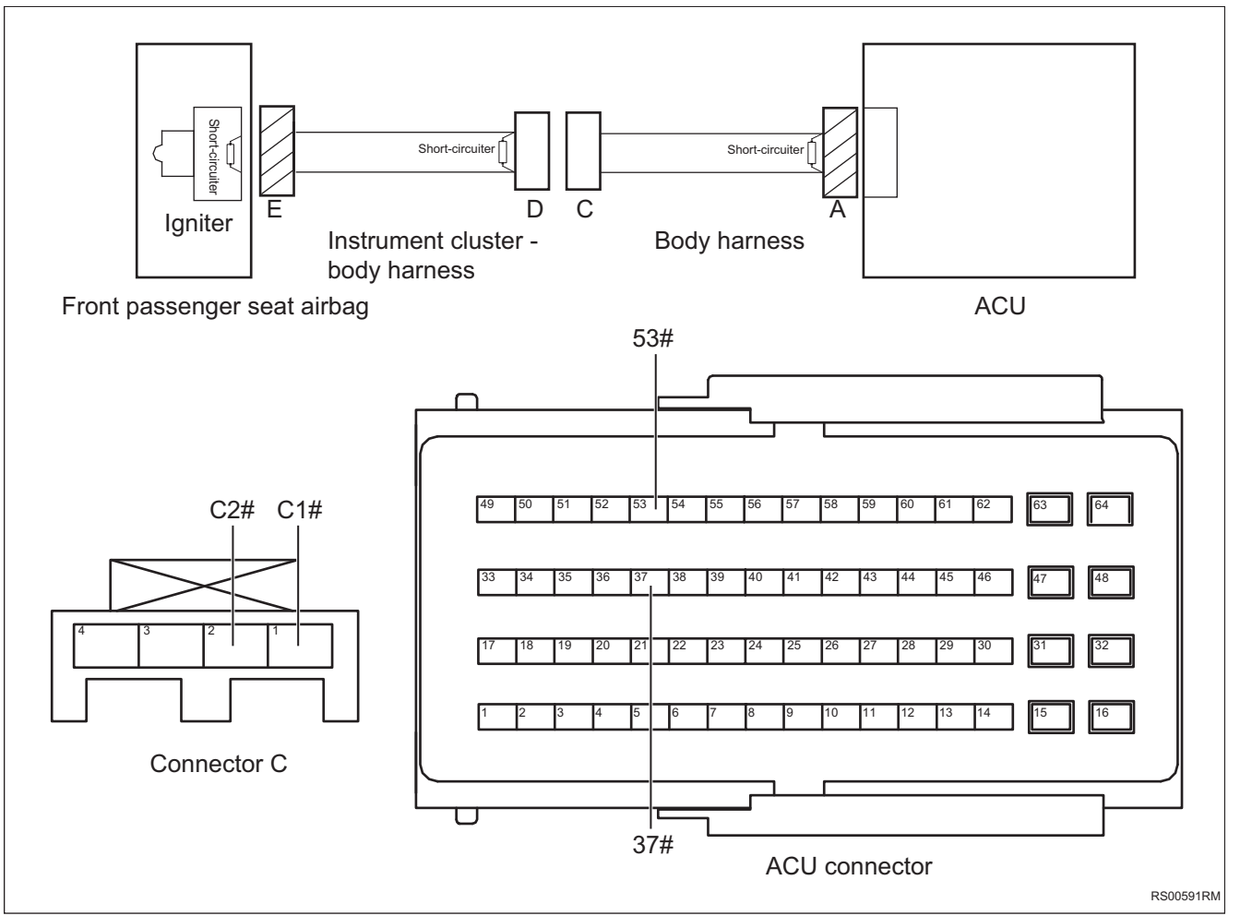
Detector connection	Detection conditions	Specified state
Connector C1#-connector C2#	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

6	**Check front passenger seat airbag harness and connector for open circuit (body harness)**

RS



(a) Measure the resistance according to the values in the table below.

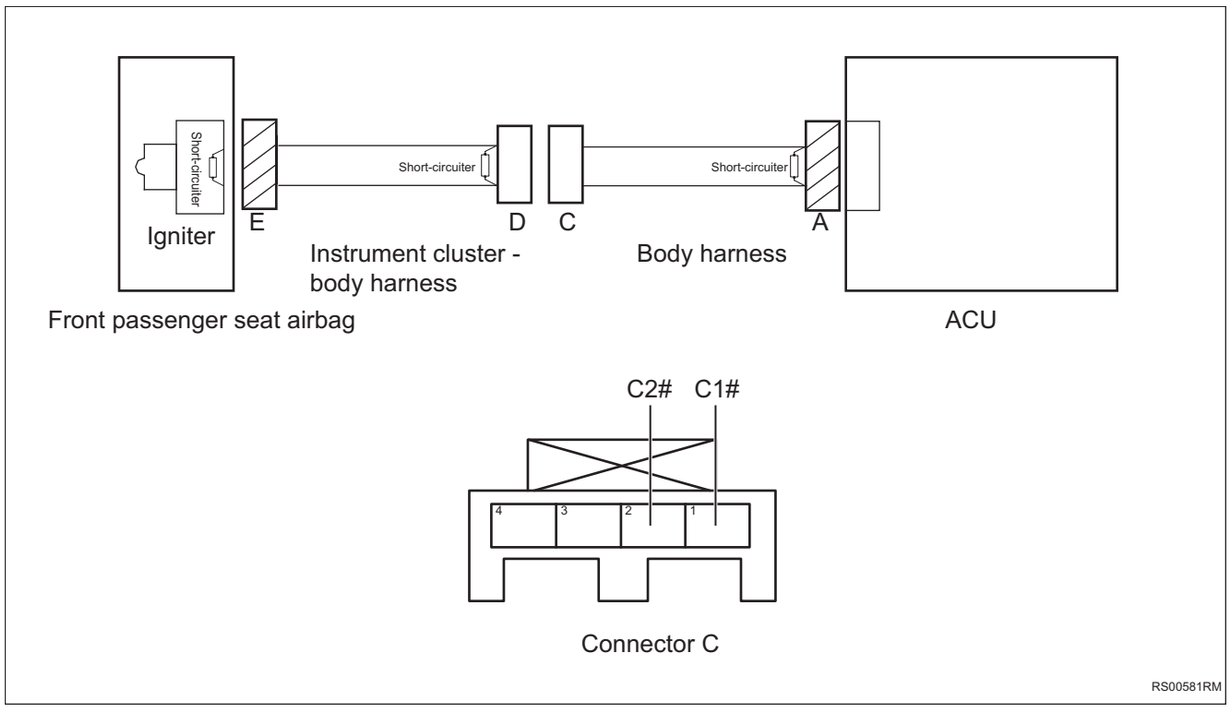
Standard value

Detector connection	Detection conditions	Specified state
Connector C1# - ACU connector 53#	Always connected	Less than 1Ω
Connector C2# - ACU connector 37#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

7	**Check front passenger seat airbag harness and connector for circuit shorted to ground (body harness)**



(a) Measure the resistance according to the values in the table below.

Standard value

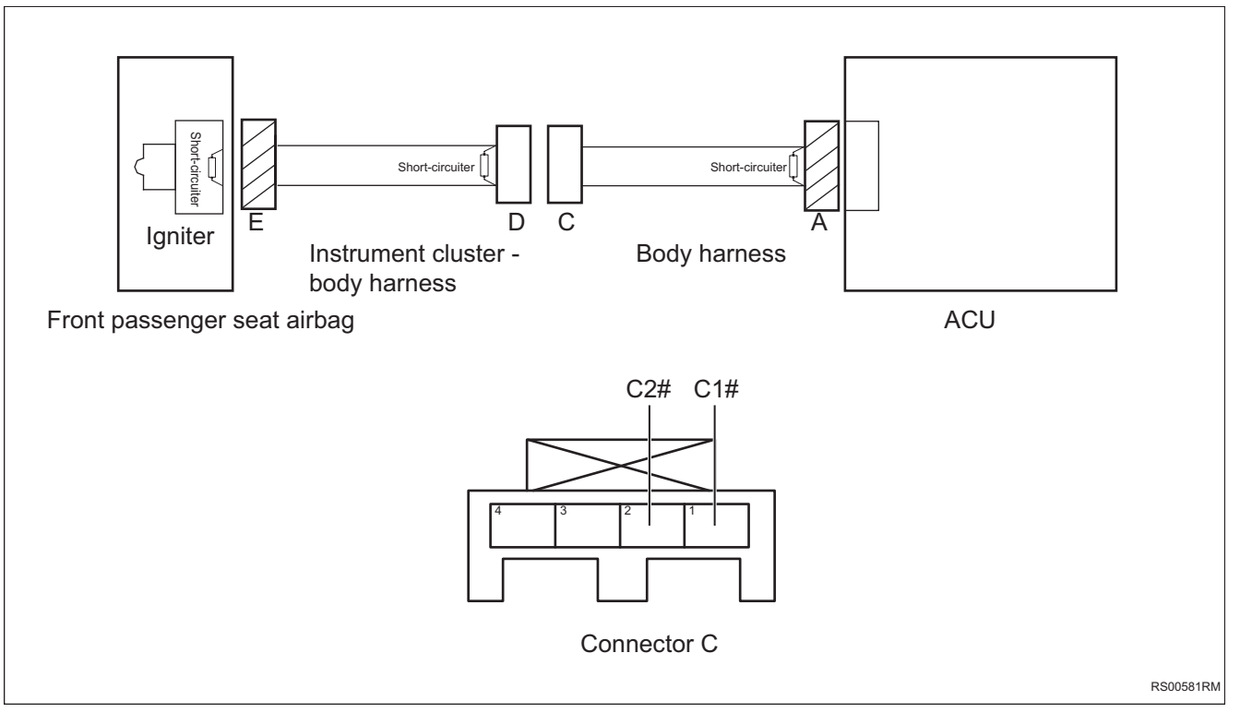
Detector connection	Detection conditions	Specified state
Connector C1#-body GND	Always connected	10 KΩ or greater
Connector C2#-body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

8	**Check front passenger seat airbag harness and connector for circuit shorted to power supply (body harness)**

RS



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Connector C1#-body GND	The ignition switch is set to "ON"	Less than 1 V
Connector C2#-body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

9	**Replace the front passenger seat airbag (See page RS-226)**

(a) Replace the front passenger seat airbag.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace ACU (See page RS-218)**

OK

10	**End**

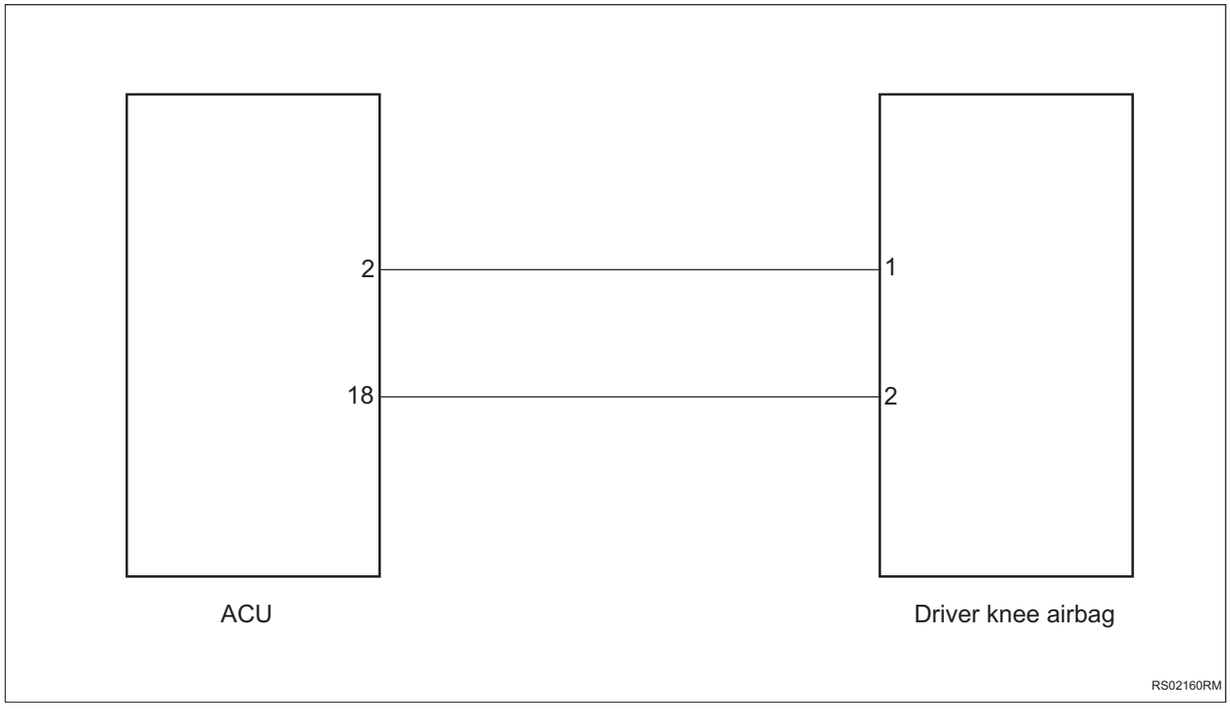
DTC	**B001311**	**Driver knee airbag-circuit shorted to ground**
DTC	**B001312**	**Driver knee airbag-circuit shorted to battery**
DTC	**B00131A**	**Driver knee airbag-low resistance**
DTC	**B00131B**	**Driver knee airbag-high resistance**
DTC	**B001356**	**Driver knee airbag-configuration error**

Description

When the driver knee airbag ignition circuit is open, shorted, has configuration error, too high or too low resistance, the ACU will record the DTC.

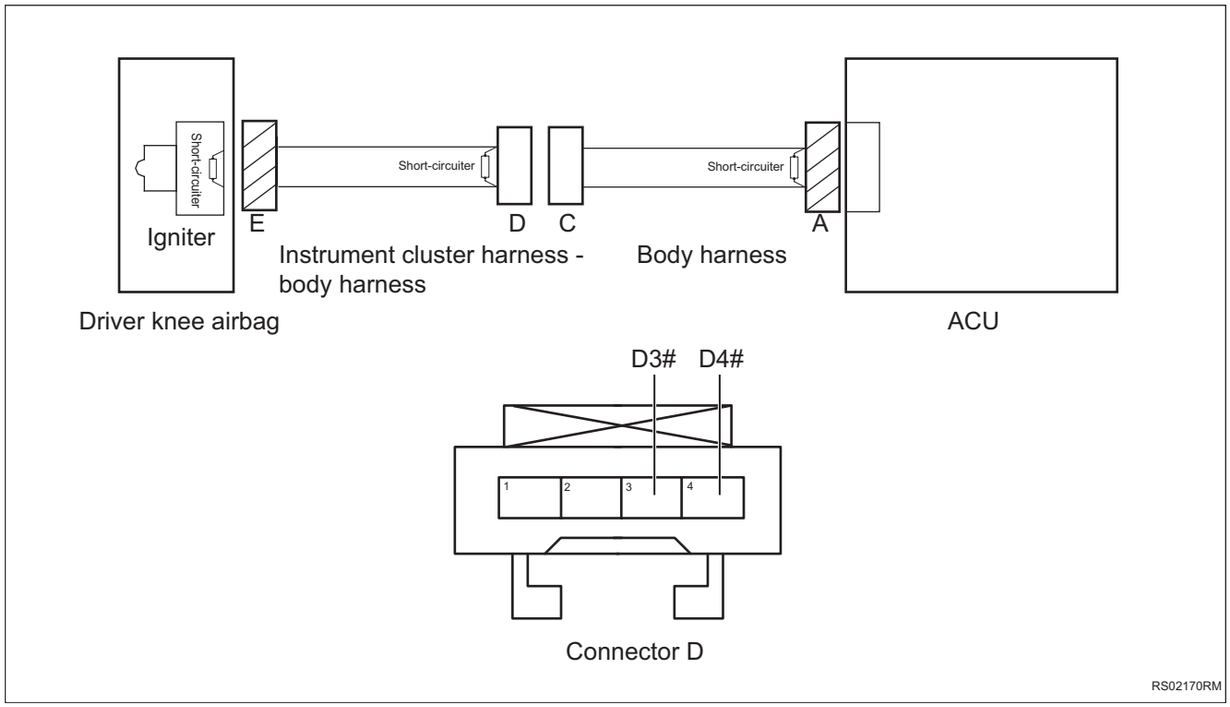
DTC	DTC detection conditions	Faulty location
B001311	(a) Driver knee airbag circuit shorted to ground.	• Driver knee airbag • ACU • Harness and connector
B001312	(a) The driver knee airbag circuit is shorted to power supply.	• Driver knee airbag • ACU • Harness and connector
B00131A	(a) Driver knee airbag circuit resistance is less than lower limit.	• Driver knee airbag • ACU • Harness and connector
B00131B	(a) Driver knee airbag circuit resistance is higher than the upper limit.	• Driver knee airbag • ACU • Harness and connector
B001356	(a) Driver knee airbag configuration error.	• Driver knee airbag • ACU • Harness and connector

Circuit diagram



Inspection procedure

1	**Check driver knee airbag harness and connector for circuit shorted to each other (instrument cluster harnessbody harness)**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors D, E.

RS

(d) Release the internal short-circuiter of connector D.

(e) Measure the resistance according to the values in the table below.

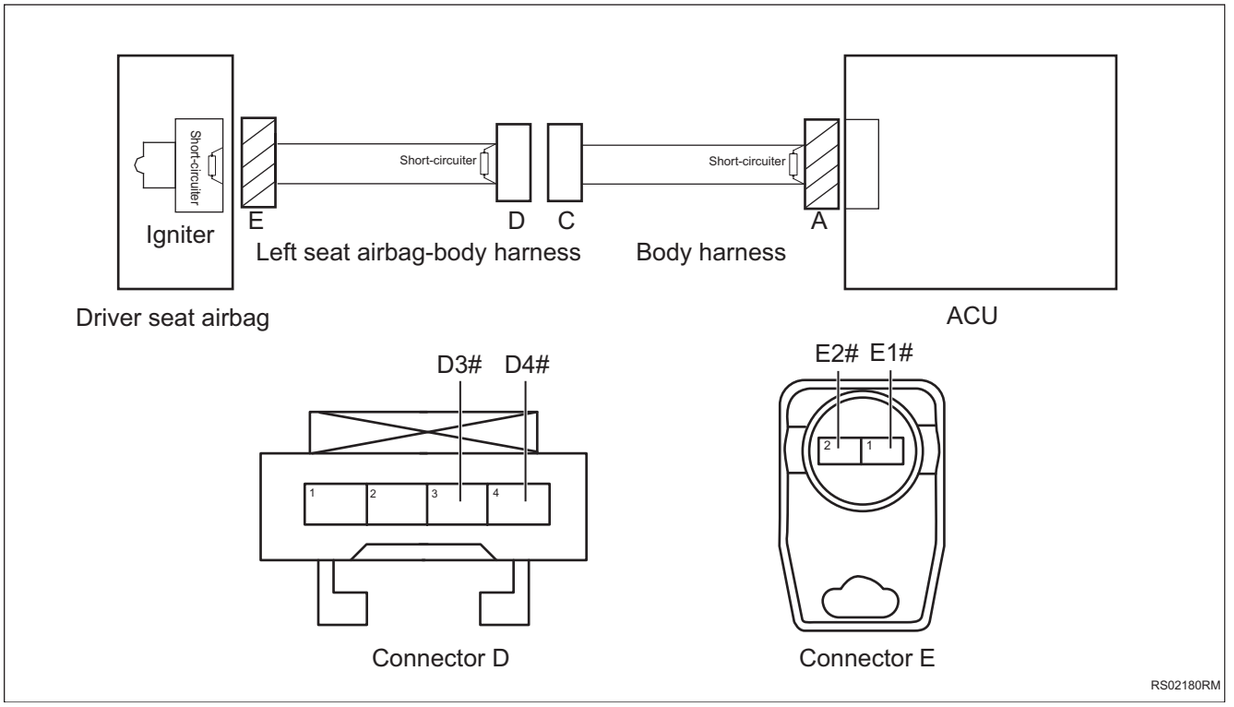
Standard value

Detector connection	Detection conditions	Specified state
Connector D3#-connector D4#	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

2	**Check driver knee airbag harness and connector for open circuit (instrument cluster harness-body harness)**



(a) Measure the resistance according to the values in the table below.

Standard value

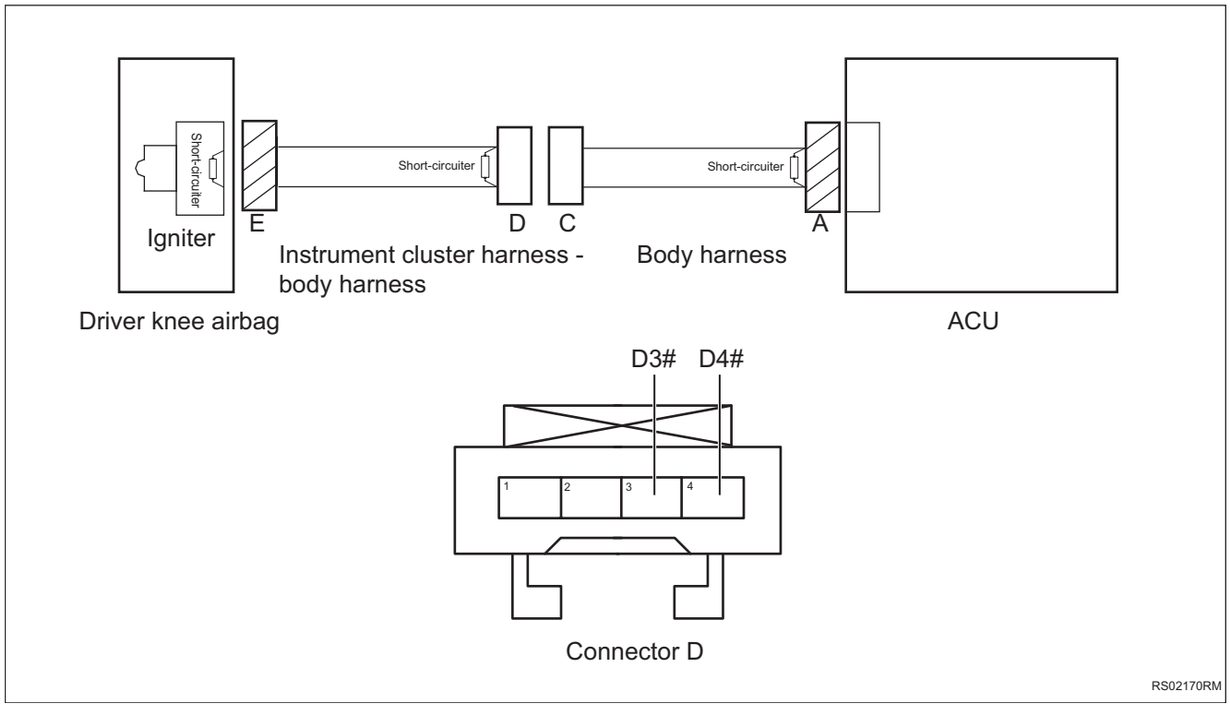
Detector connection	Detection conditions	Specified state
Connector E1#-connector D1#	Always connected	Less than 1Ω
Connector E2#-connector D2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

RS

OK

3	**Check driver knee airbag harness and connector for circuit shorted to ground (instrument cluster harness-body harness)**



(a) Measure the resistance according to the values in the table below.

Standard value

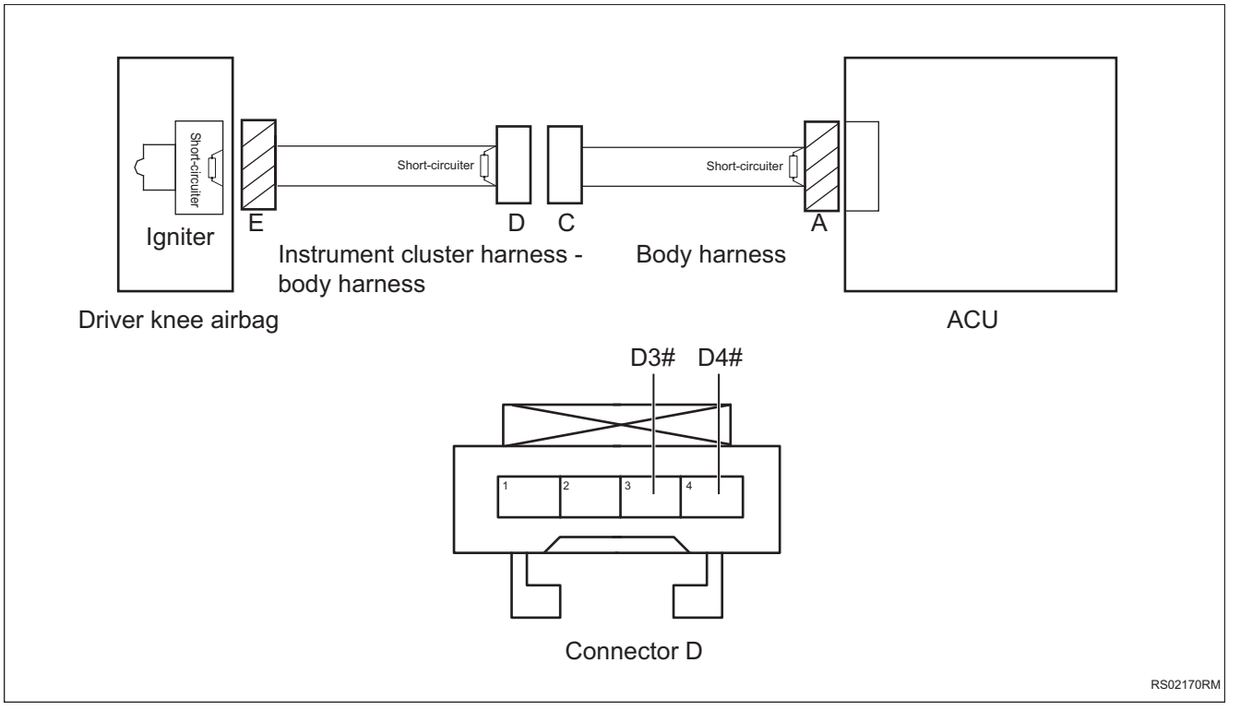
Detector connection	Detection conditions	Specified state
Connector D3#-body GND	Always connected	10 KΩ or greater
Connector D4#-body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check driver knee airbag harness and connector for circuit shorted to power supply (instrument cluster harness-body harness)**

RS



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

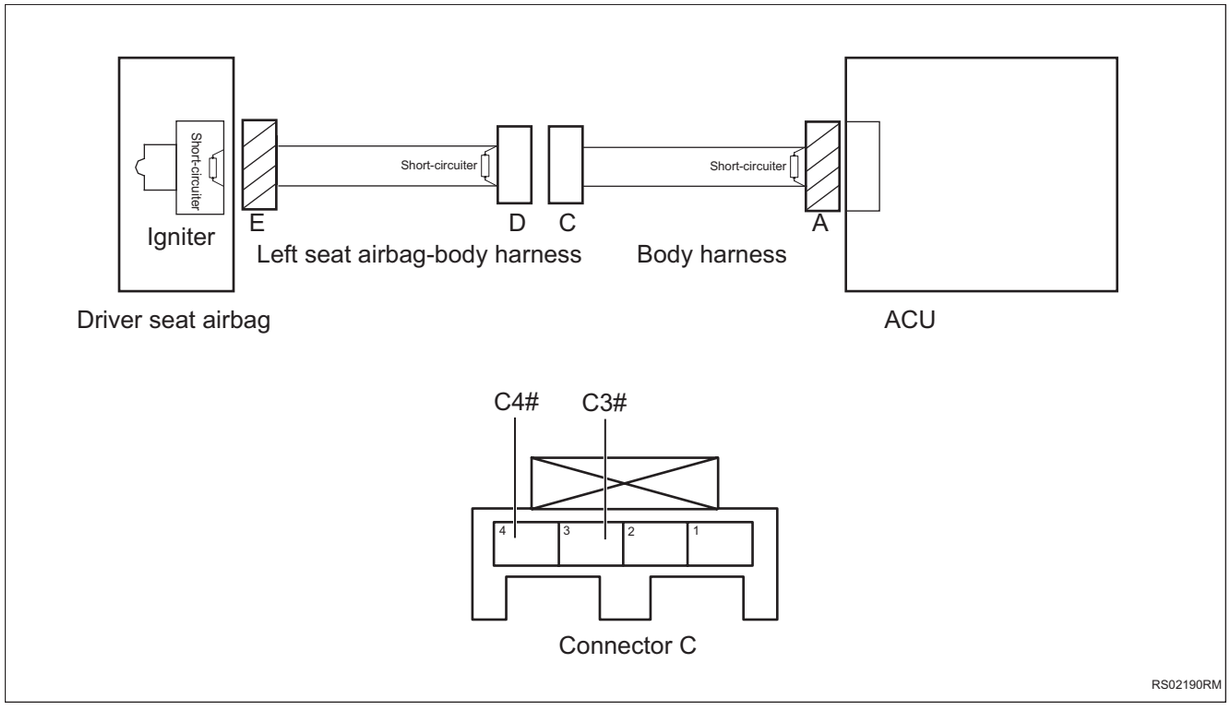
Standard value

Detector connection	Detection conditions	Specified state
Connector D3#-body GND	The ignition switch is set to "ON"	Less than 1 V
Connector D4#-body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Check driver knee airbag harness and connector for circuit shorted to each other (body harness)**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors A, C.

(d) Release the internal short-circuiter of connector A.

(e) Measure the resistance according to the values in the table below.

Standard value

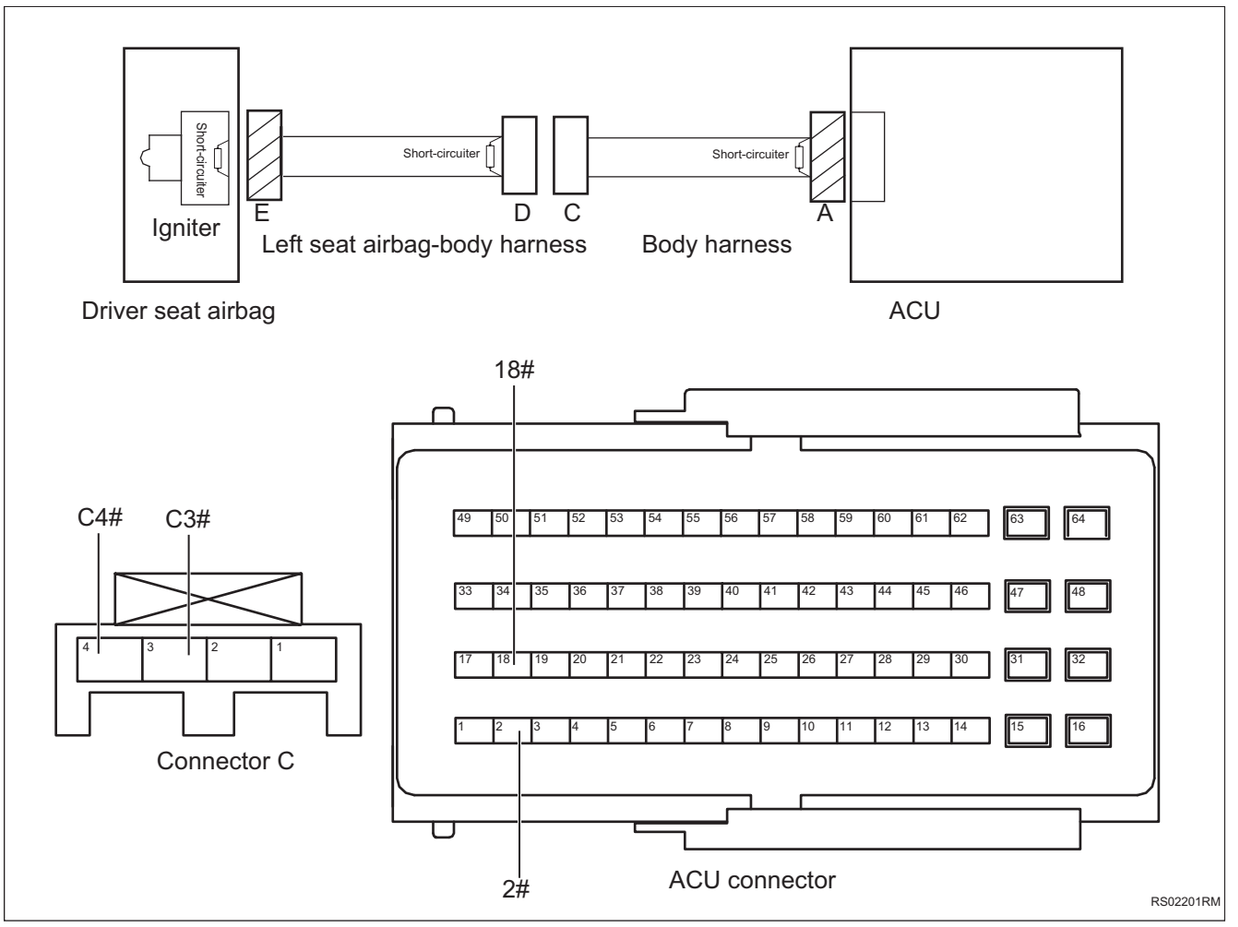
Detector connection	Detection conditions	Specified state
Connector C3#-connector C4#	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

6	**Check driver knee airbag harness and connector for open circuit (body harness)**

RS



(a) Measure the resistance according to the values in the table below.

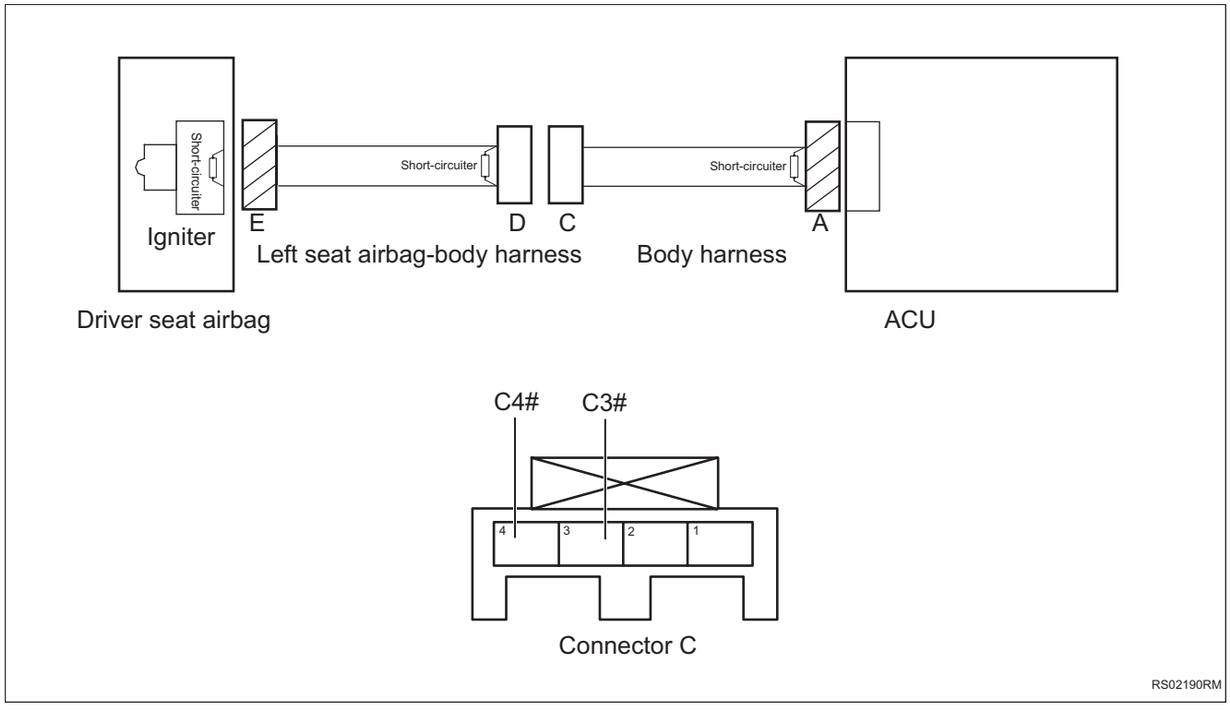
Standard value

Detector connection	Detection conditions	Specified state
Connector C3# - ACU connector 2#	Always connected	Less than 1Ω
Connector C4# - ACU connector 18#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

7	**Check driver knee airbag harness and connector for circuit shorted to ground (body harness)**



(a) Measure the resistance according to the values in the table below.

Standard value

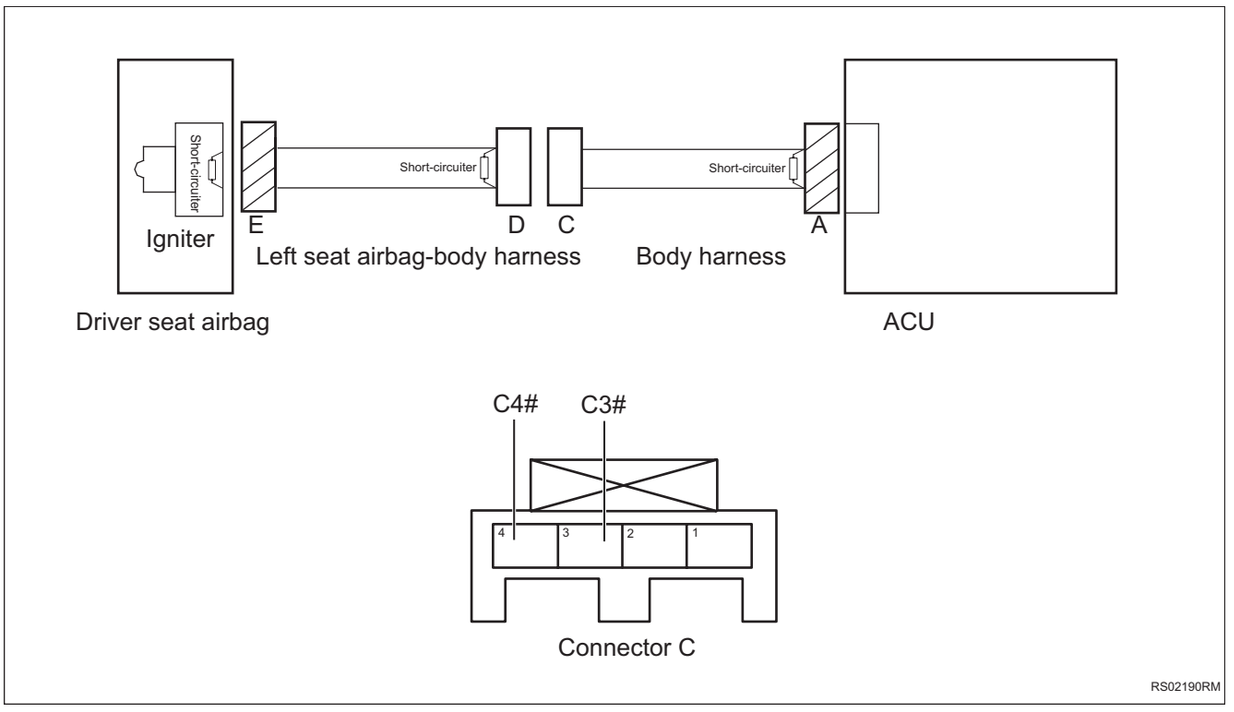
Detector connection	Detection conditions	Specified state
Connector C3#-body GND	Always connected	10 KΩ or greater
Connector C4#-body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

8	**Check driver knee airbag harness and connector for circuit shorted to power supply (body harness)**

RS



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Connector C3#-body GND	The ignition switch is set to "ON"	Less than 1 V
Connector C4#-body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

9	**Replace driver knee airbag (See page RS-233)**

(a) Replace the driver knee airbag.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace ACU (See page RS-218)**

OK

10	**End**

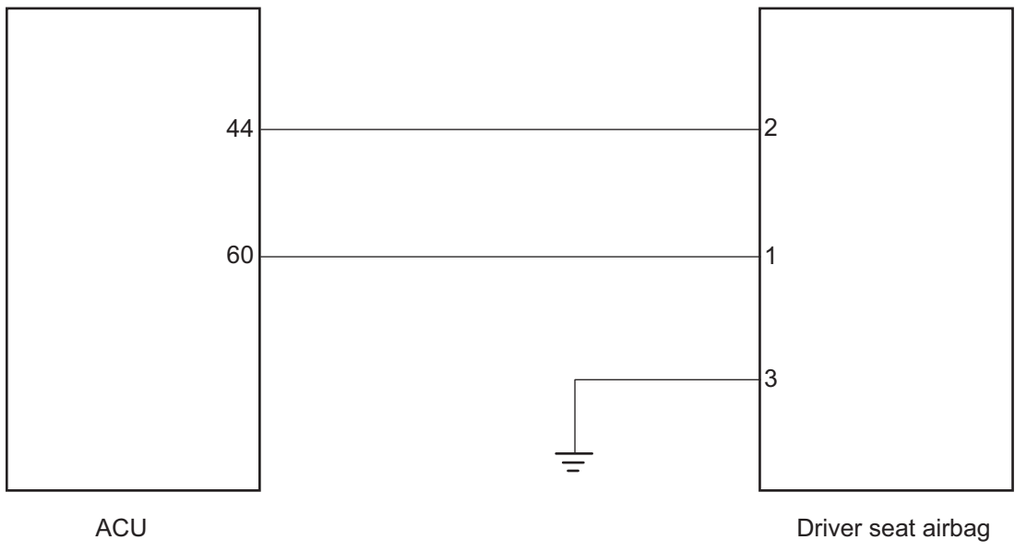
DTC	**B002011**	**Left side airbag -circuit shorted to ground**
DTC	**B002012**	**Left side airbag-shorted to battery**
DTC	**B00201A**	**Left side airbag-too low resistance**
DTC	**B00201B**	**Left side airbag-too high resistance**
DTC	**B002056**	**Left side airbag-configuration error**

Description

When the driver seat airbag ignition circuit is open, shorted, has configuration error, too high or too low resistance, the ACU will record the DTC.

DTC	DTC detection conditions	Faulty location
B002011	(a) Driver seat airbag circuit shorted to ground.	• Driver seat airbag • ACU • Harness and connector
B002012	(a) Driver seat airbag circuit is shorted to power supply.	• Driver seat airbag • ACU • Harness and connector
B00201A	(a) Driver seat airbag circuit resistance is below the lower limit.	• Driver seat airbag • ACU • Harness and connector
B00201B	(a) Driver seat airbag circuit resistance is above the upper limit.	• Driver seat airbag • ACU • Harness and connector
B002056	(a) Driver seat airbag configuration error.	• Driver seat airbag • ACU • Harness and connector

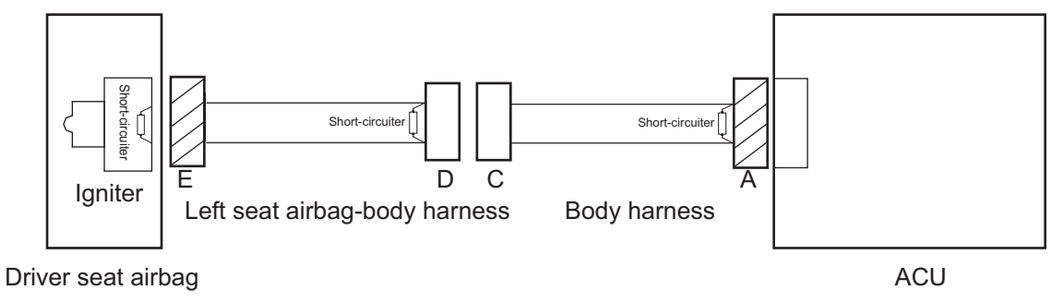
Circuit diagram

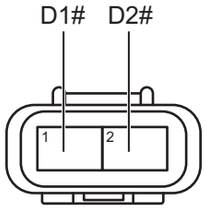


RS00660RM

Inspection procedure

1	**Check driver seat airbag harness and connector for circuit shorted to each other (left seat airbag-body harness)**





Connector D

RS00670RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors D, E.

RS

(d) Release the internal short-circuiter of connector D.

(e) Measure the resistance according to the values in the table below.

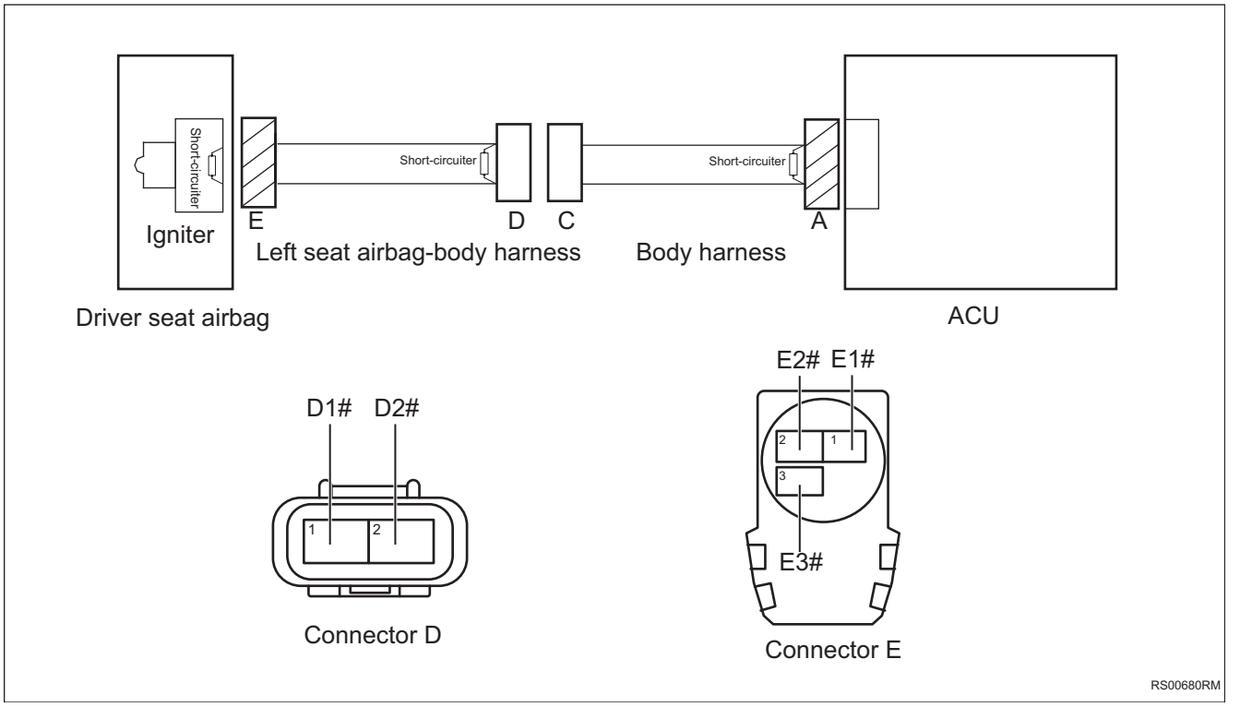
Standard value

Detector connection	Detection conditions	Specified state
Connector D1#-connector D2#	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

2	**Check driver seat airbag harness and connector for open circuit (left seat airbag-body harness)**



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Connector E1#-connector D2#	Always connected	Less than 1Ω
Connector E2#-connector D1#	Always connected	Less than 1Ω

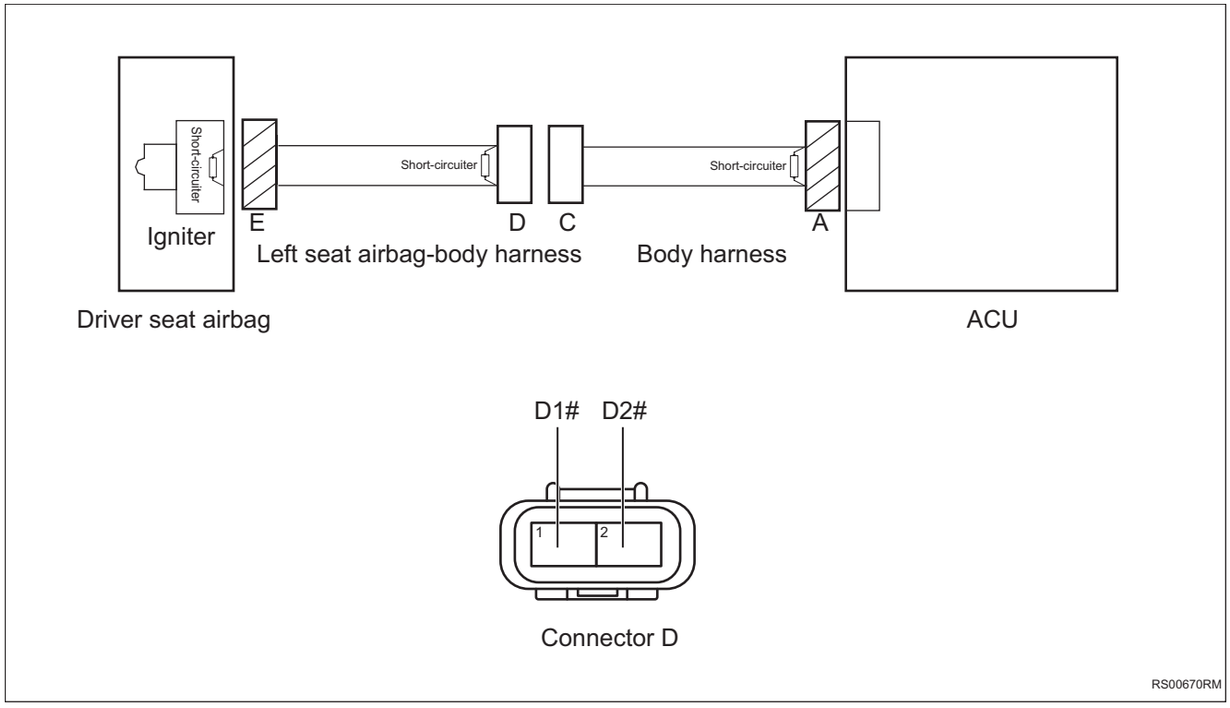
Detector connection	Detection conditions	Specified state
Connector E3#-body GND	Always connected	Less than 1Ω

RS

NG → **Repair or replace the harness and connector**

OK

3	**Check driver seat airbag harness and connector for circuit shorted to ground (left seat airbag-body harness)**



(a) Measure the resistance according to the values in the table below.

Standard value

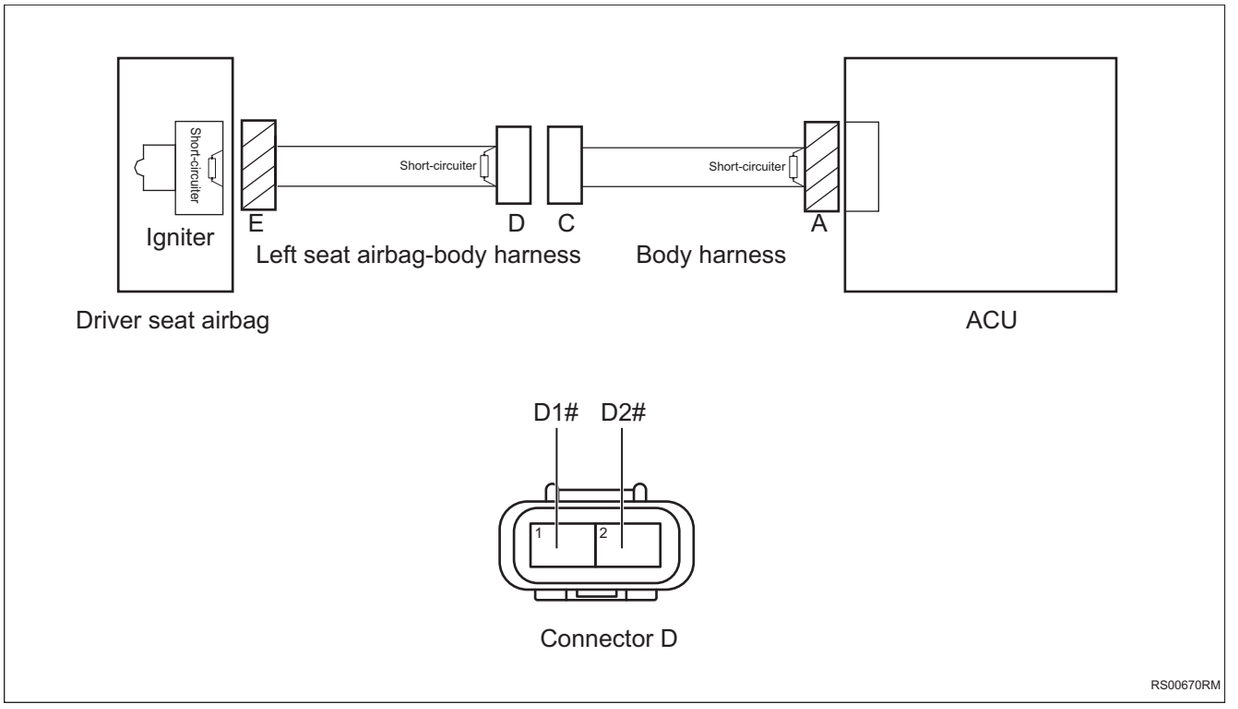
Detector connection	Detection conditions	Specified state
Connector D1#-body GND	Always connected	10 KΩ or greater
Connector D2#-body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

RS

4	**Check driver seat airbag harness and connector for circuit shorted to power supply (left seat airbag-body harness)**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

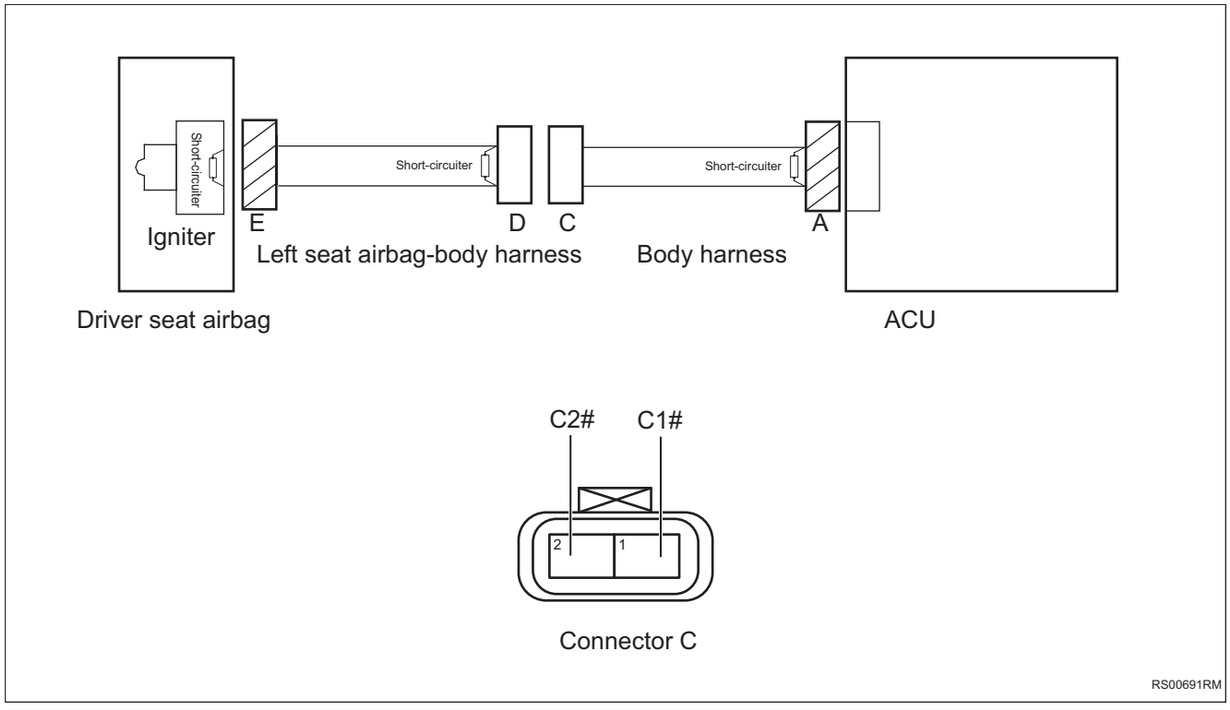
Standard value

Detector connection	Detection conditions	Specified state
Connector D1#-body GND	The ignition switch is set to "ON"	Less than 1 V
Connector D2#-body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Check driver seat airbag harness and connector for circuit shorted to each other (body harness)**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors A, C.

(d) Release the internal short-circuiter of connector A.

(e) Measure the resistance according to the values in the table below.

Standard value

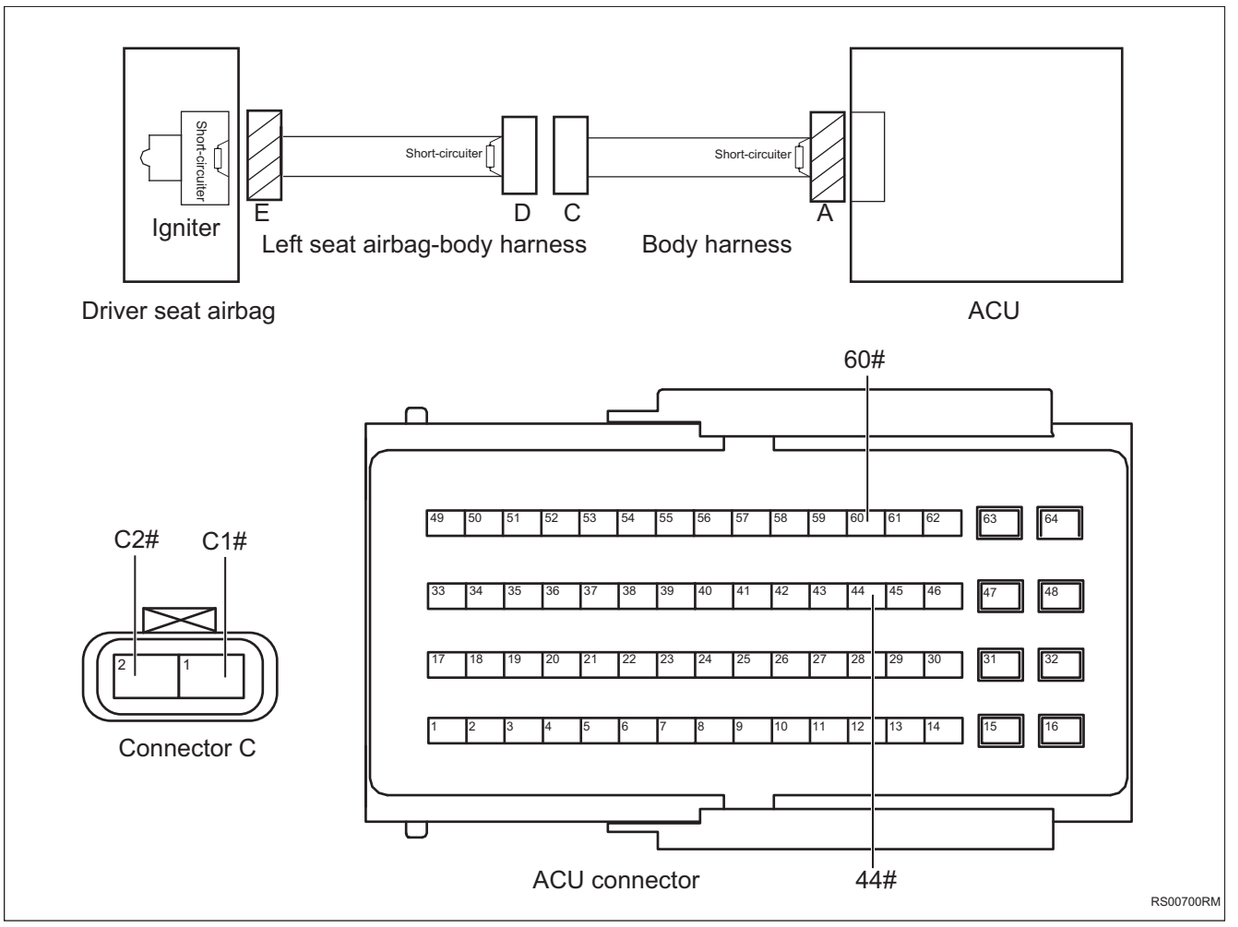
Detector connection	Detection conditions	Specified state
Connector C1#-connector C2#	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

6	**Check driver seat airbag harness and connector for open circuit (body harness)**

RS



(a) Measure the resistance according to the values in the table below.

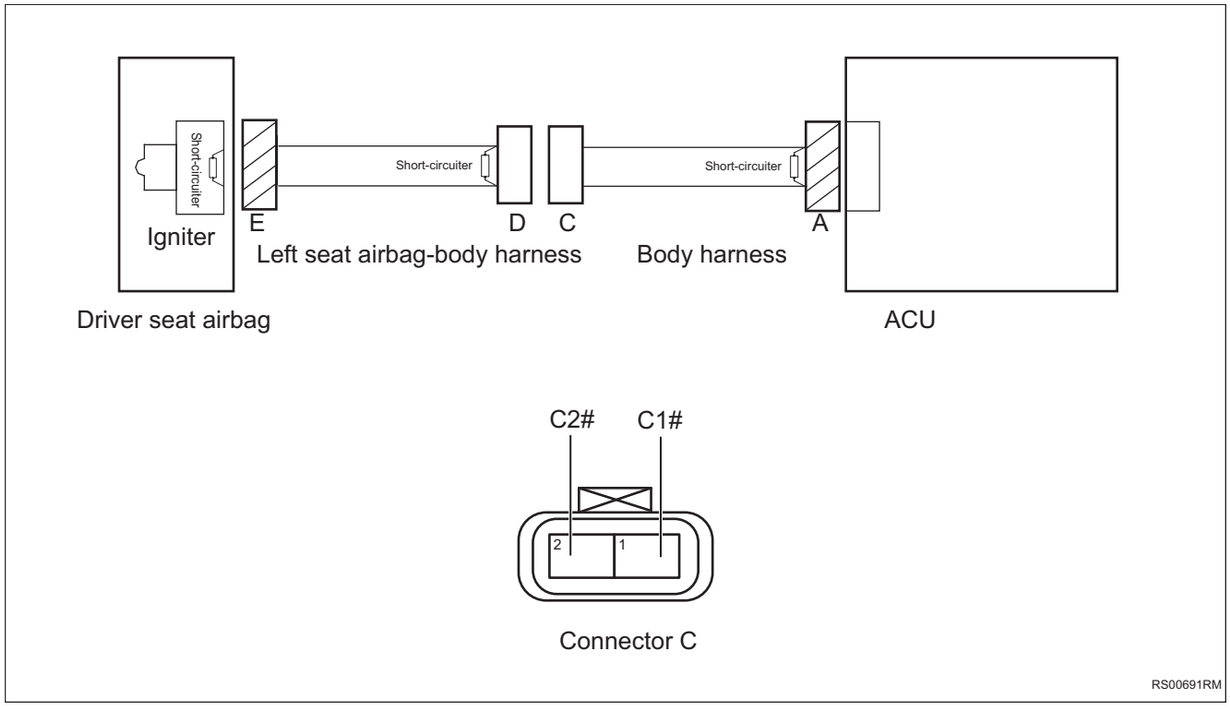
Standard value

Detector connection	Detection conditions	Specified state
Connector C1# - ACU connector 60#	Always connected	Less than 1Ω
Connector C2# - ACU connector 44#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

7	**Check driver seat airbag harness and connector for circuit shorted to ground (body harness)**



(a) Measure the resistance according to the values in the table below.

Standard value

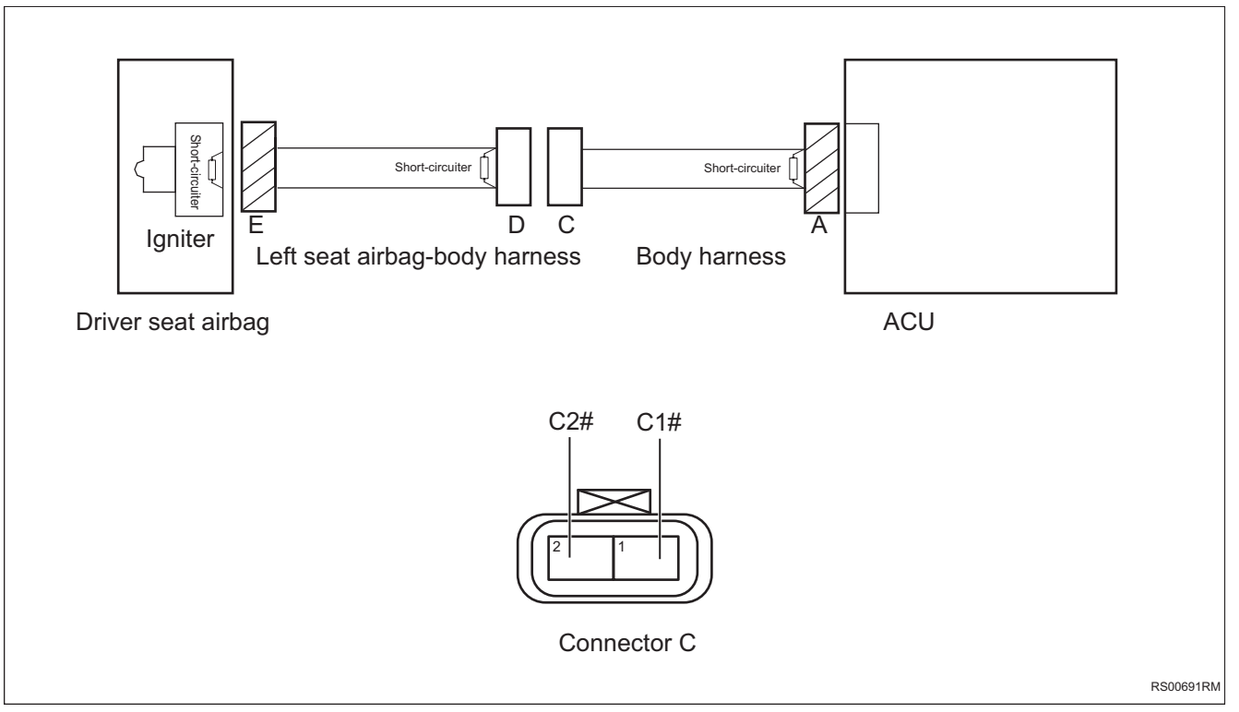
Detector connection	Detection conditions	Specified state
Connector C1#-body GND	Always connected	10 KΩ or greater
Connector C2#-body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

8	**Check driver seat airbag harness and connector for circuit shorted to power supply (body harness)**

RS



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Connector C1#-body GND	The ignition switch is set to "ON"	Less than 1 V
Connector C2#-body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

9	**Replace driver seat airbag (See page RS-223)**

(a) Replace the driver seat airbag.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace ACU (See page RS-218)**

OK

10	**End**

RS

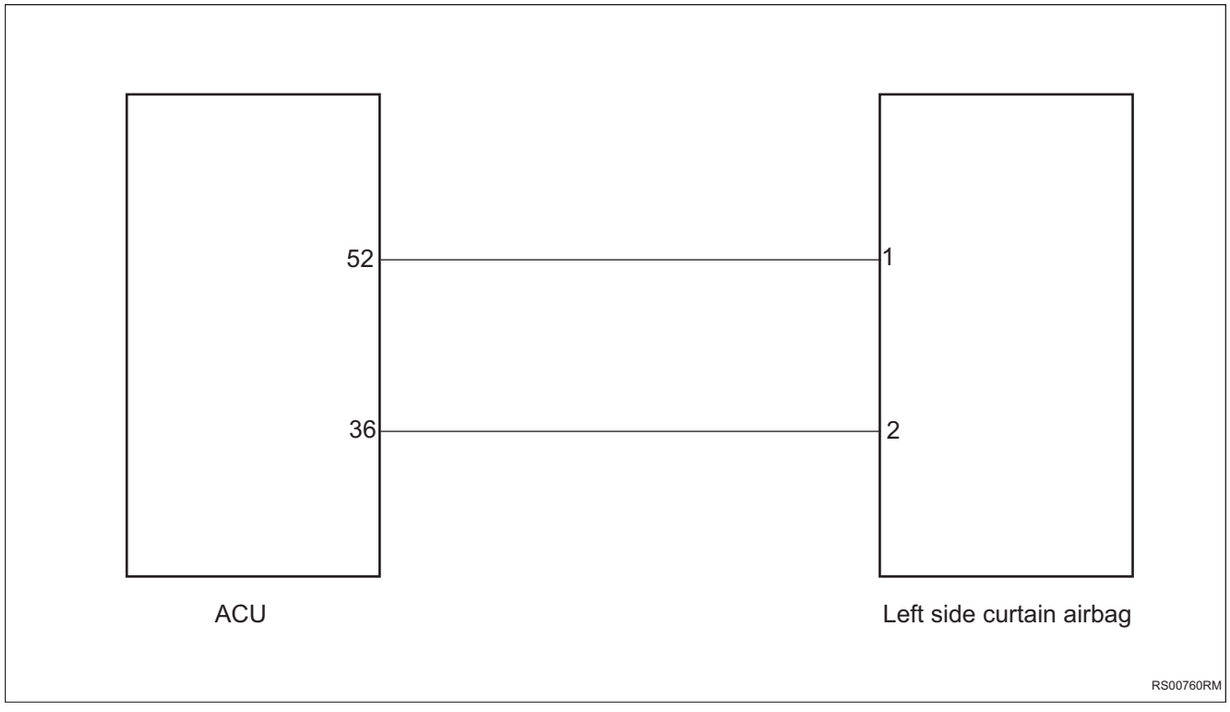
DTC	**B002111**	**Left side curtain airbag - circuit shorted to ground**
DTC	**B002112**	**Left side curtain airbag-shorted to battery**
DTC	**B00211A**	**Left side curtain airbag-too low resistance**
DTC	**B00211B**	**Left side curtain airbag - high resistance**
DTC	**B002156**	**Left side curtain airbag - configuration error**

Description

When the left side curtain airbag ignition circuit is shorted, the resistance is too high or too low, ACU records the DTC.

DTC	DTC detection conditions	Faulty location
B002111	(a) Left side curtain airbag circuit shorted to ground.	• Left side curtain airbag • ACU • Harness and connector
B002112	(a) Left side curtain airbag circuit shorted to power supply.	• Left side curtain airbag • ACU • Harness and connector
B00211A	(a) Left side curtain airbag circuit resistance less than lower limit.	• Left side curtain airbag • ACU • Harness and connector
B00211B	(a) The left side curtain airbag circuit resistance is higher than the upper limit.	• Left side curtain airbag • ACU • Harness and connector
B002156	(a) Left side curtain airbag configuration error.	• Left side curtain airbag • ACU • Harness and connector

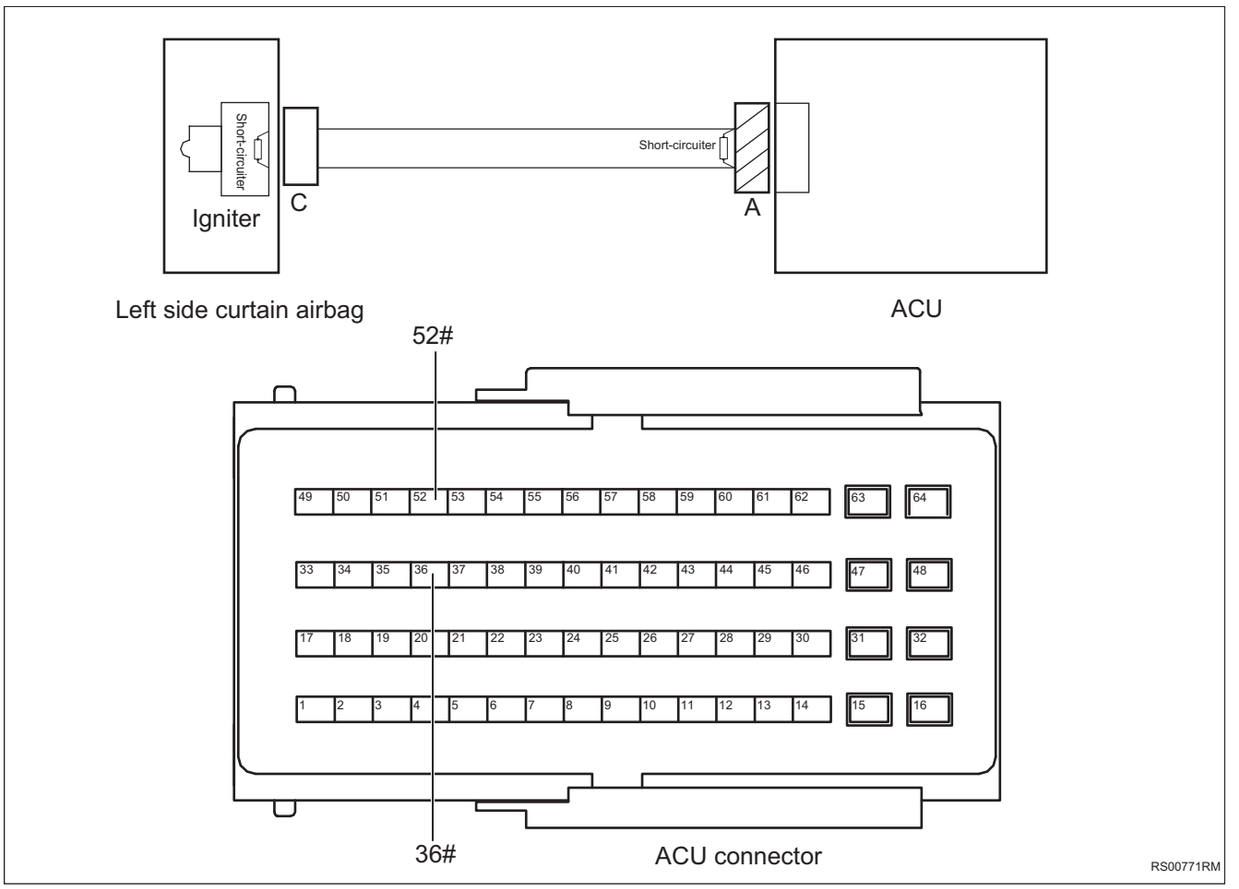
Circuit diagram



Inspection procedure

1	**Check left side curtain airbag harness and connector for circuit shorted to each other**

RS



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors A, C.

(d) Release the internal short-circuiter of connector A.

(e) Measure the resistance according to the values in the table below.

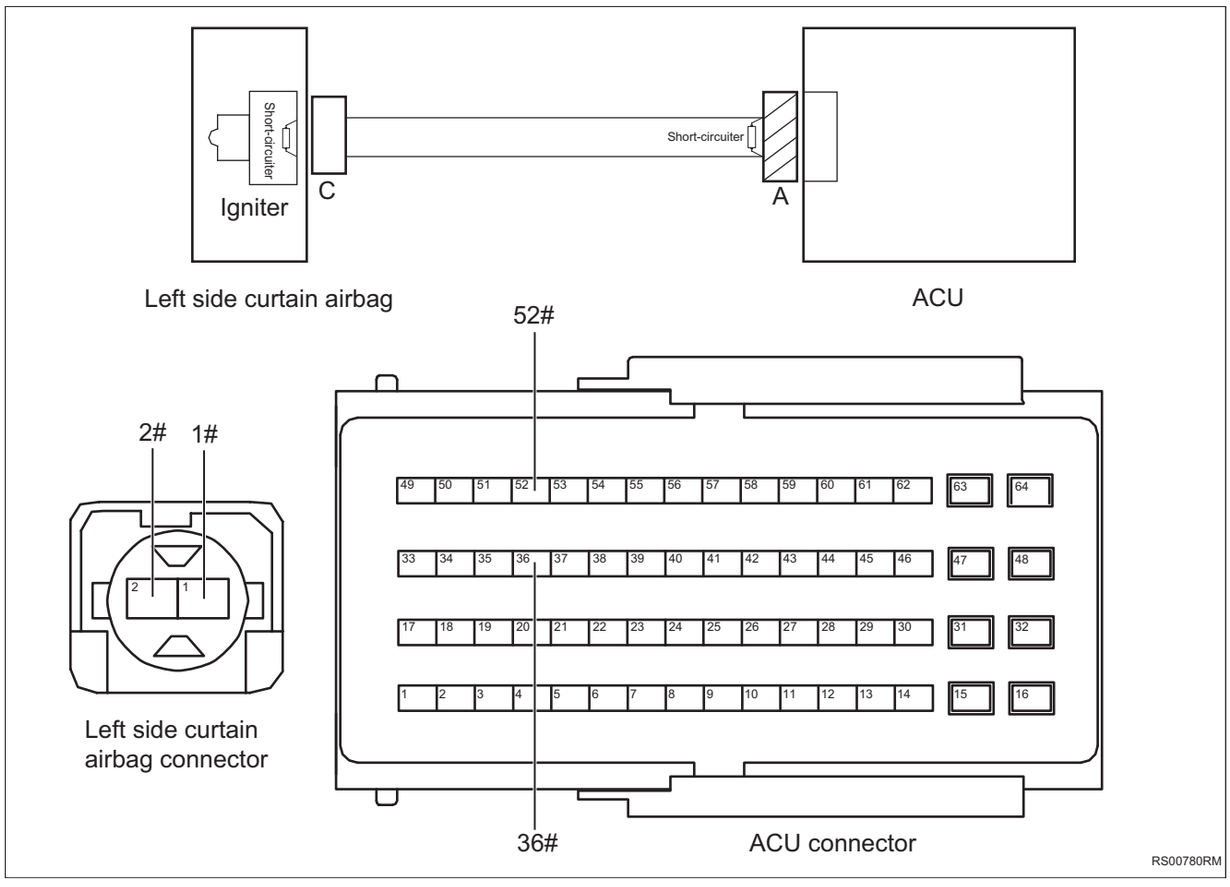
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 52# -ACU connector 36#	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

2	**Check left side curtain airbag harness and connector for open circuit**



(a) Measure the resistance according to the values in the table below.

Standard value

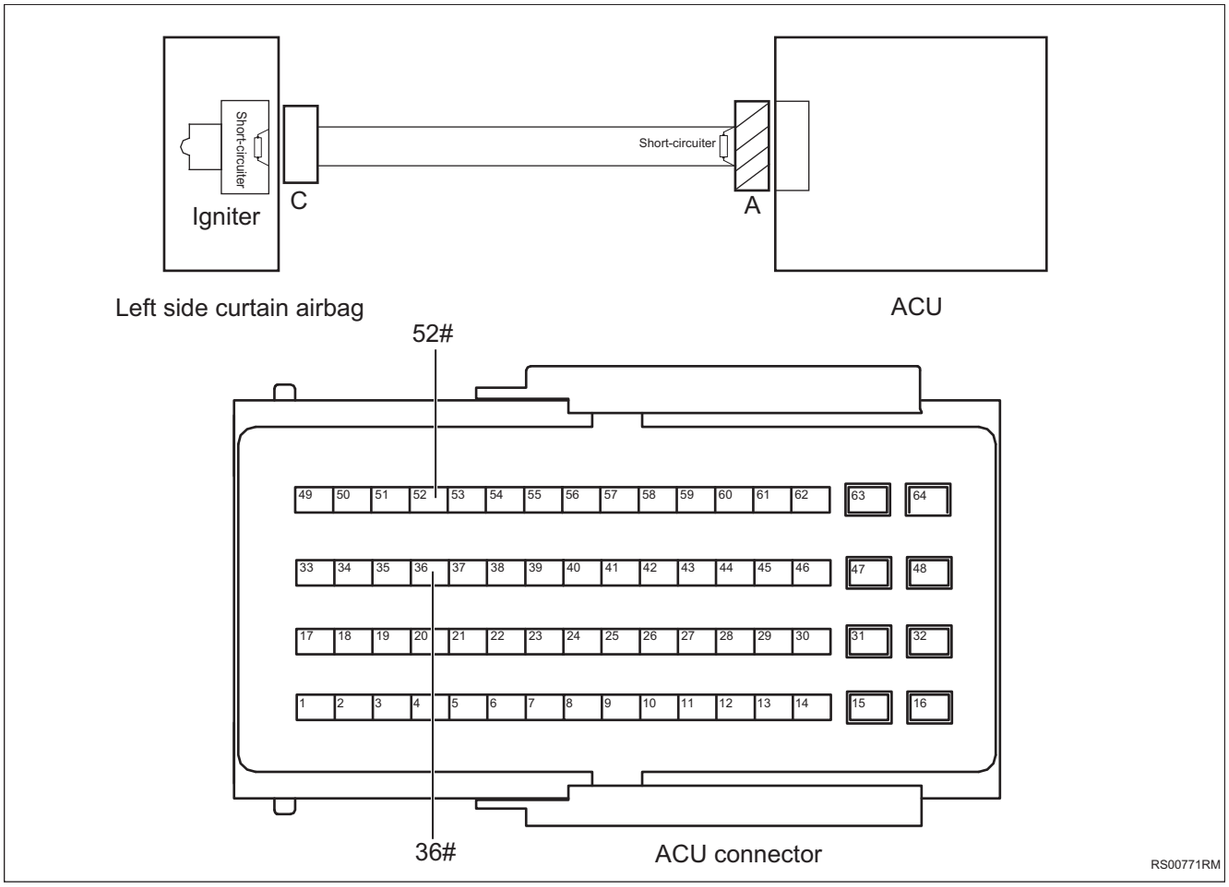
Detector connection	Detection conditions	Specified state
ACU connector 36#-left side curtain airbag connector 2#	Always connected	Less than 1Ω
ACU connector 52#-left side curtain airbag connector 1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check left side curtain airbag harness and connector for circuit shorted to ground**

RS



(a) Measure the resistance according to the values in the table below.

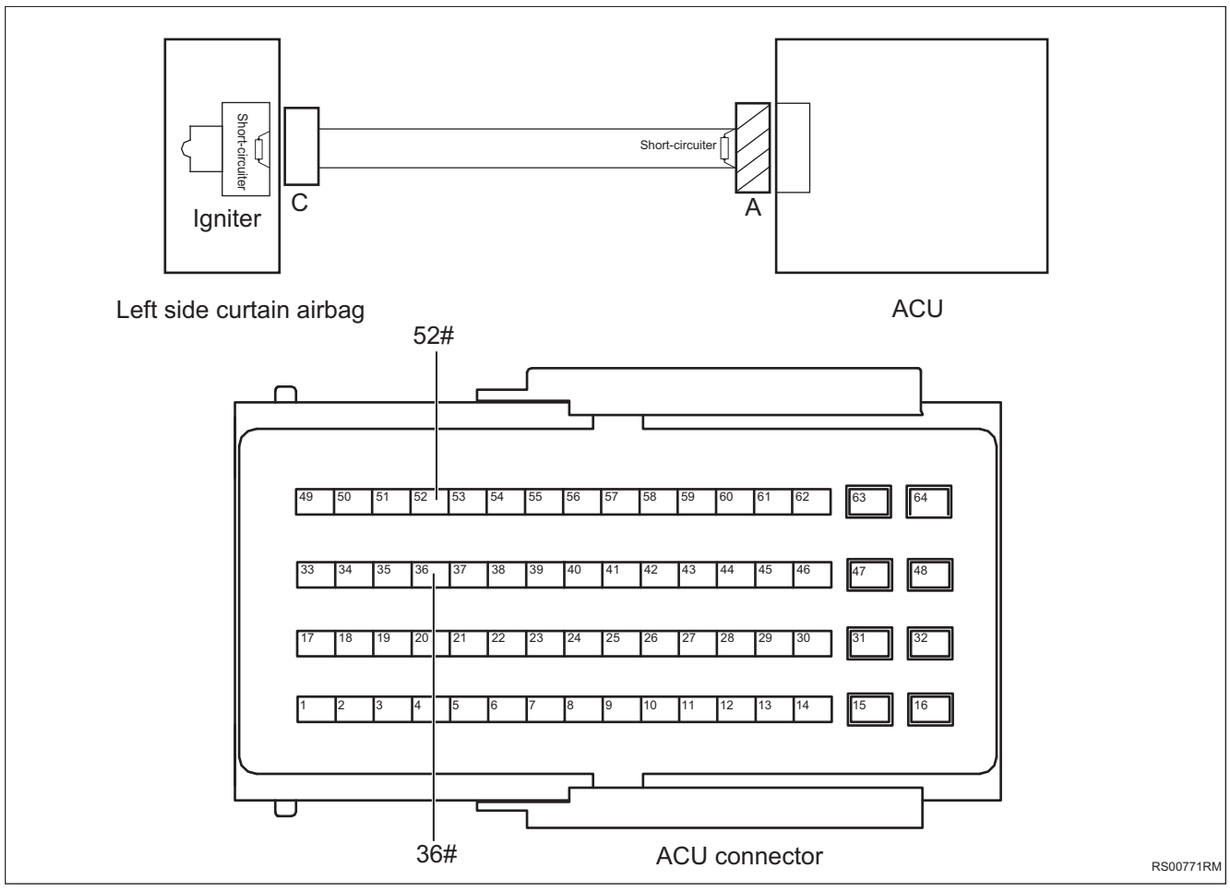
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 36#-body GND	Always connected	10 KΩ or greater
ACU connector 52#-body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

4	**Check left side curtain airbag harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACU connector 36#-body GND	The ignition switch is set to "ON"	Less than 1 V
ACU connector 52#-body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the left side curtain airbag (See page RS-220)**

(a) Replace the left side curtain airbag.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

RS

NG → **Replace ACU (See page RS-218)**

OK

6	**End**

DTC	**B002811**	**Right side airbag -circuit shorted to ground**
DTC	**B002812**	**Right side airbag-shorted to battery**
DTC	**B00281A**	**Right side airbag-too low resistance**
DTC	**B00281B**	**Right side airbag-too high resistance**
DTC	**B002856**	**Right side airbag -configuration error**

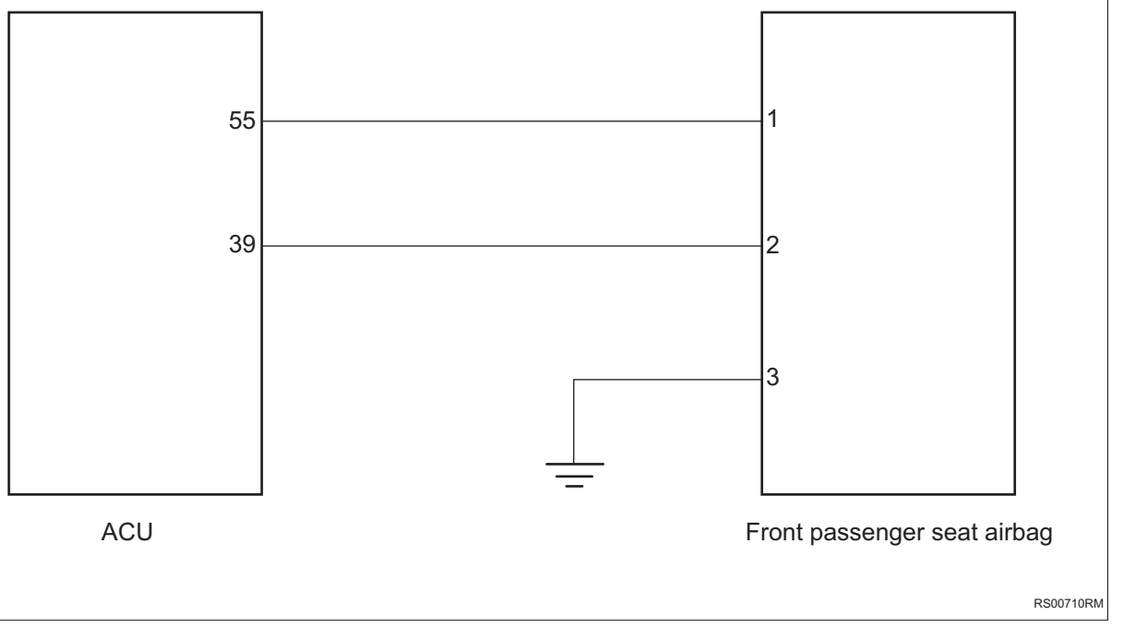
Description

When the ignition circuit of the front passenger seat airbag is open, shorted, has configuration error, or too high or too low resistance, the ACU will record the DTC.

DTC	DTC detection conditions	Faulty location
B002811	(a) Front passenger seat airbag circuit shorted to ground.	• Front passenger seat airbag • ACU • Harness and connector
B002812	(a) Front passenger seat airbag circuit shorted to power supply.	• Front passenger seat airbag • ACU • Harness and connector
B00281A	(a) Front passenger seat airbag circuit resistance below the lower limit.	• Front passenger seat airbag • ACU • Harness and connector
B00281B	(a) Front passenger seat airbag circuit resistance above the upper limit.	• Front passenger seat airbag • ACU • Harness and connector
B002856	(a) Front passenger seat airbag circuit resistance above the upper limit.	• Front passenger seat airbag • ACU • Harness and connector

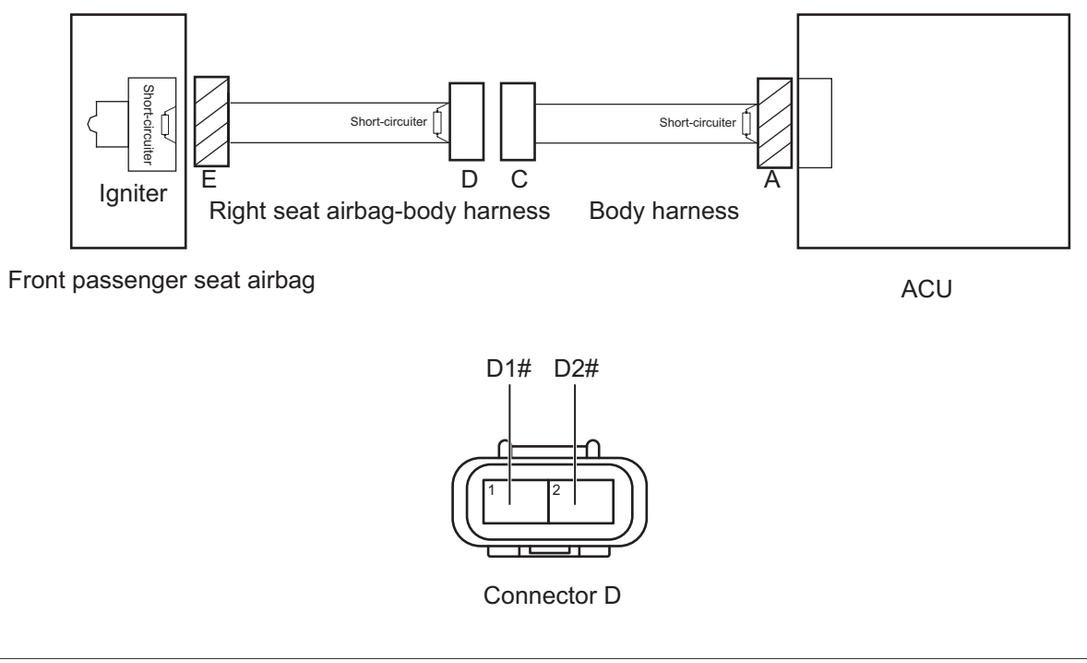
RS

Circuit diagram



Inspection procedure

1	**Check front passenger seat airbag harness and connector for circuit shorted to each other (right seat airbagbody harness)**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors D, E.

(d) Release the internal short-circuiter of connector D.

(e) Measure the resistance according to the values in the table below.

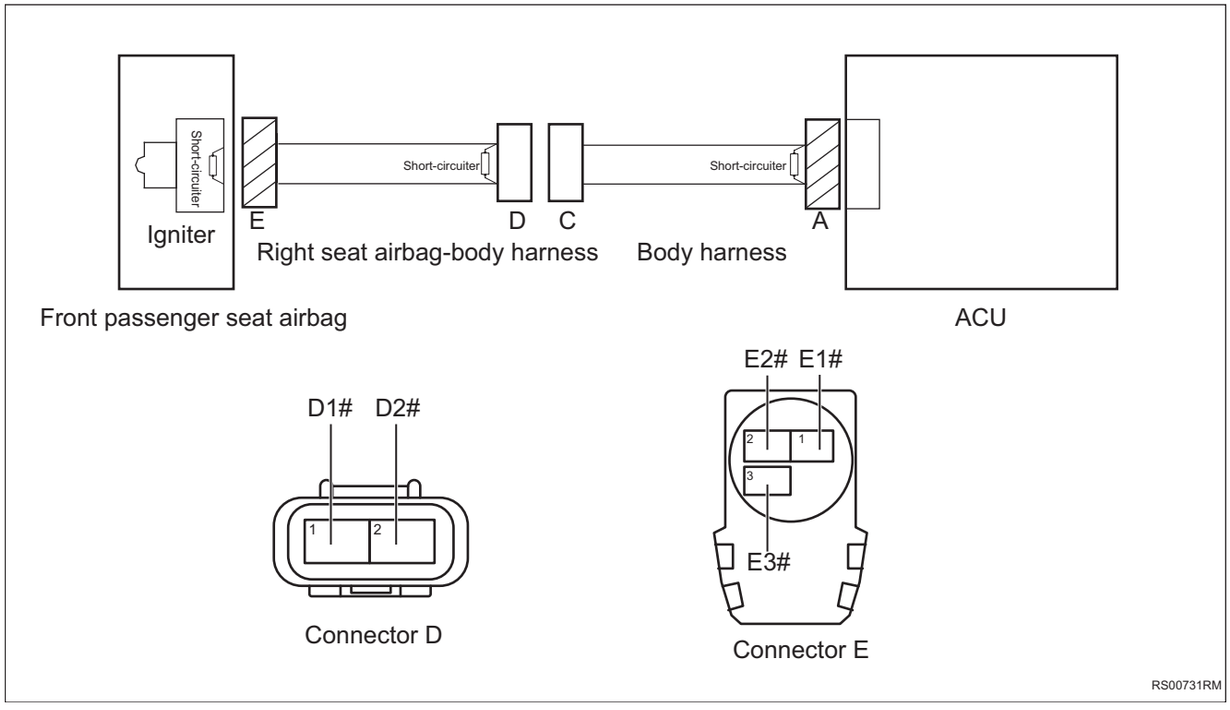
Standard value

Detector connection	Detection conditions	Specified state
Connector D1#-connector D2#	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

2	**Check front passenger seat airbag harness and connector for open circuit (right seat airbag-body harness)**



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Connector E1#-connector D1#	Always connected	Less than 1Ω
Connector E2#-connector D2#	Always connected	Less than 1Ω

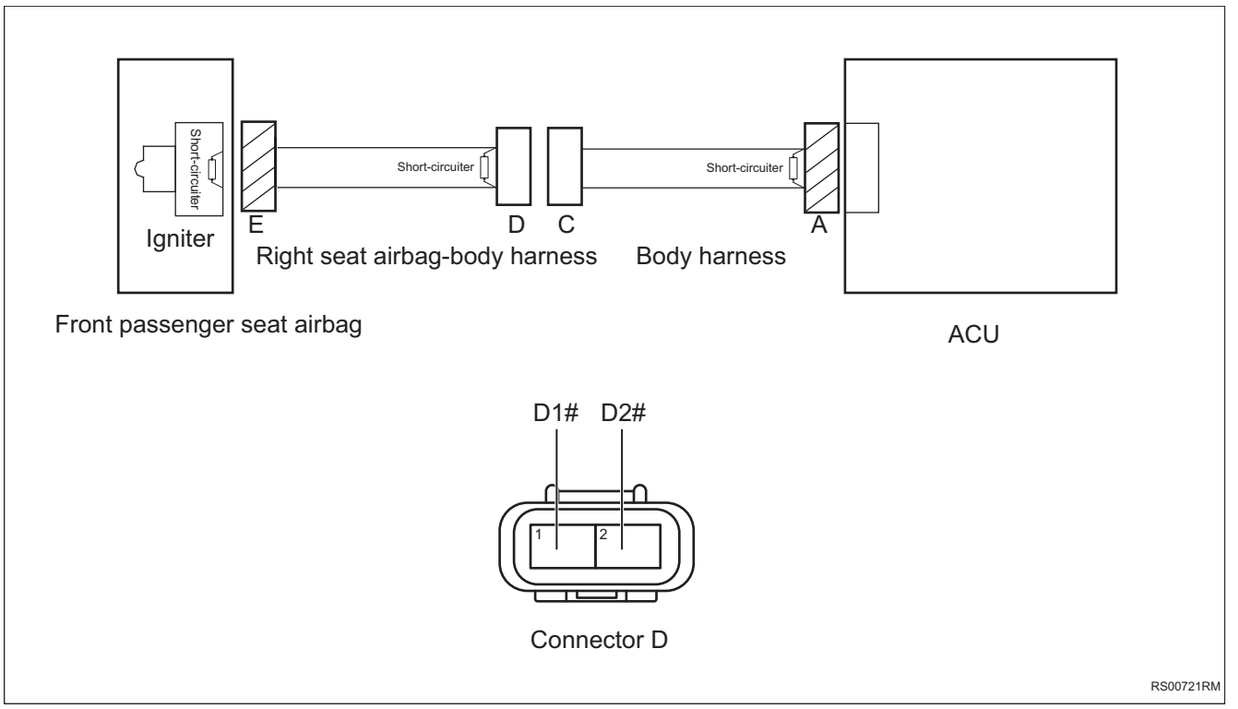
RS

Detector connection	Detection conditions	Specified state
Connector E3#-body GND	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	**Check front passenger seat airbag harness and connector for circuit shorted to ground (right seat airbag-body harness)**



(a) Measure the resistance according to the values in the table below.

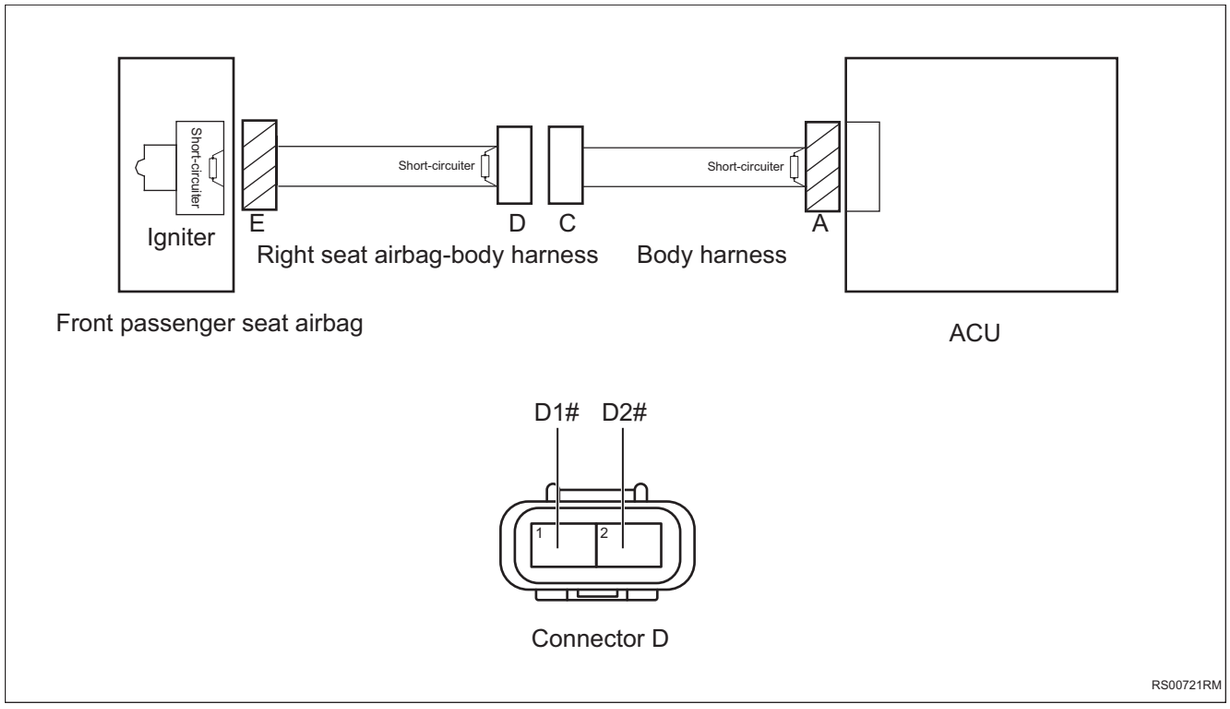
Standard value

Detector connection	Detection conditions	Specified state
Connector D1#-body GND	Always connected	10 KΩ or greater
Connector D2#-body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

4	**Check front passenger seat airbag harness and connector for circuit shorted to power supply (right seat airbag-body harness)**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

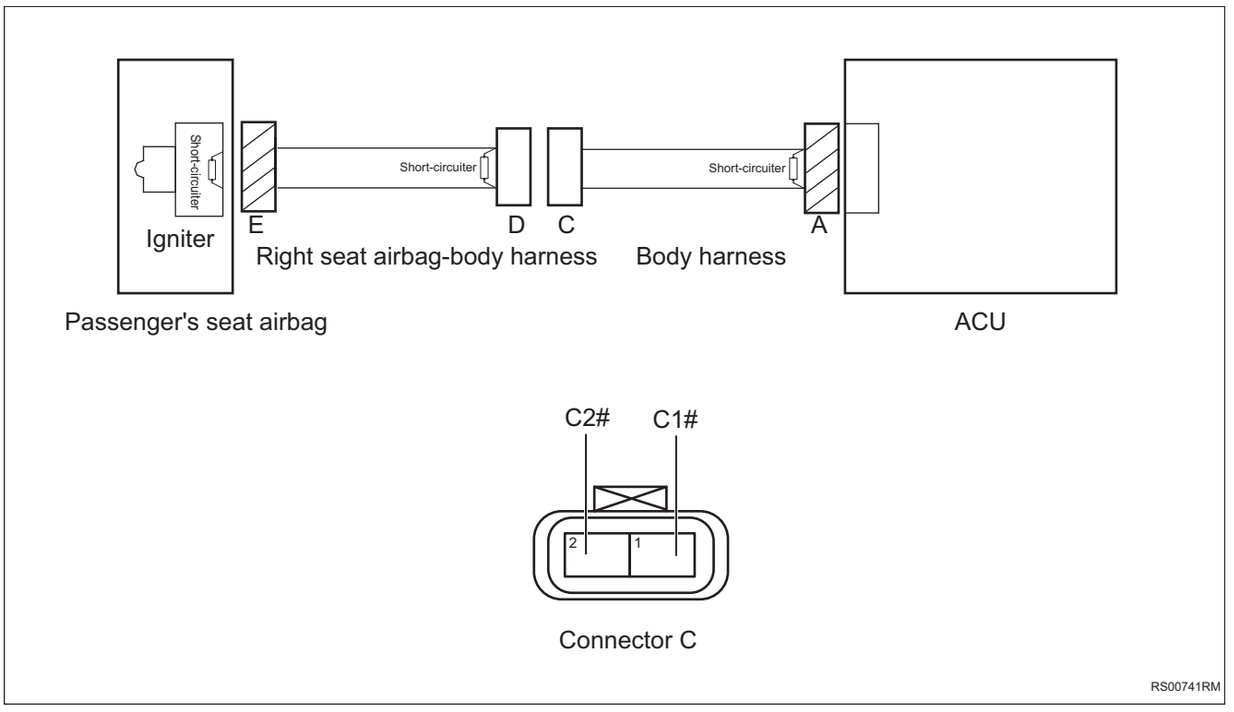
Detector connection	Detection conditions	Specified state
Connector D1#-body GND	The ignition switch is set to "ON"	Less than 1 V
Connector D2#-body GND	The ignition switch is set to "ON"	Less than 1 V

NG **Repair or replace the harness and connector**

OK

5	**Check front passenger seat airbag harness and connector for circuit shorted to each other (body harness)**

RS



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors A, C.

(d) Release the internal short-circuiter of connector A.

(e) Measure the resistance according to the values in the table below.

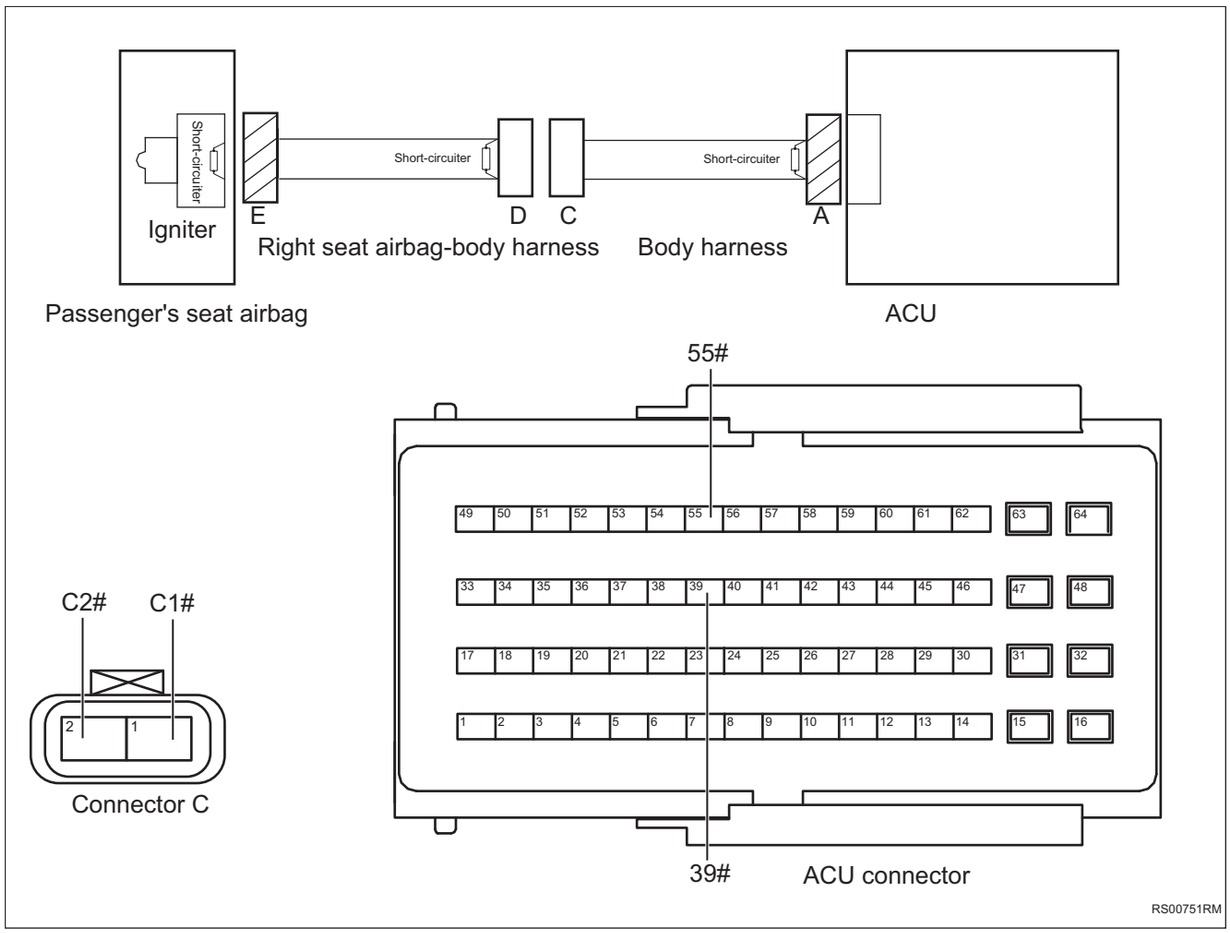
Standard value

Detector connection	Detection conditions	Specified state
Connector C1#-connector C2#	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

6	**Check front passenger seat airbag harness and connector for open circuit (body harness)**



(a) Measure the resistance according to the values in the table below.

Standard value

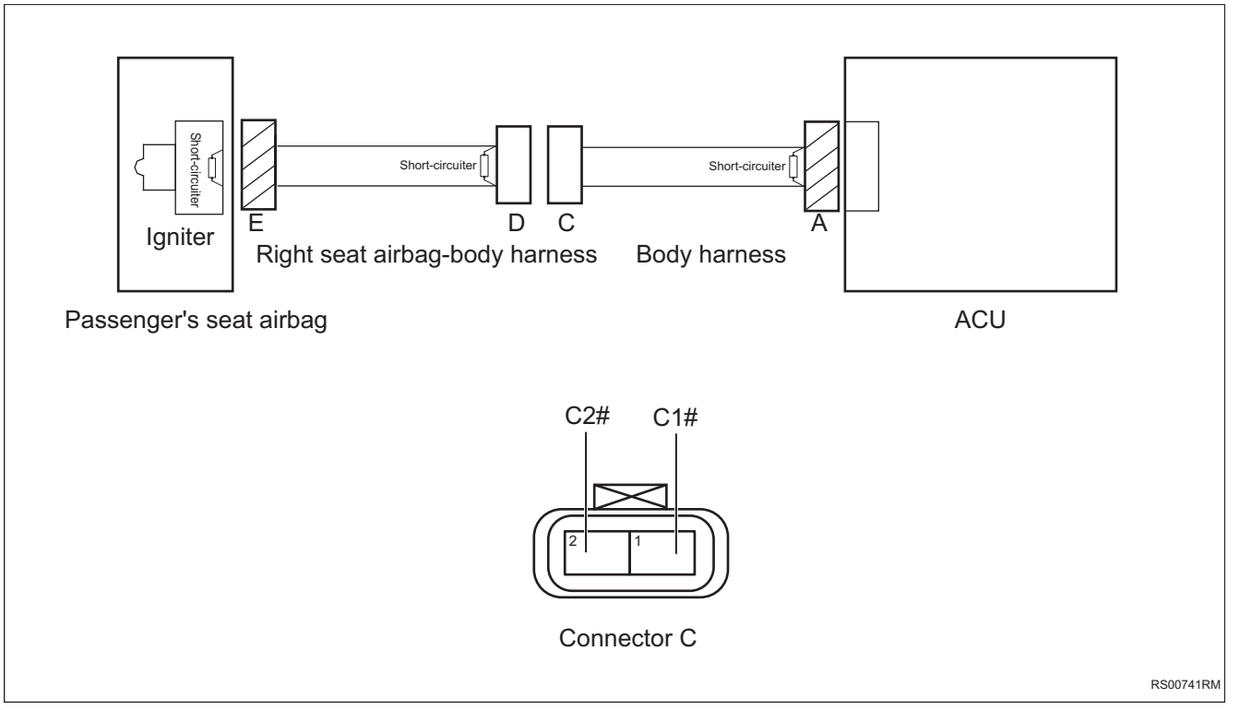
Detector connection	Detection conditions	Specified state
Connector C1# - ACU connector 55#	Always connected	Less than 1Ω
Connector C2# - ACU connector 39#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

7	**Check front passenger seat airbag harness and connector for circuit shorted to ground (body harness)**

RS



(a) Measure the resistance according to the values in the table below.

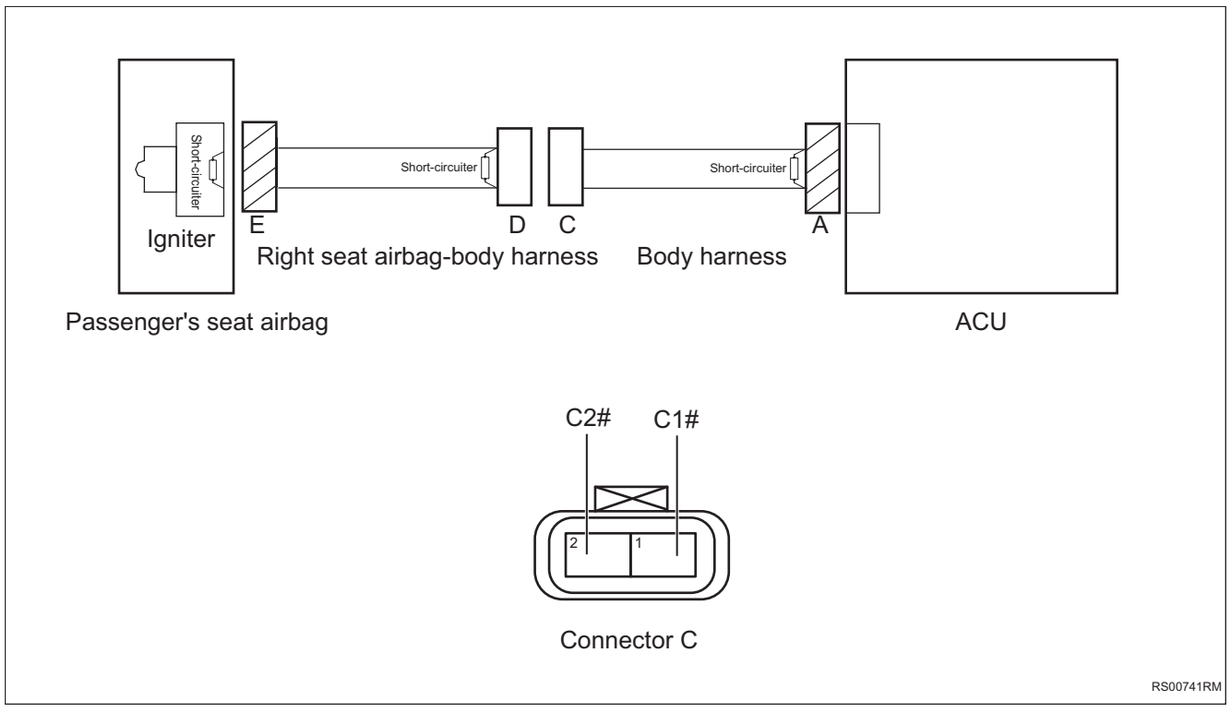
Standard value

Detector connection	Detection conditions	Specified state
Connector C1#-body GND	Always connected	10 KΩ or greater
Connector C2#-body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

8	**Check front passenger seat airbag harness and connector for circuit shorted to power supply (body harness)**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Connector C1#-body GND	The ignition switch is set to "ON"	Less than 1 V
Connector C2#-body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

9	**Replace front passenger seat airbag (See page RS-223)**

(a) Replace the front passenger seat airbag.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace ACU (See page RS-218)**

OK

10	**End**

DTC	**B002911**	**Right side curtain airbag -circuit shorted to ground**
DTC	**B002912**	**Right side curtain airbag-shorted to battery**
DTC	**B00291A**	**Right side curtain airbag-too low resistance**
DTC	**B00291B**	**Right side curtain airbag - high resistance**
DTC	**B002956**	**Right side curtain airbag -configuration error**

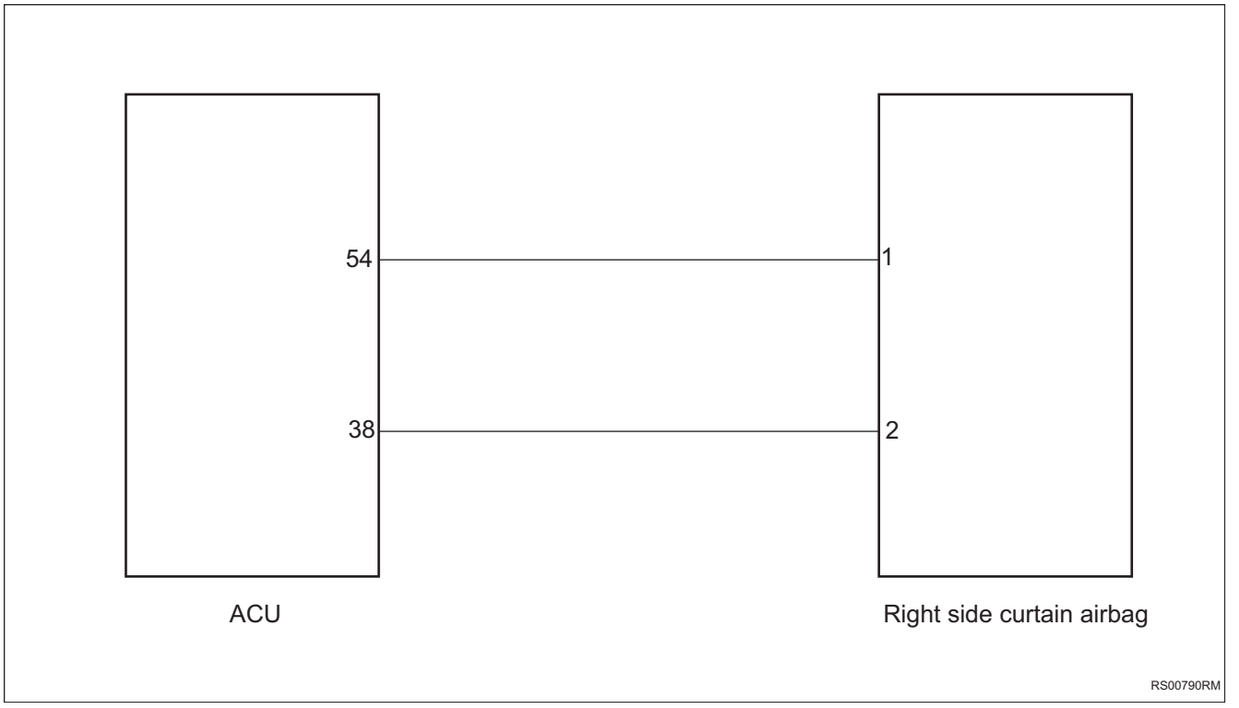
Description

When the right side curtain airbag ignition circuit is shorted, the resistance is too high or too low, ACU records the DTC.

DTC	DTC detection conditions	Faulty location
B002911	(a) Right side curtain airbag circuit shorted to ground.	• Right side curtain airbag • ACU • Harness and connector
B002912	(a) Right side curtain airbag circuit shorted to power supply.	• Right side curtain airbag • ACU • Harness and connector
B00291A	(a) Right side curtain airbag circuit resistance less than lower limit.	• Right side curtain airbag • ACU • Harness and connector
B00291B	(a) The right side curtain airbag circuit resistance is higher than the upper limit.	• Right side curtain airbag • ACU • Harness and connector
B002956	(a) Right side curtain airbag configuration error.	• Right side curtain airbag • ACU • Harness and connector

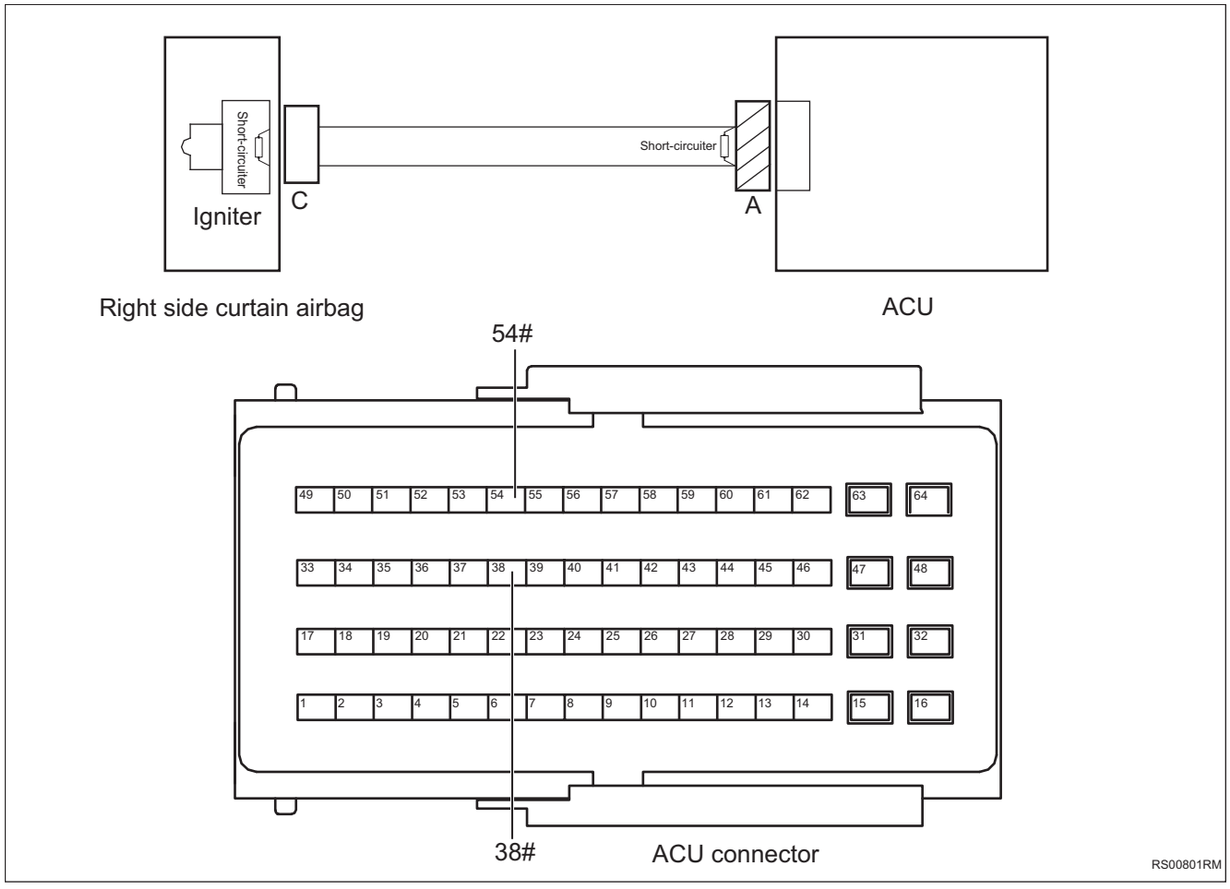
RS

Circuit diagram



Inspection procedure

1	**Check right side curtain airbag harness and connector for circuit shorted to each other**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors A, C.

(d) Release the internal short-circuiter of connector A.

(e) Measure the resistance according to the values in the table below.

Standard value

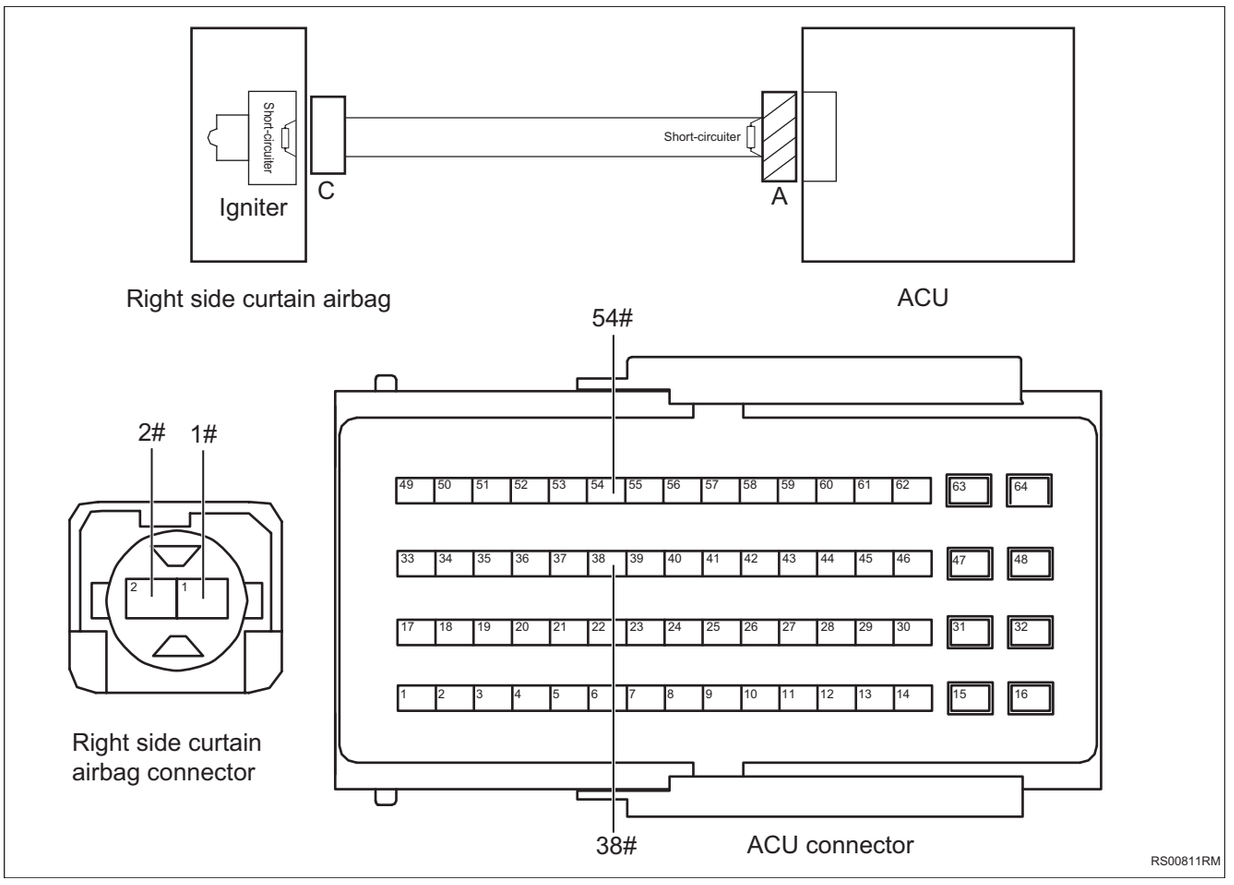
Detector connection	Detection conditions	Specified state
ACU connector 54# -ACU connector 38#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

2	**Check right side curtain airbag harness and connector for open circuit**

RS



(a) Measure the resistance according to the values in the table below.

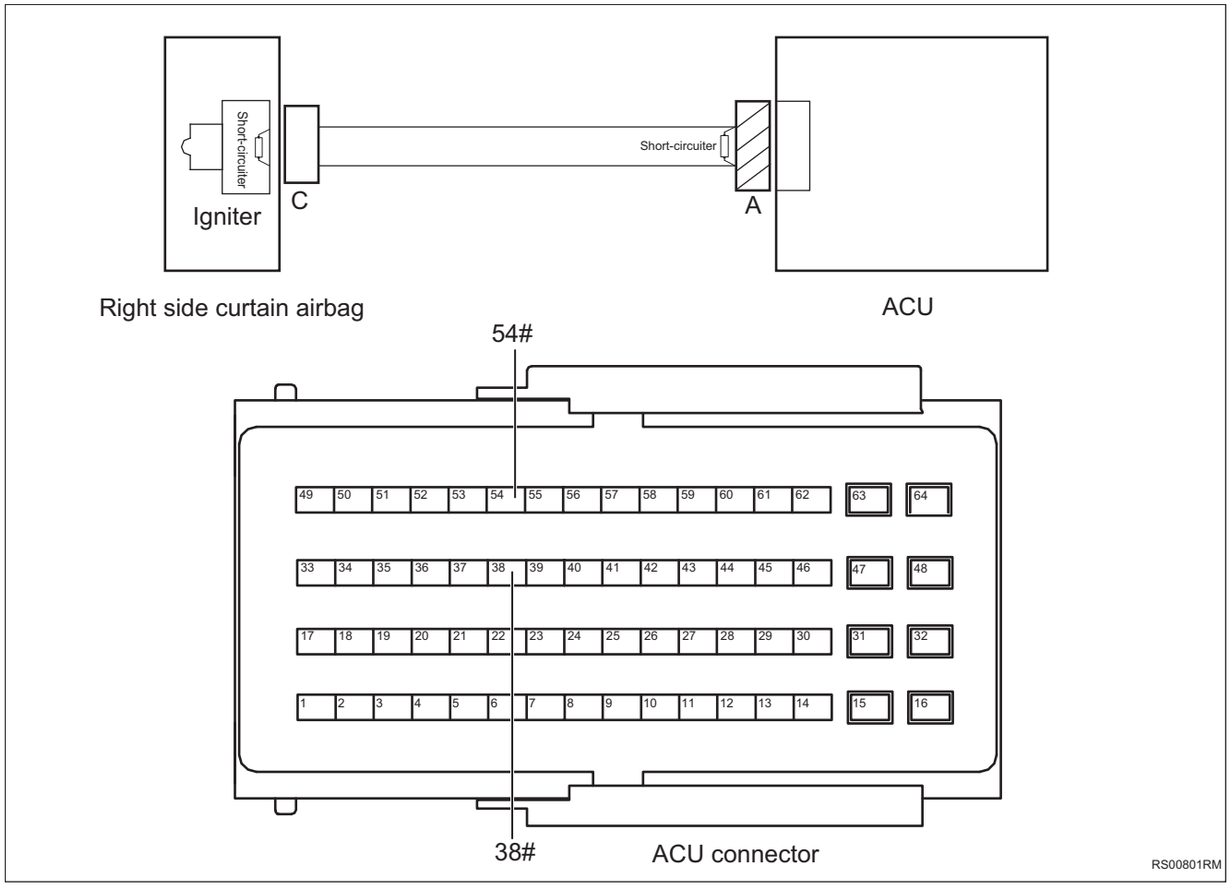
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 38#-right side curtain airbag connector 2#	Always connected	Less than 1Ω
ACU connector 54#-right side curtain airbag connector 1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check right side curtain airbag harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

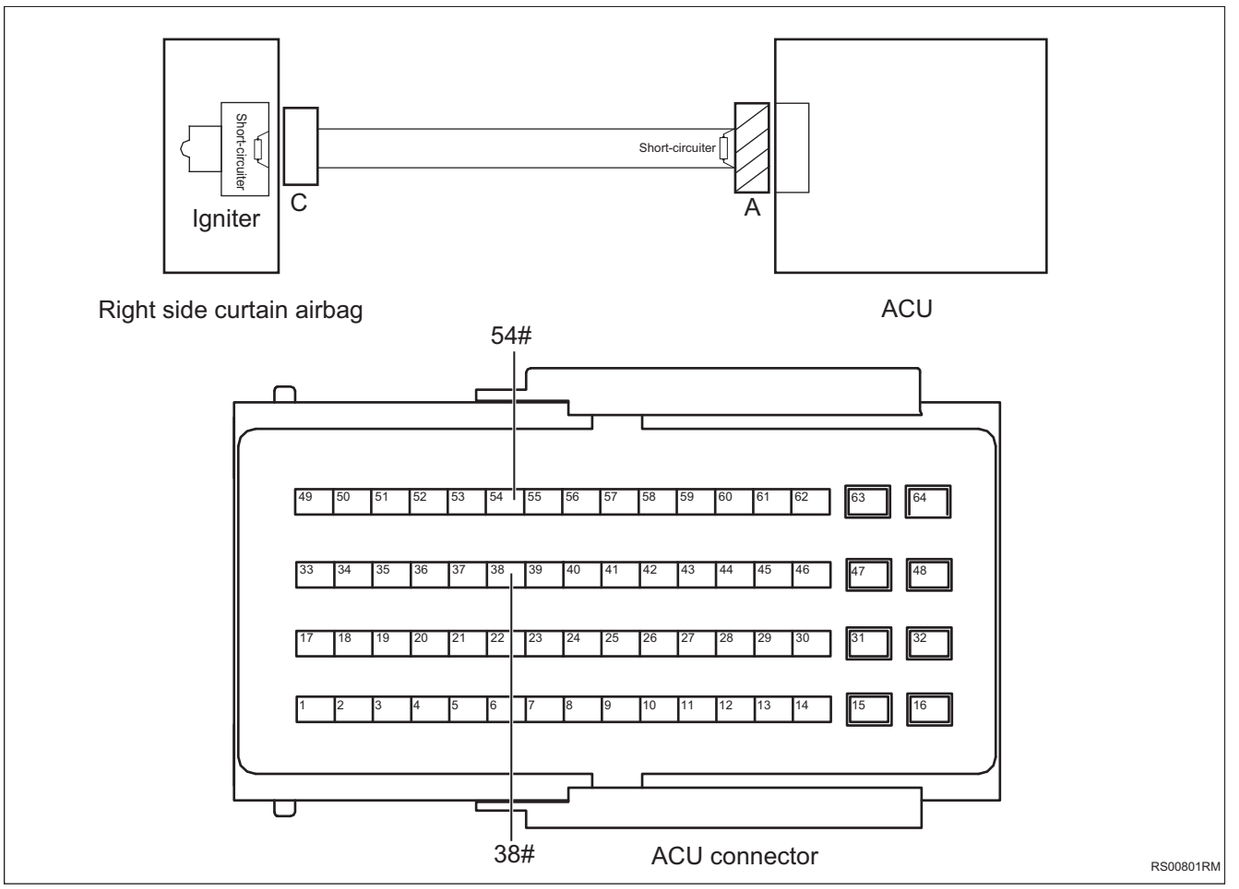
Detector connection	Detection conditions	Specified state
ACU connector 38# -body GND	Always connected	10 KΩ or greater
ACU connector 54# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check right side curtain airbag harness and connector for circuit shorted to power supply**

RS



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACU connector 38# -body GND	The ignition switch is set to "ON"	Less than 1 V
ACU connector 54# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the right side curtain airbag (See page RS-220)**

(a) Replace the right side curtain airbag.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace ACU (See page RS-218)**

OK

6	**End**

RS

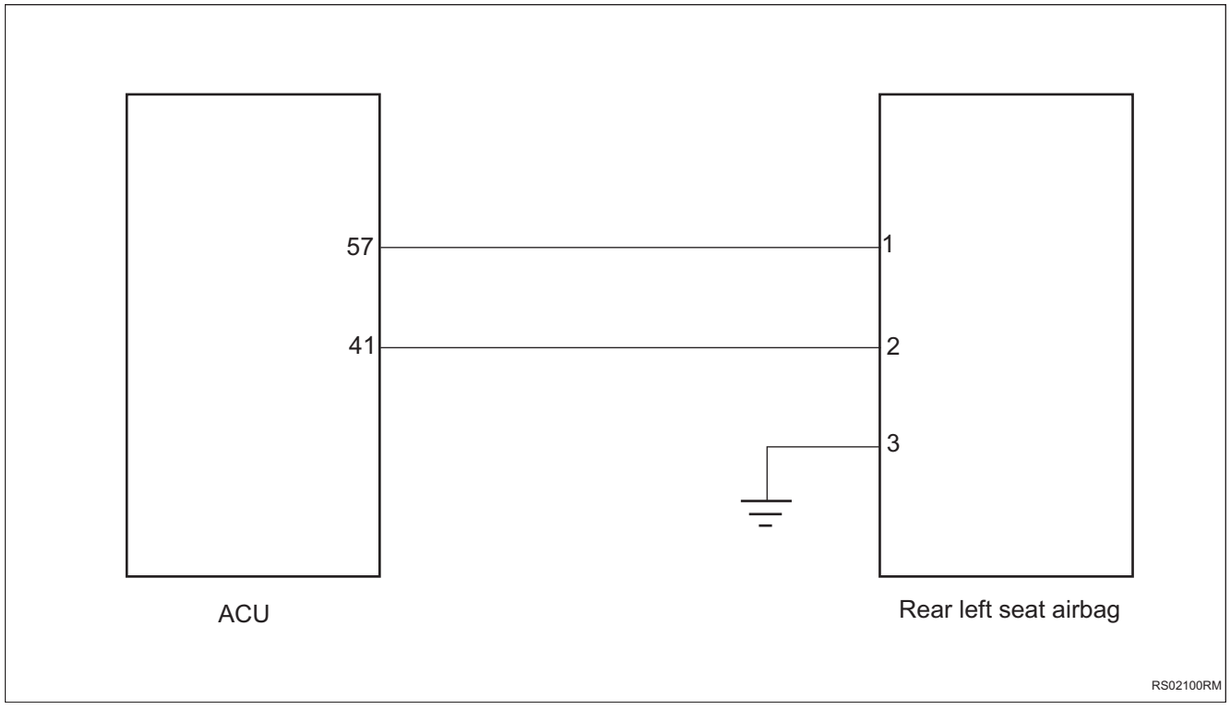
DTC	**B003011**	**Rear left side airbag -circuit shorted to ground**
DTC	**B003012**	**Rear left side airbag- shorted to battery**
DTC	**B00301A**	**Rear left side airbag-low resistance**
DTC	**B00301B**	**Rear left side airbag- high resistance**
DTC	**B003056**	**Rear left side airbag-configuration error**

Description

When the rear left seat airbag ignition circuit is shorted, has too high or too low resistance, the ACU will record the DTC.

DTC	DTC detection conditions	Faulty location
B003011	(a) Rear left side airbag circuit is shorted to ground.	• Rear left seat airbag • ACU • Harness and connector
B003012	(a) Rear left side airbag shorted to battery.	• Rear left seat airbag • ACU • Harness and connector
B00301A	(a) Rear left side airbag low resistance.	• Rear left seat airbag • ACU • Harness and connector
B00301B	(a) Rear left side airbag high resistance.	• Rear left seat airbag • ACU • Harness and connector
B003056	(a) Rear left side airbag configuration error.	• Rear left seat airbag • ACU • Harness and connector

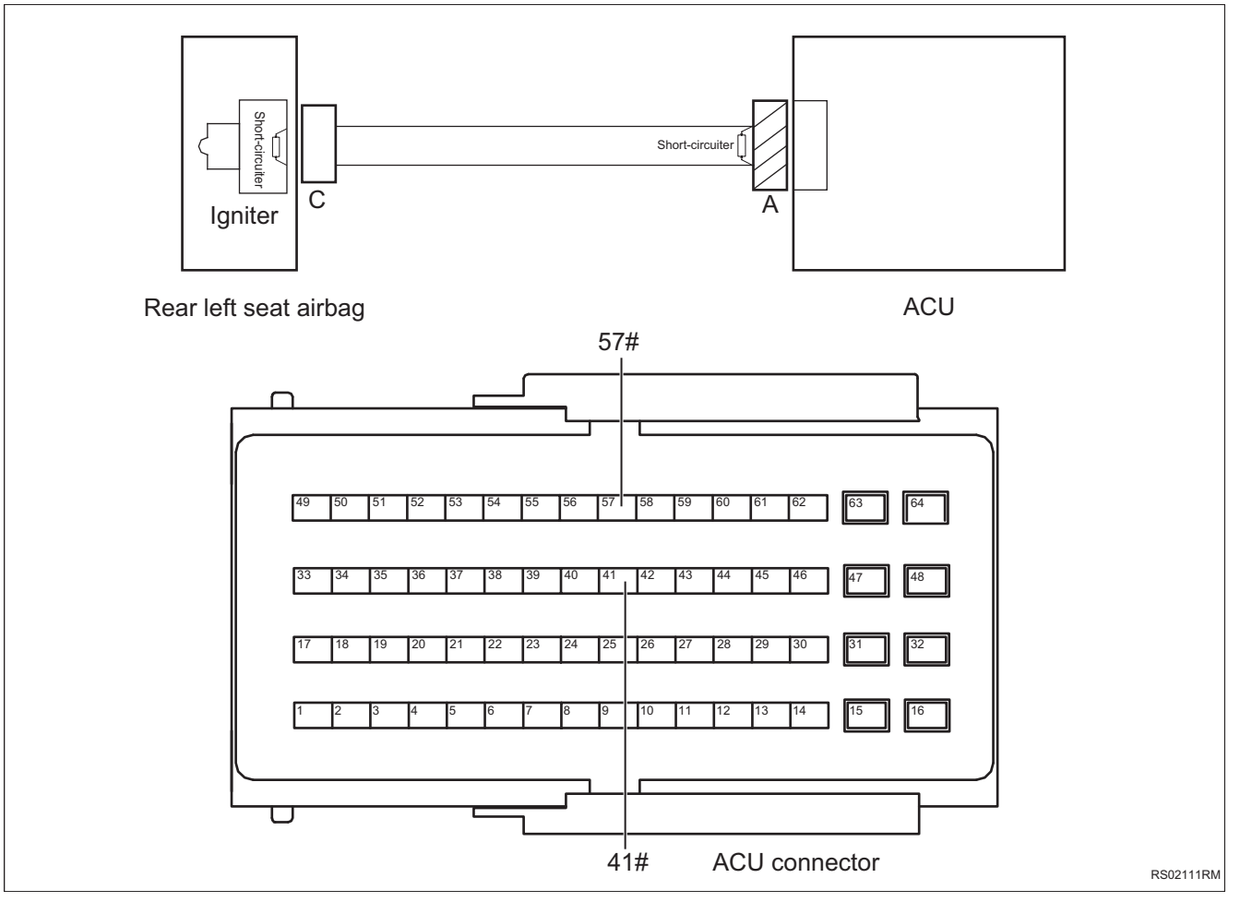
Circuit diagram



Inspection procedure

1	**Check rear left seat airbag harness and connector for circuit shorted to each other**

RS



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors A, C.

(d) Release the internal short-circuiter of connector A.

(e) Measure the resistance according to the values in the table below.

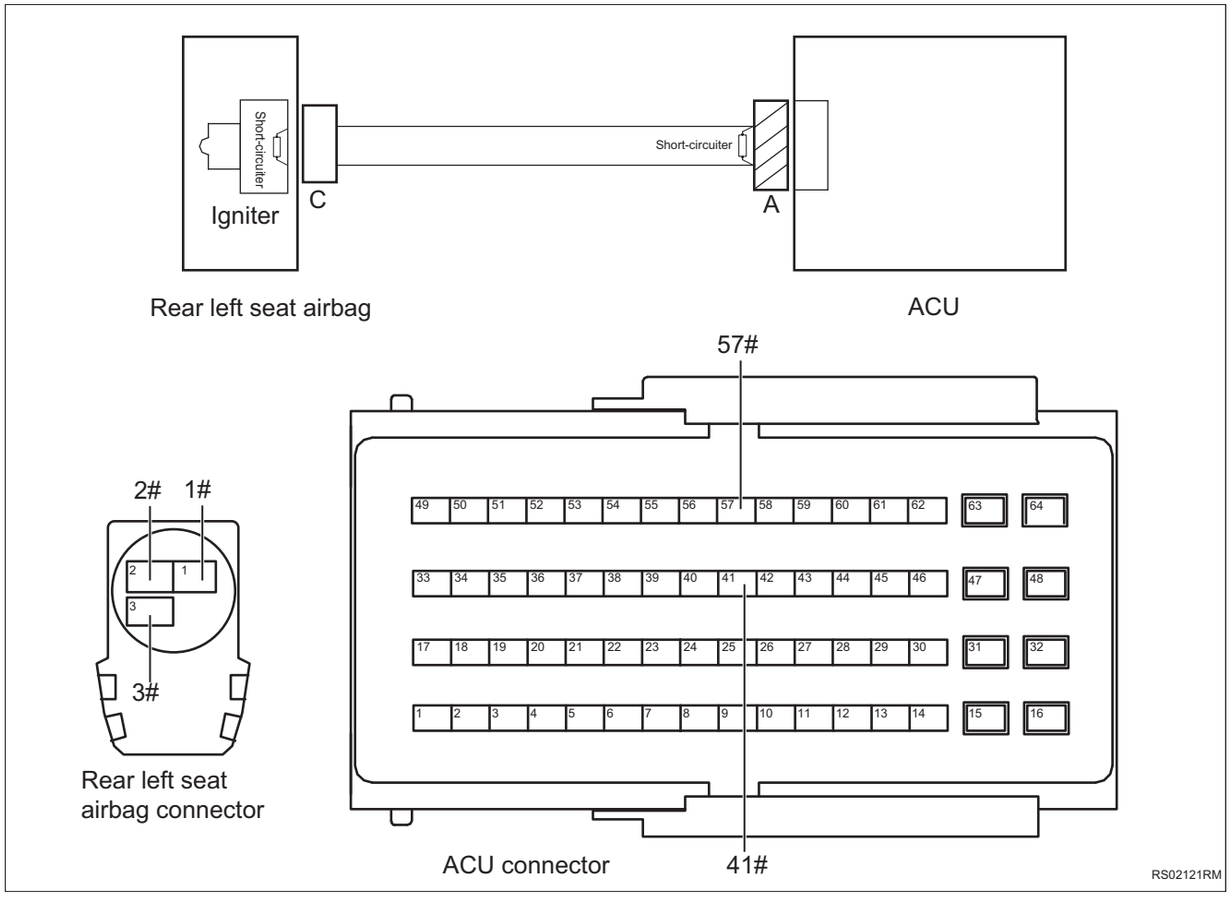
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 41# -ACU connector 57#	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

2	**Check rear left seat airbag harness and connector for open circuit**



(a) Measure the resistance according to the values in the table below.

Standard value

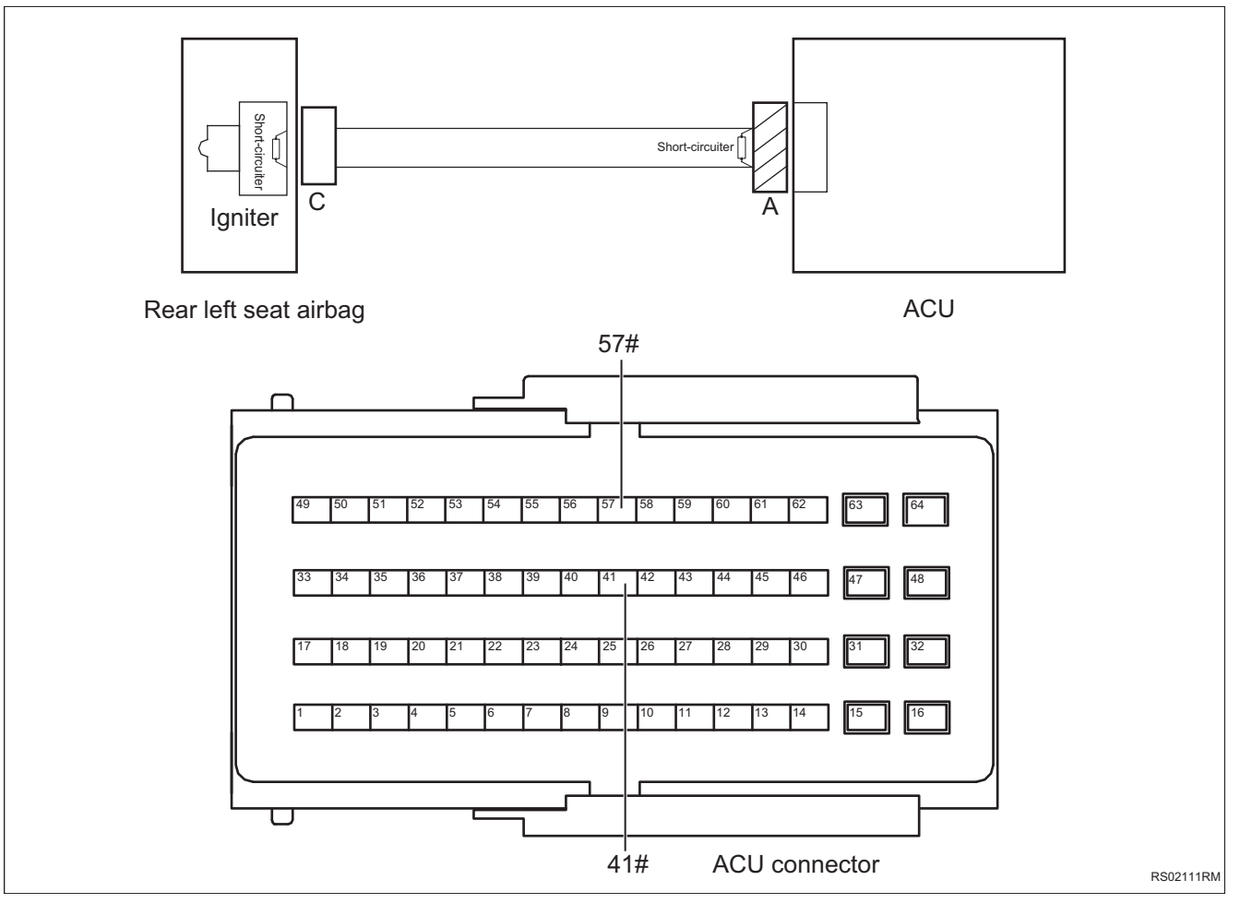
Detector connection	Detection conditions	Specified state
ACU connector 41#-rear left seat airbag connector 2#	Always connected	Less than 1Ω
ACU connector 57#-rear left seat airbag connector 1#	Always connected	Less than 1Ω
Rear left seat airbag connector 3# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check rear left seat airbag harness and connector for circuit shorted to ground**

RS



(a) Measure the resistance according to the values in the table below.

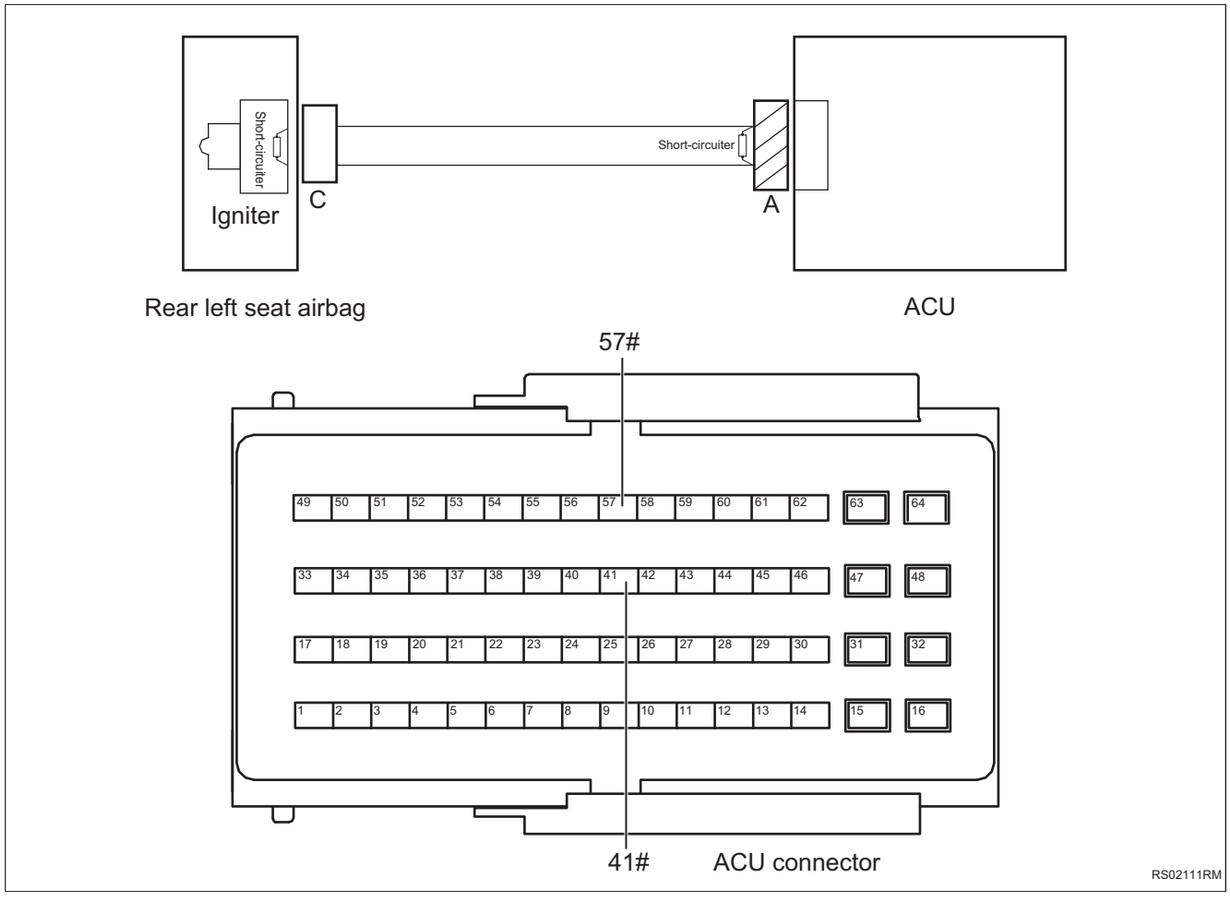
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 41# - body GND	Always connected	10 KΩ or greater
ACU connector 57# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check rear left seat airbag harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACU connector 41# - body GND	The ignition switch is set to "ON"	Less than 1 V
ACU connector 57# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace rear left seat airbag (See page RS-238)**

(a) Replace the rear left seat airbag.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

RS

NG → **Replace ACU (See page RS-218)**

OK

6	**End**

DTC	**B003811**	**Rear right side airbag -circuit shorted to ground**
DTC	**B003812**	**Rear right side airbag- shorted to battery**
DTC	**B00381A**	**Rear right side airbag-low resistance**
DTC	**B00381B**	**Rear right side airbag-high resistance**
DTC	**B003856**	**Rear right side airbag-configuration error**

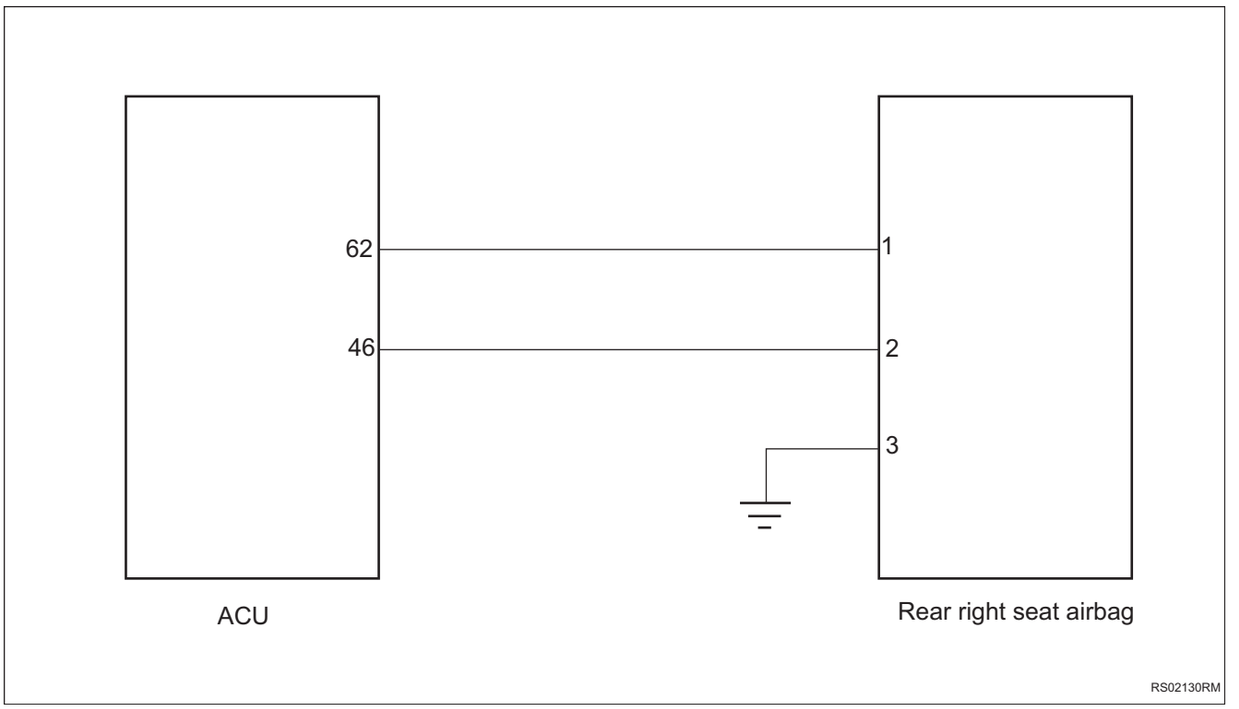
Description

When the rear right seat airbag ignition circuit is shorted, has too high or too low resistance, the ACU will record the DTC.

DTC	DTC detection conditions	Faulty location
B003811	(a) Rear right side airbag circuit is shorted to ground.	• Rear right seat airbag • ACU • Harness and connector
B003812	(a) Rear right side airbag is shorted to battery.	• Rear right seat airbag • ACU • Harness and connector
B00381A	(a) Rear right side airbag resistance too low.	• Rear right seat airbag • ACU • Harness and connector
B00381B	(a) Rear right side airbag high resistance.	• Rear right seat airbag • ACU • Harness and connector
B003856	(a) Rear right side airbag configuration error.	• Rear right seat airbag • ACU • Harness and connector

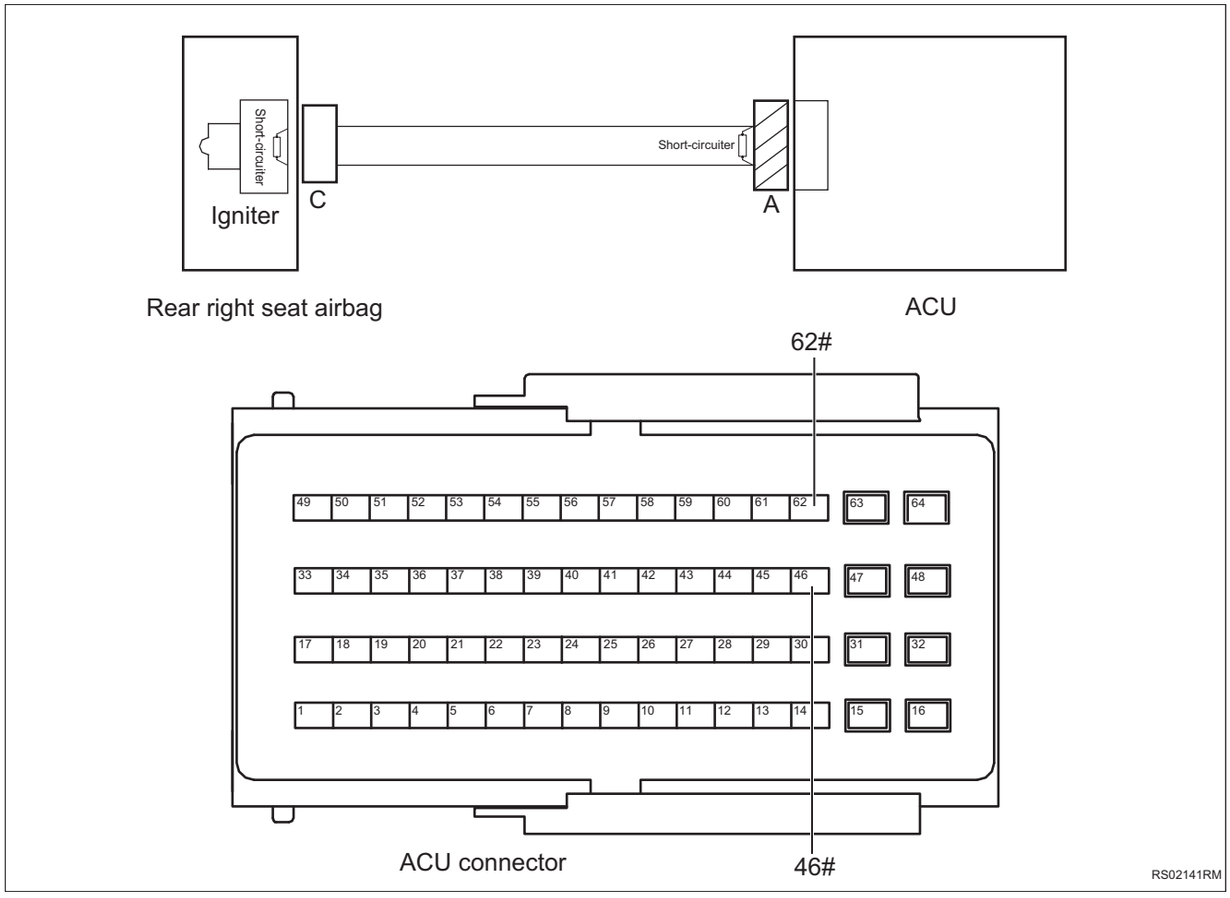
RS

Circuit diagram



Inspection procedure

1	**Check rear right seat airbag harness and connector for circuit shorted to each other**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors A, C.

(d) Release the internal short-circuiter of connector A.

(e) Measure the resistance according to the values in the table below.

Standard value

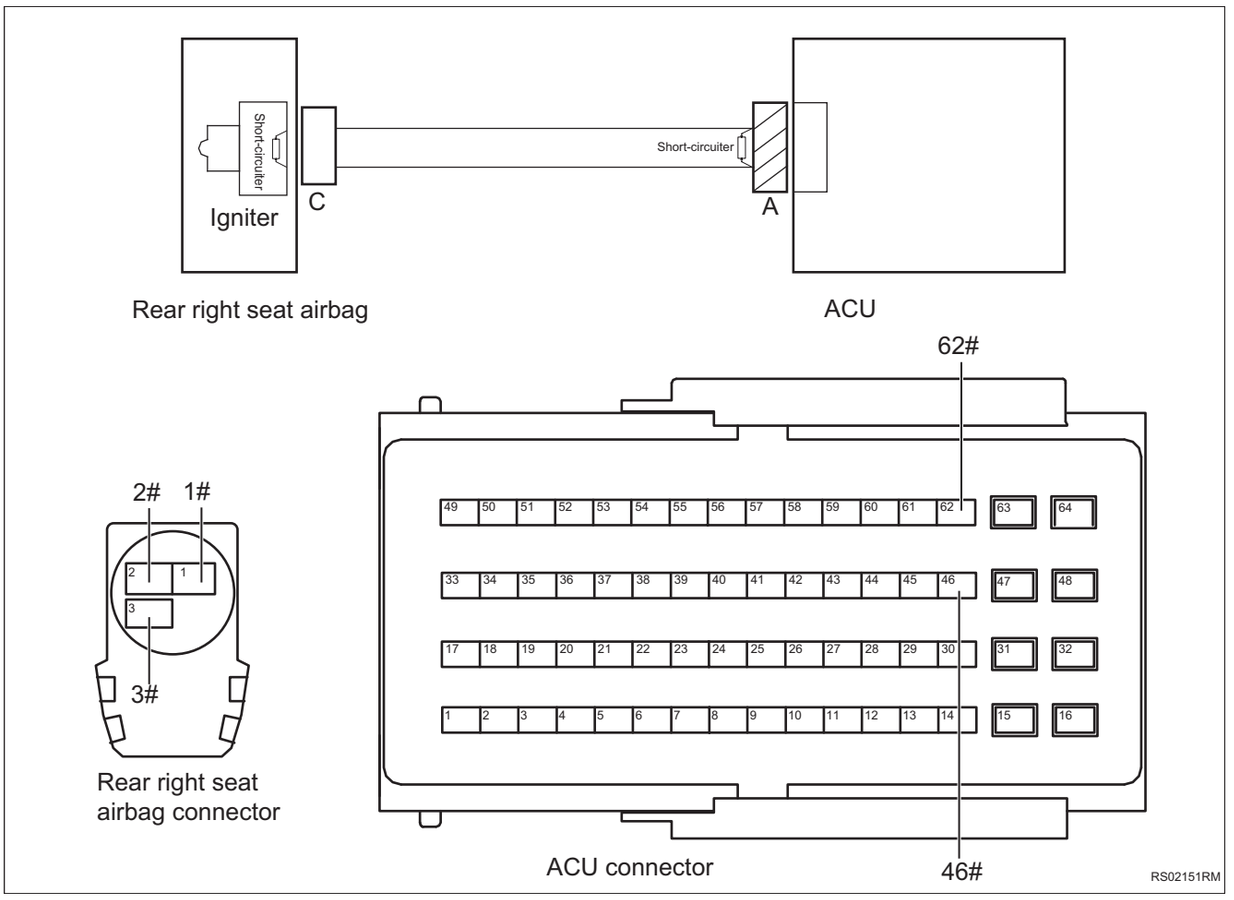
Detector connection	Detection conditions	Specified state
ACU connector 46# - ACU connector 62#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

2	**Check the rear right seat airbag harness and connector for open circuit**

RS



(a) Measure the resistance according to the values in the table below.

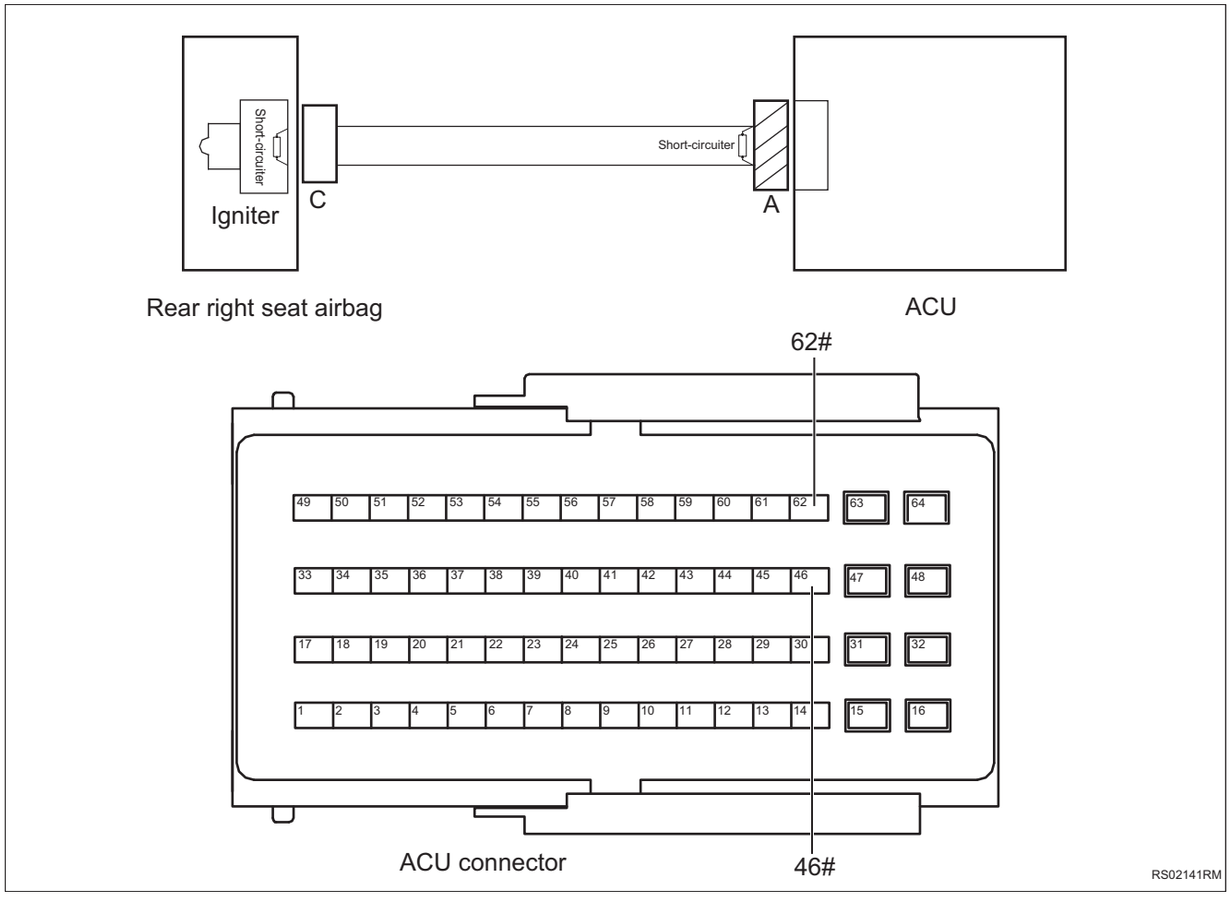
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 46#-rear right seat airbag connector 2#	Always connected	Less than 1Ω
ACU connector 62#-rear right seat airbag connector 1#	Always connected	Less than 1Ω
Rear right seat airbag connector 3# - body GND	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	**Check rear right seat airbag harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

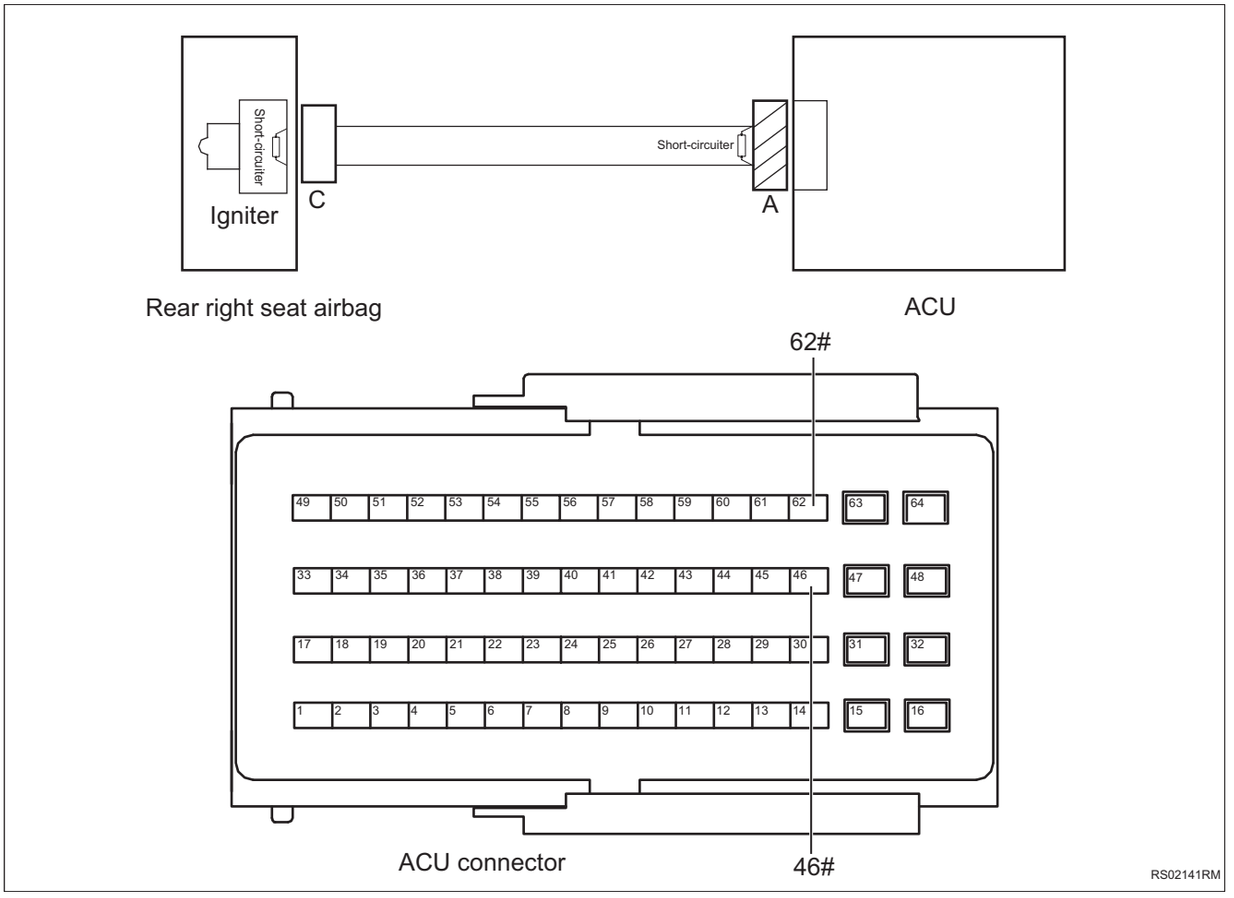
Detector connection	Detection conditions	Specified state
ACU connector 46# - body GND	Always connected	10 KΩ or greater
ACU connector 62# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check rear right seat airbag harness and connector for circuit shorted to power supply**

RS



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACU connector 46# - body GND	The ignition switch is set to "ON"	Less than 1 V
ACU connector 62# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace rear right seat airbag (See page RS-238)**

(a) Replace the rear right seat airbag.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace ACU (See page RS-218)**

OK

6	**End**

DTC	B005012	Driver side seat belt buckle circuit shorted to power supply

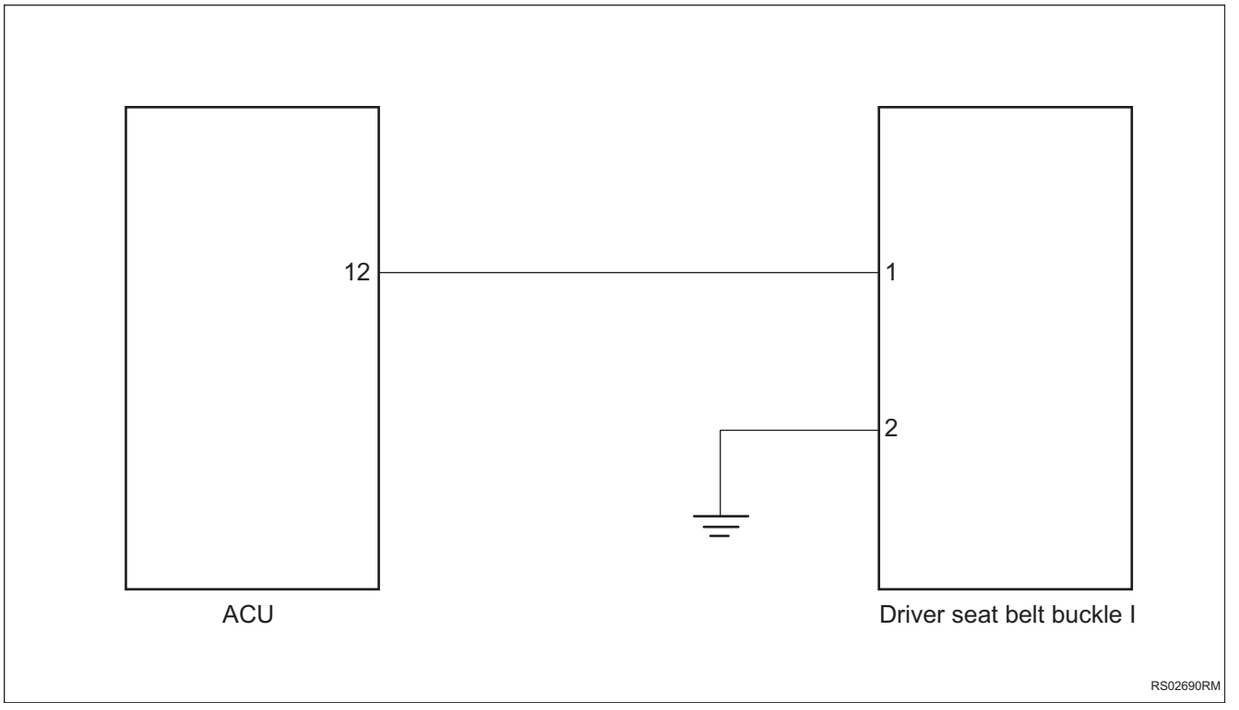
RS

Description

When the driver seat belt buckle itself has failure or is short-circuited, the ACU will record the DTC.

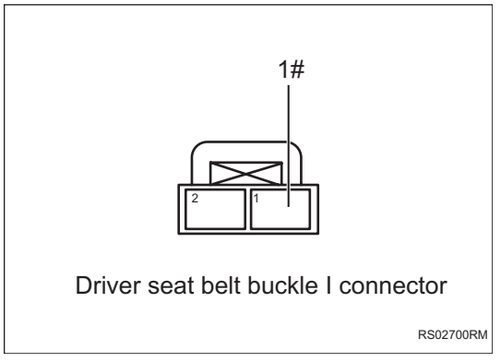
DTC	DTC detection conditions	Faulty location
B005012	(a) Driver seat belt buckle I switch circuit shorted to power supply.	• Driver seat belt buckle I • ACU • Harness and connector

Circuit diagram



Inspection procedure

1	**Check the driver seat belt buckle I harness and connector for circuit shorted to power supply**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ACU connector.

(d) Disconnect the driver seat belt buckle I connector.

(e) Connect battery negative terminal.

(f) Set the ignition switch to "ON".

(g) Measure the resistance according to the values in the table below.

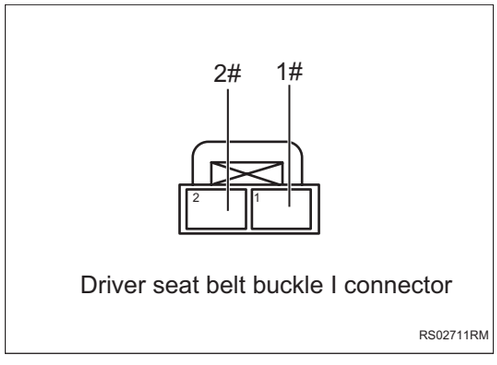
Standard value

Detector connection	Detection conditions	Specified state
Driver seat belt buckle I connector 1# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

2 **Check driver seat belt buckle I harness and connector for circuit shorted to each other**



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Driver seat belt buckle I connector #1 - driver seat belt buckle I connector #2	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3 **Replace the driver seat belt buckle I (See page SB-1)**

(a) Replace the driver seat belt buckle I.

(b) Connect the HQ - VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace ACU (See page RS-218)**

DTC	B005212	Front passenger side seat belt buckle circuit shorted to power supply

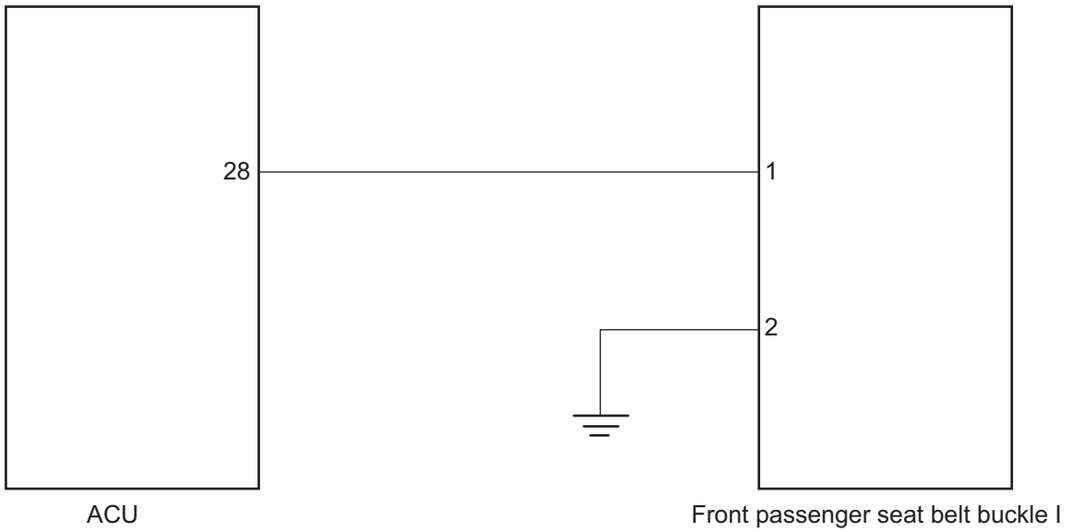
RS

Description

When the passenger seat belt buckle I itself has failure or is short-circuited, the ACU will record the DTC.

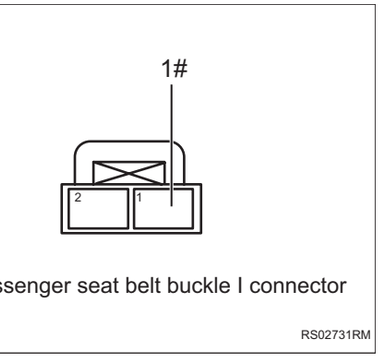
DTC	DTC detection conditions	Faulty location
B005212	(a) Front passenger seat belt buckle I switch circuit shorted to power supply.	• Front passenger seat belt buckle I • ACU • Harness and connector

Circuit diagram



Inspection procedure

1	Check front passenger seat belt buckle I harness and connector for circuit shorted to power supply



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ACU connector.

(d) Disconnect the front passenger seat belt buckle I connector.

(e) Connect battery negative terminal.

(f) Set the ignition switch to "ON".

(g) Measure the resistance according to the values in the table below.

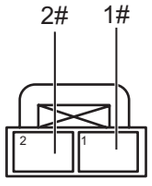
Standard value

Detector connection	Detection conditions	Specified state
Front passenger seat belt buckle Ⅰ connector 1# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

2	**Check front passenger seat belt buckle Ⅰ harness and connector for circuit shorted to each other**



Front passenger seat belt buckle I connector

RS02741RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Front passenger seat belt buckle I connector #1 -front passenger seat belt buckle I connector #2	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Replace the front passenger seat belt buckle I (See page SB-1)**

(a) Replace the front passenger seat belt buckle I.

(b) Connect the HQ - VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace ACU (See page RS-218)**

RS

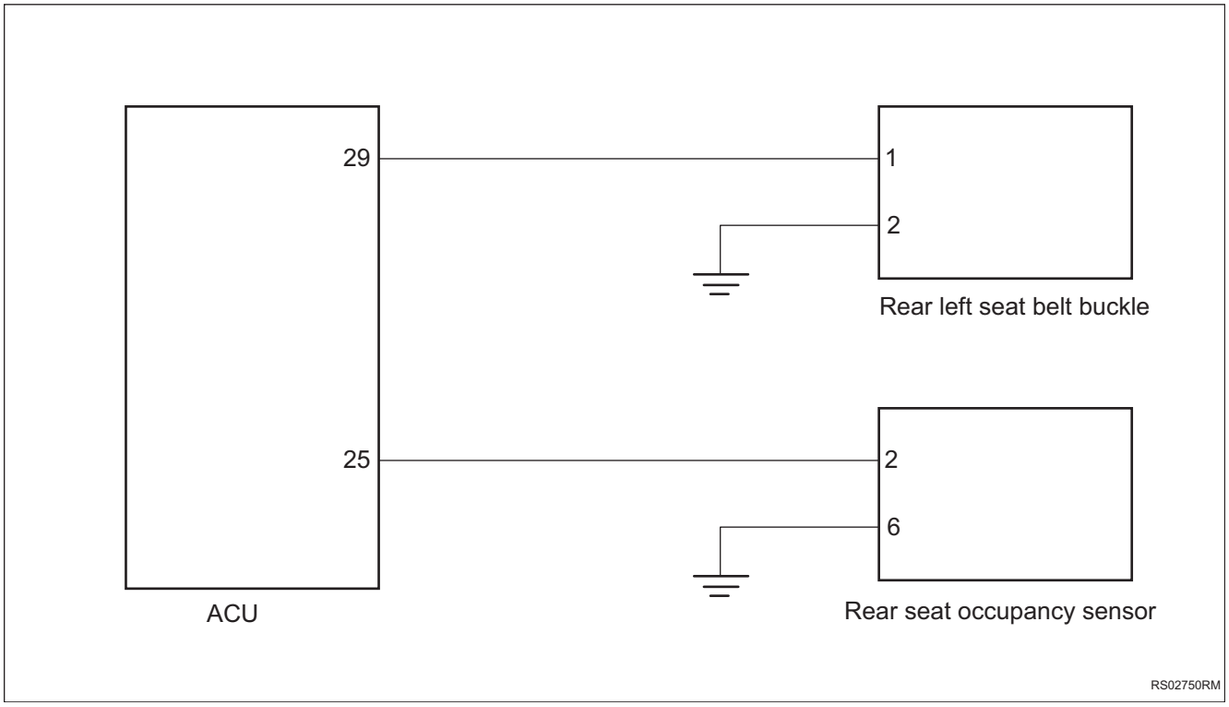
DTC	**B005312**	**Rear left seat belt buckle circuit shorted to power supply**
DTC	**B1A0812**	**Rear left occupant detection sensor circuit shorted to power supply**

Description

When the rear left seat belt buckle or rear seat occupancy sensor itself has failure or is short-circuited, the ACU will record the DTC.

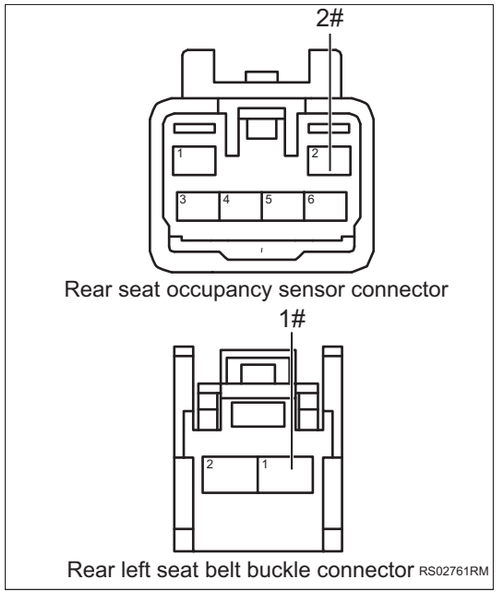
DTC	DTC detection conditions	Faulty location
B005312	(a) Rear left seat belt buckle circuit shorted to power supply.	• Rear left seat belt buckle • Rear seat occupancy sensor • ACU • Harness and connector
B1A0812	(a) Rear left occupant detection sensor circuit shorted to power supply.	• Rear seat occupancy sensor • ACU • Harness and connector

Circuit diagram



Inspection procedure

1	**Check rear left seat belt buckle and rear seat occupancy sensor harness and connector for circuit shorted to power supply**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ACU connector.

(d) Disconnect the rear left seat belt buckle connector.

(e) Disconnect the rear seat occupancy sensor connector.

(f) Connect battery negative terminal.

(g) Set the ignition switch to "ON".

(h) Measure the resistance according to the values in the table below.

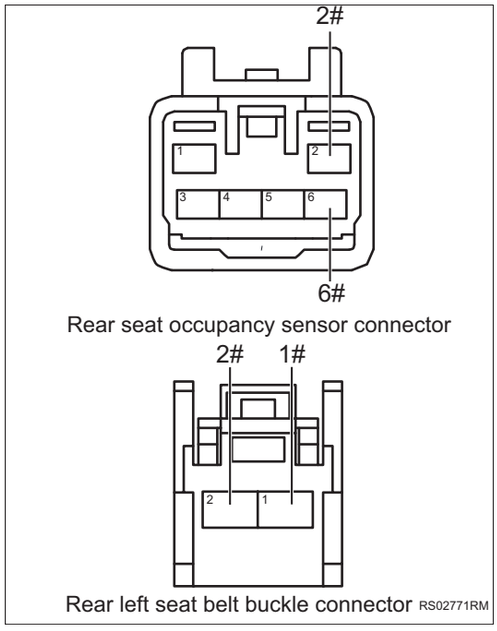
Standard value

Detector connection	Detection conditions	Specified state
Rear left seat belt buckle connector 1# - body GND	The ignition switch is set to "ON"	Less than 1 V
Rear seat occupancy sensor connector 2# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

2	**Check rear left seat belt buckle and rear seat occupancy sensor harness and connector for circuit shorted to each other**



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Rear left seat belt buckle connector #1 - rear left seat belt buckle connector #2	Always connected	10 KΩ or greater
Rear seat occupancy sensor connector 2# - rear seat occupancy sensor connector 6#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

RS

OK

3	**Replace rear left seat belt buckle or rear seat occupancy sensor**

(a) Replace the rear left seat belt buckle or rear seat occupancy sensor.

(b) Connect the HQ - VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace ACU (See page RS-218)**

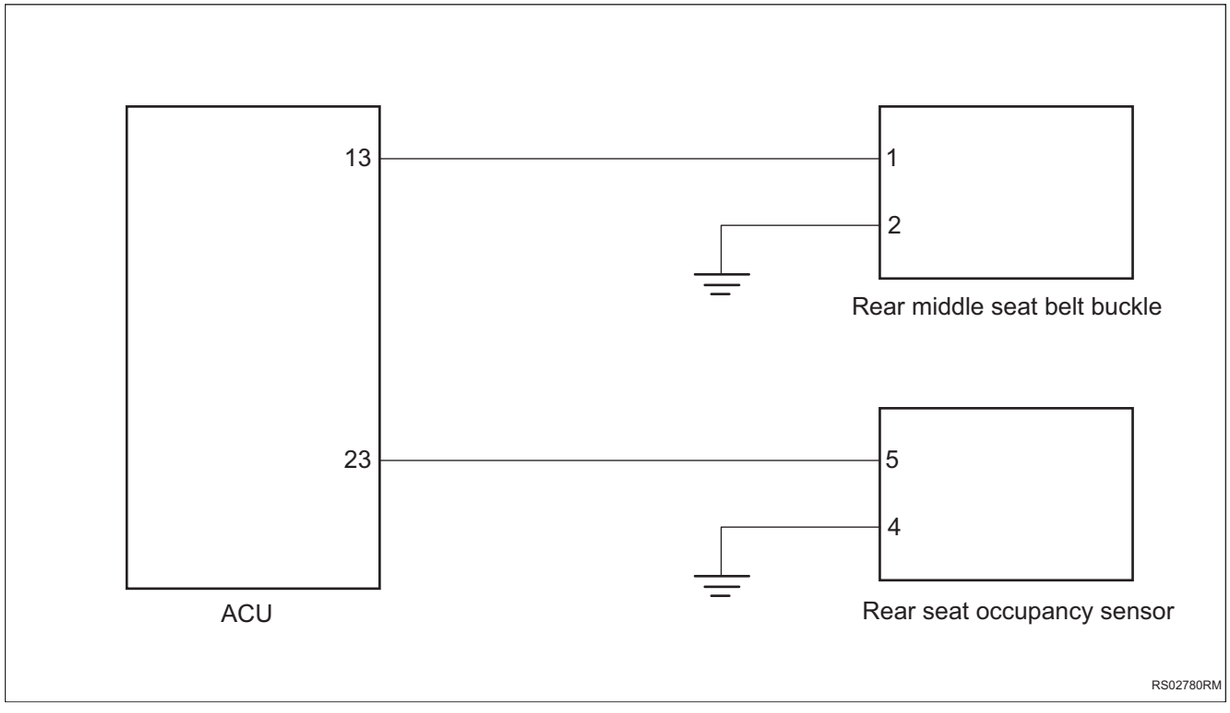
DTC	**B005412**	**Rear middle seat belt buckle circuit shorted to power supply**
DTC	**B1A0912**	**Rear middle occupant detection sensor circuit shorted to power supply.**

Description

When the rear middle seat belt buckle or rear seat occupancy sensor itself has failure or is short-circuited, the ACU will record the DTC.

DTC	DTC detection conditions	Faulty location
B005412	(a) Rear middle seat belt buckle circuit shorted to power supply.	• Rear middle seat belt buckle • Rear seat occupancy sensor • ACU • Harness and connector
B1A0912	(a) Rear middle occupant detection sensor circuit shorted to power supply.	• Rear seat occupancy sensor • ACU • Harness and connector

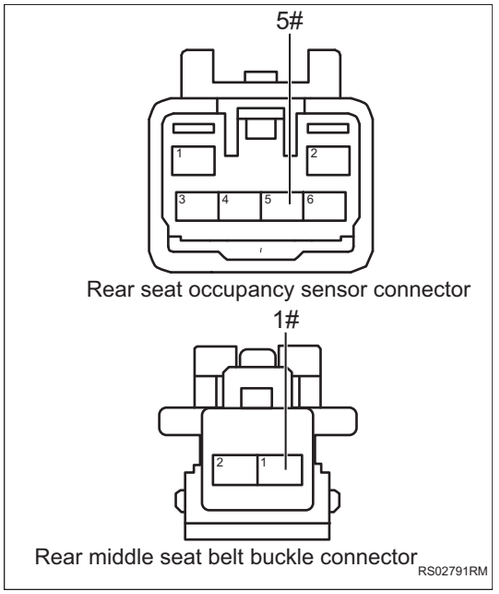
Circuit diagram



Inspection procedure

1	**Check rear middle seat belt buckle and rear seat occupancy sensor harness and connector for circuit shorted to power supply**

RS



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ACU connector.

(d) Disconnect the rear middle seat belt buckle connector.

(e) Disconnect the rear seat occupancy sensor connector.

(f) Connect battery negative terminal.

(g) Set the ignition switch to "ON".

(h) Measure the resistance according to the values in the table below.

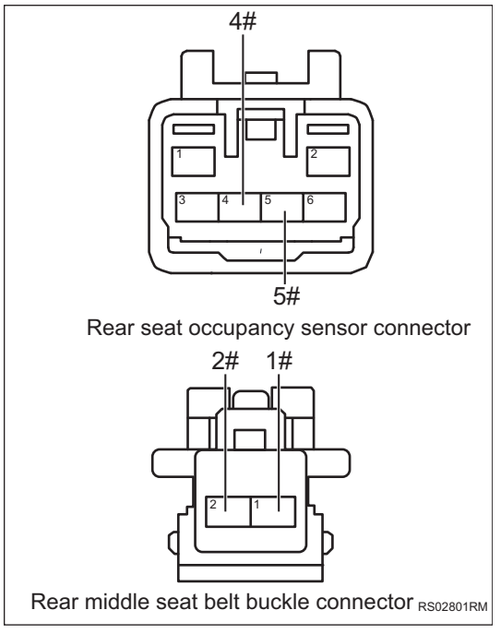
Standard value

Detector connection	Detection conditions	Specified state
Rear middle seat belt buckle connector 1# - body GND	The ignition switch is set to "ON"	Less than 1 V
Rear seat occupancy sensor connector 5# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG **Repair or replace the harness and connector**

OK

2	**Check rear middle seat belt buckle and rear seat occupancy sensor harness and connector for circuit shorted to each other**



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Rear middle seat belt buckle connector #1 - rear middle seat belt buckle connector #2	Always connected	10 KΩ or greater
Rear seat occupancy sensor connector 5# - rear seat occupancy sensor connector 4#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Replace the rear middle seat belt buckle or the rear seat occupancy sensor**

(a) Replace the rear middle seat belt buckle or the rear seat occupancy sensor.

(b) Connect the HQ - VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace ACU (See page RS-218)**

RS

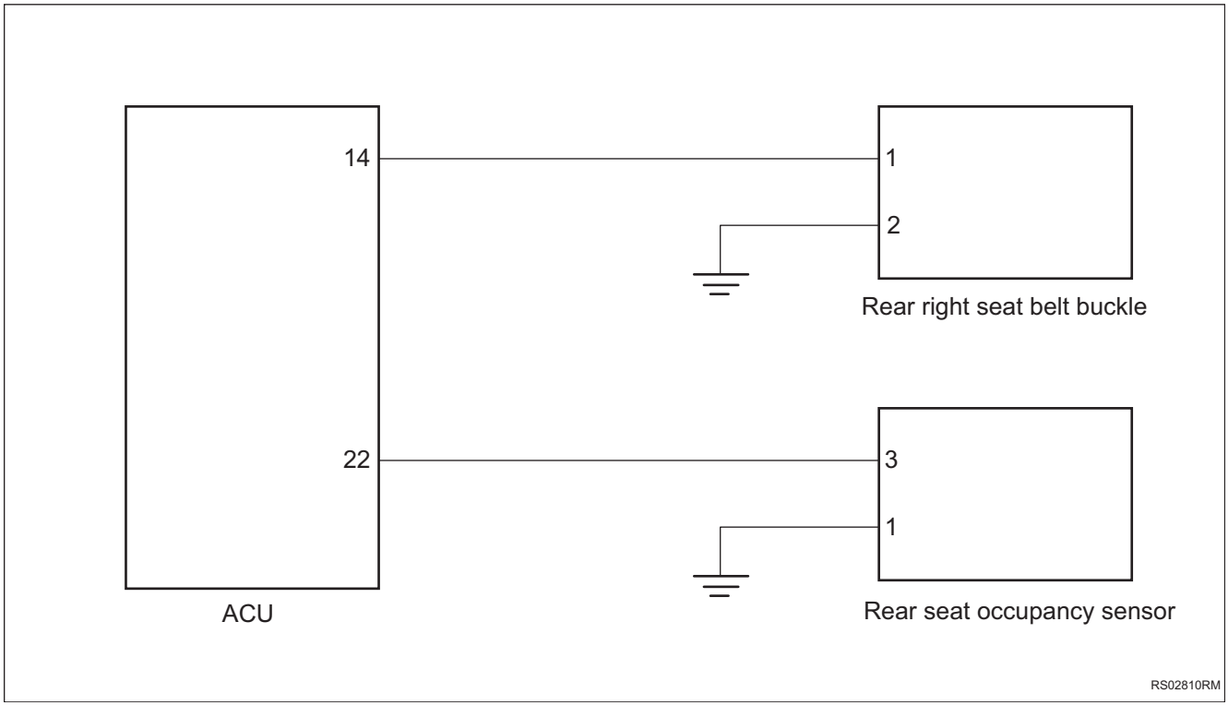
DTC	**B005512**	**Rear right seat belt buckle circuit shorted to power supply**
DTC	**B1A0A12**	**Rear right occupant detection sensor circuit shorted to power supply**

Description

When the rear right seat belt buckle or rear seat occupancy sensor itself has failure or is short-circuited, the ACU will record the DTC.

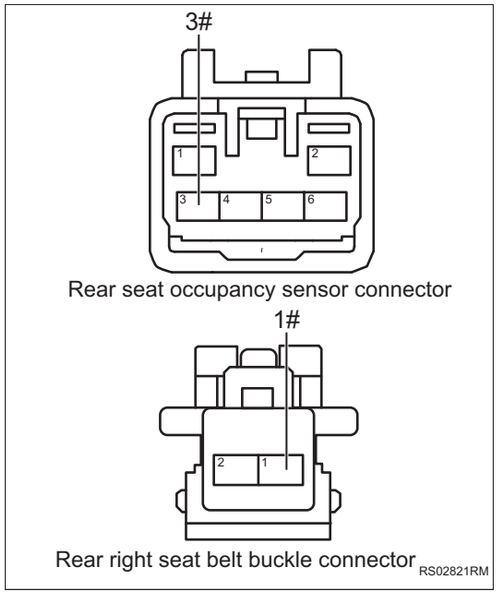
DTC	DTC detection conditions	Faulty location
B005512	(a) Rear right seat belt buckle circuit shorted to power supply.	• Rear right seat belt buckle • Rear seat occupancy sensor • ACU • Harness and connector
B1A0A12	(a) Rear right occupant detection sensor circuit shorted to power supply.	• Rear seat occupancy sensor • ACU • Harness and connector

Circuit diagram



Inspection procedure

1	**Check rear right seat belt buckle and rear seat occupancy sensor harness and connector for circuit shorted to power supply**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ACU connector.

(d) Disconnect the rear right seat belt buckle connector.

(e) Disconnect the rear seat occupancy sensor connector.

(f) Connect battery negative terminal.

(g) Set the ignition switch to "ON".

(h) Measure the resistance according to the values in the table below.

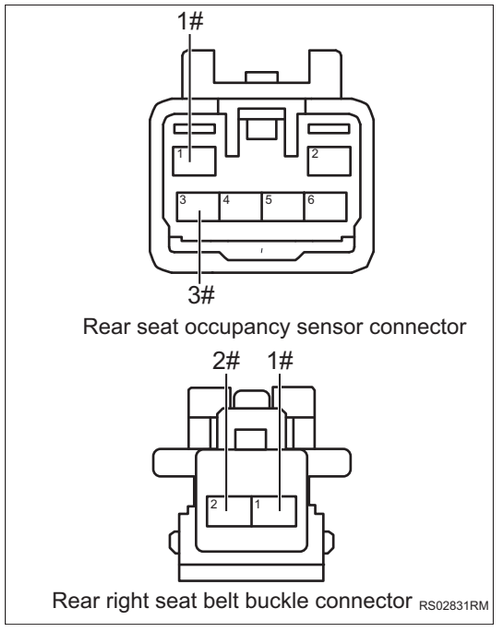
Standard value

Detector connection	Detection conditions	Specified state
Rear right seat belt buckle connector 1# - body GND	The ignition switch is set to "ON"	Less than 1 V
Rear seat occupancy sensor connector 3# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG **Repair or replace the harness and connector**

OK

2	**Check rear right seat belt buckle and rear seat occupancy sensor harness and connector for circuit shorted to each other**



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Rear right seat belt buckle connector #1 -right rear seat belt buckle connector #2	Always connected	10 KΩ or greater
Rear seat occupancy sensor connector 3# - rear seat occupancy sensor connector 1#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

RS

OK

3	**Replace rear right seat belt buckle or rear seat occupancy sensor**

(a) Replace the rear right seat belt buckle or rear seat occupancy sensor.

(b) Connect the HQ - VDS.

(c) Clear the DTC.

(d) Re-read the DTC

NG → **Replace ACU (See page RS-218)**

DTC	**B007011**	**Driver pretensioner seat belt anchor-circuit shorted to ground**
DTC	**B007012**	**Driver pretensioner seat belt anchor-circuit shorted to battery**
DTC	**B00701A**	**Driver pretensioner seat belt anchor-resistance too low**
DTC	**B00701B**	**Driver pretensioner seat belt anchor-resistance too high**
DTC	**B007056**	**Driver pretensioner seat belt anchor-configuration error**

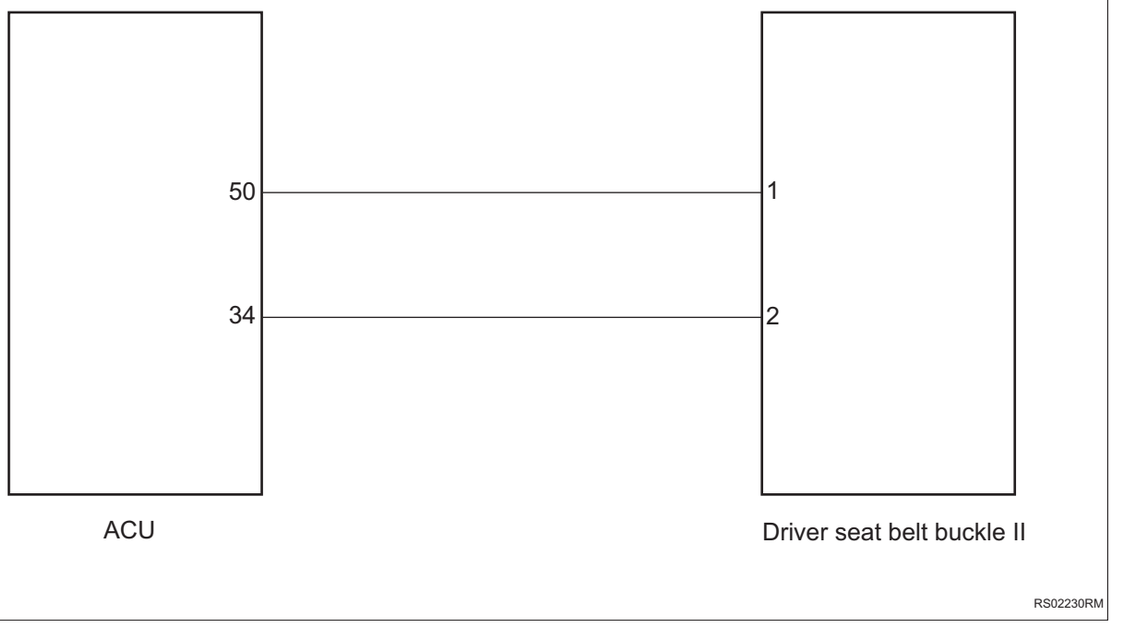
Description

When the driver seat belt buckle II circuit is shorted, has too high or too low resistance, the ACU will record the DTC.

DTC	DTC detection conditions	Faulty location
B007011	(a) Driver seat belt buckle Ⅱ circuit shorted to ground.	• Driver seat belt buckle II • ACU • Harness and connector
B007012	(a) Driver seat belt buckle II circuit shorted to power supply.	• Driver seat belt buckle II • ACU • Harness and connector
B00701A	(a) Driver seat belt buckle II circuit resistance less than lower limit.	• Driver seat belt buckle II • ACU • Harness and connector
B00701B	(a) Driver seat belt buckle II circuit resistance higher than the upper limit.	• Driver seat belt buckle II • ACU • Harness and connector
B007056	(a) Driver seat belt buckle II configuration error.	• Driver seat belt buckle II • ACU • Harness and connector

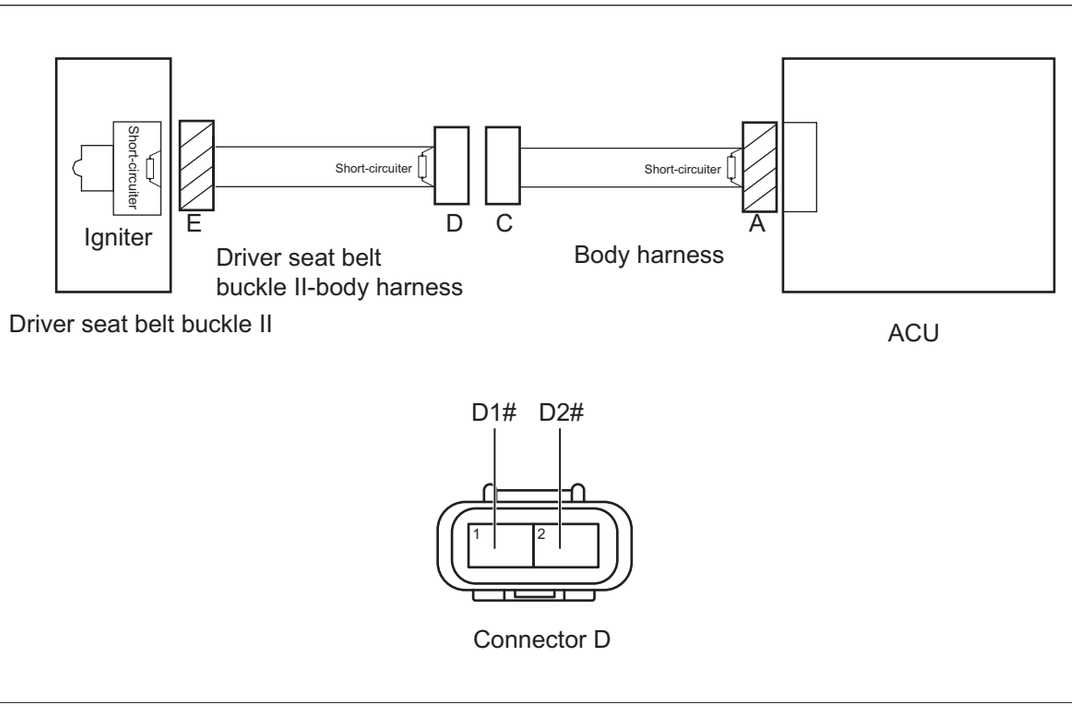
Circuit diagram

RS



Inspection procedure

1	**Check driver seat belt buckle II harness and connector for circuit shorted to each other (driver seat belt buckle II -body harness)**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors D, E.

(d) Release the internal short-circuiter of connector D.

(e) Measure the resistance according to the values in the table below.

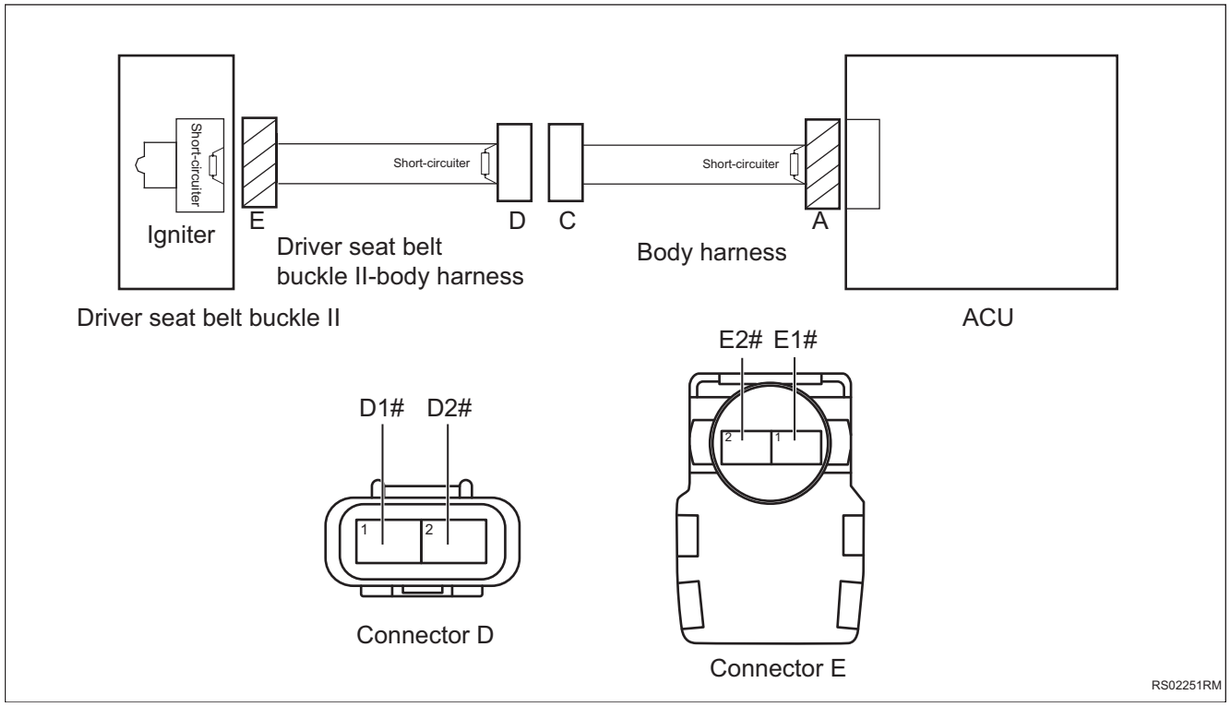
Standard value

Detector connection	Detection conditions	Specified state
Connector D1#-connector D2#	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

2	**Check driver seat belt buckle Ⅱ harness and connector for open circuit (driver seat belt buckle Ⅱ -body harness)**



(a) Measure the resistance according to the values in the table below.

Standard value

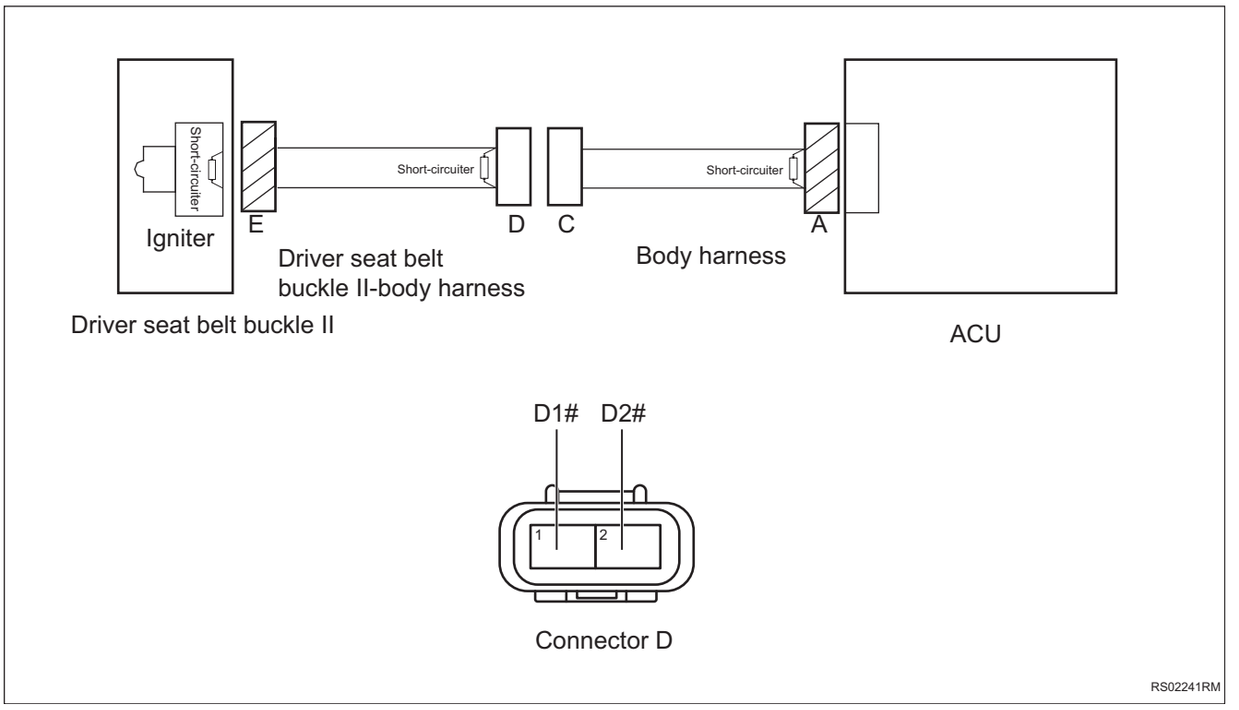
Detector connection	Detection conditions	Specified state
Connector E1#-connector D1#	Always connected	Less than 1Ω
Connector E2#-connector D2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

RS

OK

3	**Check driver seat belt buckle II harness and connector for circuit shorted to ground (driver seat belt buckle II - body harness)**



(a) Measure the resistance according to the values in the table below.

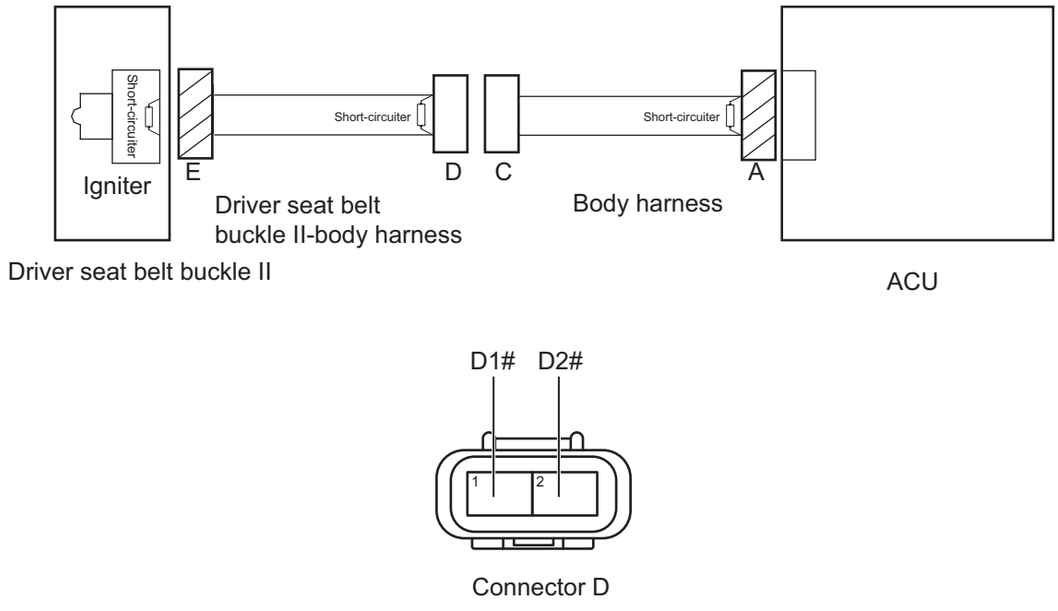
Standard value

Detector connection	Detection conditions	Specified state
Connector D1#-body GND	Always connected	10 KΩ or greater
Connector D2#-body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check driver seat belt buckle II harness and connector for circuit shorted to power supply (driver seat belt buckle II -body harness)**



Connector D

RS02241RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

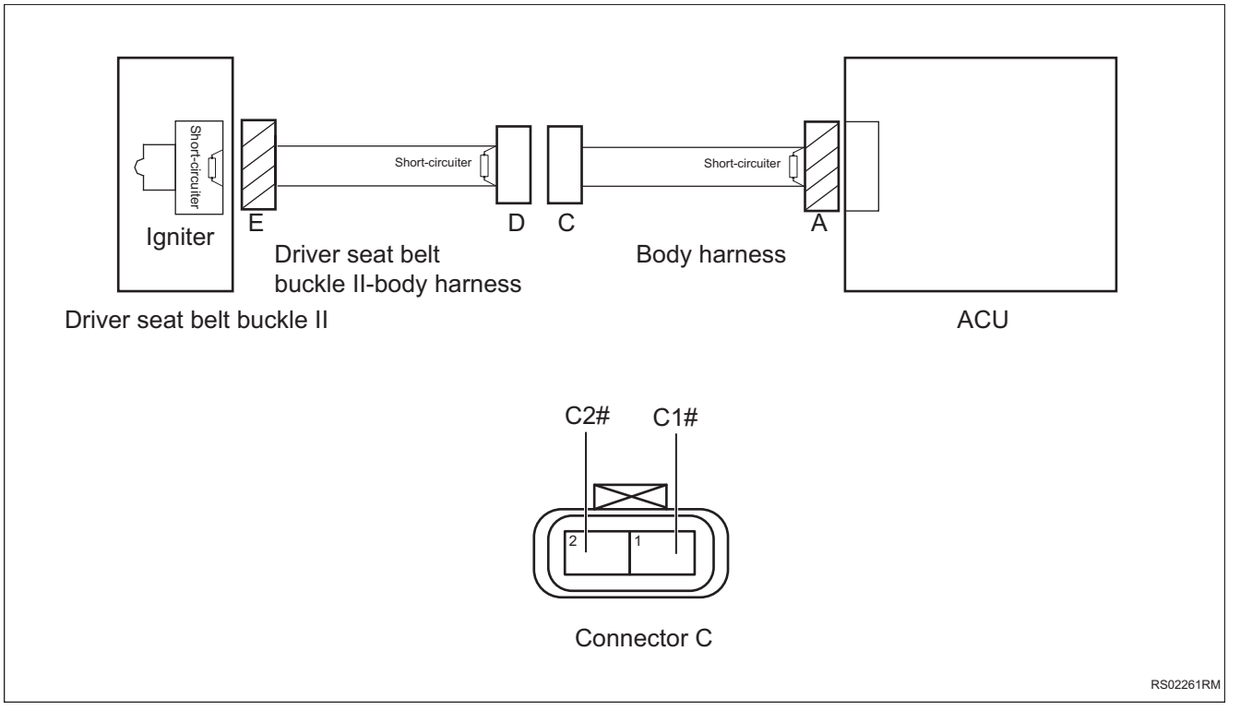
Detector connection	Detection conditions	Specified state
Connector D1#-body GND	The ignition switch is set to "ON"	Less than 1 V
Connector D2#-body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Check driver seat belt buckle II harness and connector for circuit shorted to each other (body harness)**

RS



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors A, C.

(d) Release the internal short-circuiter of connector A.

(e) Measure the resistance according to the values in the table below.

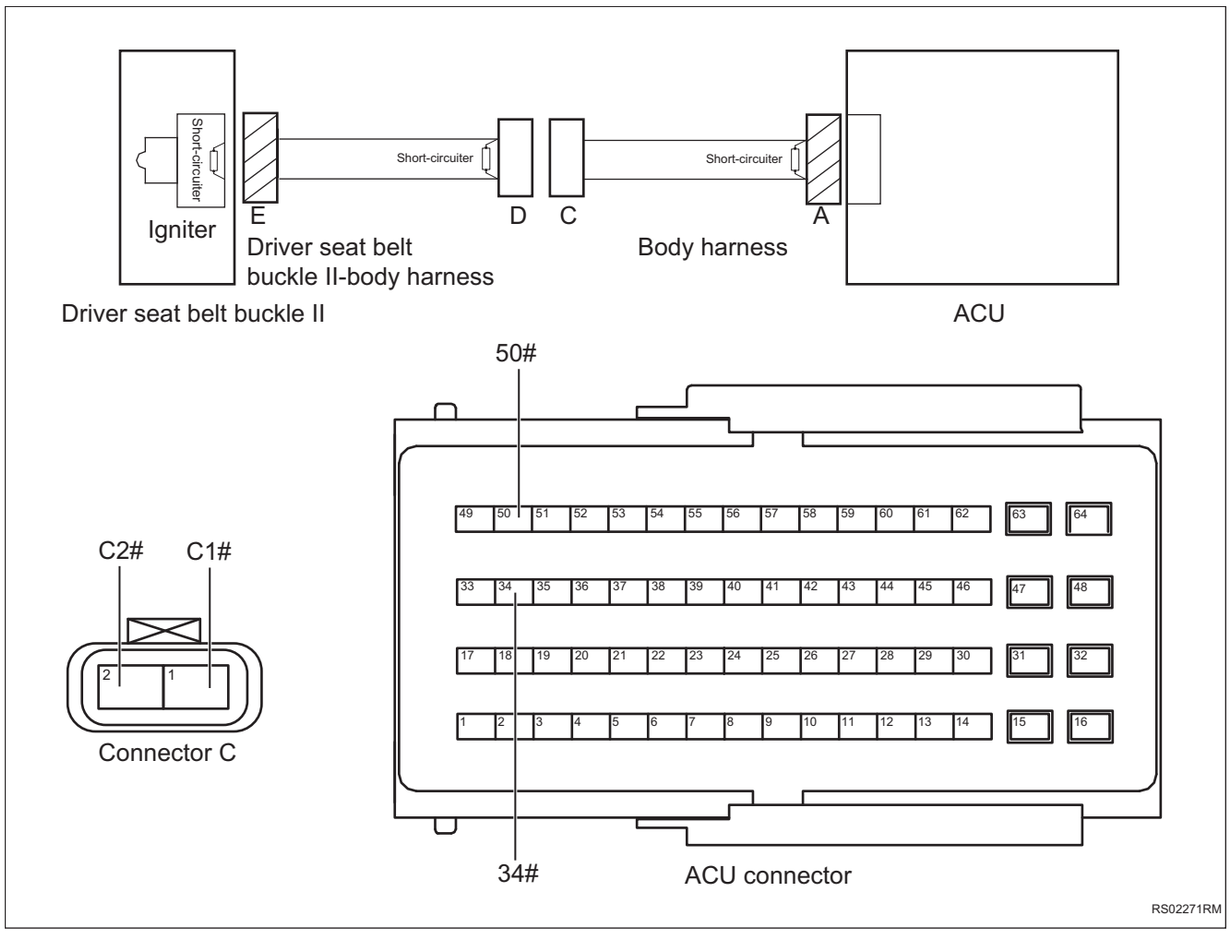
Standard value

Detector connection	Detection conditions	Specified state
Connector C1#-connector C2#	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

6	**Check driver seat belt buckle II harness and connector for open circuit (body harness)**



(a) Measure the resistance according to the values in the table below.

Standard value

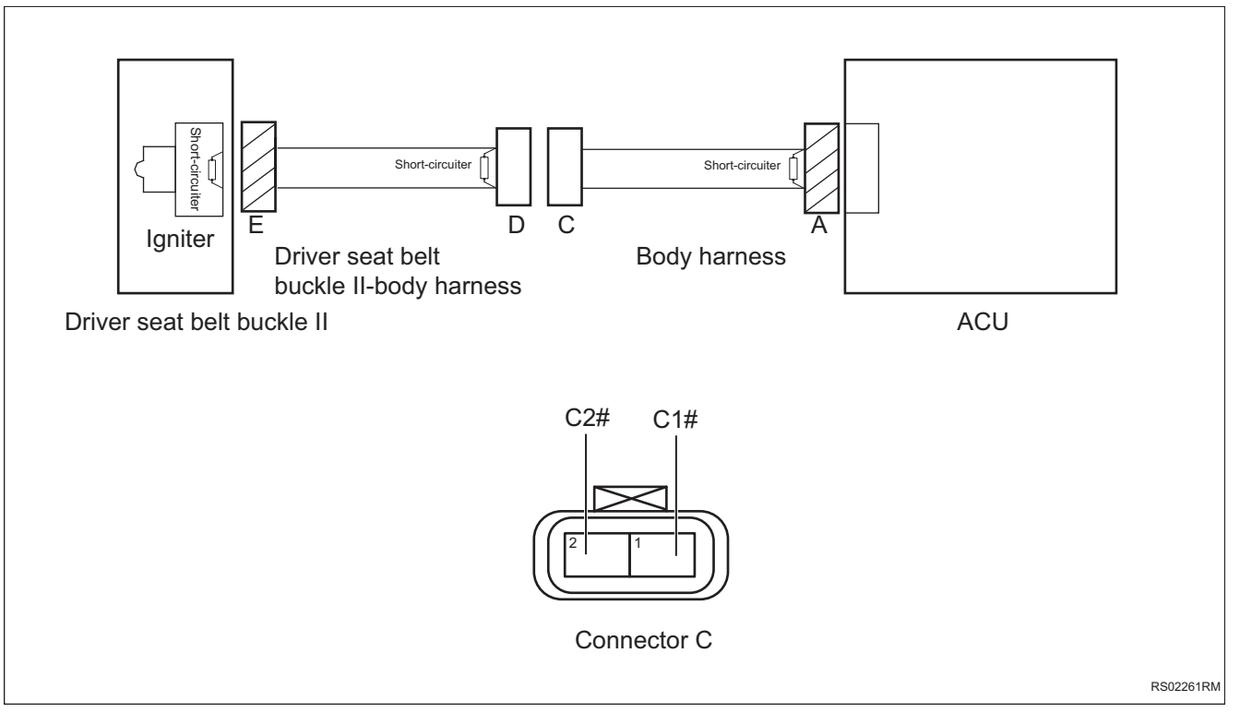
Detector connection	Detection conditions	Specified state
Connector C1# - ACU connector 50#	Always connected	Less than 1Ω
Connector C2# - ACU connector 34#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

7	**Check driver seat belt buckle II harness and connector for circuit shorted to ground (body harness)**

RS



(a) Measure the resistance according to the values in the table below.

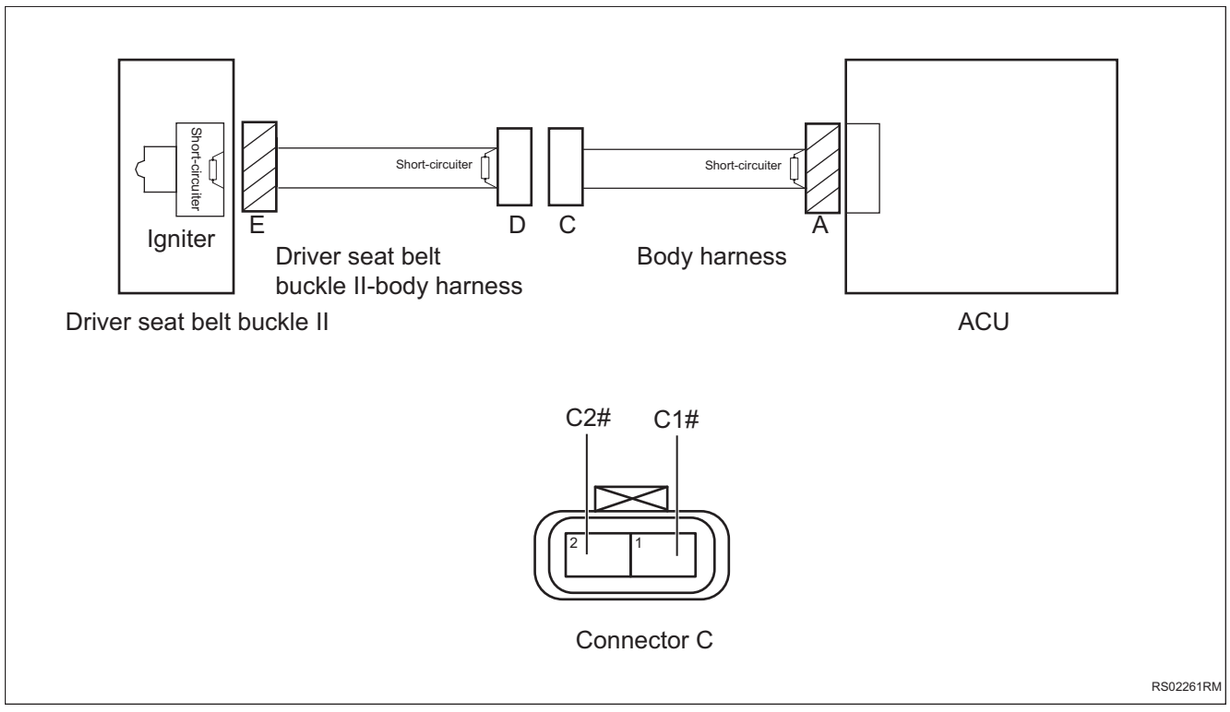
Standard value

Detector connection	Detection conditions	Specified state
Connector C1#-body GND	Always connected	10 KΩ or greater
Connector C2#-body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

8	**Check driver seat belt buckle II harness and connector for circuit shorted to power supply (body harness)**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Connector C1#-body GND	The ignition switch is set to "ON"	Less than 1 V
Connector C2#-body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

9	**Replace the driver seat belt buckle II (See page SB-1)**

(a) Replace the driver seat belt buckle II.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace ACU (See page RS-218)**

OK

10	**End**

DTC	**B007211**	**Front passenger pretensioner seat belt anchor -circuit shorted to ground**
DTC	**B007212**	**Front passenger pretensioner seat belt anchor -circuit shorted to battery**
DTC	**B00721A**	**Front passenger pretensioner seat belt anchor -resistance too low**
DTC	**B00721B**	**Front passenger pretensioner seat belt anchor -resistance too high**
DTC	**B007256**	**Front passenger pretensioner seat belt anchor-configuration error**

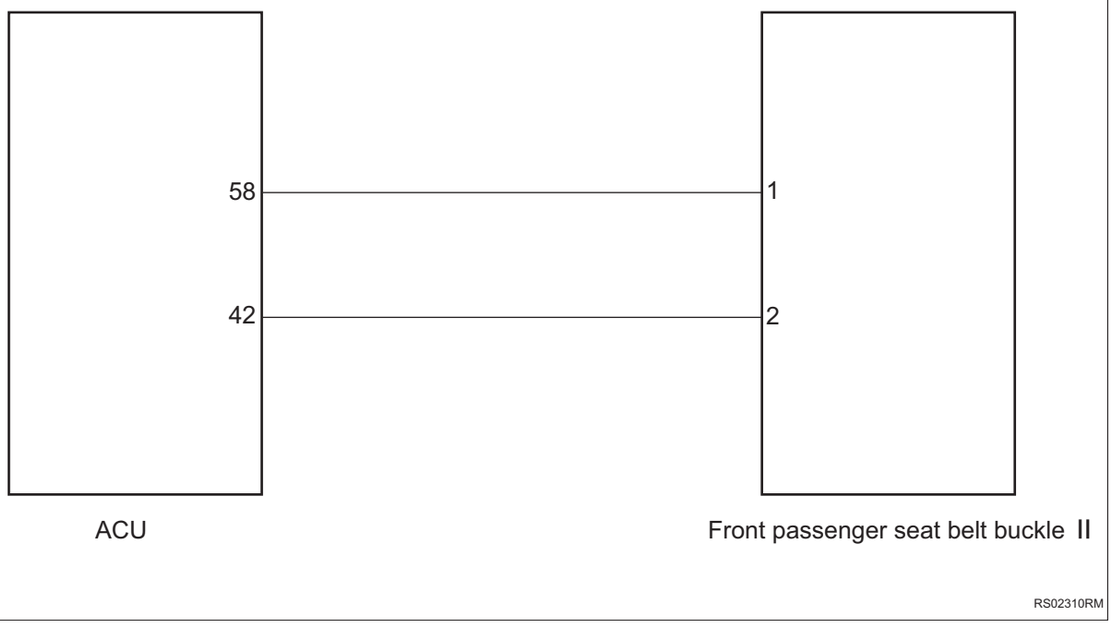
Description

When the front passenger seat belt buckle II circuit is shorted, has too high or too low resistance, the ACU will record the DTC.

DTC	DTC detection conditions	Faulty location
B007211	(a) Front passenger seat belt buckle Ⅱ circuit shorted to ground.	• Front passenger seat belt buckle Ⅱ • ACU • Harness and connector
B007212	(a) Front passenger seat belt buckle II circuit shorted to power supply.	• Front passenger seat belt buckle Ⅱ • ACU • Harness and connector
B00721A	(a) Front driver seat belt buckle II circuit resistance less than lower limit.	• Front passenger seat belt buckle Ⅱ • ACU • Harness and connector
B00721B	(a) Front driver seat belt buckle II circuit resistance higher than the upper limit.	• Front passenger seat belt buckle Ⅱ • ACU • Harness and connector
B007256	(a) Front passenger seat belt buckle II configuration error.	• Front passenger seat belt buckle Ⅱ • ACU • Harness and connector

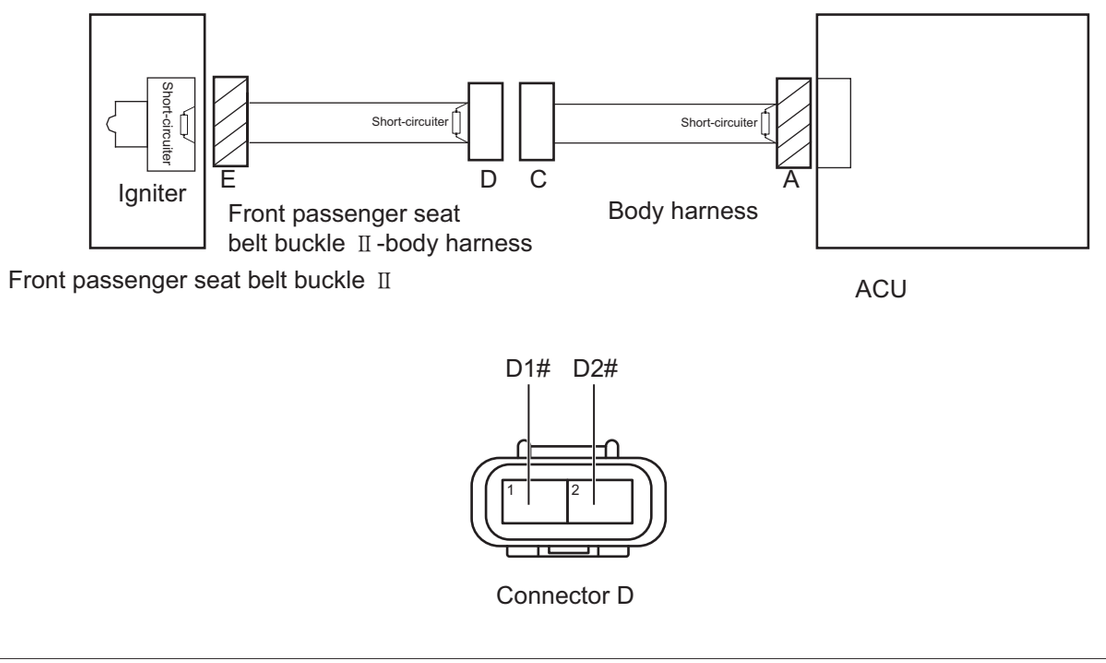
Circuit diagram

RS



Inspection procedure

1	**Check front passenger seat belt buckle II harness and connector for circuit shorted to each other (front passenger seat belt buckle II -body harness)**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors D, E.

(d) Release the internal short-circuiter of connector D.

(e) Measure the resistance according to the values in the table below.

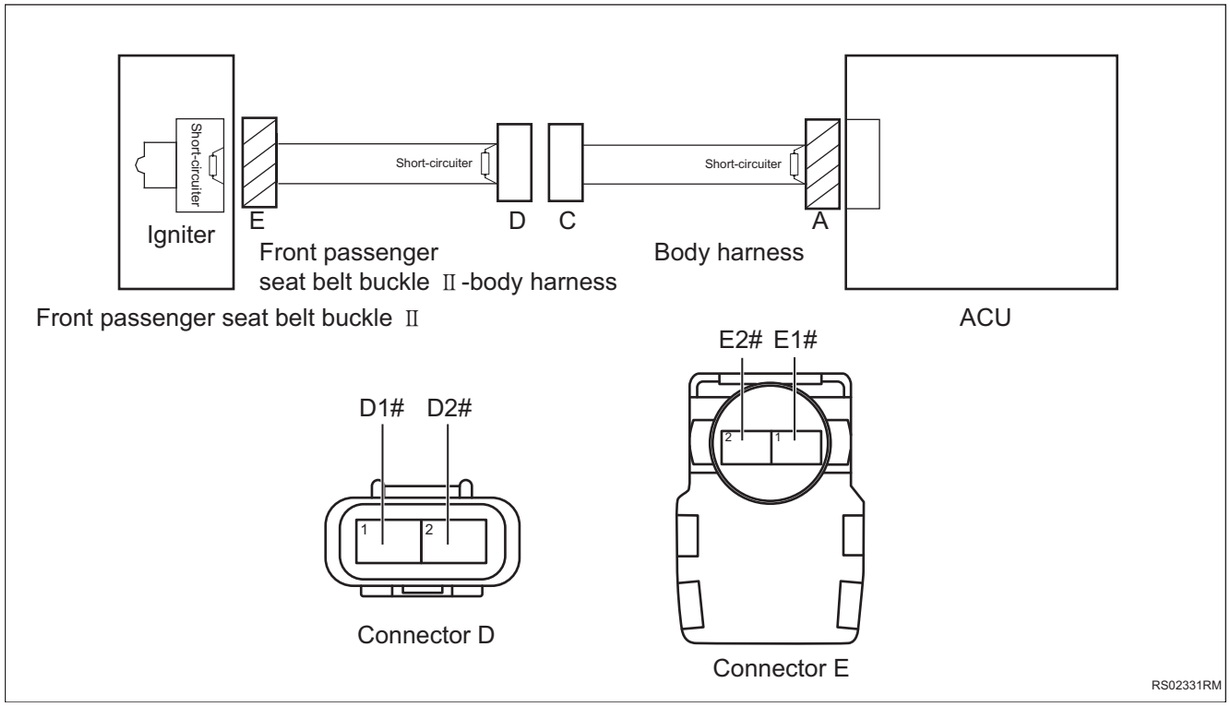
Standard value

Detector connection	Detection conditions	Specified state
Connector D1#-connector D2#	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

2	**Check front passenger seat belt buckle Ⅱ harness and connector for open circuit (front passenger seat belt buckle Ⅱ -body harness)**



(a) Measure the resistance according to the values in the table below.

Standard value

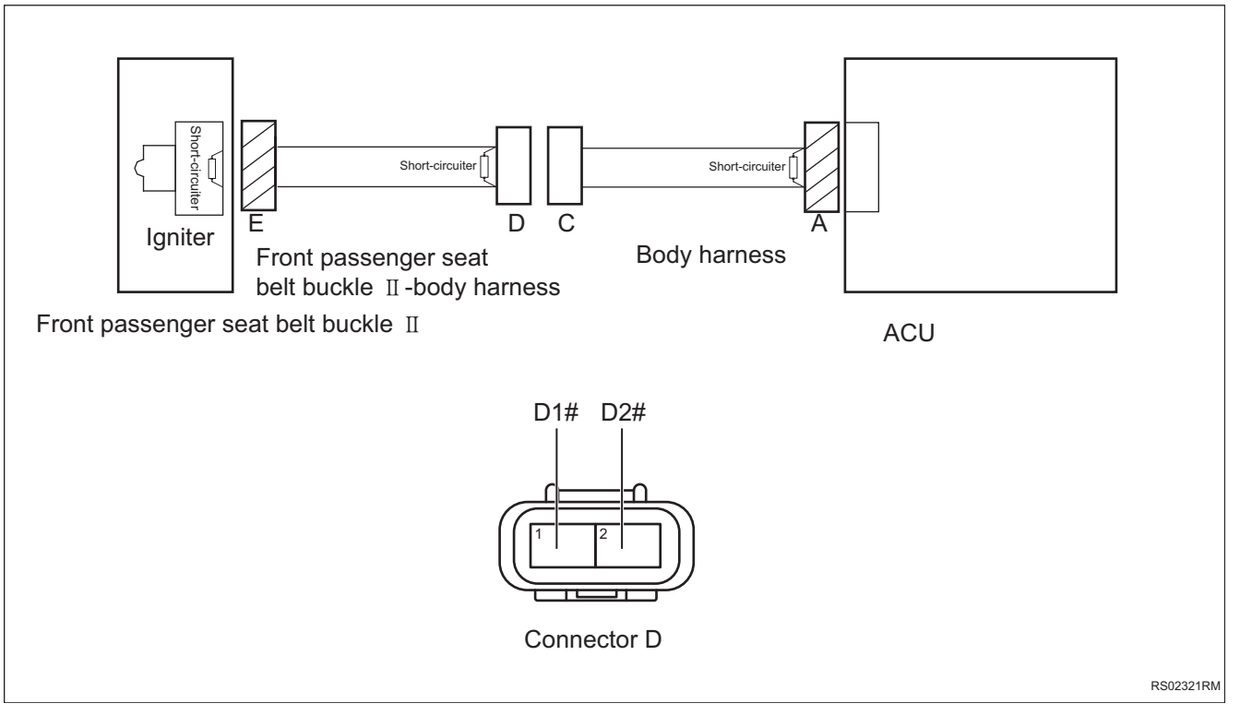
Detector connection	Detection conditions	Specified state
Connector E1#-connector D1#	Always connected	Less than 1Ω
Connector E2#-connector D2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

RS

OK

3	**Check front passenger seat belt buckle Ⅱ harness and connector for circuit shorted to ground (front passenger seat belt buckle Ⅱ -body harness)**



(a) Measure the resistance according to the values in the table below.

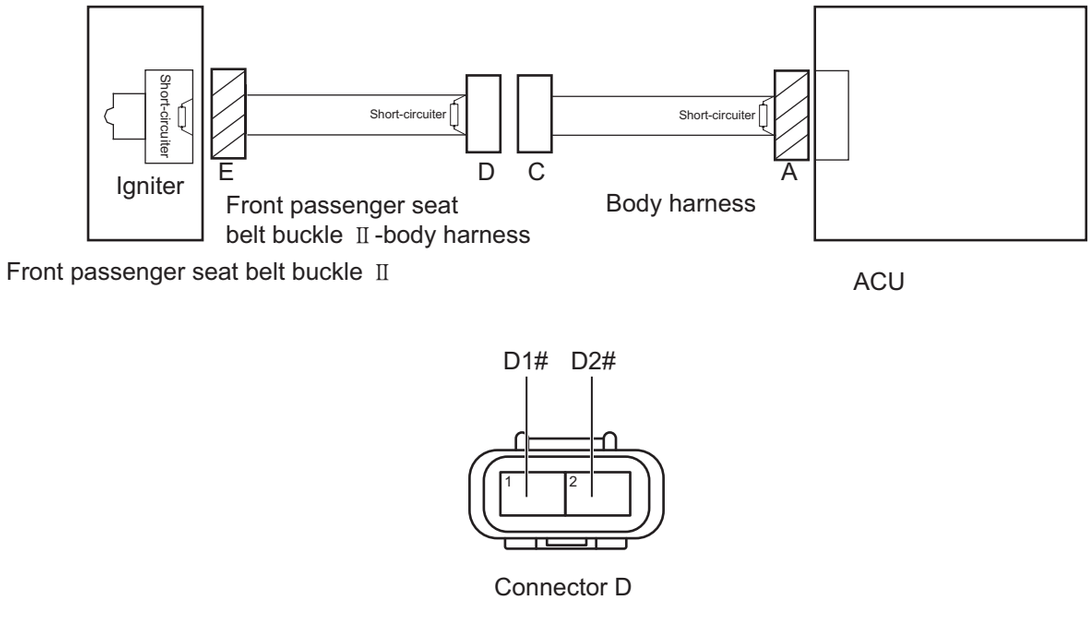
Standard value

Detector connection	Detection conditions	Specified state
Connector D1#-body GND	Always connected	10 KΩ or greater
Connector D2#-body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check front passenger seat belt buckle Ⅱ harness and connector for circuit shorted to power supply (front passenger seat belt buckle Ⅱ -body harness)**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

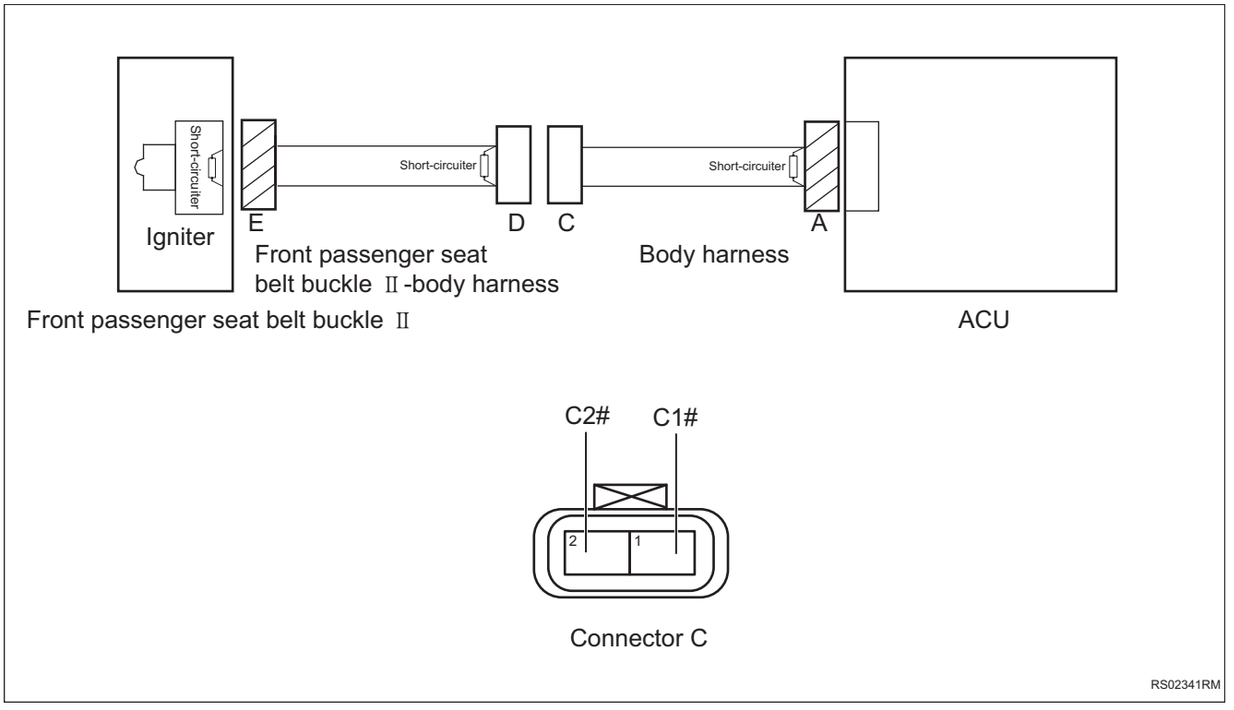
Detector connection	Detection conditions	Specified state
Connector D1#-body GND	The ignition switch is set to "ON"	Less than 1 V
Connector D2#-body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Check front passenger seat belt buckle Ⅱ harness and connector for circuit shorted to each other (body harness)**

RS



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors A, C.

(d) Release the internal short-circuiter of connector A.

(e) Measure the resistance according to the values in the table below.

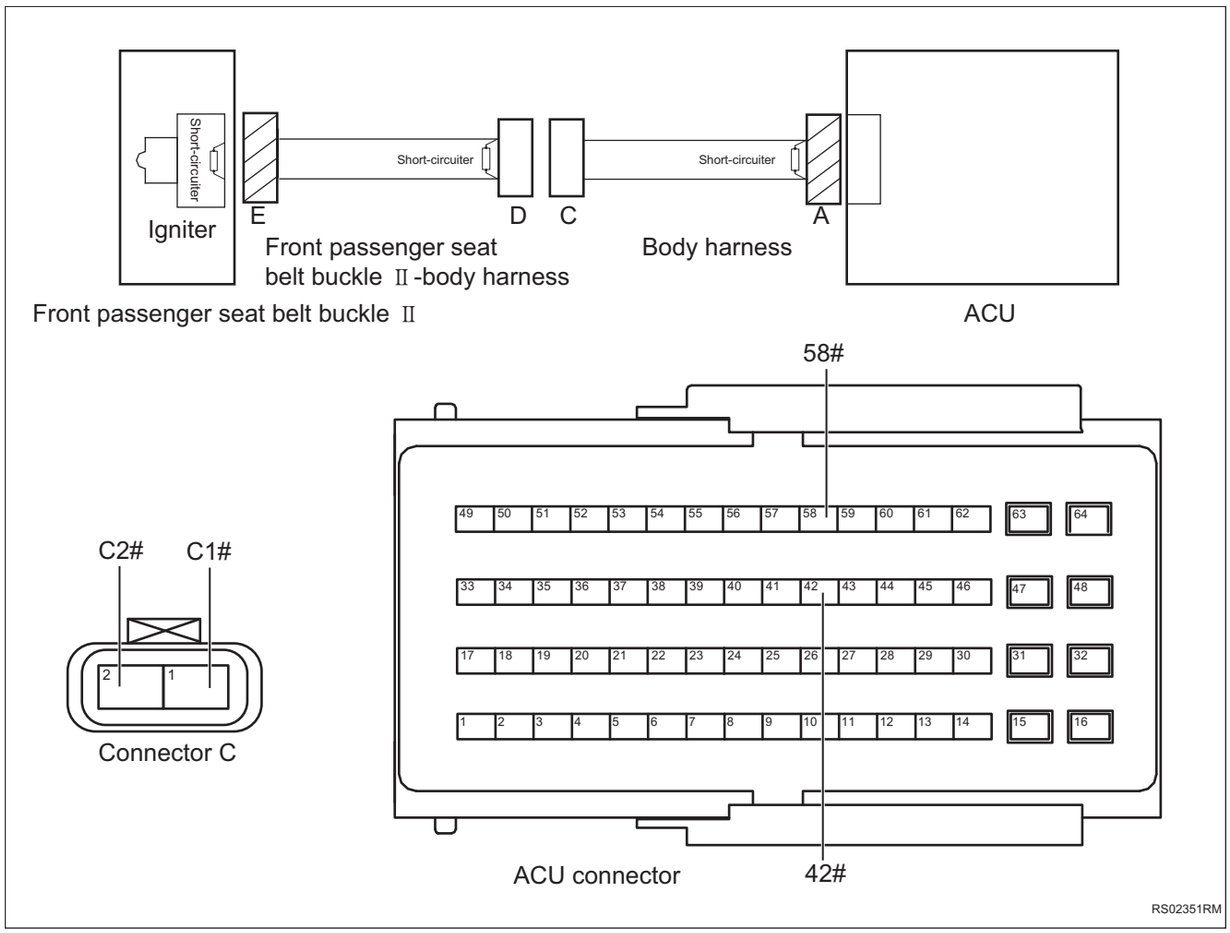
Standard value

Detector connection	Detection conditions	Specified state
Connector C1#-connector C2#	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

6	**Check front passenger seat belt buckle Ⅱ harness and connector for open circuit (body harness)**



(a) Measure the resistance according to the values in the table below.

Standard value

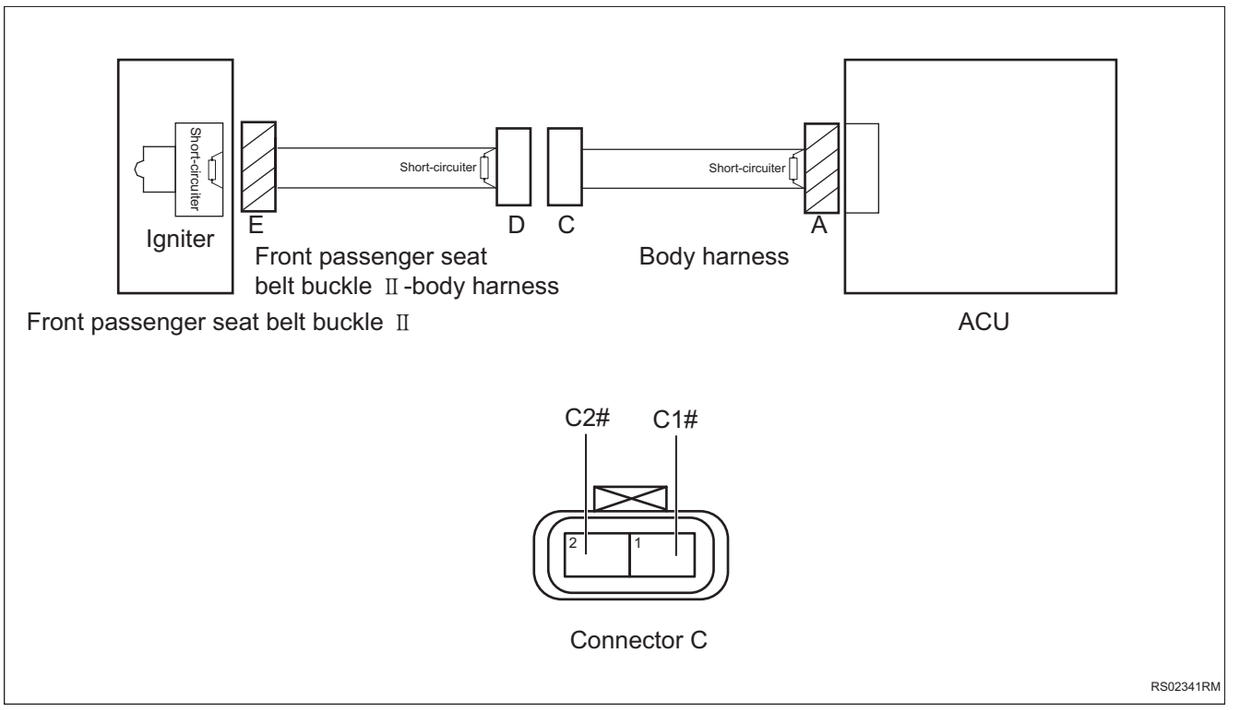
Detector connection	Detection conditions	Specified state
Connector C1# -ACU connector connector 58#	Always connected	Less than 1Ω
Connector C2# -ACU connector connector 42#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

7	**Check front passenger seat belt buckle Ⅱ harness and connector for circuit shorted to ground (body harness)**

RS



(a) Measure the resistance according to the values in the table below.

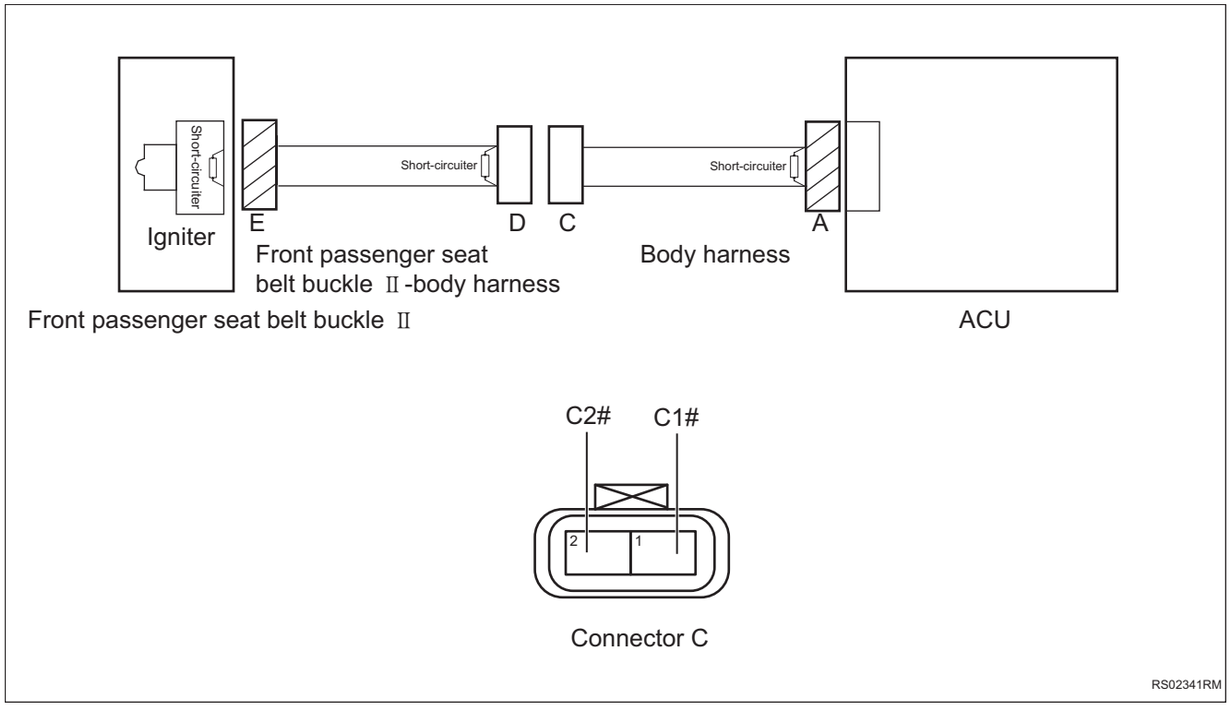
Standard value

Detector connection	Detection conditions	Specified state
Connector C1#-body GND	Always connected	10 KΩ or greater
Connector C2#-body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

8	**Check front passenger seat belt buckle II harness and connector for circuit shorted to power supply (body harness)**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Connector C1#-body GND	The ignition switch is set to "ON"	Less than 1 V
Connector C2#-body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

9	**Replace the front passenger seat belt buckle II (See page SB-1)**

(a) Replace the front passenger seat belt buckle II.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace ACU (See page RS-218)**

OK

10	**End**

DTC	**B007311**	**Rear left pretensioner seat belt retractor -circuit shorted to ground**
DTC	**B007312**	**Rear left pretensioner seat belt retractor- circuit shorted to battery**
DTC	**B00731A**	**Rear left pretensioner seat belt retractor-resistance low**
DTC	**B00731B**	**Rear left pretensioner seat belt with retractor-resistance high**
DTC	**B007356**	**Rear left pretensioner seat belt retractor-configuration error**

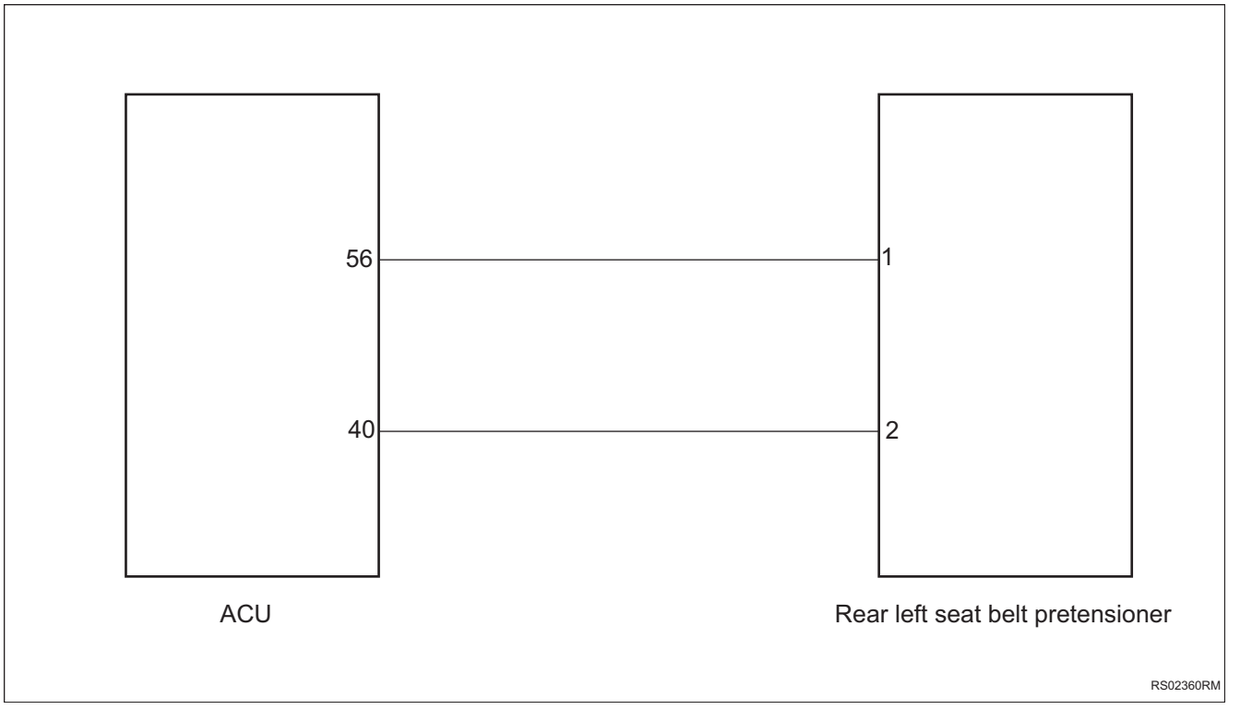
Description

When the rear left seat belt pretensioner loop is shorted, has too high or too low resistance, the ACU will record the DTC.

DTC	DTC detection conditions	Faulty location
B007311	(a) Rear left seat belt pretensioner circuit shorted to ground.	• Rear left seat belt pretensioner • ACU • Harness and connector
B007312	(a) Rear left seat belt pretensioner circuit shorted to power supply.	• Rear left seat belt pretensioner • ACU • Harness and connector
B00731A	(a) Rear left seat belt pretensioner circuit resistance lower than the lower limit.	• Rear left seat belt pretensioner • ACU • Harness and connector
B00731B	(a) The rear left seat belt pretensioner circuit resistance is higher than the upper limit.	• Rear left seat belt pretensioner • ACU • Harness and connector
B007356	(a) Rear left seat belt pretensioner configuration error.	• Rear left seat belt pretensioner • ACU • Harness and connector

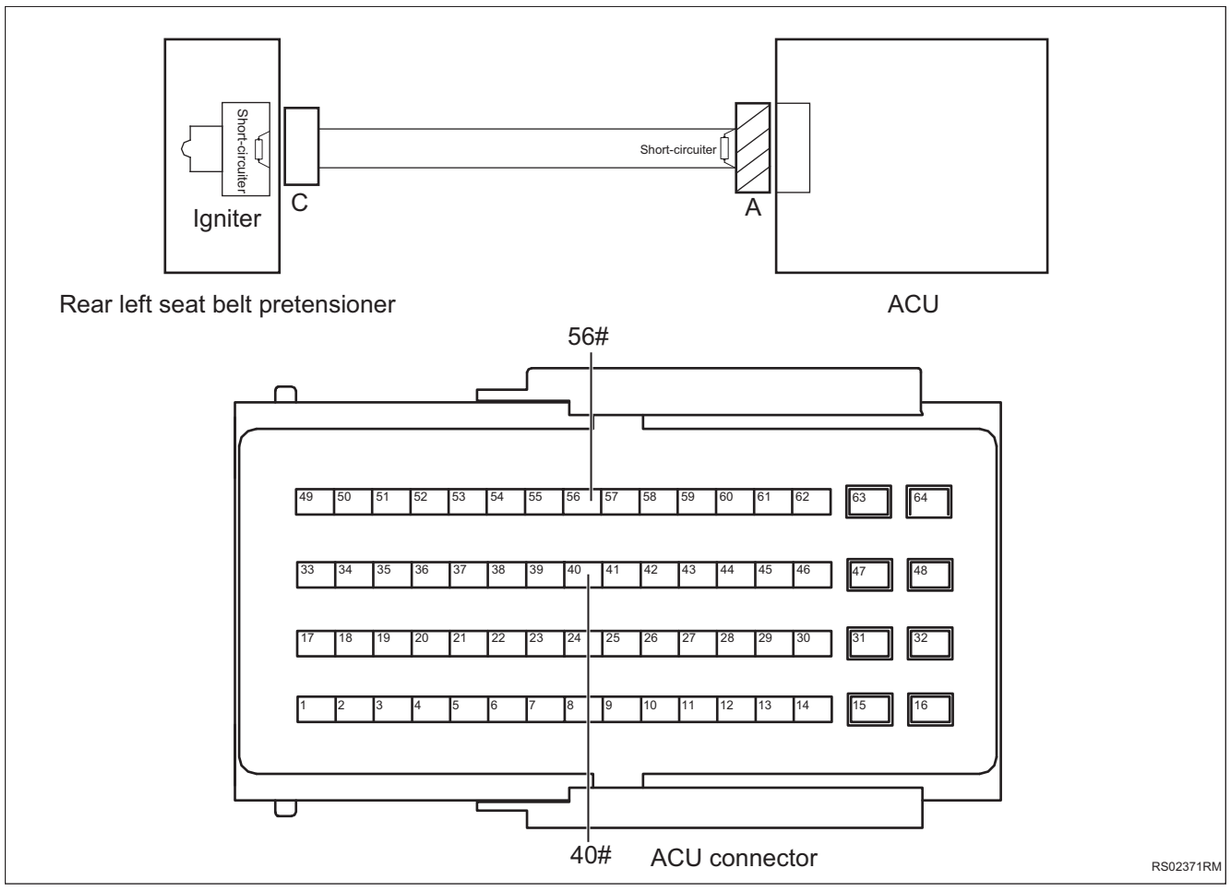
RS

Circuit diagram



Inspection procedure

1	**Check rear left seat belt pretensioner harness and connector for circuit shorted to each other**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors A, C.

(d) Release the internal short-circuiter of connector A.

(e) Measure the resistance according to the values in the table below.

Standard value

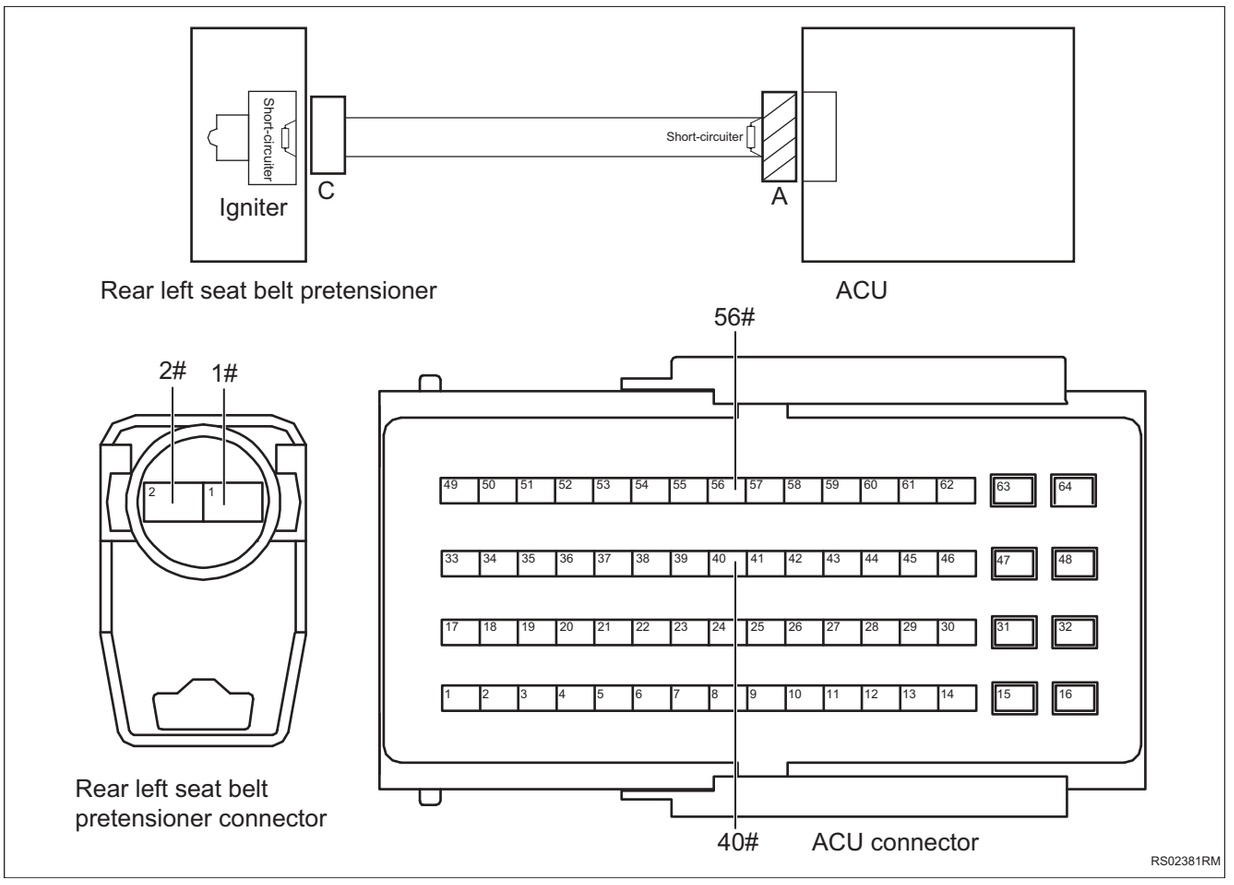
Detector connection	Detection conditions	Specified state
ACU connector 40# - ACU connector 56#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

2	**Check the rear left seat belt pretensioner harness and connector for open circuit**

RS



(a) Measure the resistance according to the values in the table below.

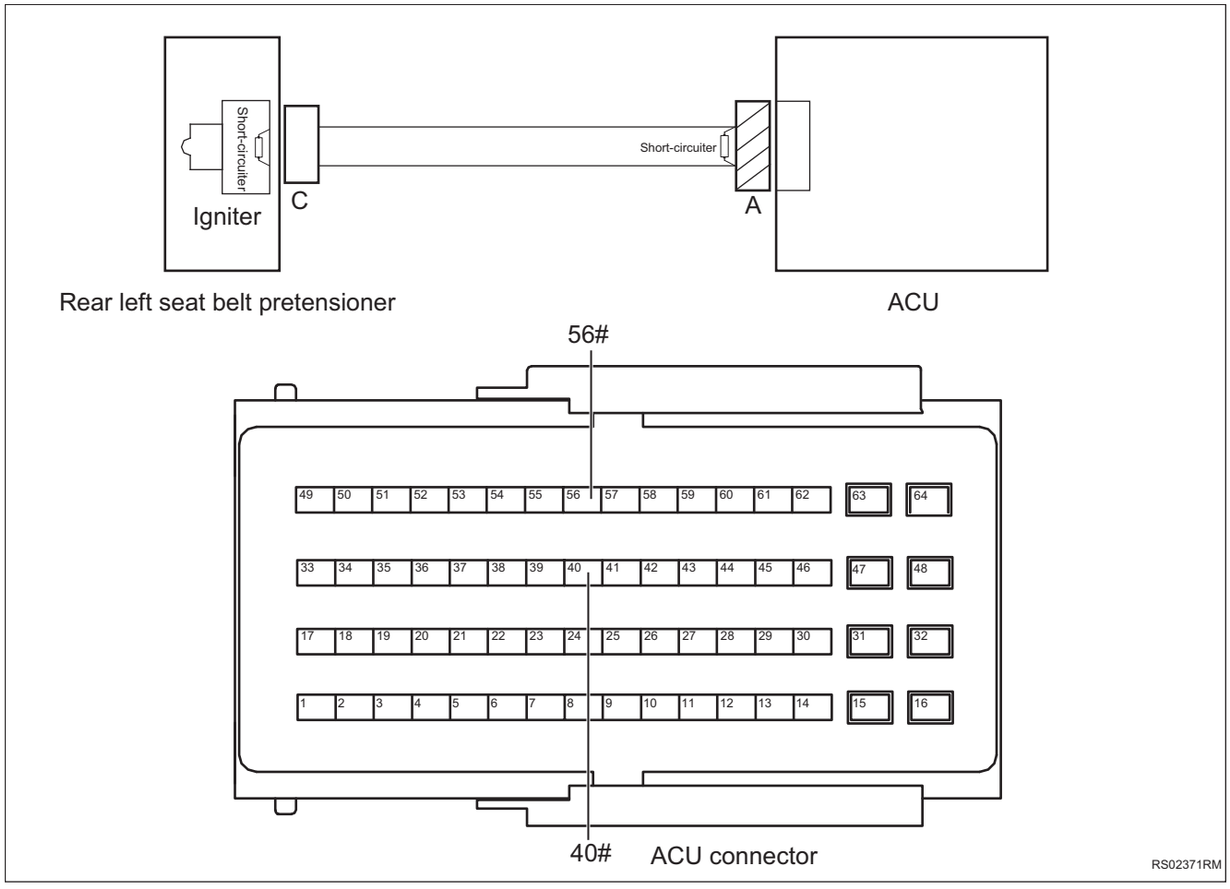
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 40# - rear left seat belt pretensioner connector 2#	Always connected	Less than 1Ω
ACU connector 56# - rear left seat belt pretensioner connector 1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check rear left seat belt pretensioner harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

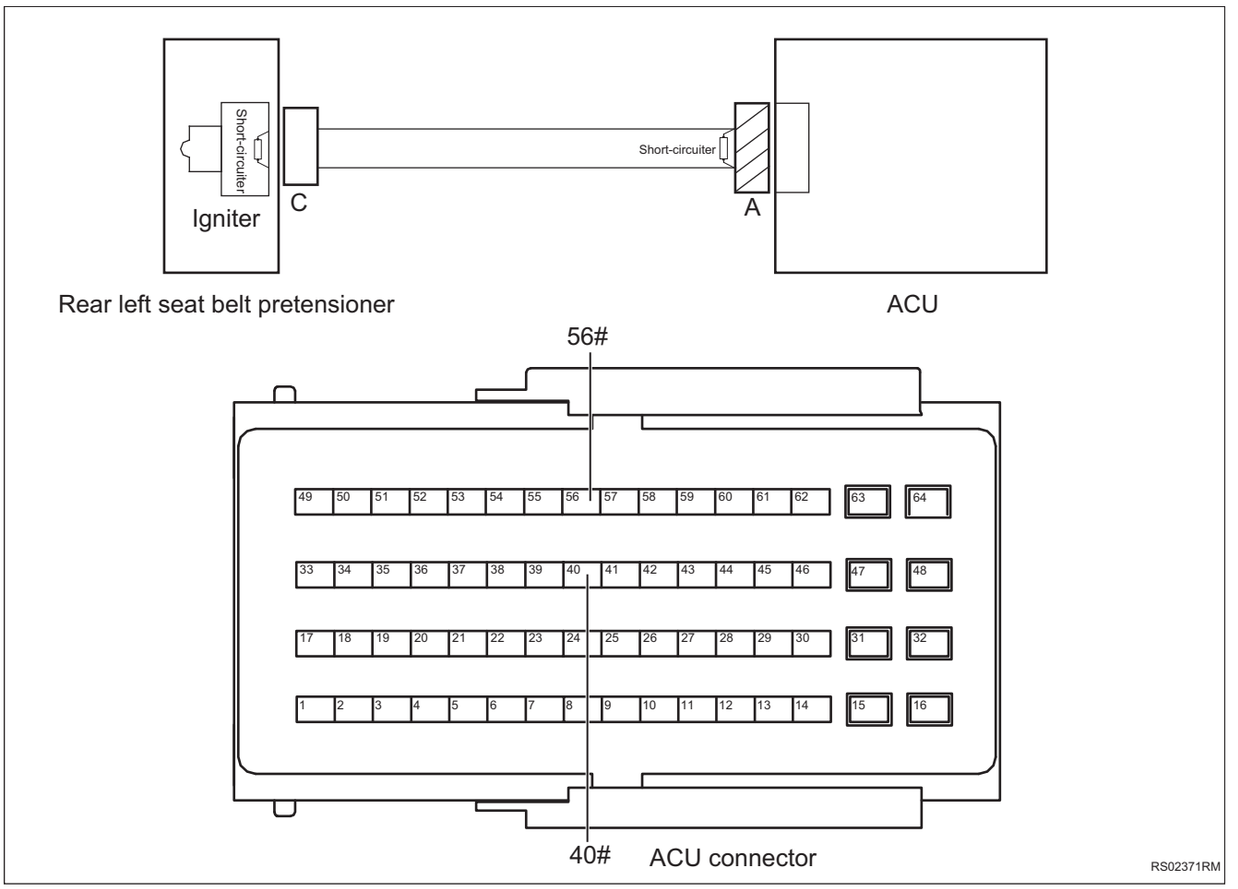
Detector connection	Detection conditions	Specified state
ACU connector 40# - body GND	Always connected	10 KΩ or greater
ACU connector 56# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check rear left seat belt pretensioner harness and connector for circuit shorted to power supply**

RS



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACU connector 40# - body GND	The ignition switch is set to "ON"	Less than 1 V
ACU connector 56# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the rear left seat belt pretensioner (See page SB-5)**

(a) Replace the rear left seat belt pretensioner.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace ACU (See page RS-218)**

OK

6	**End**

RS

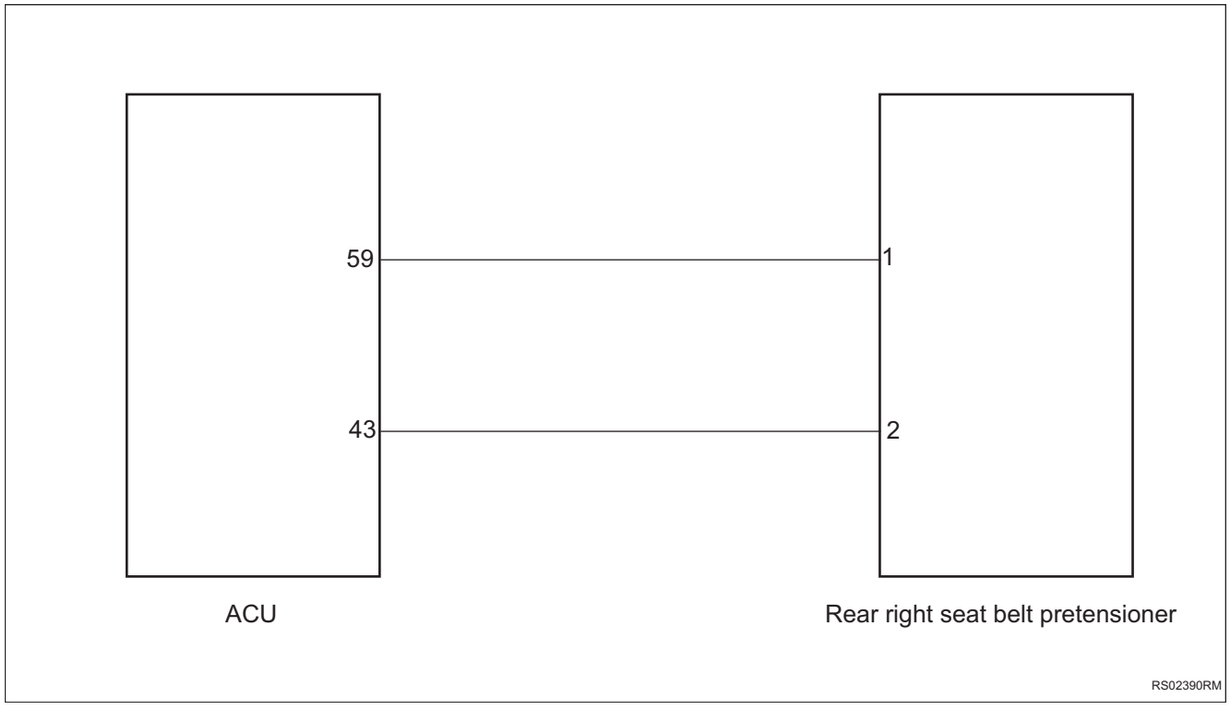
DTC	**B007511**	**Rear right pretensioner seat belt retractor retractor-short circuit to ground**
DTC	**B007512**	**Rear right pretensioner seat belt retractor - circuit shorted to battery**
DTC	**B00751A**	**Rear right pretensioner seat belt retractor-resistance low**
DTC	**B00751B**	**Rear right pretensioner seat belt retractor-resistance high**
DTC	**B007556**	**Rear right pretensioner seat belt retractor-configuration error**

Description

When the rear right seat belt pretensioner loop is shorted, has too high or too low resistance, the ACU will record the DTC.

DTC	DTC detection conditions	Faulty location
B007511	(a) Rear right seat belt pretensioner circuit shorted to ground.	• Rear right seat belt pretensioner • ACU • Harness and connector
B007512	(a) Rear right seat belt pretensioner circuit shorted to power supply.	• Rear right seat belt pretensioner • ACU • Harness and connector
B00751A	(a) Rear right side seat belt pretensioner circuit resistance lower than the lower limit.	• Rear right seat belt pretensioner • ACU • Harness and connector
B00751B	(a) The rear right side seat belt pretensioner circuit resistance is above the upper limit.	• Rear right seat belt pretensioner • ACU • Harness and connector
B007556	(a) Rear right seat belt pretensioner configuration error.	• Rear right seat belt pretensioner • ACU • Harness and connector

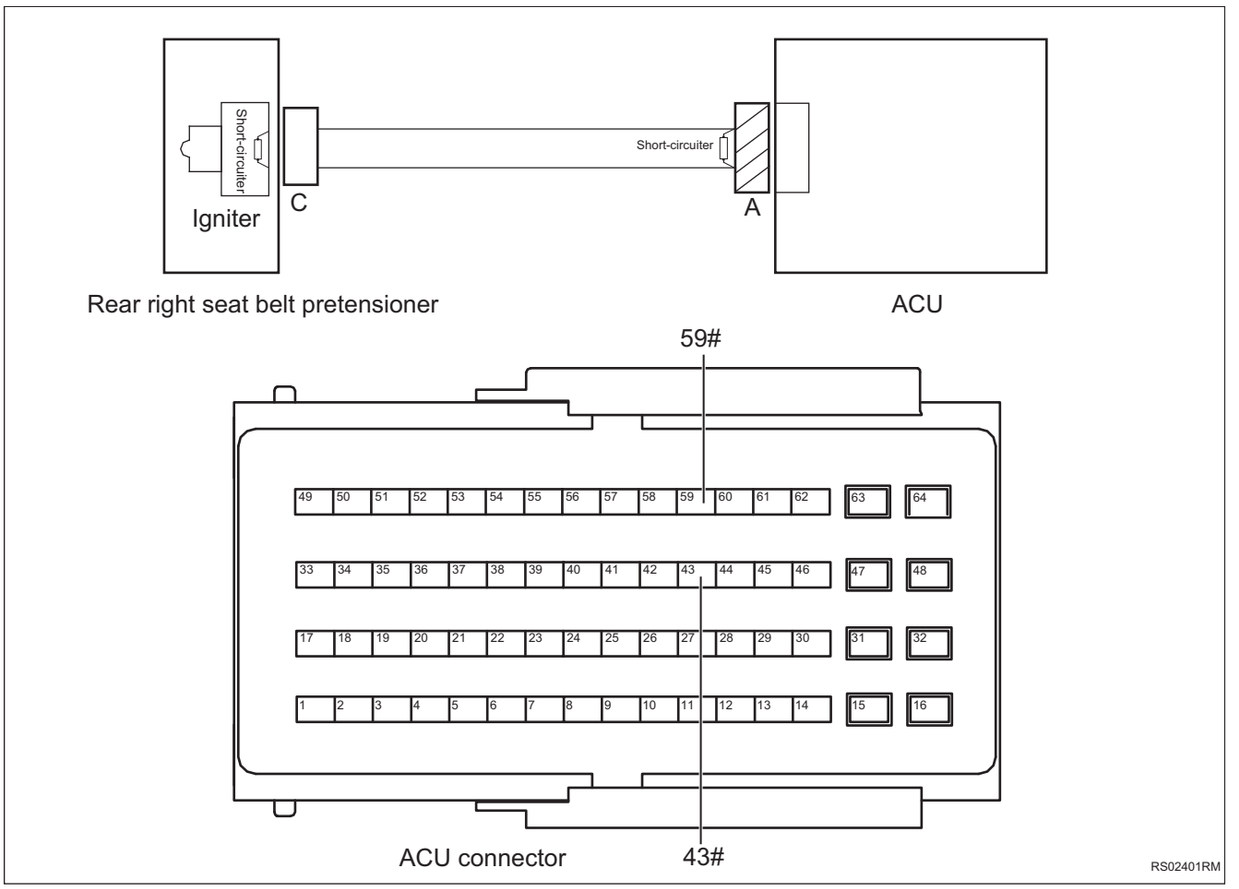
Circuit diagram



Inspection procedure

1	**Check rear right seat belt pretensioner harness and connector for circuit shorted to each other**

RS



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors A, C.

(d) Release the internal short-circuiter of connector A.

(e) Measure the resistance according to the values in the table below.

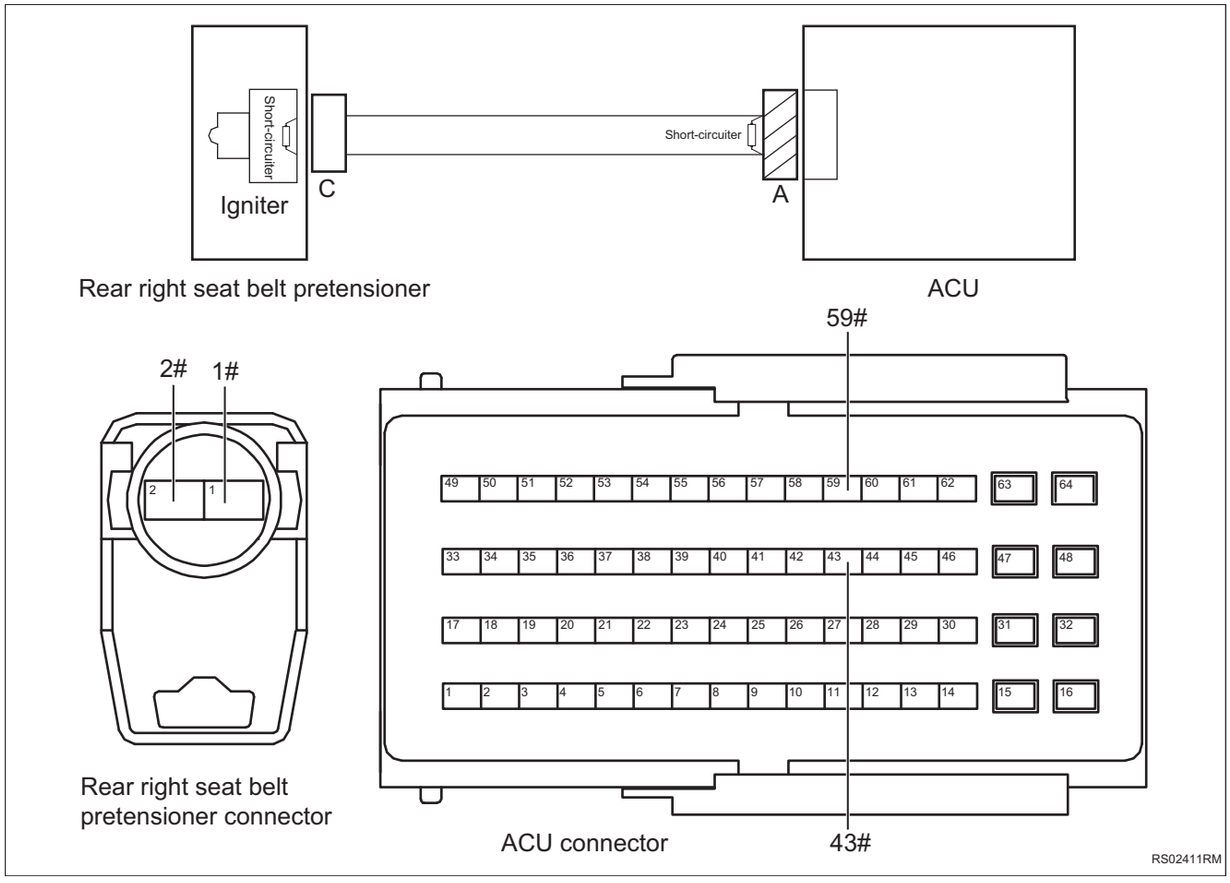
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 43# - ACU connector 59#	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

2	**Check the rear right seat belt pretensioner harness and connector for open circuit**



(a) Measure the resistance according to the values in the table below.

Standard value

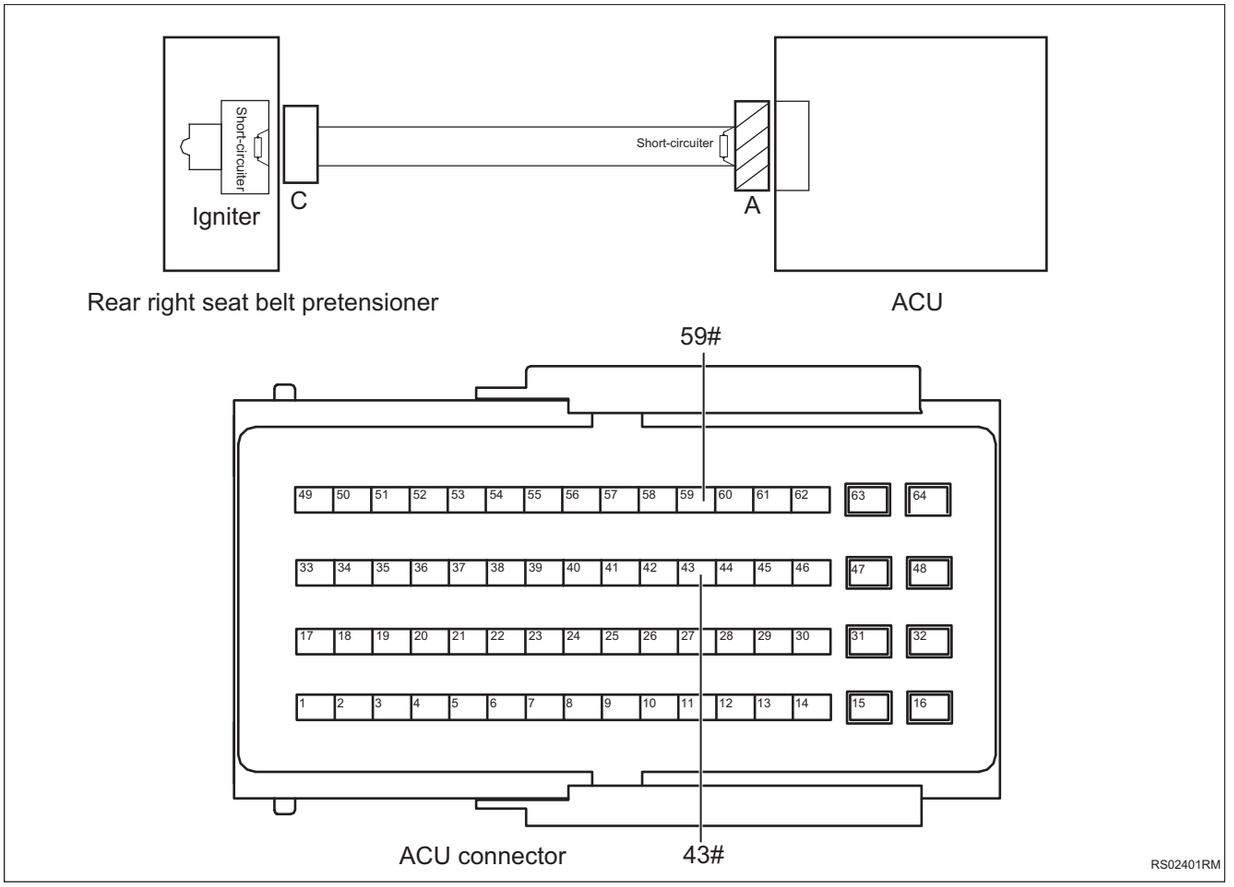
Detector connection	Detection conditions	Specified state
ACU connector 43# - rear right seat belt pretensioner connector 2#	Always connected	Less than 1Ω
ACU connector 59# - rear right seat belt pretensioner connector 1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check rear right seat belt pretensioner harness and connector for circuit shorted to ground**

RS



(a) Measure the resistance according to the values in the table below.

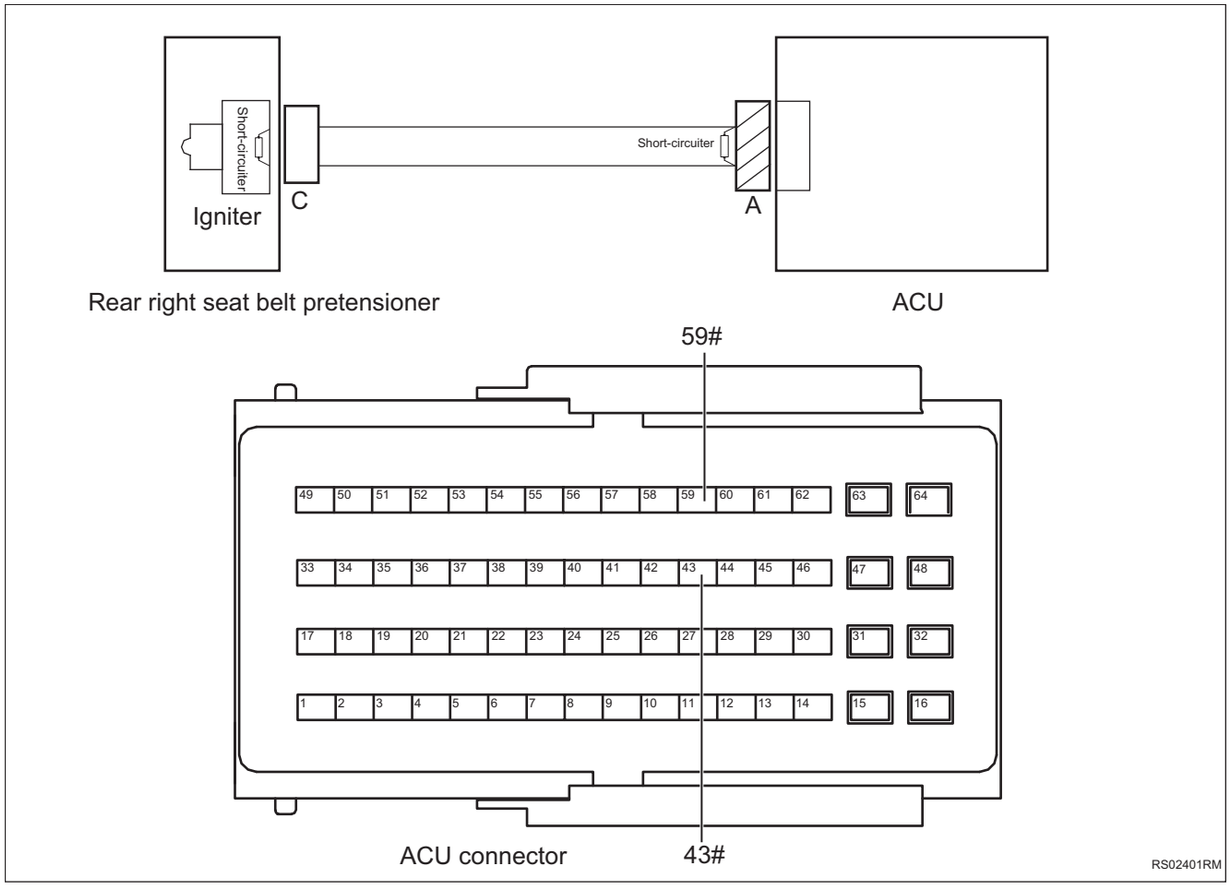
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 43# - body GND	Always connected	10 KΩ or greater
ACU connector 59# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check rear right seat belt pretensioner harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACU connector 43# - body GND	The ignition switch is set to "ON"	Less than 1 V
ACU connector 59# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the rear right seat belt pretensioner (See page SB-5)**

(a) Replace the rear right seat belt pretensioner.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

RS

NG → **Replace ACU (See page RS-218)**

OK

6	**End**

DTC	**B007911**	**Driver pretensioner seat belt retractor-circuit shorted to ground**
DTC	**B007912**	**Driver pretensioner seat belt retractor-circuit shorted to battery**
DTC	**B00791A**	**Driver pretensioner seat belt retractor-resistance low**
DTC	**B00791B**	**Driver pretensioner seat belt retractor-resistance high**
DTC	**B007956**	**Driver pretensioner seat belt retractor-configuration error**

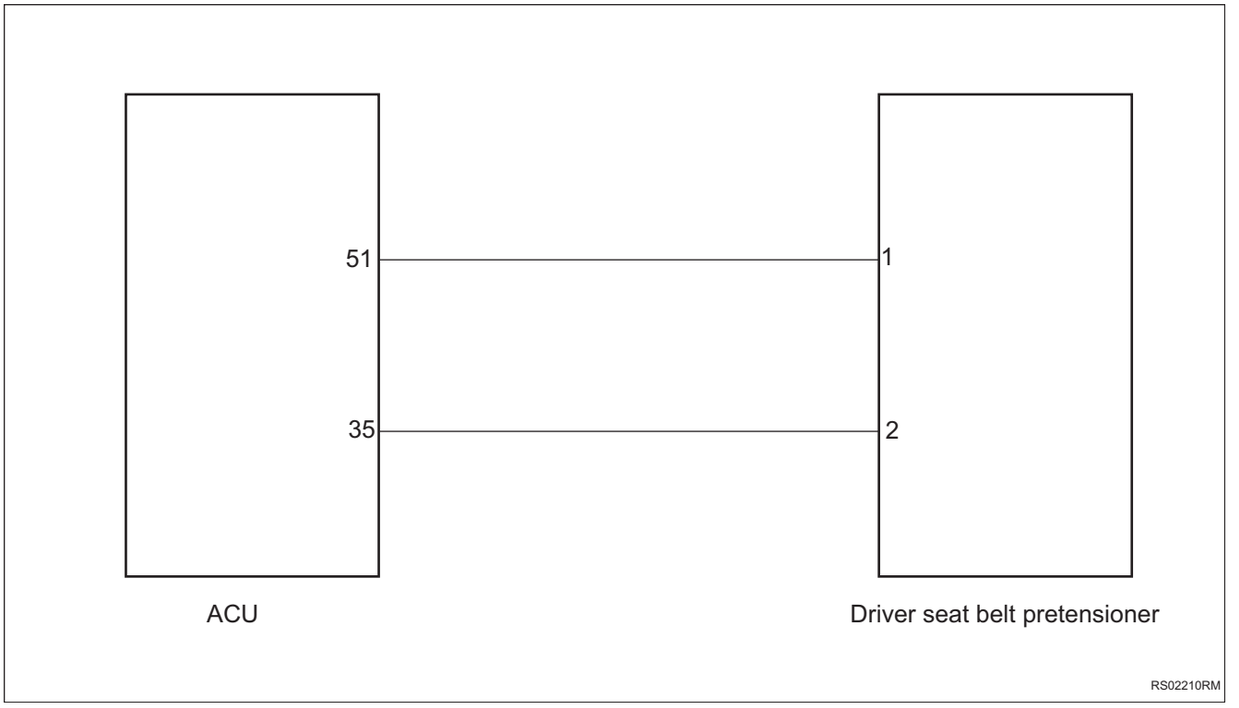
Description

When the driver seat belt pretensioner circuit is shorted, has too high or too low resistance, the ACU will record the DTC.

DTC	DTC detection conditions	Faulty location
B007911	(a) Driver seat belt pretensioner circuit shorted to ground.	• Driver seat belt pretensioner • ACU • Harness and connector
B007912	(a) Driver seat belt pretensioner circuit shorted to power supply.	• Driver seat belt pretensioner • ACU • Harness and connector
B00791A	(a) Driver seat belt pretensioner circuit resistance less than the lower limit.	• Driver seat belt pretensioner • ACU • Harness and connector
B00791B	(a) Driver seat belt pretensioner circuit resistance above the upper limit.	• Driver seat belt pretensioner • ACU • Harness and connector
B007956	(a) Driver seat belt pretensioner configuration error.	• Driver seat belt pretensioner • ACU • Harness and connector

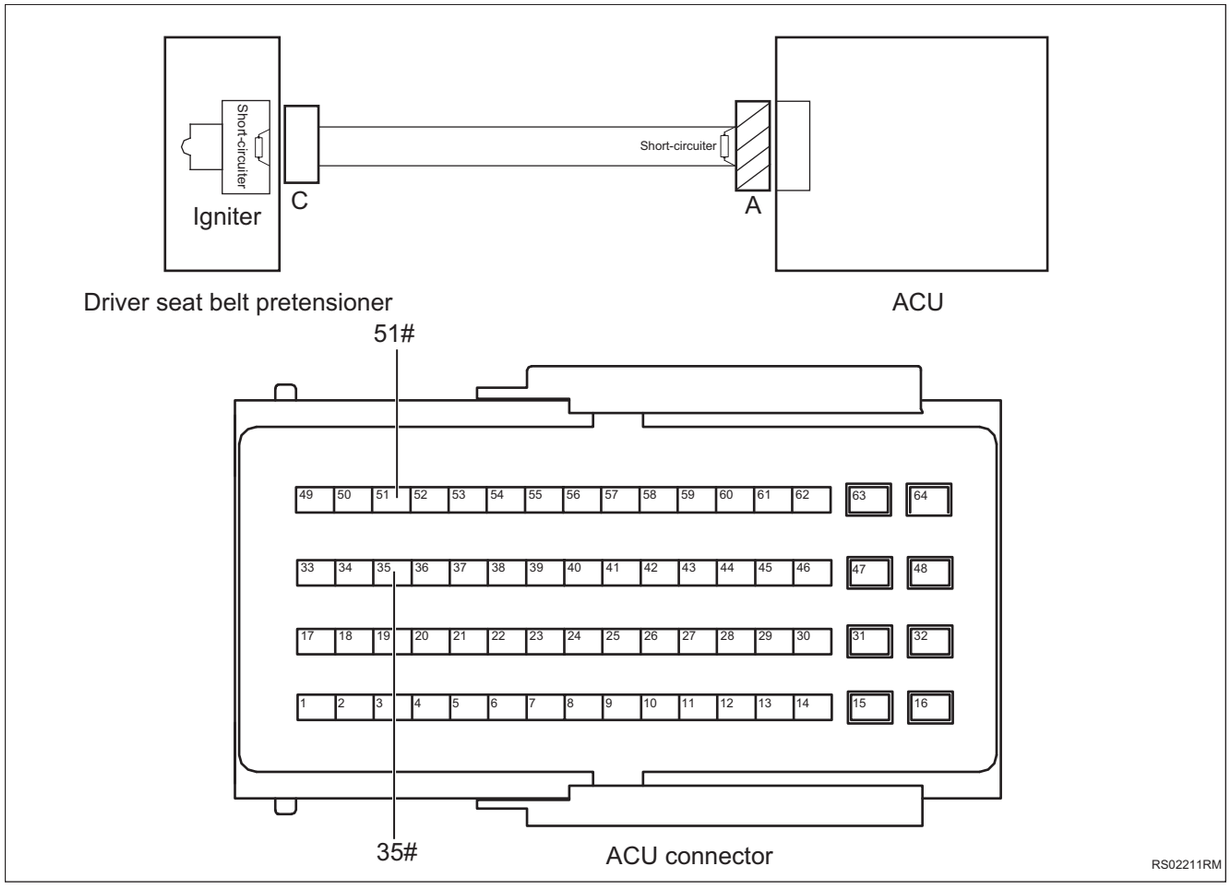
RS

Circuit diagram



Inspection procedure

1	**Check driver seat belt pretensioner harness and connector for circuit shorted to each other**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors A, C.

(d) Release the internal short-circuiter of connector A.

(e) Measure the resistance according to the values in the table below.

Standard value

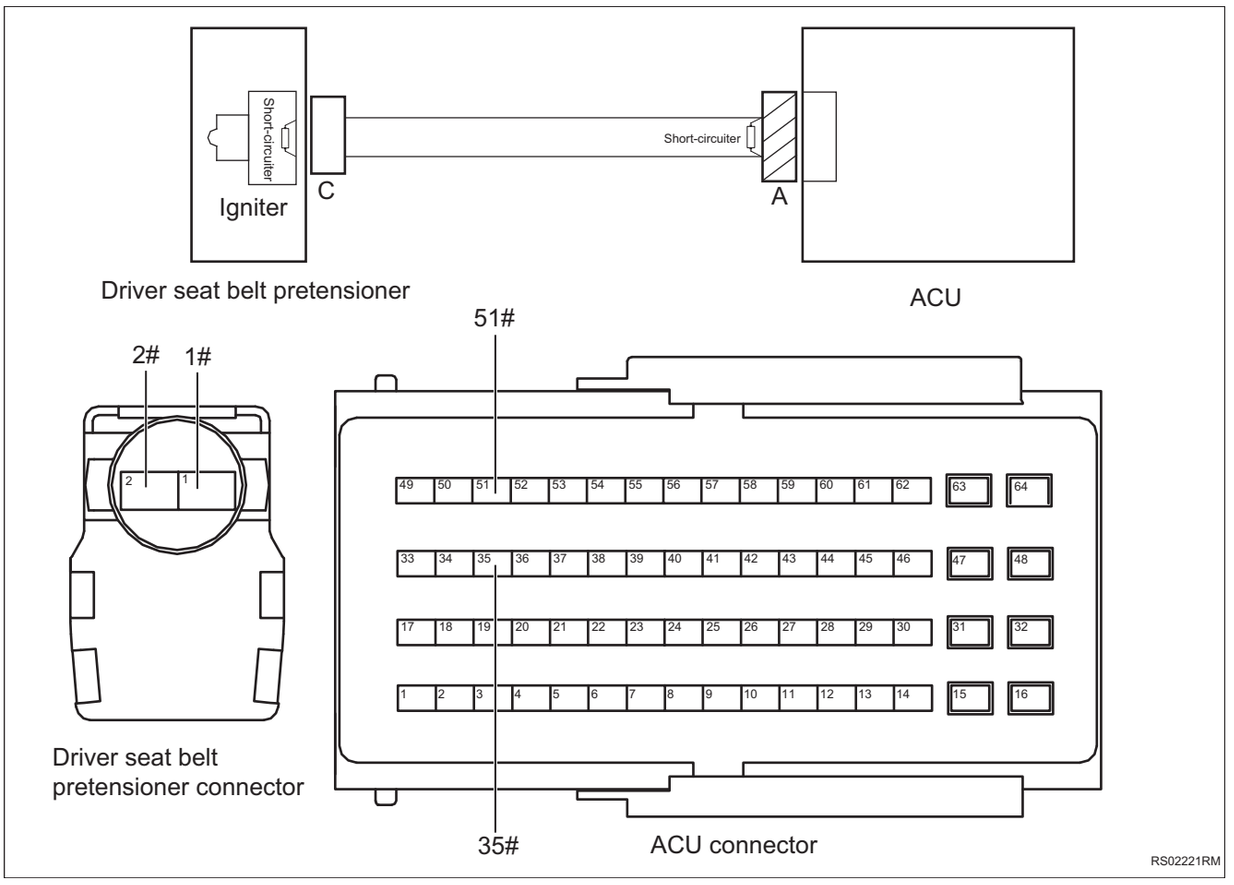
Detector connection	Detection conditions	Specified state
ACU connector 51# - ACU connector 35#	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

2	**Check the driver seat belt pretensioner harness and connector for open circuit**

RS



(a) Measure the resistance according to the values in the table below.

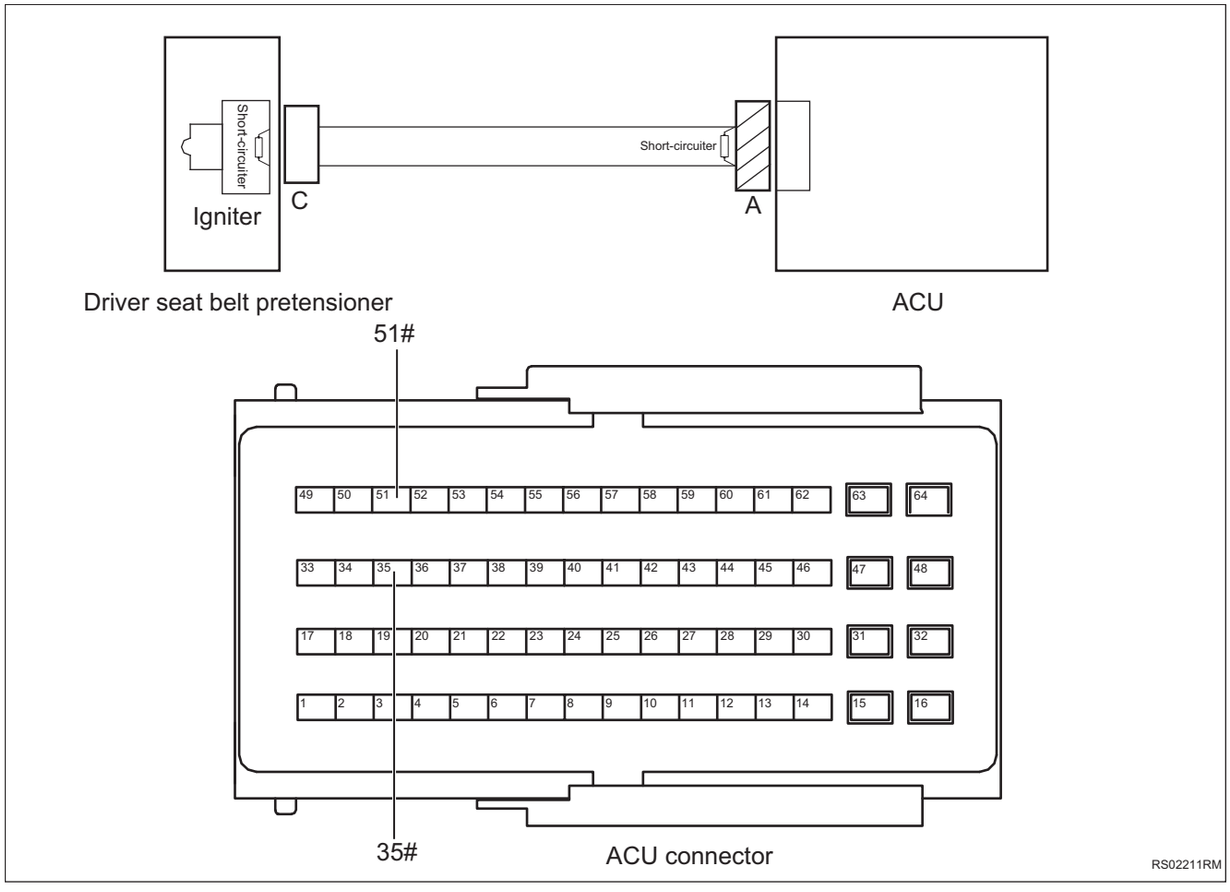
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 35# - driver seat belt pretensioner connector 2#	Always connected	Less than 1Ω
ACU connector 51# - driver seat belt pretensioner connector 1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check driver seat belt pretensioner harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

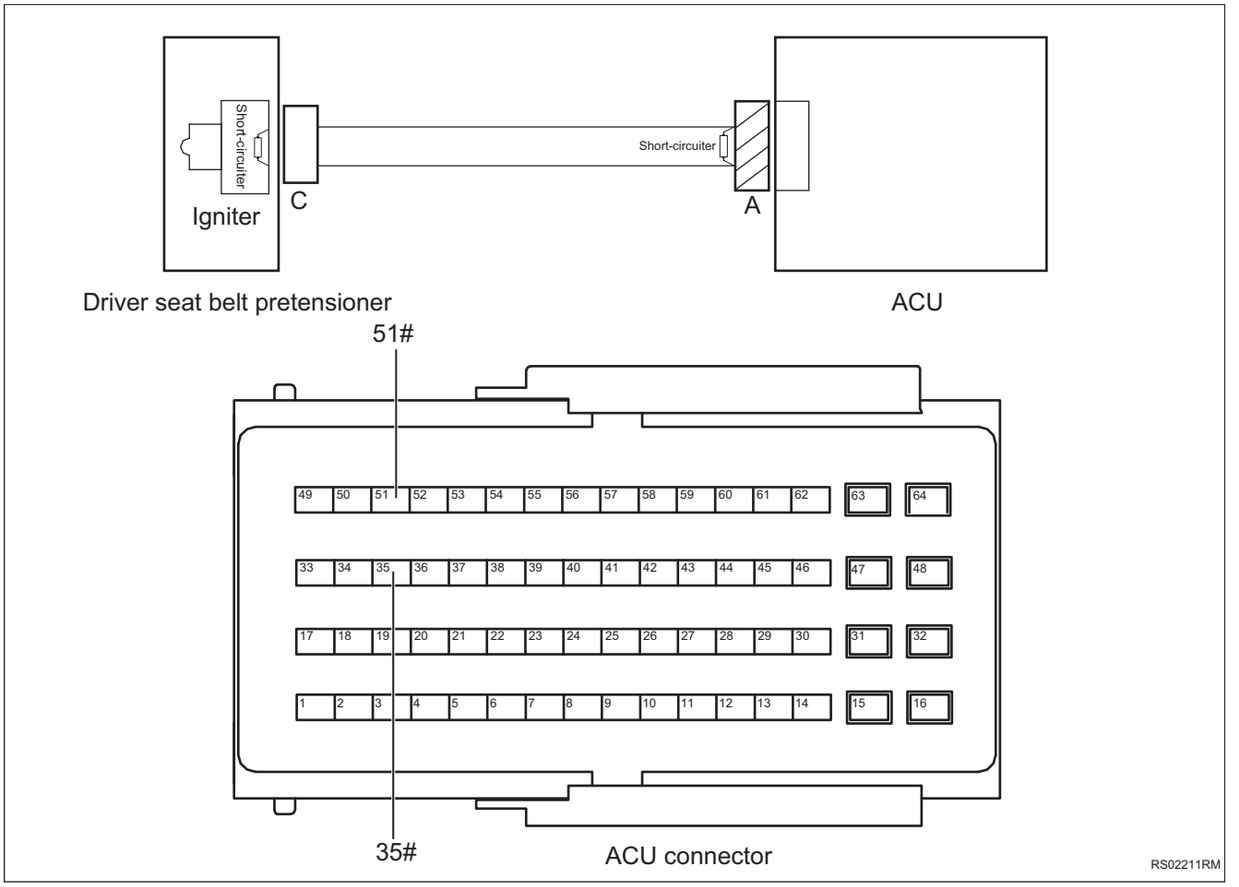
Detector connection	Detection conditions	Specified state
ACU connector 35# - body GND	Always connected	10 KΩ or greater
ACU connector 51# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check driver seat belt pretensioner harness and connector for circuit shorted to power supply**

RS



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACU connector 35# - body GND	The ignition switch is set to "ON"	Less than 1 V
ACU connector 51# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the driver seat belt pretensioner (See page SB-1)**

(a) Replace the driver seat belt pretensioner.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace ACU (See page RS-218)**

OK

6	**End**

RS

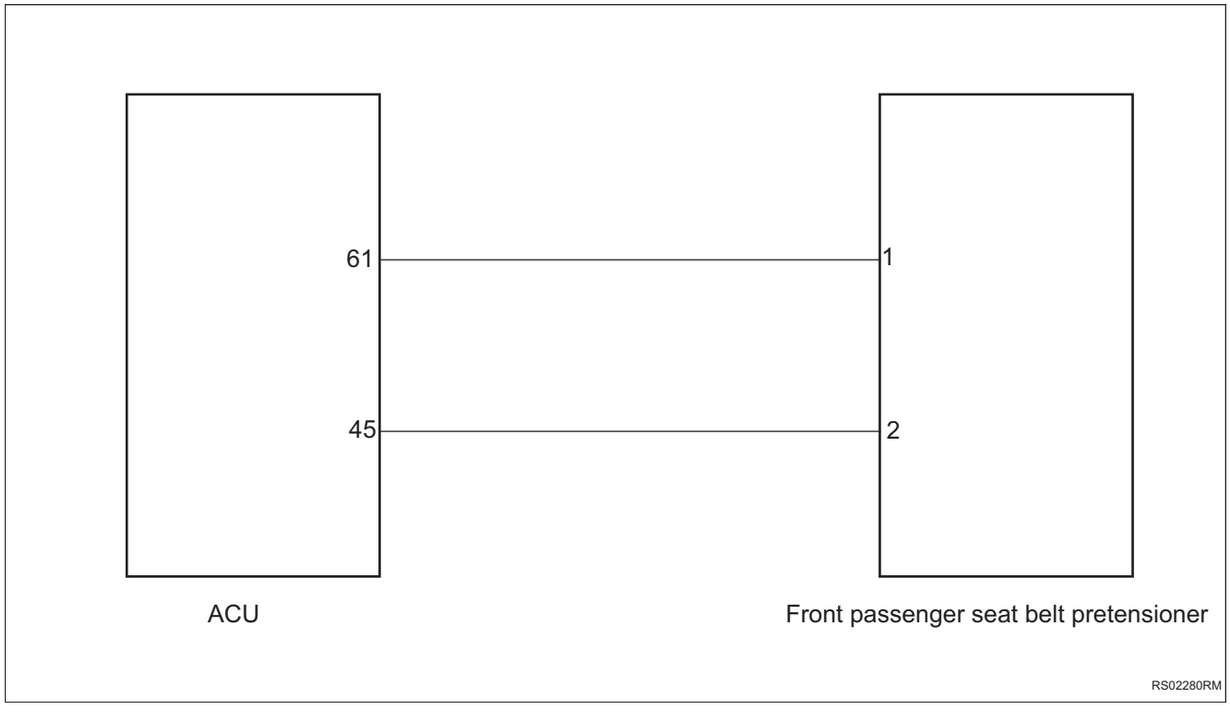
DTC	**B007A11**	**Front passenger pretensioner seat belt retractor-circuit shorted to ground**
DTC	**B007A12**	**Front passenger pretensioner seat belt retractor-circuit shorted to battery**
DTC	**B007A1A**	**Front passenger pretensioner seat belt retractor-resistance low**
DTC	**B007A1B**	**Front passenger pretensioner seat belt retractor- resistance too high**
DTC	**B007A56**	**Front passenger pretensioner seat belt retractor-configuration error**

Description

When the front passenger seat belt pretensioner loop is shorted, has too high or too low resistance, the ACU will record the DTC.

DTC	DTC detection conditions	Faulty location
B007A11	(a) Front passenger seat belt pretensioner circuit shorted to ground.	• Front passenger seat belt pretensioner • ACU • Harness and connector
B007A12	(a) Front passenger seat belt pretensioner circuit shorted to power supply.	• Front passenger seat belt pretensioner • ACU • Harness and connector
B007A1A	(a) Front passenger seat belt pretensioner circuit resistance below lower limit.	• Front passenger seat belt pretensioner • ACU • Harness and connector
B007A1B	(a) Front passenger seat belt pretensioner circuit resistance above upper limit.	• Front passenger seat belt pretensioner • ACU • Harness and connector
B007A56	(a) Front passenger seat belt pretensionerr configuration error.	• Front passenger seat belt pretensioner • ACU • Harness and connector

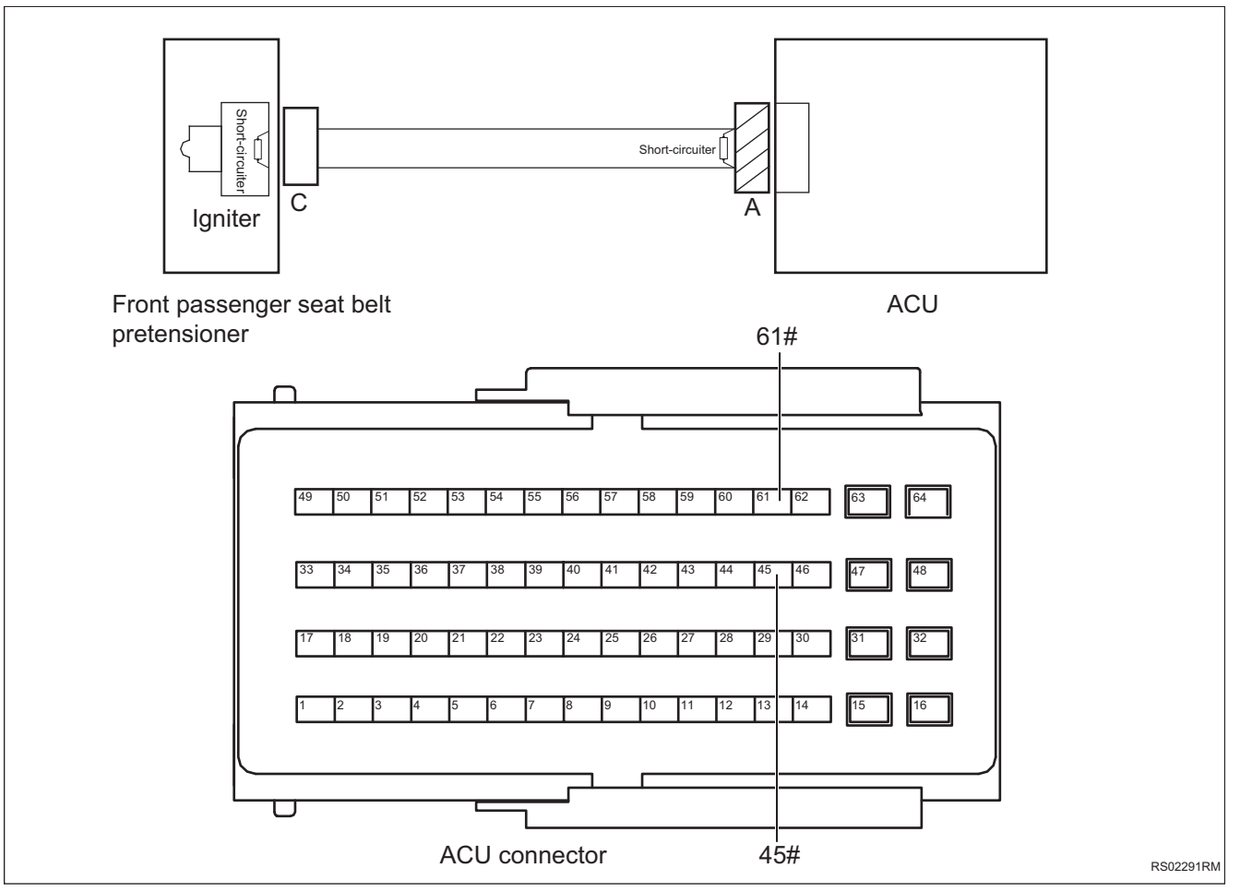
Circuit diagram



Inspection procedure

1	**Check front passenger seat belt pretensioner harness and connector for circuit shorted to each other**

RS



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the connectors A, C.

(d) Release the internal short-circuiter of connector A.

(e) Measure the resistance according to the values in the table below.

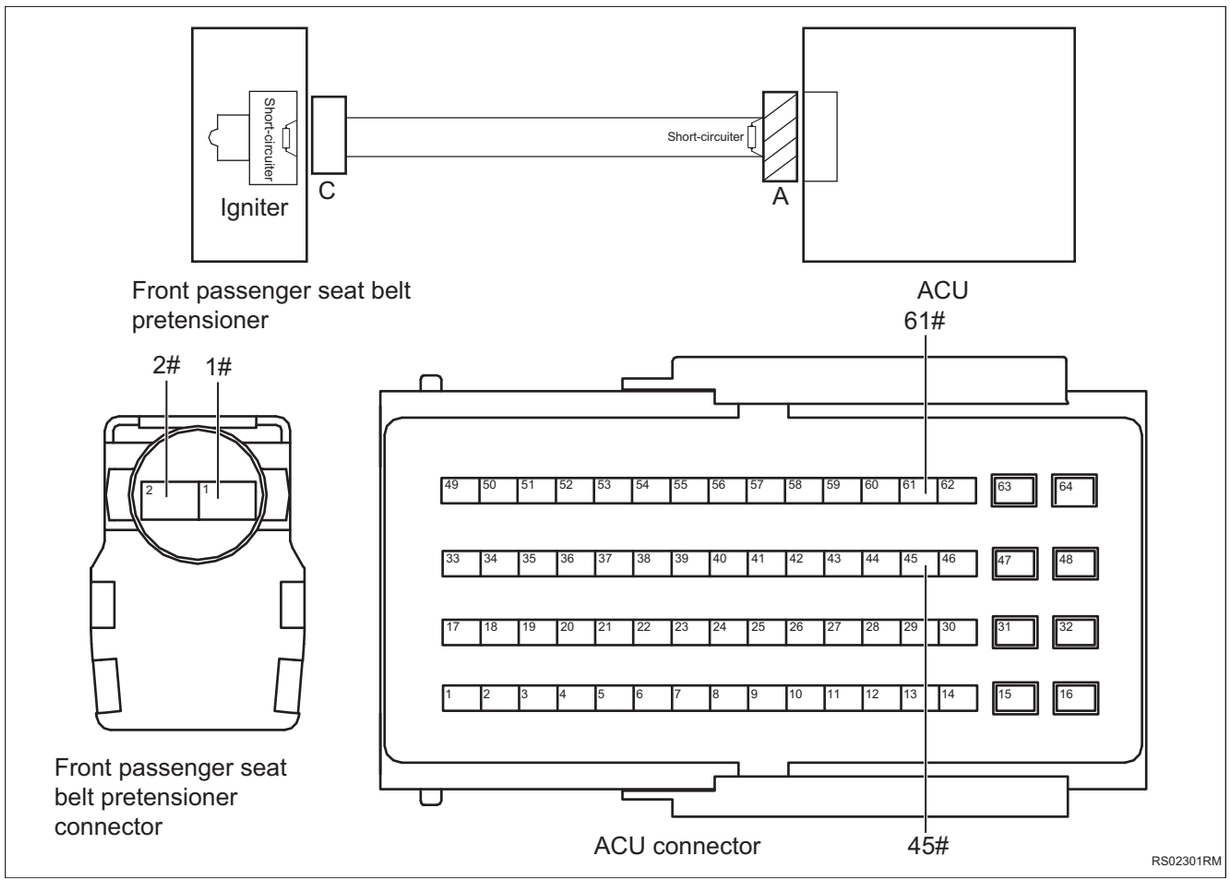
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 61# - ACU connector 45#	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

2	**Check the front passenger seat belt pretensioner harness and connector for open circuit**



(a) Measure the resistance according to the values in the table below.

Standard value

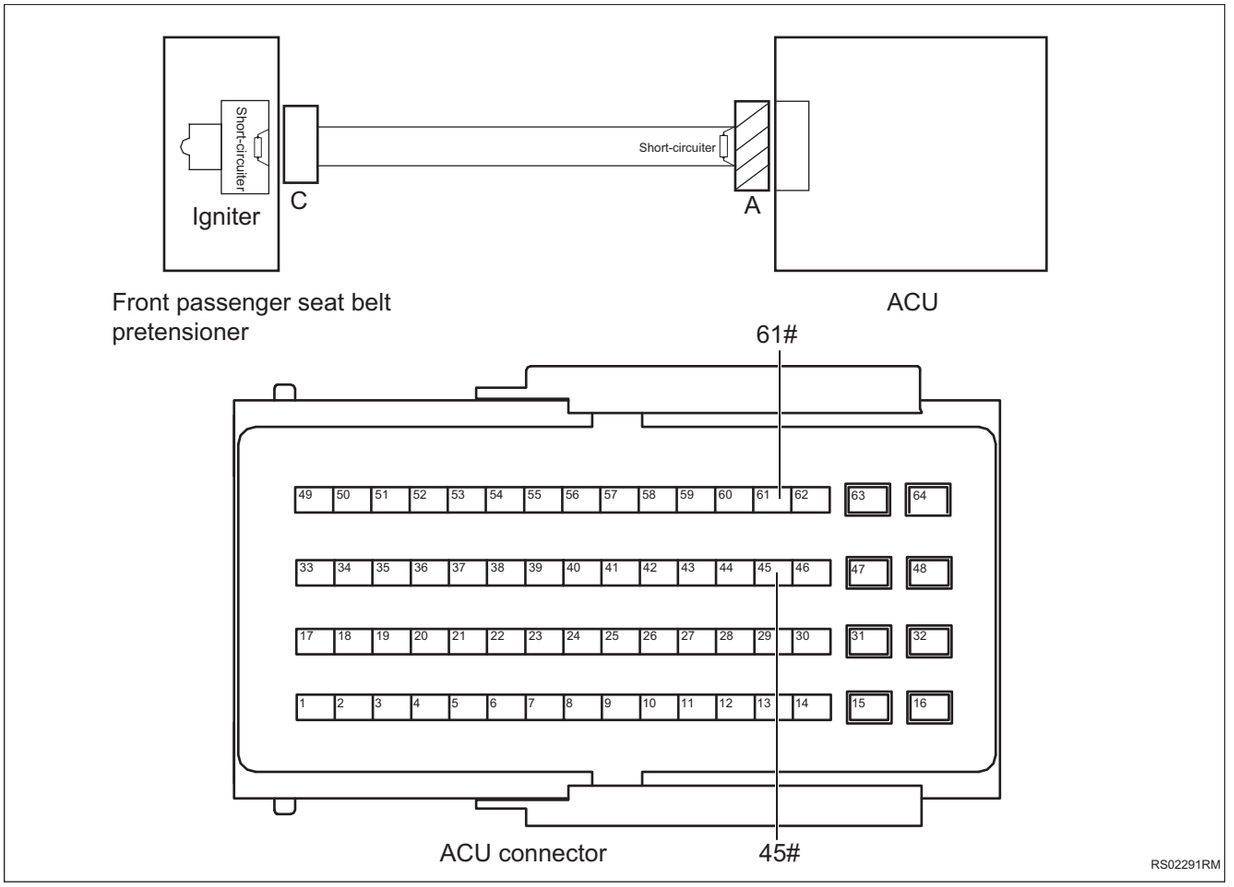
Detector connection	Detection conditions	Specified state
ACU connector 45# - front passenger seat belt pretensioner connector 2#	Always connected	Less than 1Ω
ACU connector 61# - front passenger seat belt pretensioner connector 1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check front passenger seat belt pretensioner harness and connector for circuit shorted to ground**

RS



(a) Measure the resistance according to the values in the table below.

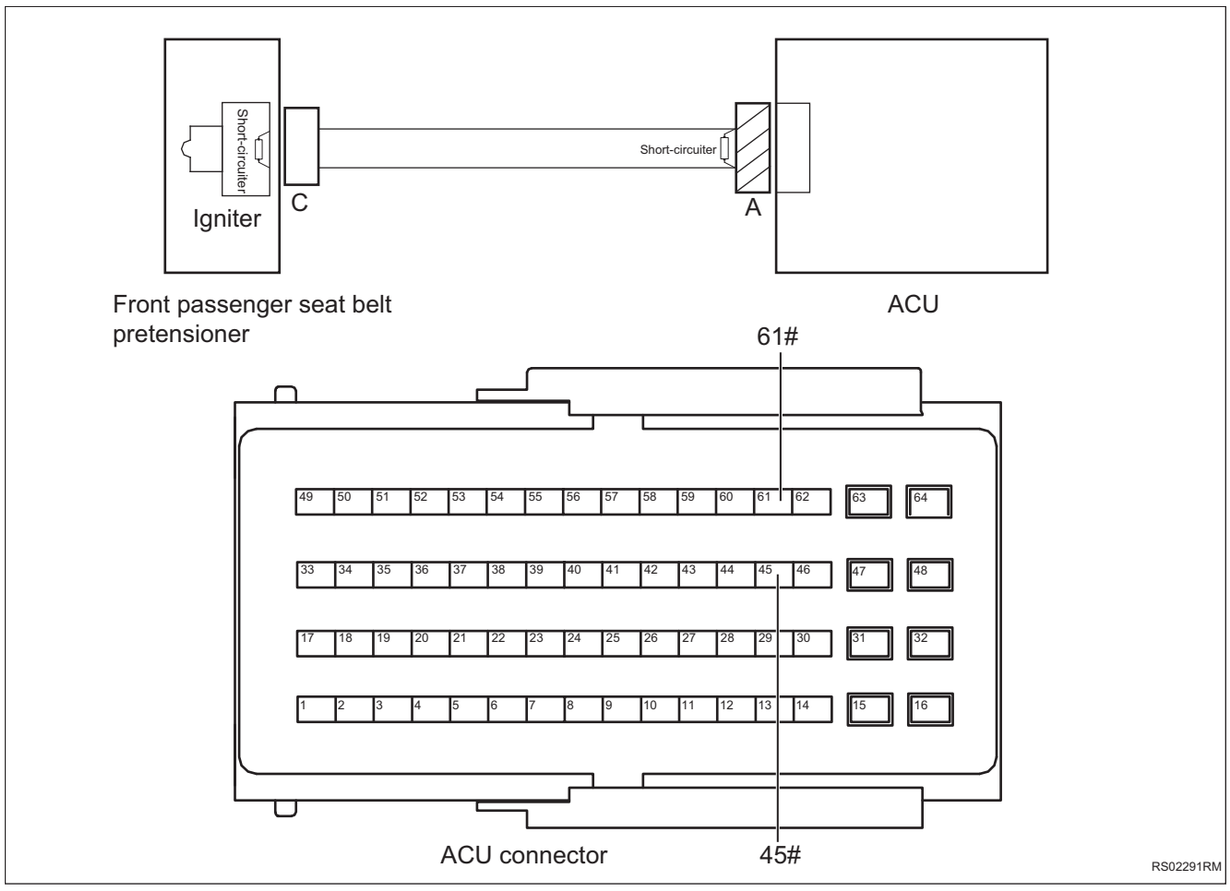
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 45# - body GND	Always connected	10 KΩ or greater
ACU connector 61# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

4	**Check front passenger seat belt pretensioner harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACU connector 45# - body GND	The ignition switch is set to "ON"	Less than 1 V
ACU connector 61# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the front passenger seat belt pretensioner (See page SB-1)**

(a) Replace the driver seat belt pretensioner.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

RS

NG → **Replace ACU (See page RS-218)**

OK

6	**End**

DTC	**B009049**	**Left front impact sensor-internal fault**
DTC	**B009087**	**Left front impact sensor-communication loss**
DTC	**B009086**	**Left front impact sensor-data transmission failure**
DTC	**B009056**	**Left front impact sensor-configuration error**

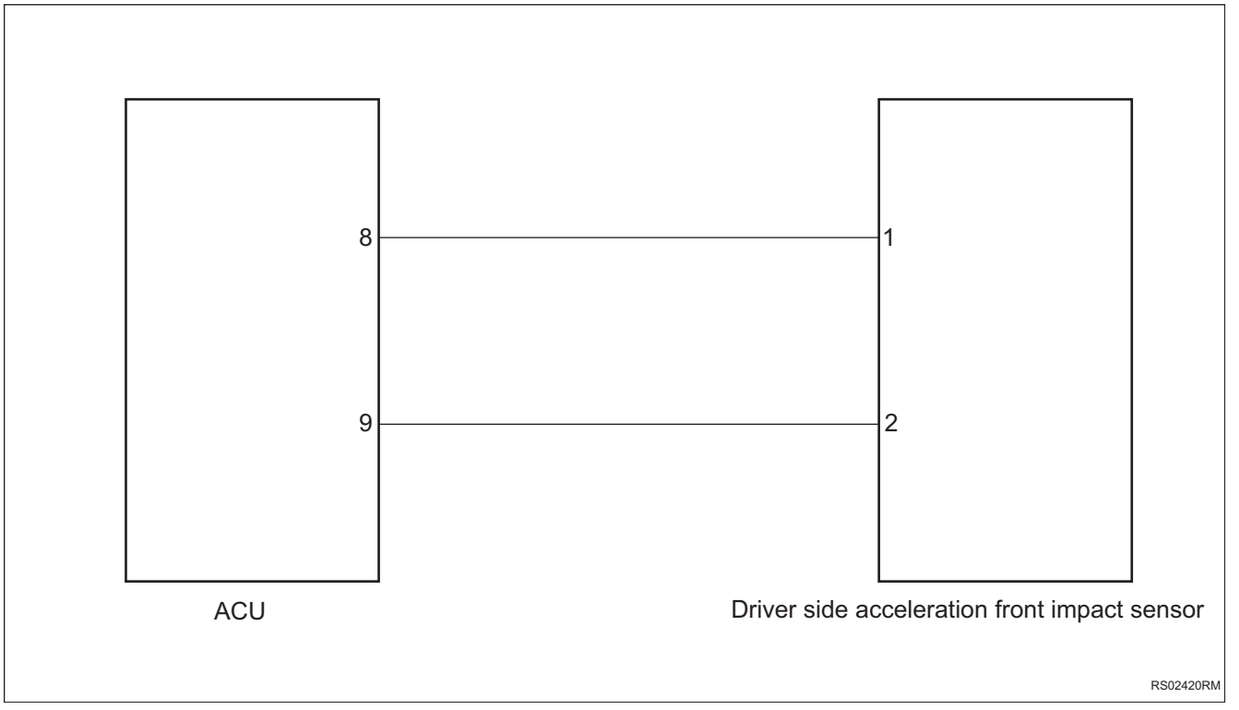
Description

When the driver side acceleration front impact sensor itself has failure or is short-circuited or open-circuited, the ACU will record the DTC.

DTC	DTC detection conditions	Faulty location
B009049	(a) Impact sensor failure.	• Driver side acceleration front impact sensor • ACU • Harness and connector
B009087	(a) Impact sensor communication error.	• Driver side acceleration front impact sensor • ACU • Harness and connector
B009086	(a) Impact sensor parameter error.	• Driver side acceleration front impact sensor • ACU • Harness and connector
B009056	(a) Impact sensor configuration error.	• Driver side acceleration front impact sensor • ACU • Harness and connector

RS

Circuit diagram



Inspection procedure

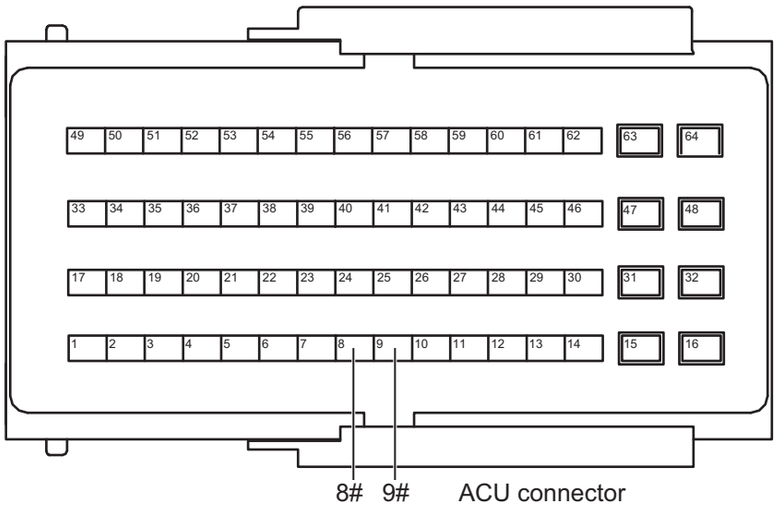
1	**Check the part number of driver side acceleration front impact sensor**

(a) Check if the part number of the driver acceleration front impact sensor is correct.

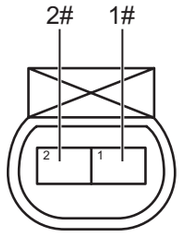
NG → **Replace the impact sensor with one of the correct model**

OK

2	**Check the driver side acceleration front impact sensor harness and connector for open circuit**



RS02431RM



Driver side acceleration front impact sensor connector

RS02440RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ACU connector.

(d) Disconnect the connector of driver side acceleration front impact sensor.

(e) Measure the resistance according to the values in the table below.

Standard value

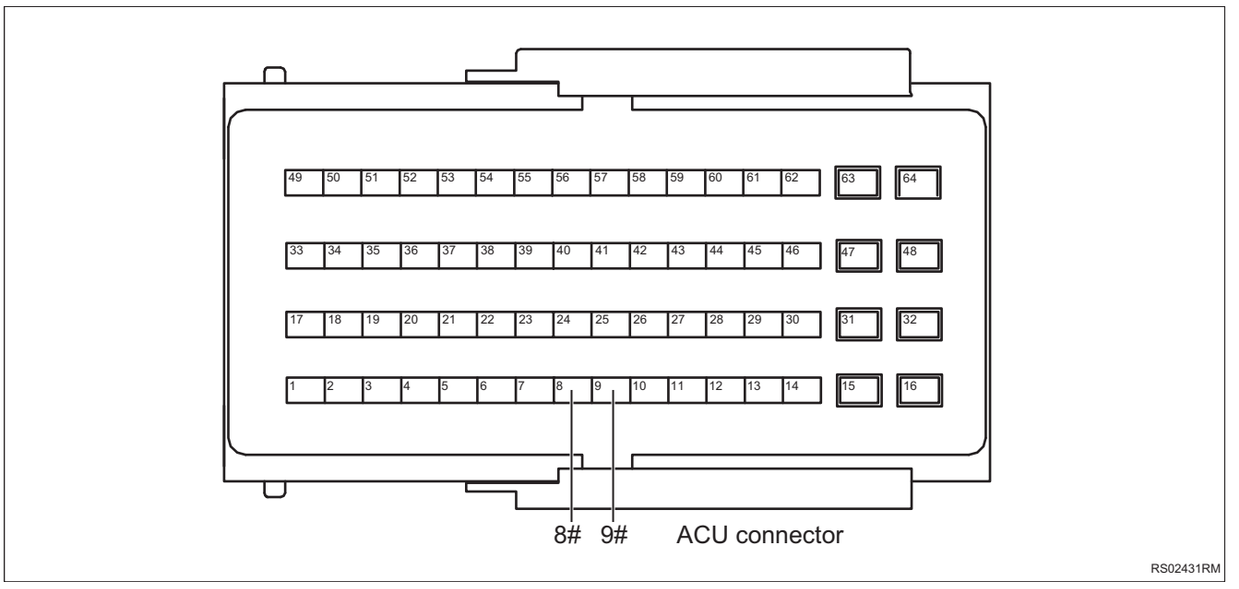
Detector connection	Detection conditions	Specified state
ACU connector 8# -driver acceleration front impact sensor connector 1#	Always connected	Less than 1Ω
ACU connector 9# -driver acceleration front impact sensor connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check the driver side acceleration front impact sensor harness and connector for circuit shorted to ground**

RS



(a) Measure the resistance according to the values in the table below.

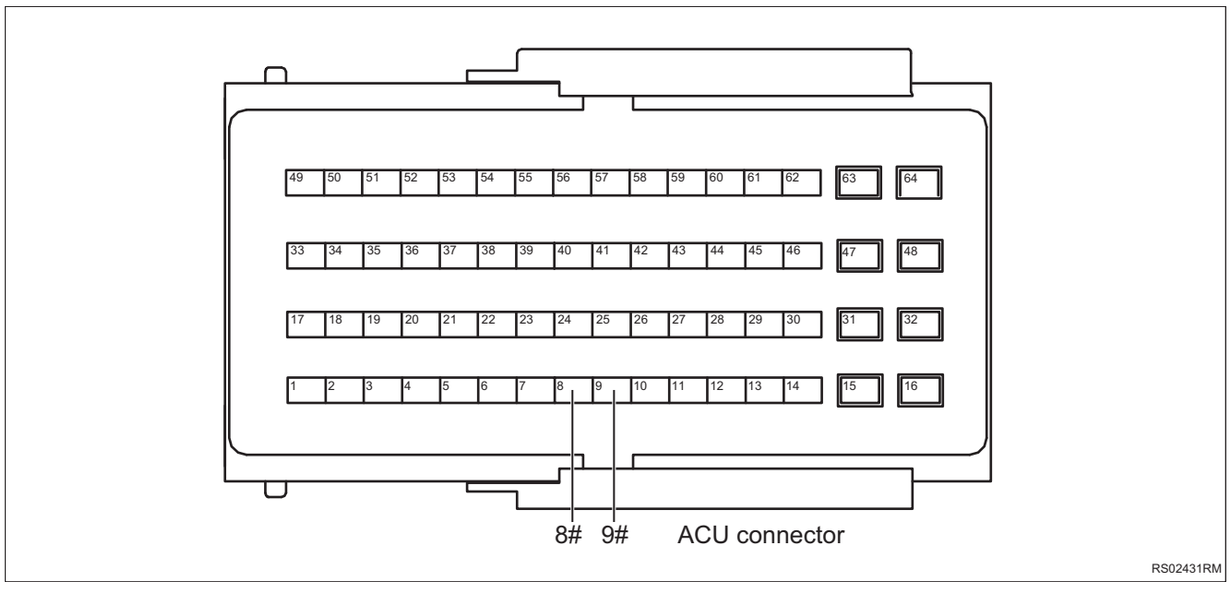
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 8# - body GND	Always connected	10 KΩ or greater
ACU connector 9# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

4	**Check driver side acceleration front impact sensor harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACU connector 8# - body GND	The ignition switch is set to "ON"	Less than 1 V
ACU connector 9# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the driver side acceleration front impact sensor (See page RS-229)**

(a) Replace the driver side acceleration front impact sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace ACU (See page RS-218)**

OK

6	**End**

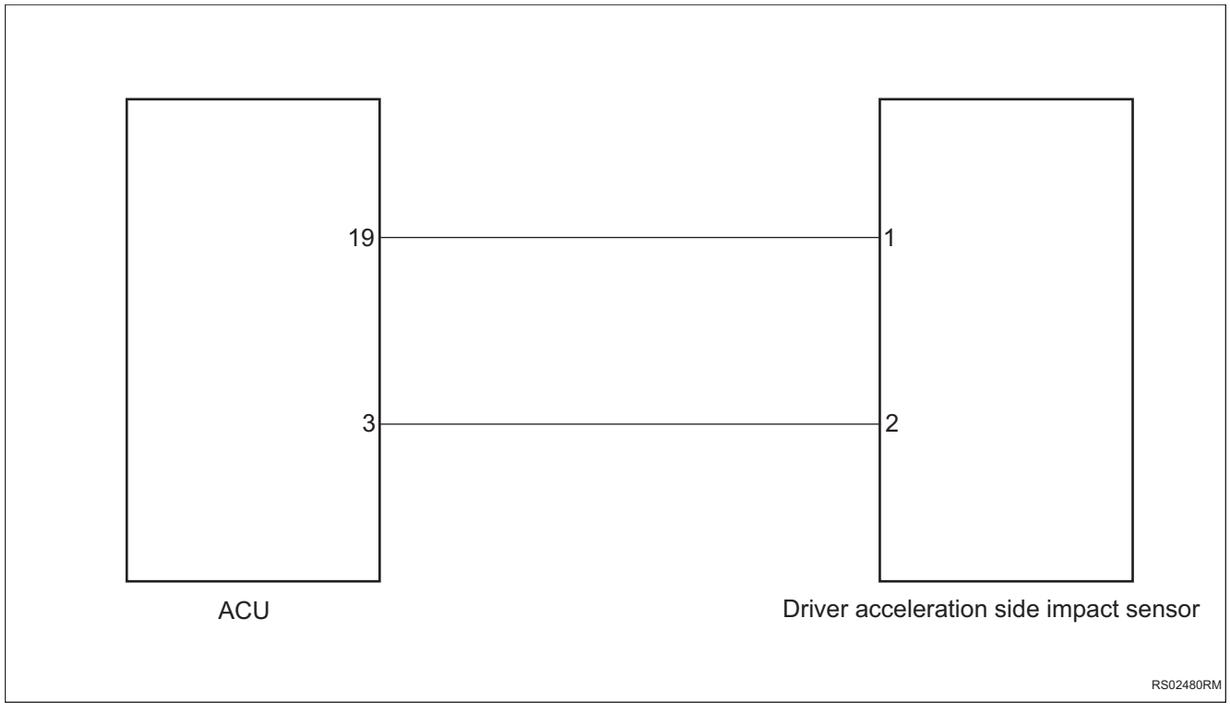
DTC	**B009149**	**Left side impact sensor-internal fault**
DTC	**B009187**	**Left side impact sensor-communication loss**
DTC	**B009186**	**Left side impact sensor-data transmission failure**
DTC	**B009156**	**Left side impact sensor-configuration error**

Description

When the driver acceleration side impact sensor itself has failure or is short-circuited or open-circuited, the ACU will record the DTC.

DTC	DTC detection conditions	Faulty location
B009149	(a) Impact sensor failure.	• Driver acceleration side impact sensor • ACU • Harness and connector
B009187	(a) Impact sensor communication error.	• Driver acceleration side impact sensor • ACU • Harness and connector
B009186	(a) Impact sensor parameter error.	• Driver acceleration side impact sensor • ACU • Harness and connector
B009156	(a) Impact sensor configuration error.	• Driver acceleration side impact sensor • ACU • Harness and connector

Circuit diagram



Inspection procedure

RS

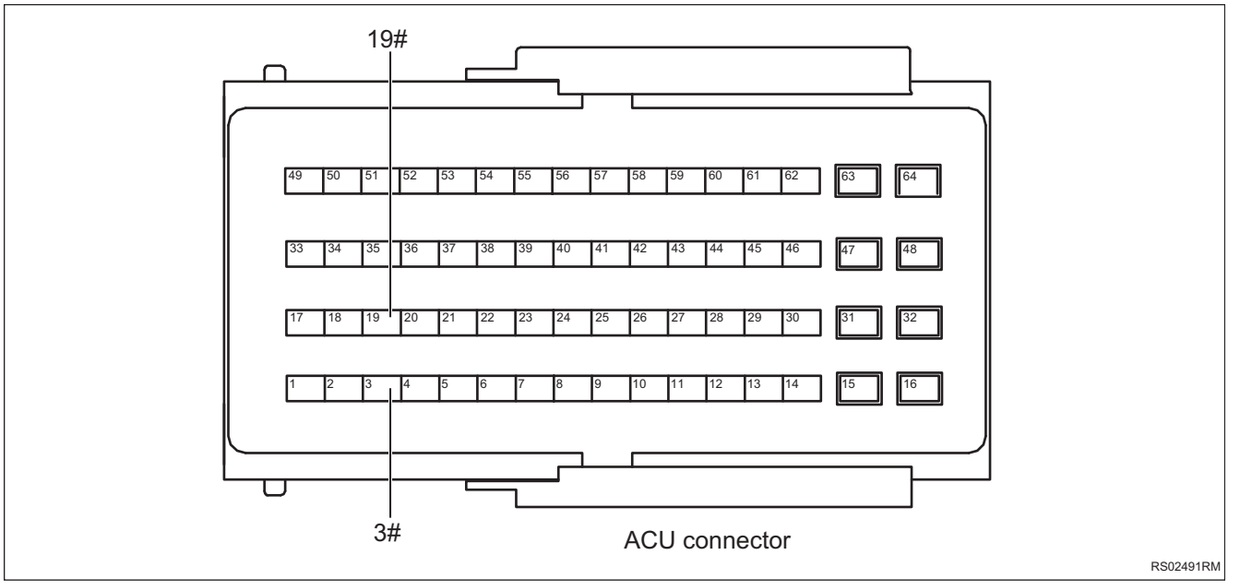
1	**Check driver acceleration side impact sensor part number**

(a) Check if the part number of the driver acceleration side impact sensor is correct.

NG → **Replace the impact sensor with one of the correct model**

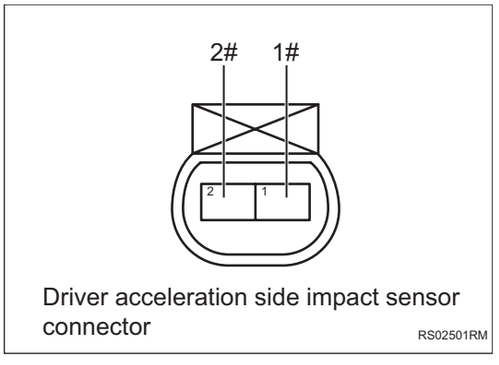
OK

2	**Check the driver acceleration side impact sensor harness and connector for open circuit**



ACU connector

RS02491RM



Driver acceleration side impact sensor connector

RS02501RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ACU connector.

(d) Disconnect the driver acceleration side impact sensor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

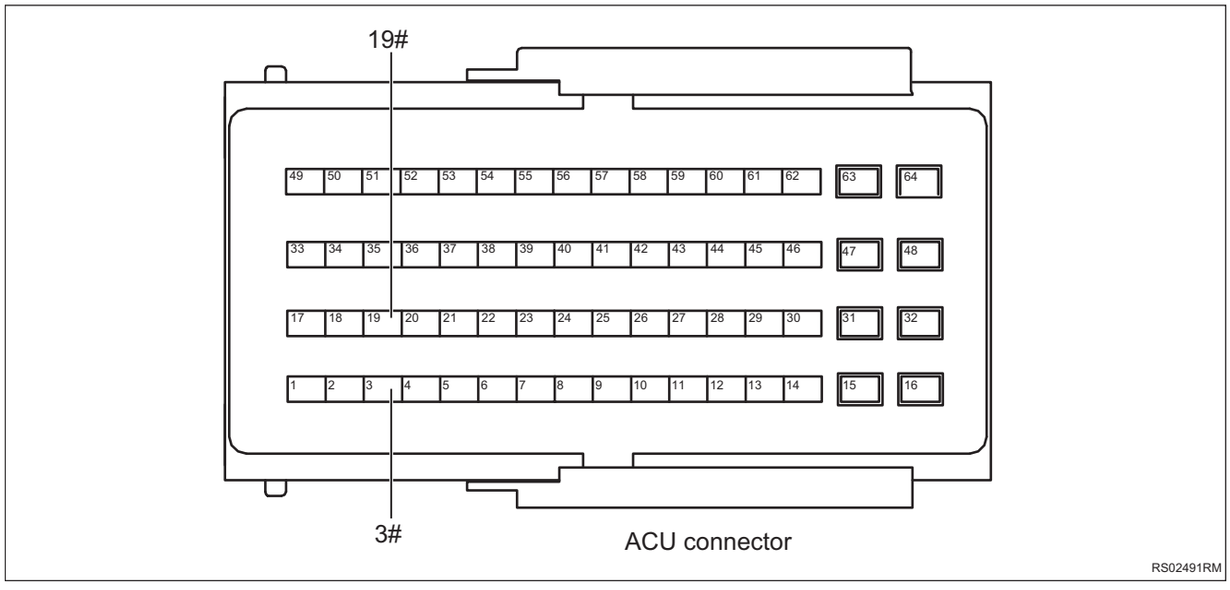
Detector connection	Detection conditions	Specified state
ACU connector 19# -driver acceleration side impact sensor connector 1#	Always connected	Less than 1Ω
ACU connector 3# -driver acceleration side impact sensor connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

RS

OK

3	**Check the driver acceleration side impact sensor harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

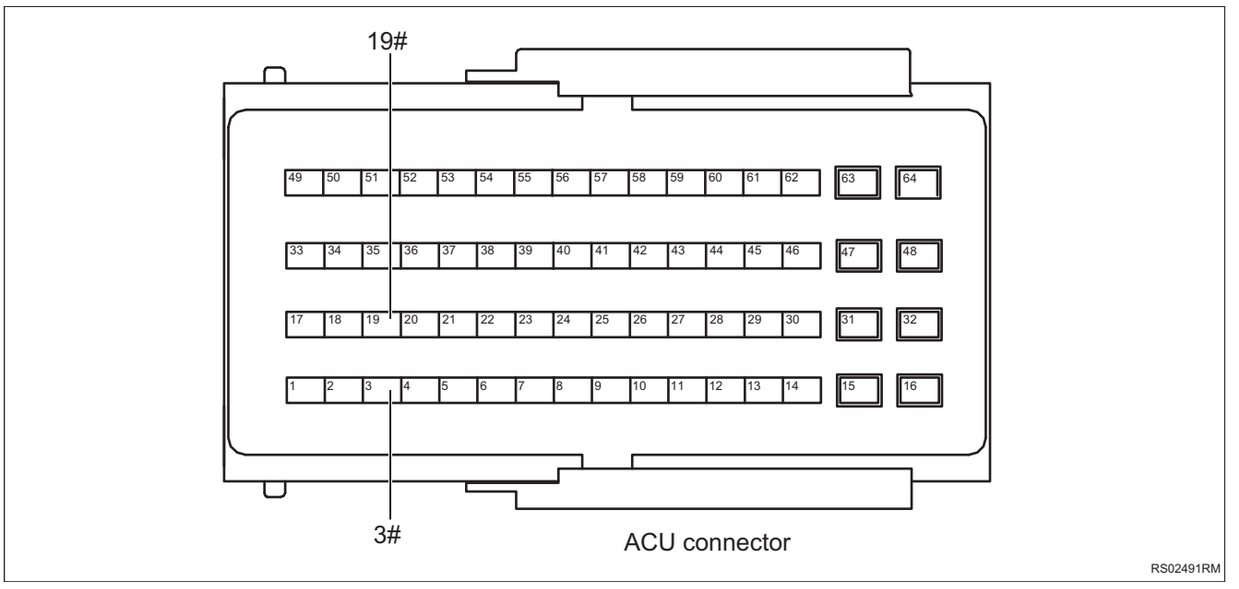
Detector connection	Detection conditions	Specified state
ACU connector 3# - body GND	Always connected	10 KΩ or greater
ACU connector 19# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check driver acceleration side impact sensor harness and connector for circuit shorted to power supply**

RS



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACU connector 3# - body GND	The ignition switch is set to "ON"	Less than 1 V
ACU connector 19# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the driver acceleration side impact sensor (See page RS-229)**

(a) Replace the driver acceleration side impact sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace ACU (See page RS-218)**

OK

6	**End**

RS

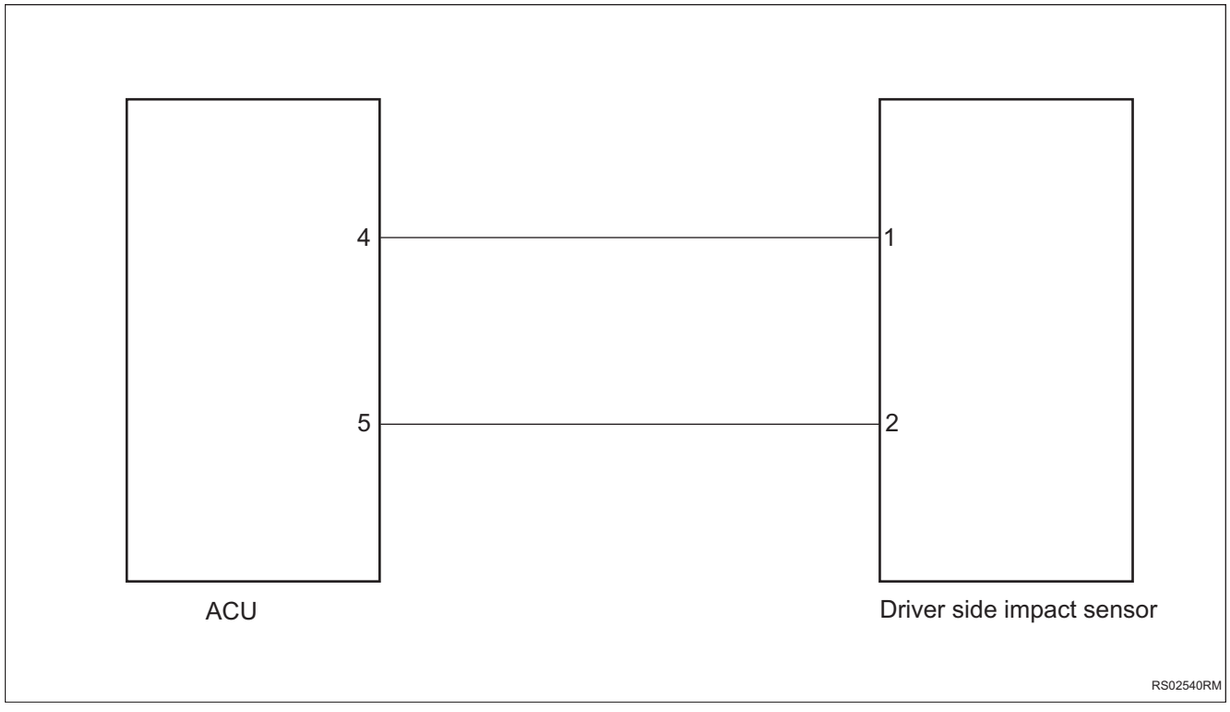
DTC	**B009249**	**Left side pressure sensor-internal fault**
DTC	**B009287**	**Left side pressure impact sensor-communication loss**
DTC	**B009286**	**Left side pressure impact sensor-data transmission failure**
DTC	**B009256**	**Left side pressure sensor-configuration error**

Description

When the driver side impact sensor has its own fault or the circuit is shorted or open, the ACU will record the DTC.

DTC	DTC detection conditions	Faulty location
B009249	(a) Impact sensor failure.	• Driver side impact sensor • ACU • Harness and connector
B009287	(a) Impact sensor communication error.	• Driver side impact sensor • ACU • Harness and connector
B009286	(a) Impact sensor parameter error.	• Driver side impact sensor • ACU • Harness and connector
B009256	(a) Impact sensor configuration error.	• Driver side impact sensor • ACU • Harness and connector

Circuit diagram



Inspection procedure

1	**Check driver side side impact sensor part number**

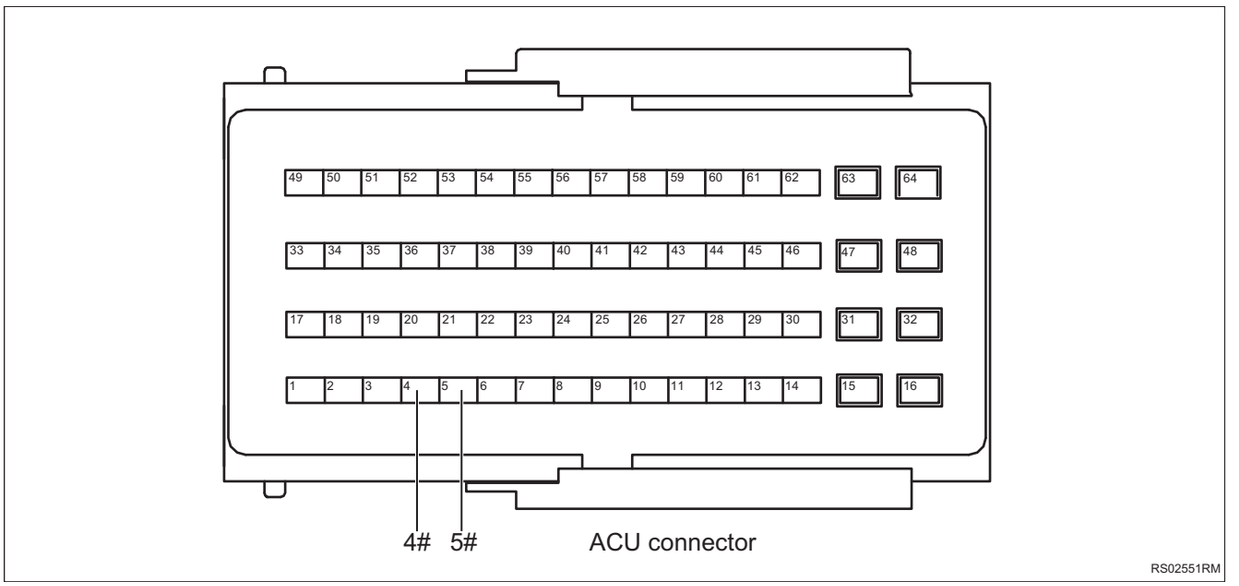
(a) Check if the part number of the driver side side impact sensor is correct.

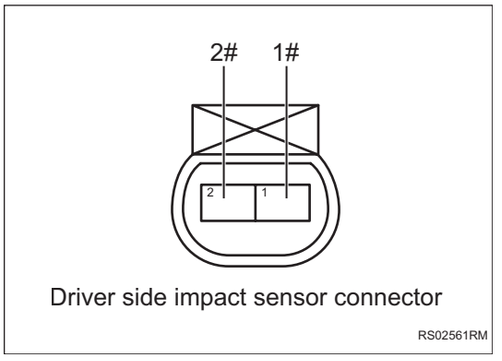
NG → **Replace the impact sensor with one of the correct model**

OK

2	**Check the driver side impact sensor harness and connector for open circuit**

RS





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ACU connector.

(d) Disconnect the driver side impact sensor connector.

(e) Measure the resistance according to the values in the table below.

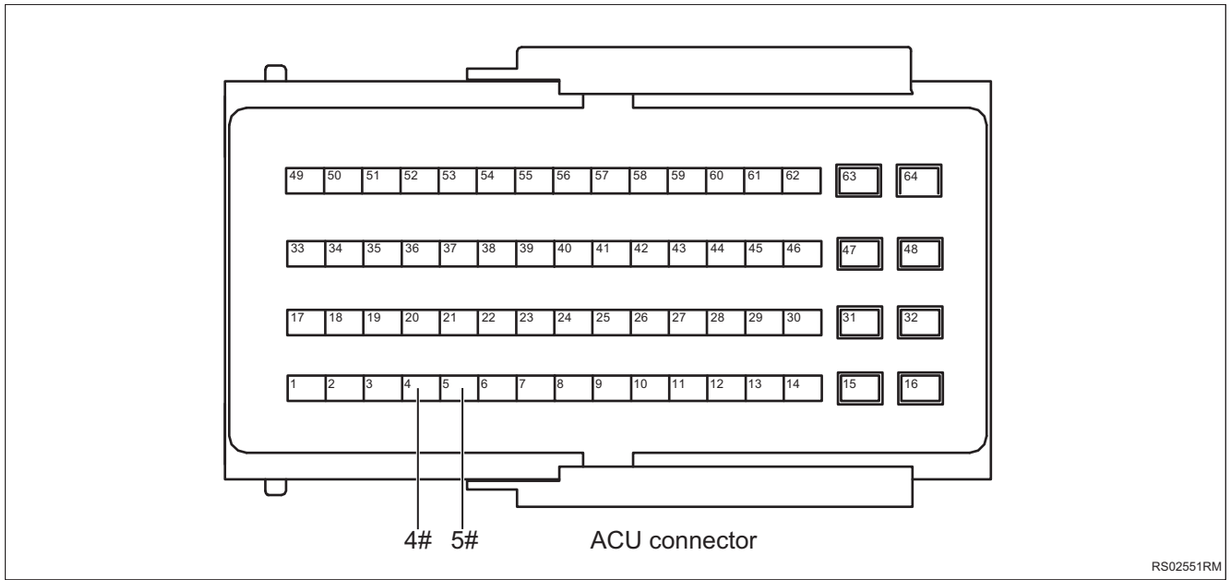
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 4# -driver side impact sensor connector 1#	Always connected	Less than 1Ω
ACU connector 5# -driver side impact sensor connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check driver side impact sensor harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

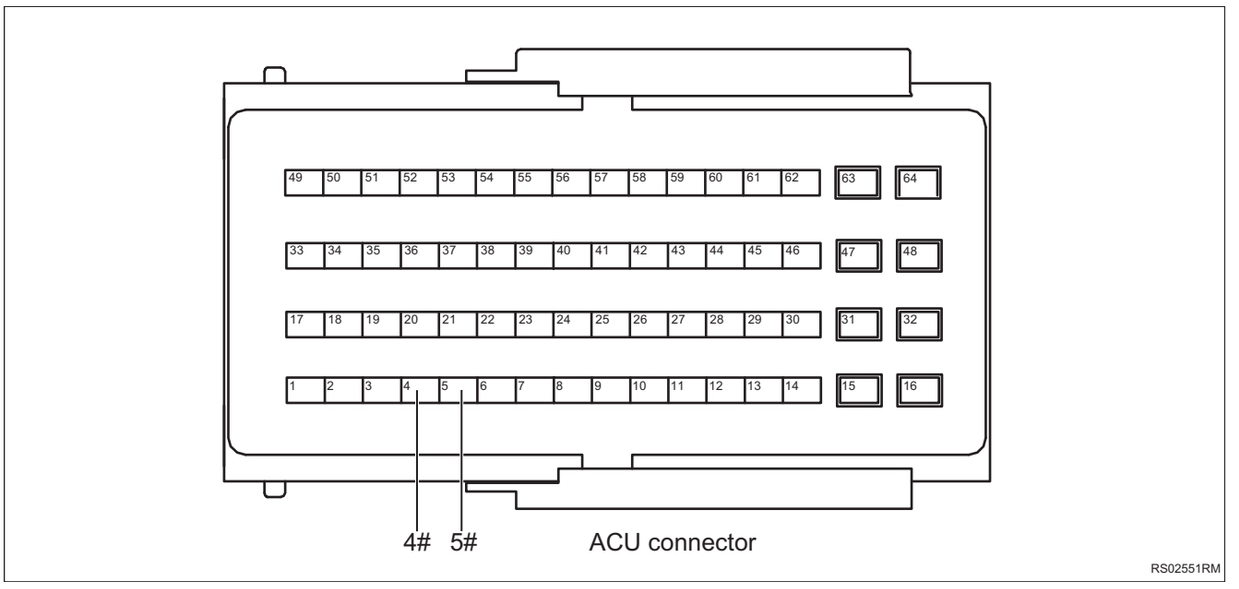
Detector connection	Detection conditions	Specified state
ACU connector 4# - body GND	Always connected	10 KΩ or greater
ACU connector 5# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check driver side impact sensor harness and connector for circuit shorted to power supply**

RS



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACU connector 4# - body GND	The ignition switch is set to "ON"	Less than 1 V
ACU connector 5# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the driver side impact sensor (See page RS-240)**

(a) Replace the driver side impact sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace ACU (See page RS-218)**

OK

6	**End**

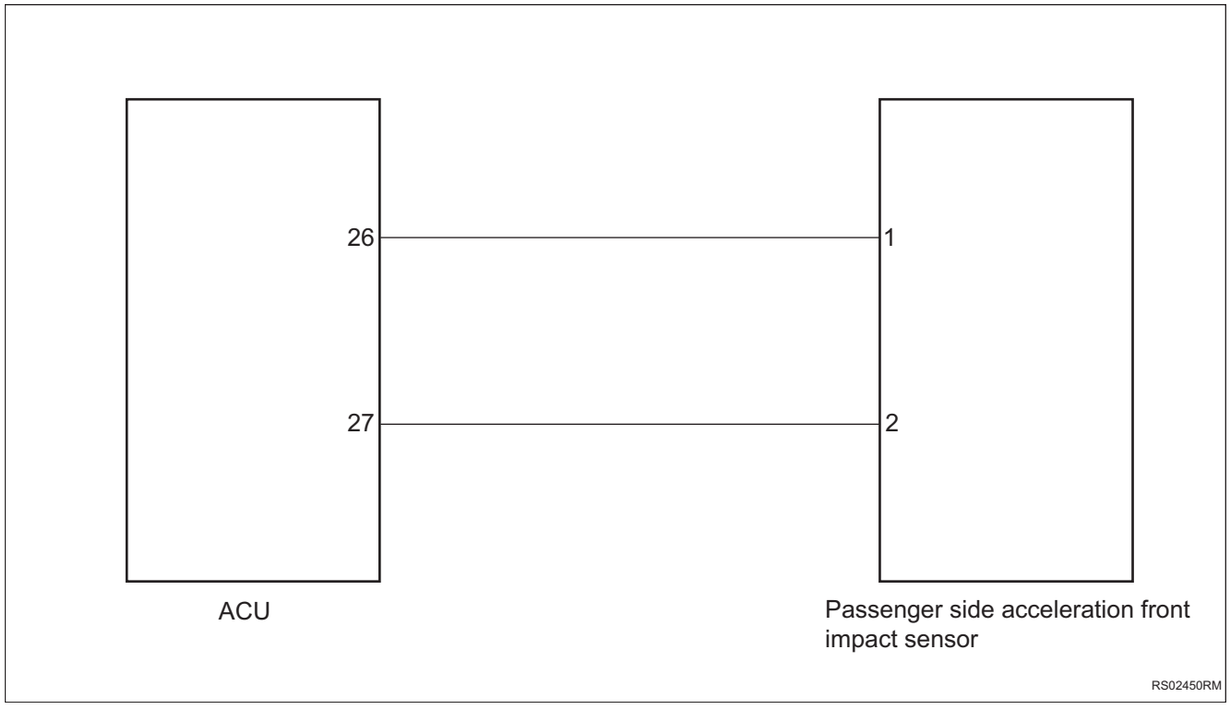
DTC	**B009549**	**Right front impact sensor-internal fault**
DTC	**B009587**	**Right front impact sensor-communication loss**
DTC	**B009586**	**Right front impact sensor-data transmission failure**
DTC	**B009556**	**Right front impact sensor-configuration error**

Description

When the passenger side acceleration front impact sensor has its own fault or the circuit is shorted or open, the ACU will record the DTC.

DTC	DTC detection conditions	Faulty location
B009549	(a) Impact sensor failure.	• Passenger side acceleration front impact sensor • ACU • Harness and connector
B009587	(a) Impact sensor communication error.	• Passenger side acceleration front impact sensor • ACU • Harness and connector
B009586	(a) Impact sensor parameter error.	• Passenger side acceleration front impact sensor • ACU • Harness and connector
B009556	(a) Impact sensor configuration error.	• Passenger side acceleration front impact sensor • ACU • Harness and connector

Circuit diagram



Inspection procedure

1	**Check the part number of passenger side acceleration front impact sensor**

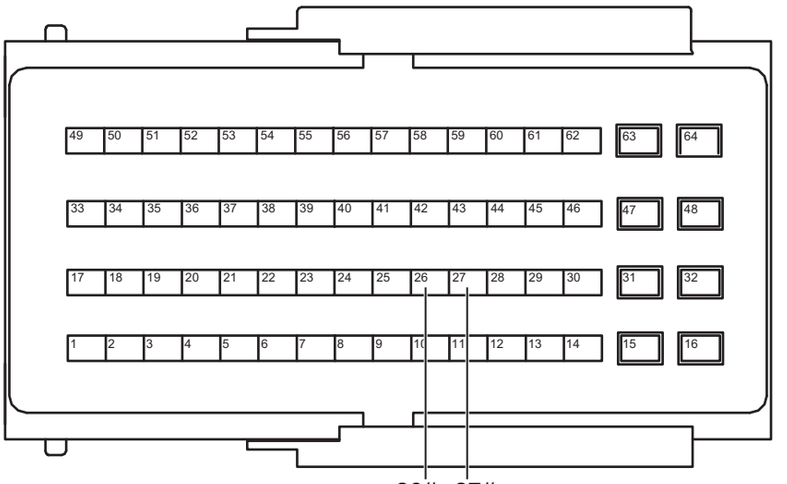
(a) Check whether the part number of passenger side acceleration front impact sensor is correct.

NG → **Replace the impact sensor with one of the correct model**

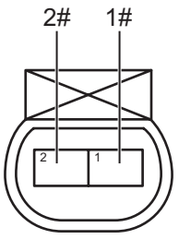
OK

2	**Check the passenger side acceleration front impact sensor harness and connector for open circuit**

RS



RS02461RM



Passenger side acceleration front impact sensor connector

RS02471RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ACU connector.

(d) Disconnect the connector of passenger side acceleration front impact sensor.

(e) Measure the resistance according to the values in the table below.

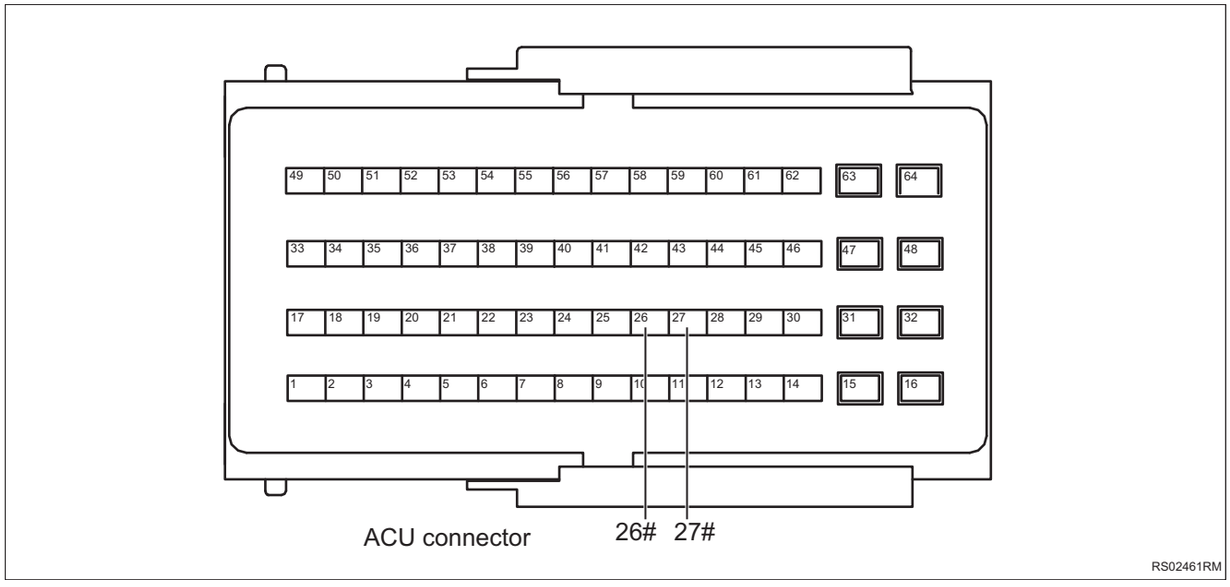
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 26# -passenger acceleration front impact sensor connector 1#	Always connected	Less than 1Ω
ACU connector 27# -passenger acceleration front impact sensor connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check the passenger side acceleration front impact sensor harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

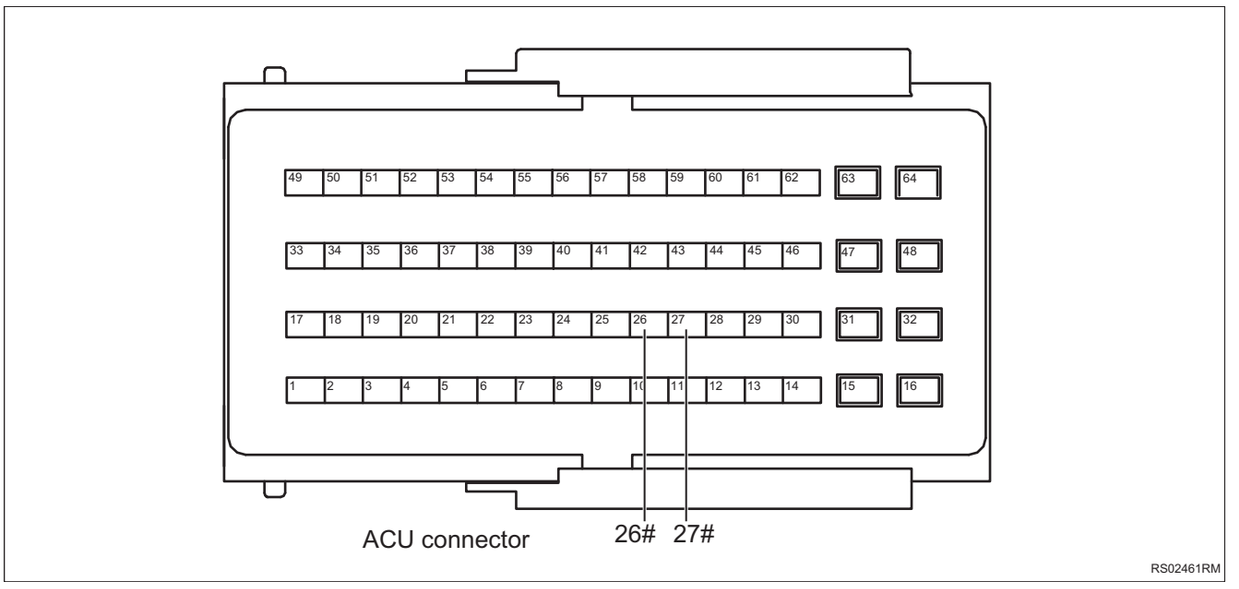
Detector connection	Detection conditions	Specified state
ACU connector 26# - body GND	Always connected	10 KΩ or greater
ACU connector 27# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check passenger side acceleration front impact sensor harness and connector for circuit shorted to power supply**

RS



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACU connector 26# - body GND	The ignition switch is set to "ON"	Less than 1 V
ACU connector 27# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG	**Repair or replace the harness and connector**

OK

5	**Replace the passenger side acceleration front impact sensor (See page RS-229)**

(a) Replace the passenger side acceleration front impact sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG	**Replace ACU (See page RS-218)**

OK

6	**End**

RS

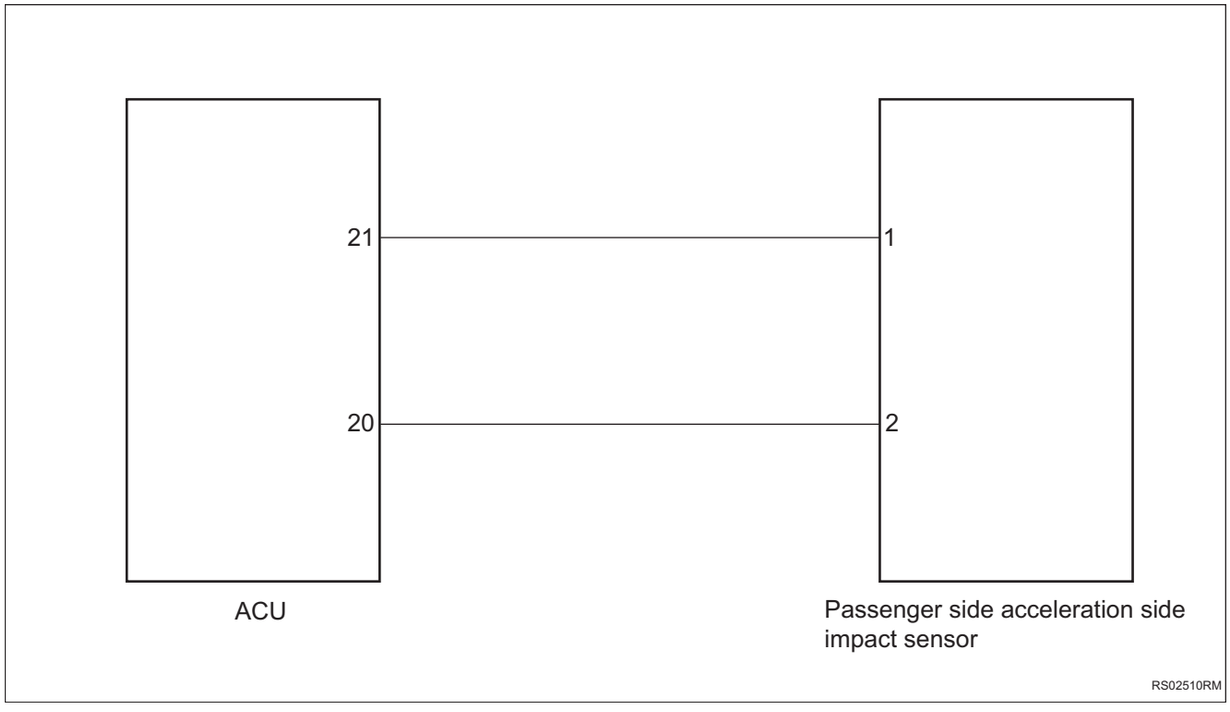
DTC	**B009649**	**Right side impact sensor-internal fault**
DTC	**B009687**	**Right side impact sensor-communication loss**
DTC	**B009686**	**Right side impact sensor-data transmission failure**
DTC	**B009656**	**Right side impact sensor-configuration error**

Description

When the passenger side acceleration side impact sensor has its own fault or the circuit is shorted or open, the ACU will record the DTC.

DTC	DTC detection conditions	Faulty location
B009649	(a) Impact sensor failure.	• Passenger side acceleration side impact sensor • ACU • Harness and connector
B009687	(a) Impact sensor communication error.	• Passenger side acceleration side impact sensor • ACU • Harness and connector
B009686	(a) Impact sensor parameter error.	• Passenger side acceleration side impact sensor • ACU • Harness and connector
B009656	(a) Impact sensor configuration error.	• Passenger side acceleration side impact sensor • ACU • Harness and connector

Circuit diagram



Inspection procedure

1	**Check the part number of passenger side acceleration side impact sensor**

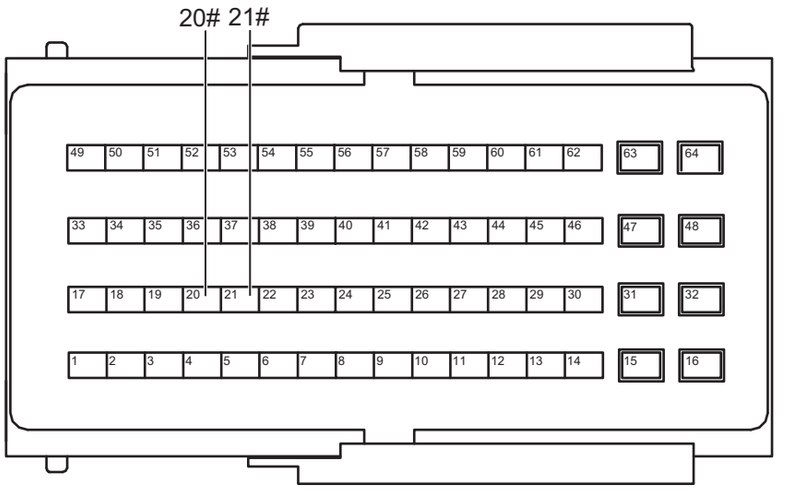
(a) Check if the part number of the passenger acceleration side impact sensor is correct.

NG → **Replace the impact sensor with one of the correct model**

OK

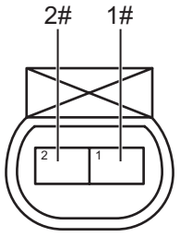
2	**Check the passenger side acceleration side impact sensor harness and connector for open circuit**

RS



ACU connector

RS02521RM



Passenger side acceleration side impact sensor connector

RS02531RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ACU connector.

(d) Disconnect the connector of passenger side acceleration side impact sensor.

(e) Measure the resistance according to the values in the table below.

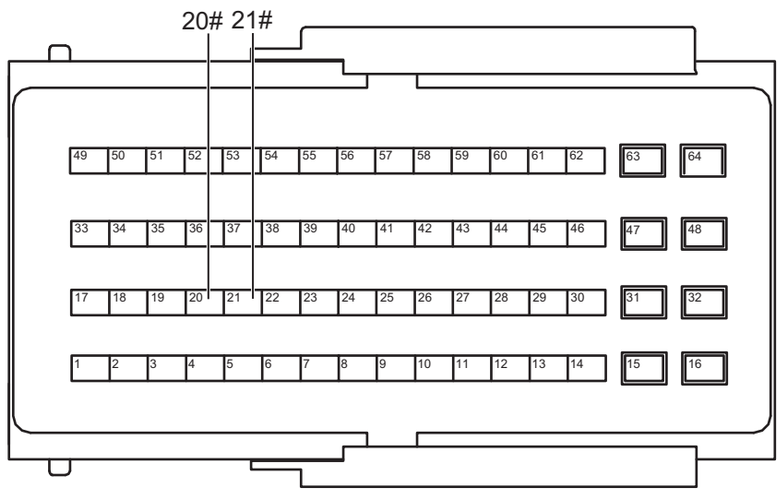
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 21# -passenger acceleration side impact sensor connector 1#	Always connected	Less than 1Ω
ACU connector 20# -passenger acceleration side impact sensor connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check the passenger side acceleration side impact sensor harness and connector for circuit shorted to ground**



ACU connector

RS02521RM

(a) Measure the resistance according to the values in the table below.

Standard value

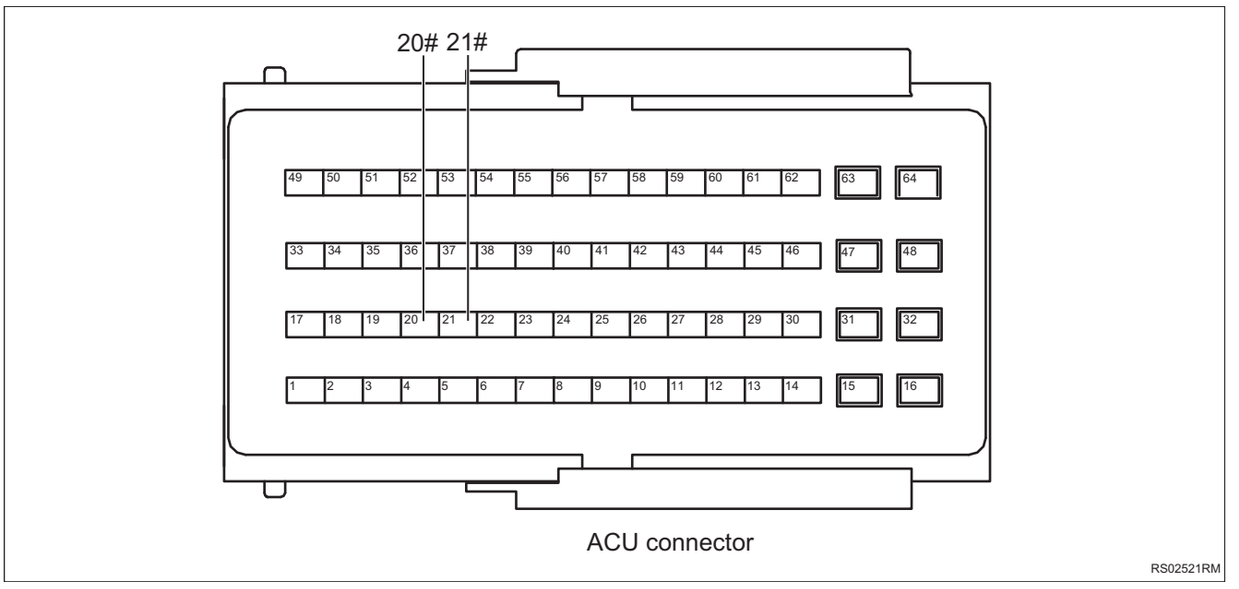
Detector connection	Detection conditions	Specified state
ACU connector 20# -body GND	Always connected	10 KΩ or greater
ACU connector 21# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check passenger side acceleration side impact sensor harness and connector for circuit shorted to power supply**

RS



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACU connector 20# -body GND	The ignition switch is set to "ON"	Less than 1 V
ACU connector 21# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the passenger side acceleration side impact sensor (See page RS-229)**

(a) Replace the passenger side acceleration side impact sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace ACU (See page RS-218)**

OK

6	**End**

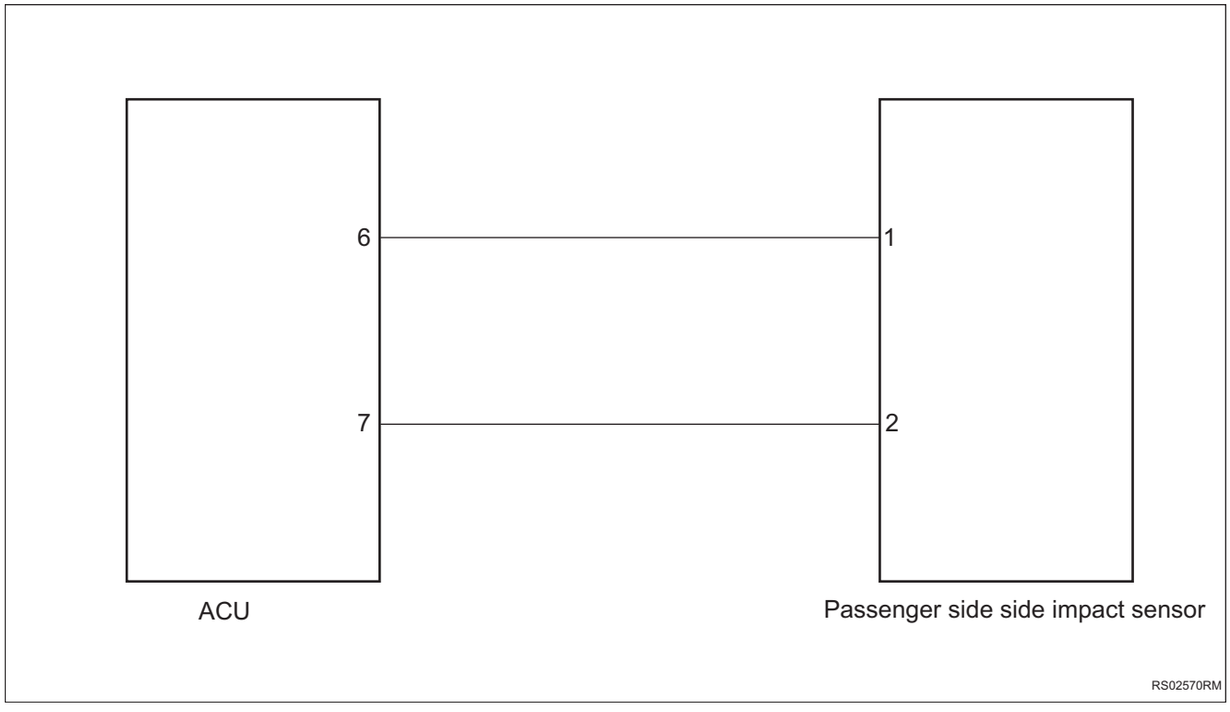
DTC	**B009749**	**Right side pressure sensor-internal fault**
DTC	**B009787**	**Right side pressure sensor-communication loss**
DTC	**B009786**	**Right side pressure sensor-data transmission failure**
DTC	**B009756**	**Right side pressure sensor-configuration error**

Description

When the passenger side side impact sensor has its own fault or the circuit is shorted or open, the ACU will record the DTC.

DTC	DTC detection conditions	Faulty location
B009749	(a) Impact sensor failure.	• Passenger side side impact sensor • ACU • Harness and connector
B009787	(a) Impact sensor communication error.	• Passenger side side impact sensor • ACU • Harness and connector
B009786	(a) Impact sensor parameter error.	• Passenger side side impact sensor • ACU • Harness and connector
B009756	(a) Impact sensor configuration error.	• Passenger side side impact sensor • ACU • Harness and connector

Circuit diagram



Inspection procedure

1	**Check the part number of passenger side side impact sensor**

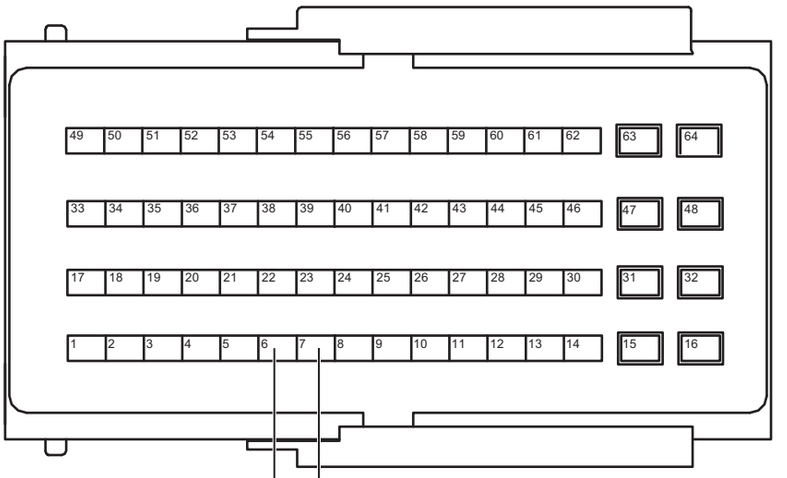
(a) Check if the part number of the passenger side side impact sensor is correct.

NG → **Replace the impact sensor with one of the correct model**

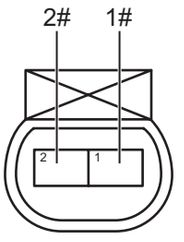
OK

2	**Check the passenger side impact sensor harness and connector for open circuit**

RS



RS02581RM



Passenger side side impact sensor connector

RS02591RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ACU connector.

(d) Disconnect the passenger side side impact sensor connector.

(e) Measure the resistance according to the values in the table below.

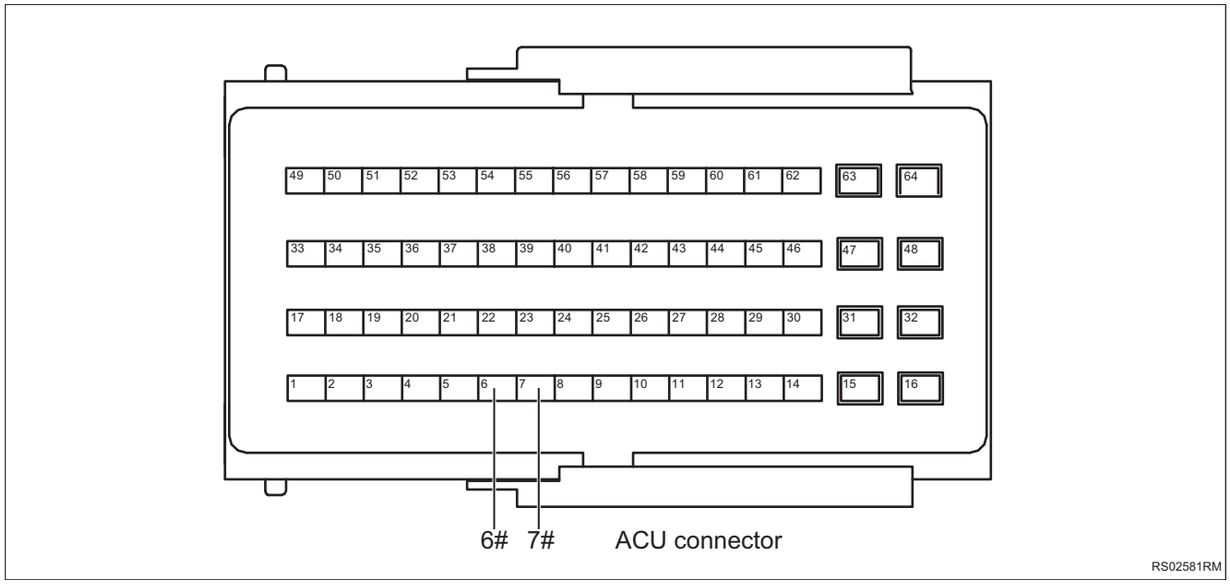
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 6# -passenger side impact sensor connector 1#	Always connected	Less than 1Ω
ACU connector 7# -passenger side impact sensor connector 2#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	**Check passenger side side impact sensor harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

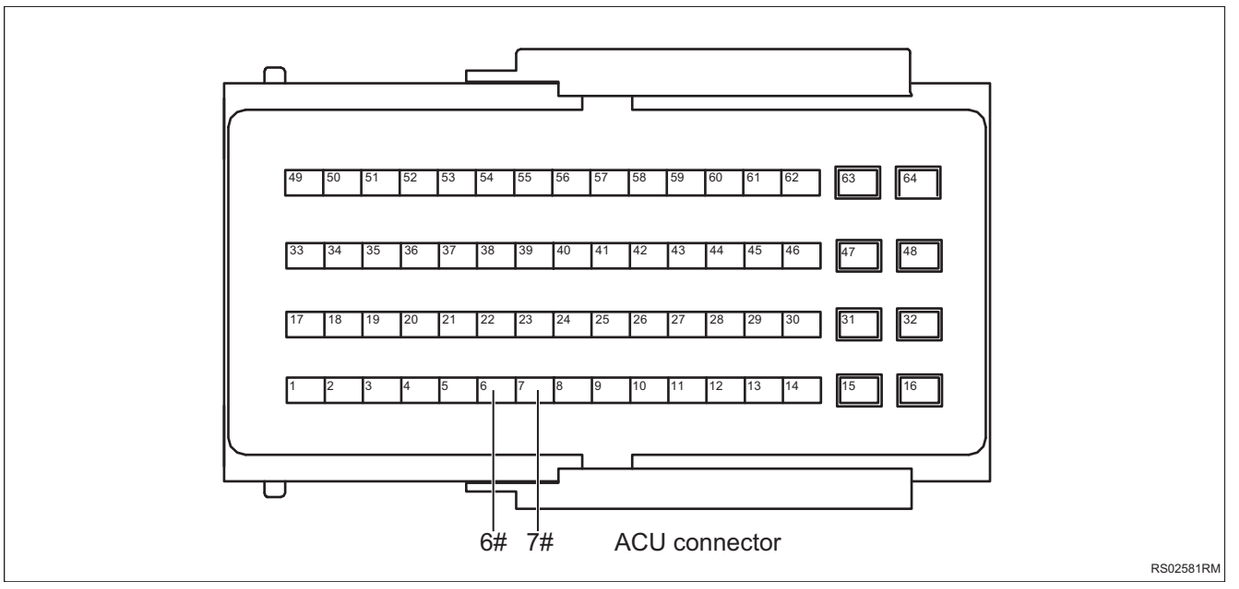
Detector connection	Detection conditions	Specified state
ACU connector 6# -body GND	Always connected	10 KΩ or greater
ACU connector 7# -body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

4	**Check passenger side side impact sensor harness and connector for circuit shorted to power supply**

RS



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACU connector 6# -body GND	The ignition switch is set to "ON"	Less than 1 V
ACU connector 7# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the passenger side side impact sensor (See page RS-240)**

(a) Replace the passenger side side impact sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace ACU (See page RS-218)**

OK

6	**End**

RS

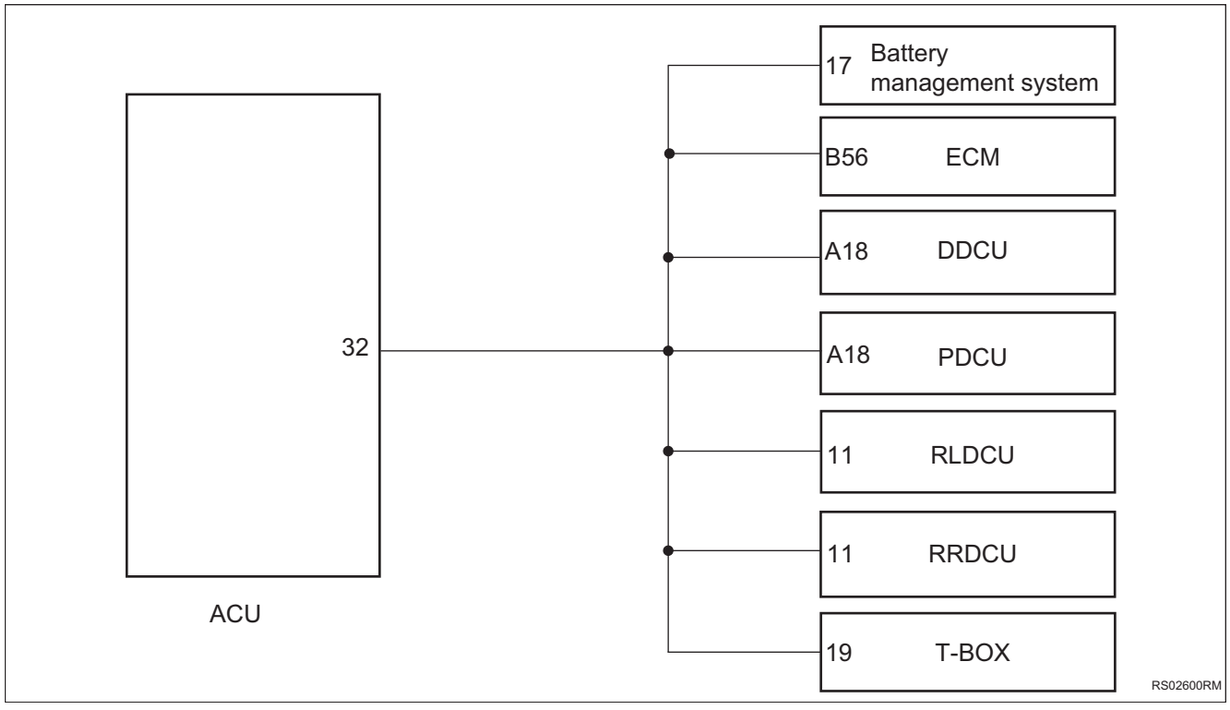
DTC	**B1A0614**	**Hardwire crash output - circuit shorted to ground or open circuit**
DTC	**B1A0612**	**Hardwire collision output - shorted to battery**

Description

When the impact output signal is abnormal, the ACU records DTC.

DTC	DTC detection conditions	Faulty location
B1A0614	(a) Collision output harness circuit shorted to ground or open.	• ACU • Harness and connector • ECM • DDCU • PDCU • RLDCU • RRDCU • BMU • T-BOX
B1A0612	(a) Collision output harness circuit shorted to power supply.	• ACU • Harness and connector • ECM • DDCU • PDCU • RLDCU • RRDCU • BMU • T-BOX

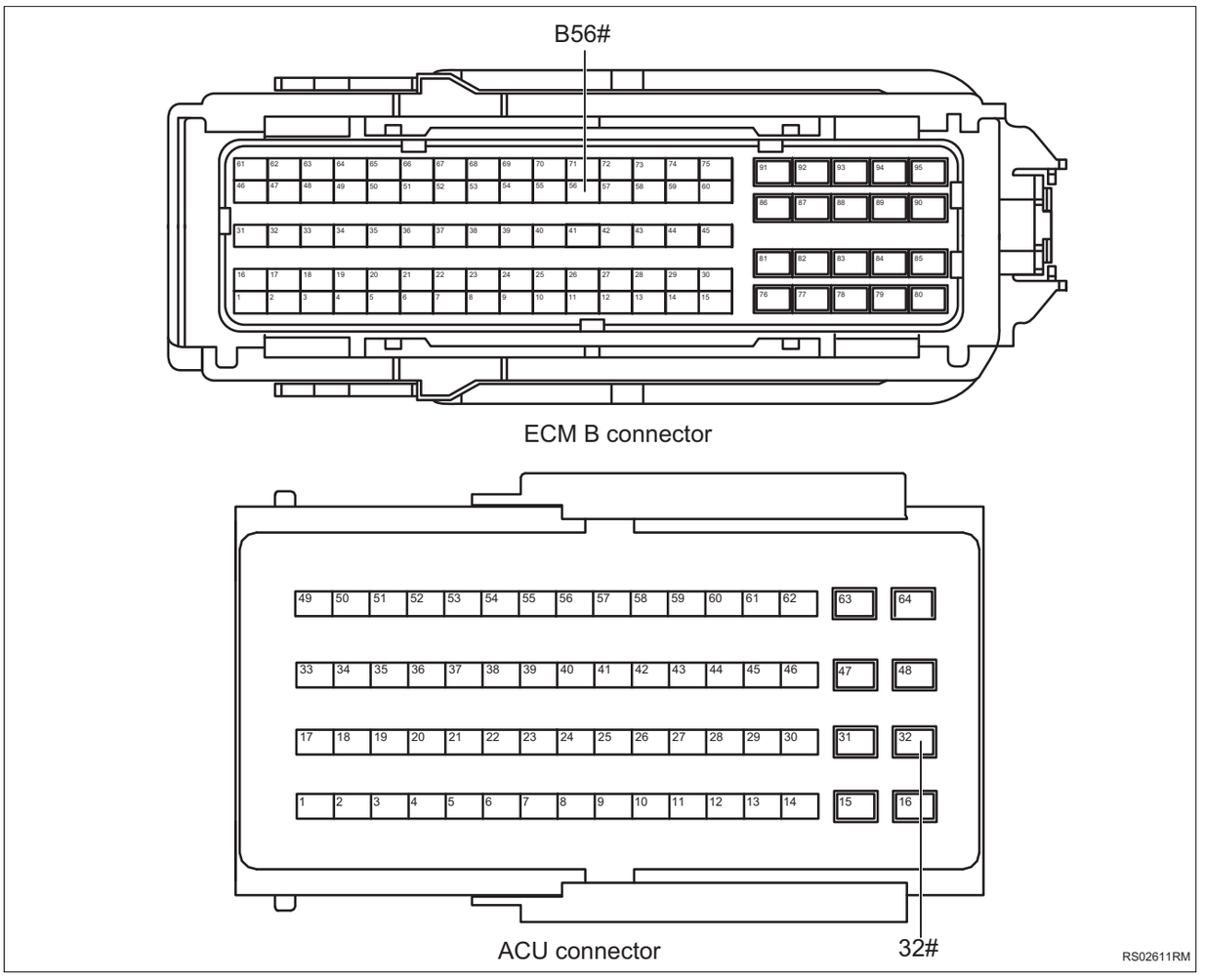
Circuit diagram



Inspection procedure

1	**Check harness and connector for open circuit (ACU-ECM)**

RS



(a) Set the ignition switch to "OFF"

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the ACU connector.

(e) Measure the resistance according to the values in the table below.

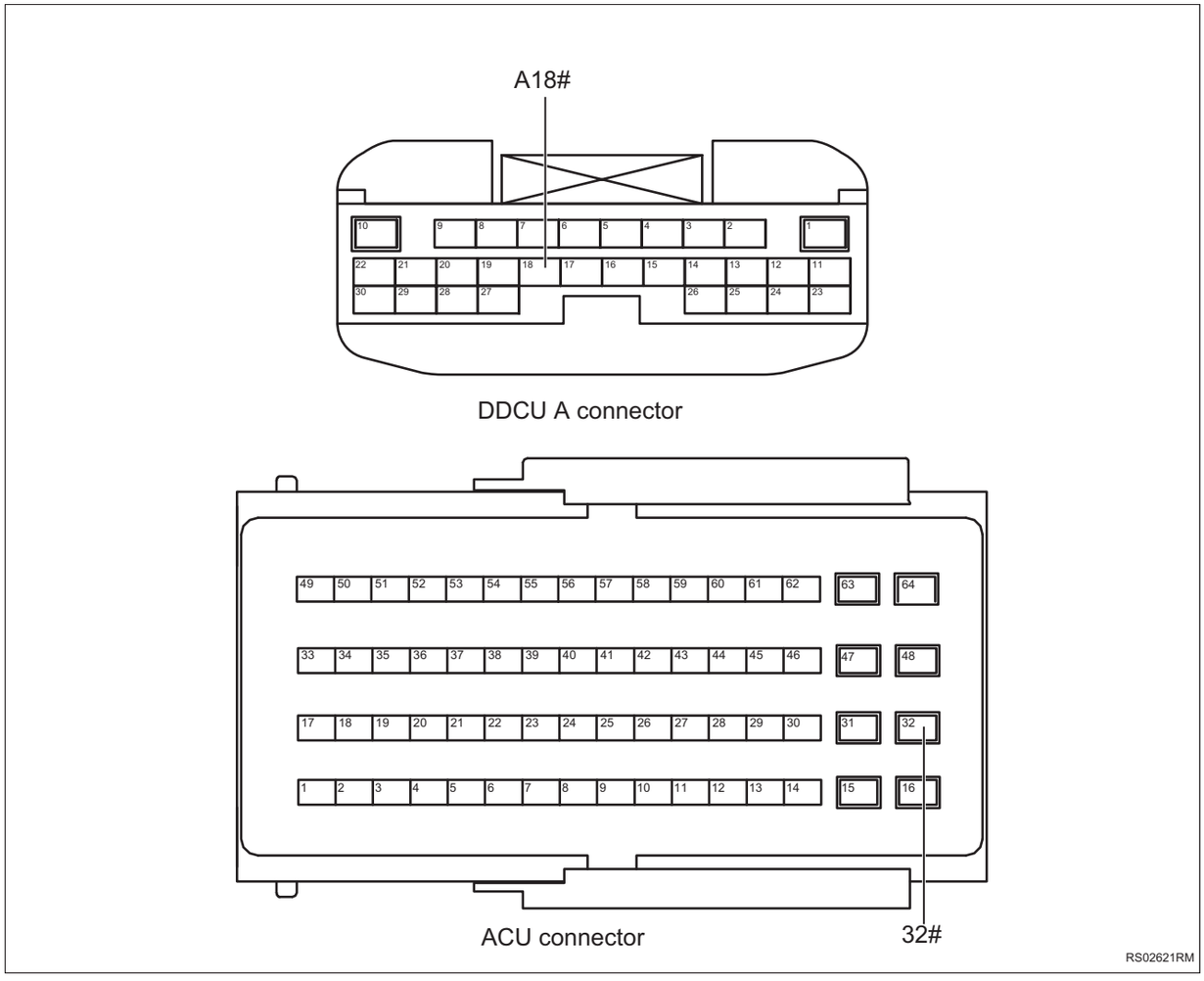
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 32# - ECM connector B56#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check harness and connector for open circuit (ACU-DDCU)**



(a) Disconnect the DDCU connector.

(b) Measure the resistance according to the values in the table below.

Standard value

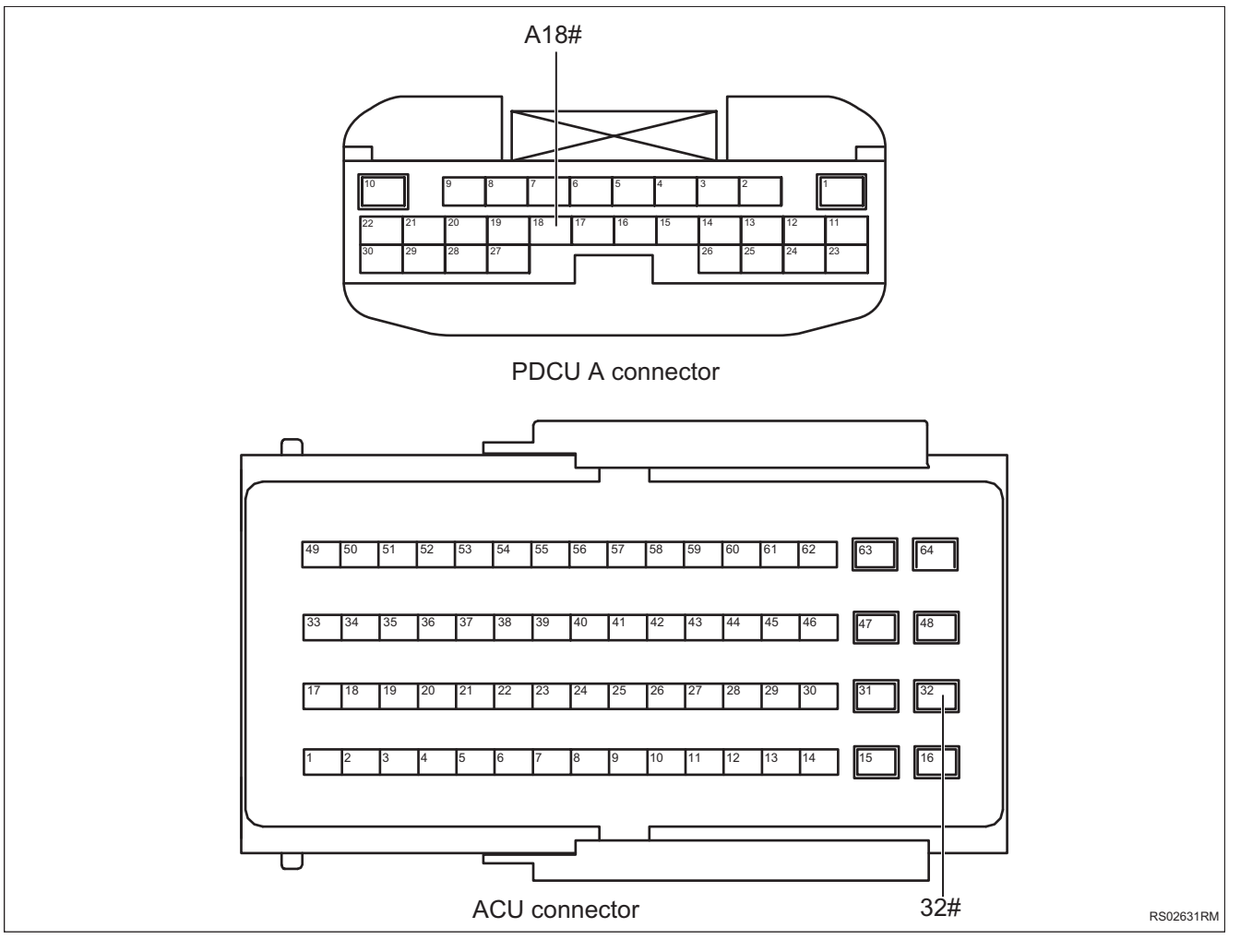
Detector connection	Detection conditions	Specified state
ACU connector 32#- DDCU connector A18#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check harness and connector for open circuit (ACU-PDCU)**

RS



(a) Disconnect the PDCU connector.

(b) Measure the resistance according to the values in the table below.

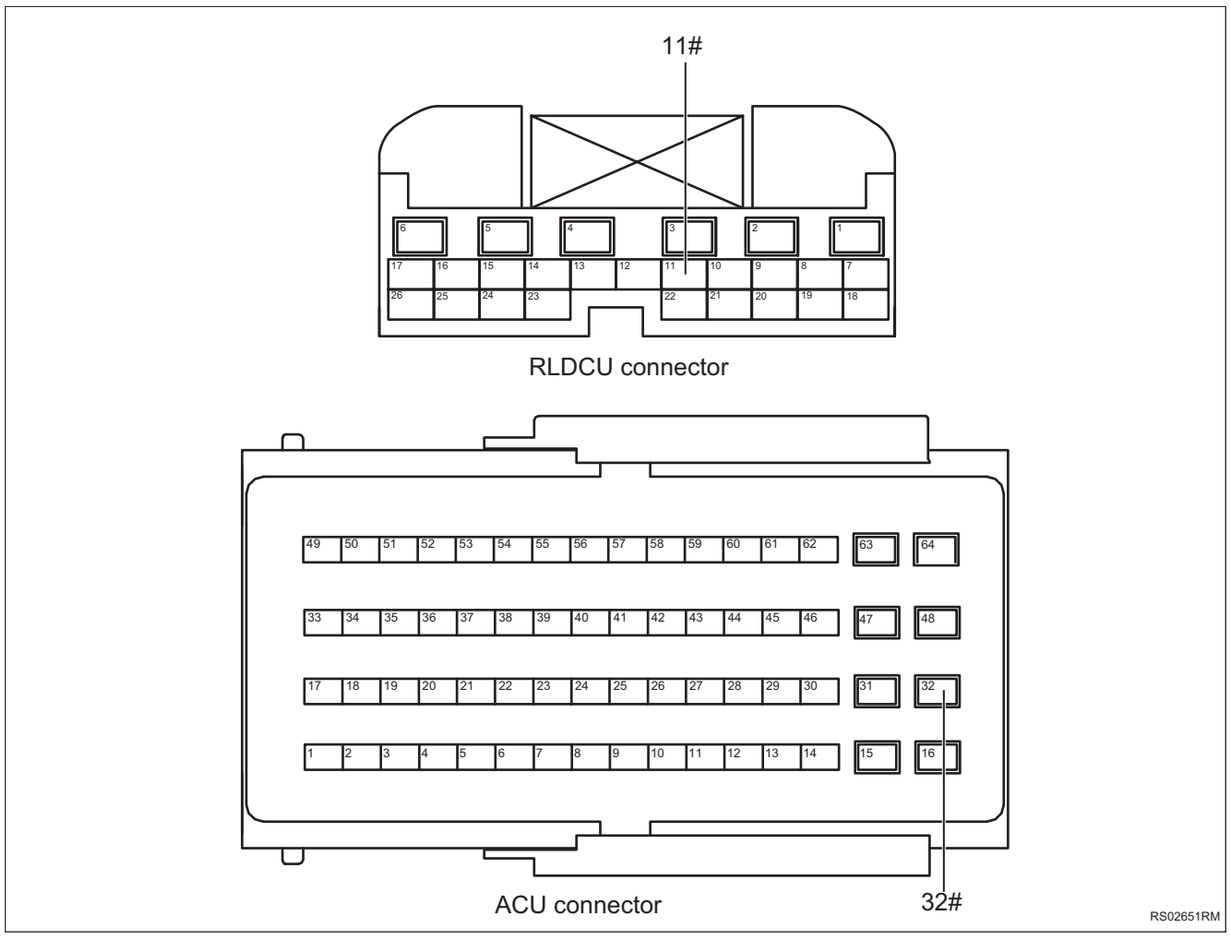
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 32#- PDCU connector A18#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check harness and connector for open circuit (ACU-RLDCU)**



(a) Disconnect the RLDCU connector.

(b) Measure the resistance according to the values in the table below.

Standard value

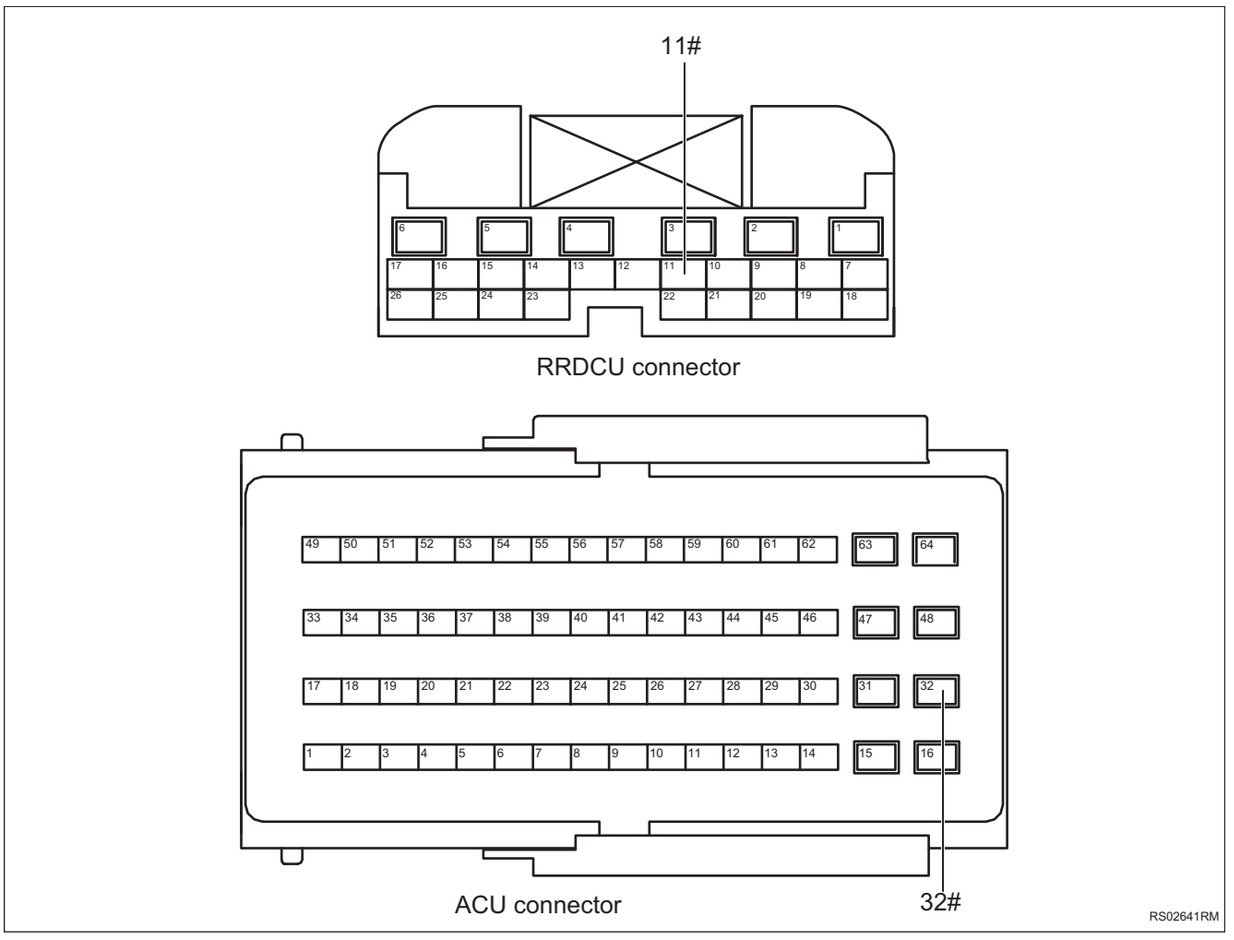
Detector connection	Detection conditions	Specified state
ACU connector 32#-rear left door control unit connector 11#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

5	**Check harness and connector for open circuit (ACU-RRDCU)**

RS



(a) Disconnect the RRDCU connector.

(b) Measure the resistance according to the values in the table below.

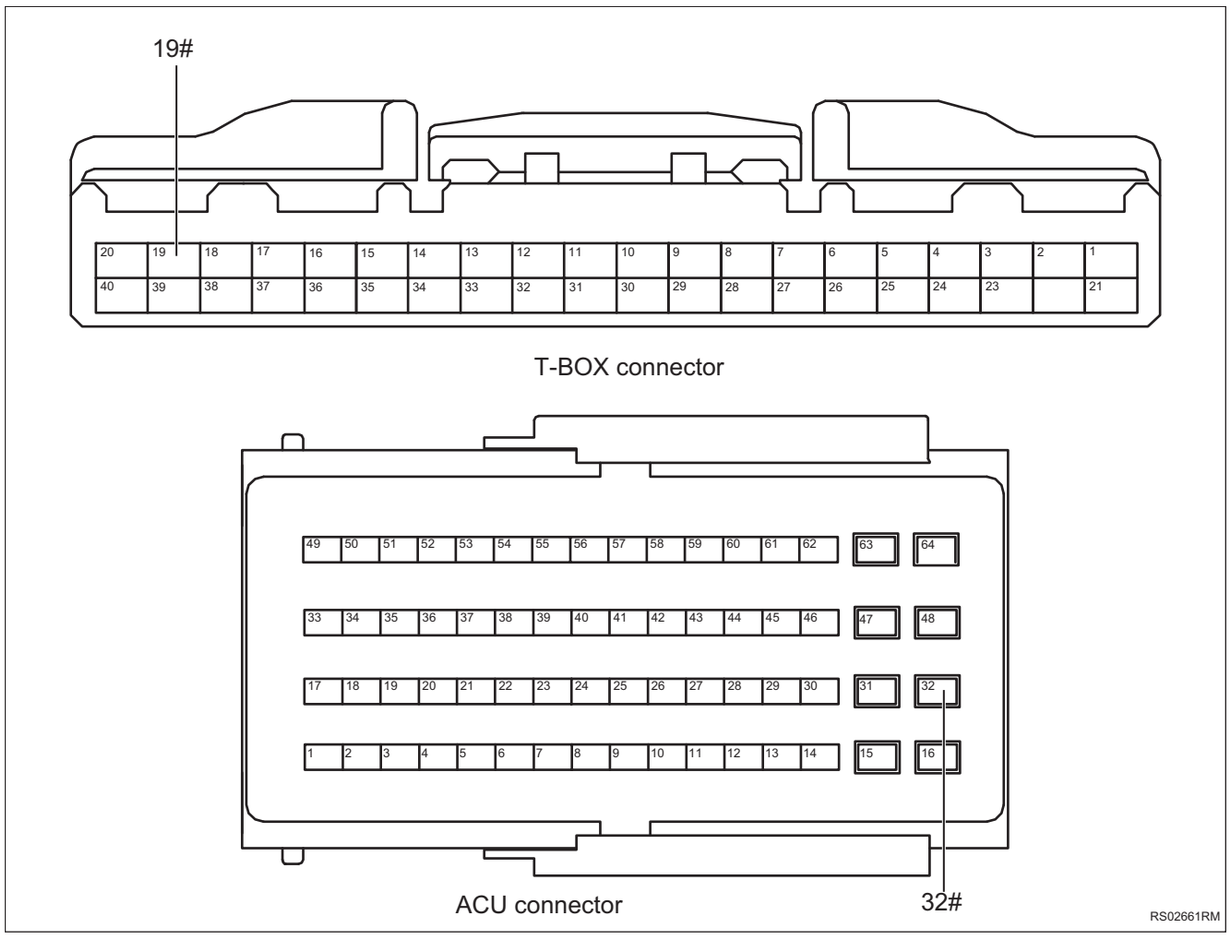
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 32#-RRDCU connector 11#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

6	**Check harness and connector for open circuit (ACU-T-BOX)**



(a) Disconnect the T-BOX connector.

(b) Measure the resistance according to the values in the table below.

Standard value

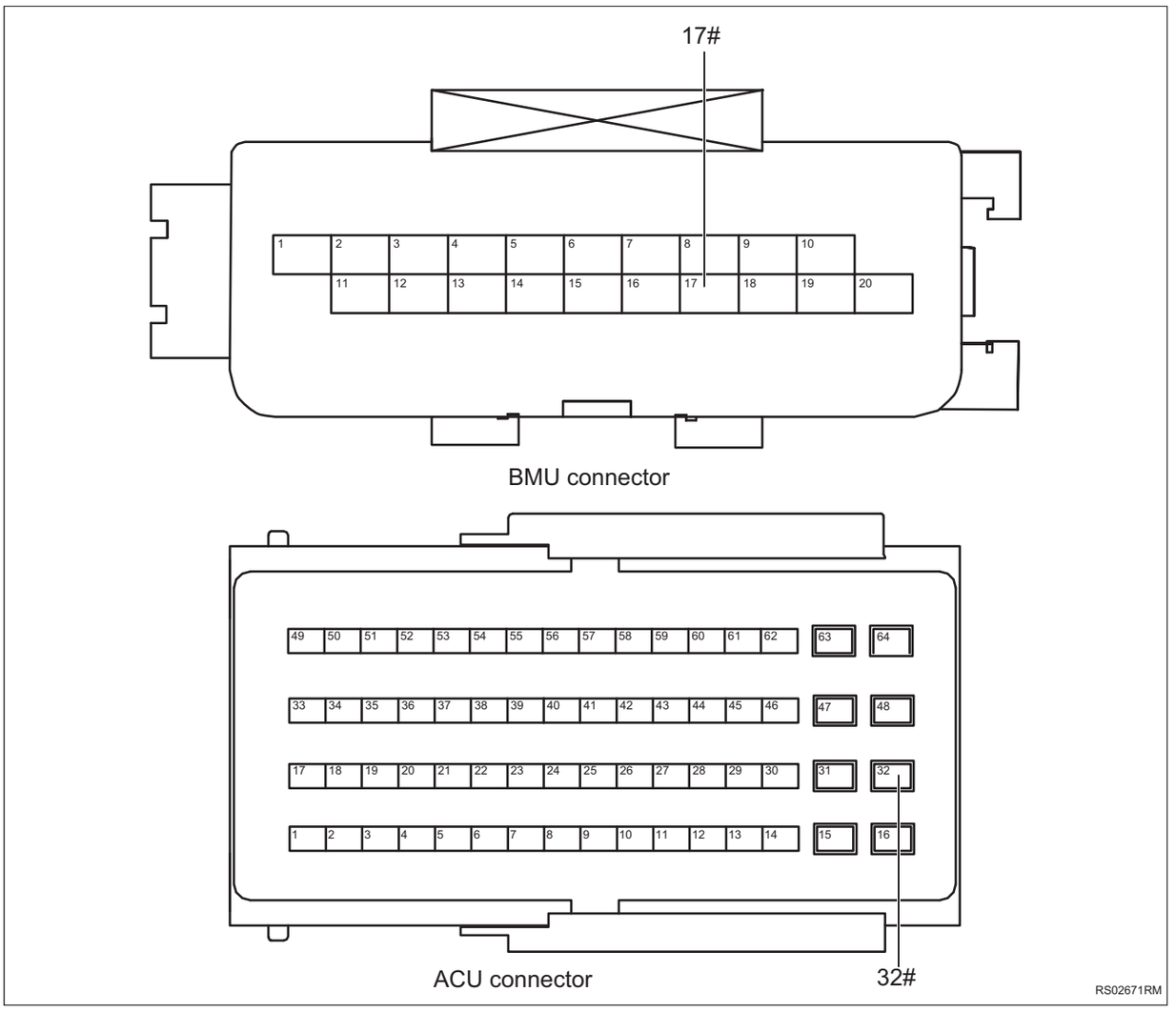
Detector connection	Detection conditions	Specified state
ACU connector 32#-T-BOX connector 19#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

7	**Check harness and connector for open circuit (ACU - BMU)**

RS



(a) Disconnect the BMU connector.

(b) Measure the resistance according to the values in the table below.

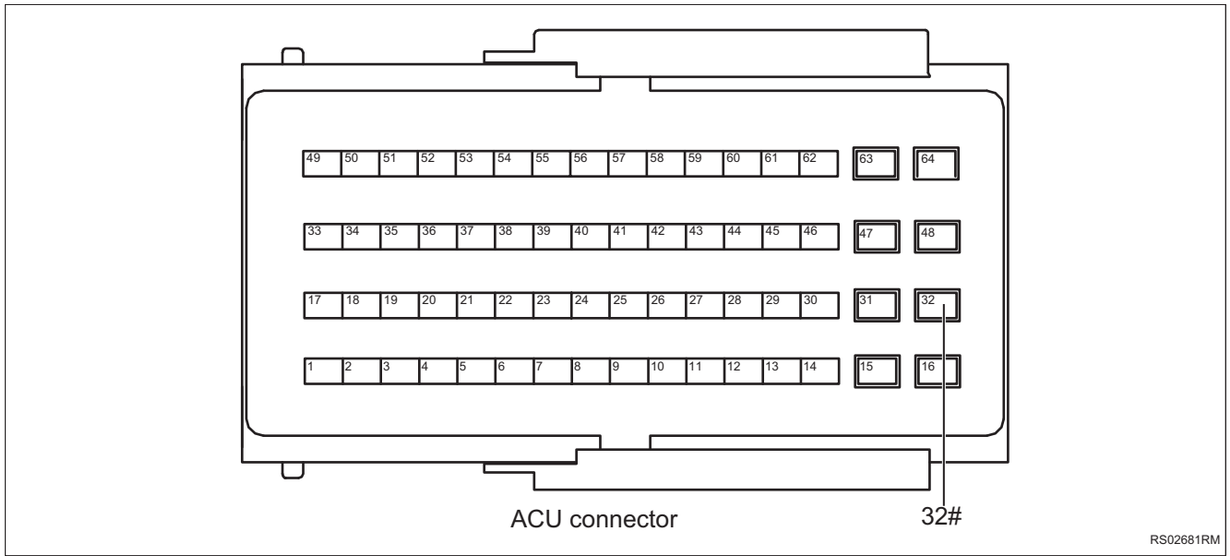
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 32#-BMU connector 17#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

8	**Check ACU harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

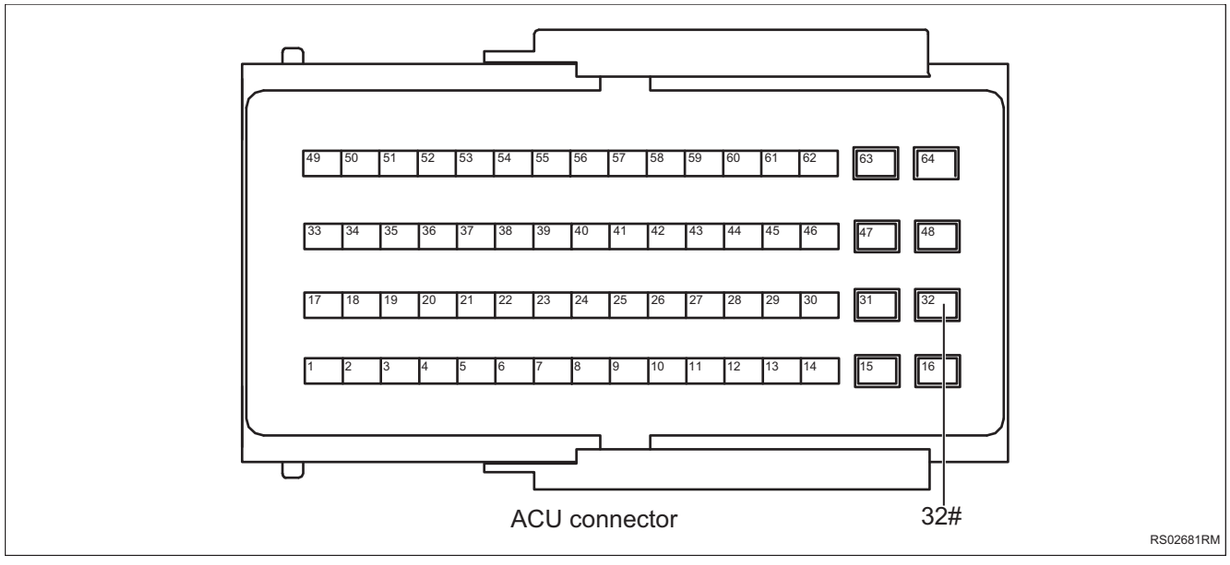
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 32#-body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

9	Check ACU harness and connector for circuit shorted to power supply



(a) Connect the battery negative terminal.

RS

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACU connector 32#-body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

10	**Replace ACU (See page RS-218)**

(a) Replace the ACU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace ECM or DCU or T-BOX or BMU**

OK

11	**End**

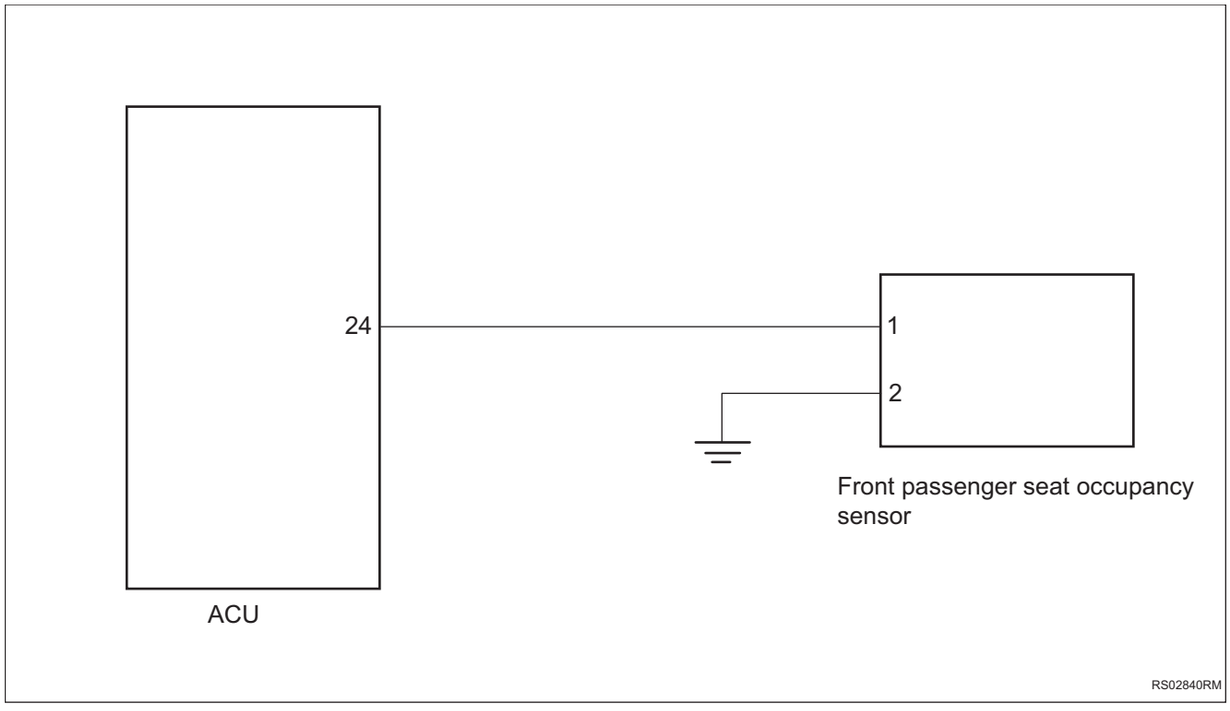
DTC	B1A0712	Front passenger occupancy sensor circuit shorted to power supply

Description

When the front passenger seat occupancy sensor has its own fault or the circuit is shorted, the ACU will record the DTC.

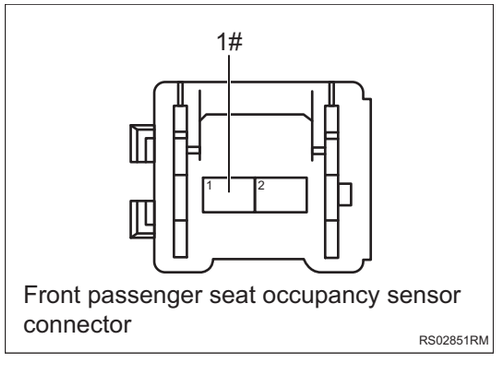
DTC	DTC detection conditions	Faulty location
B1A0712	(a) Front passenger occupant detection sensor circuit shorted to power supply.	• Front passenger seat occupancy sensor • ACU • Harness and connector

Circuit diagram



Inspection procedure

1	Check front passenger seat occupancy sensor harness and connector for circuit shorted to power supply



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ACU connector.

(d) Disconnect the front passenger seat occupancy sensor connector.

(e) Connect battery negative terminal.

(f) Set the ignition switch to "ON".

(g) Measure the resistance according to the values in the table below.

RS

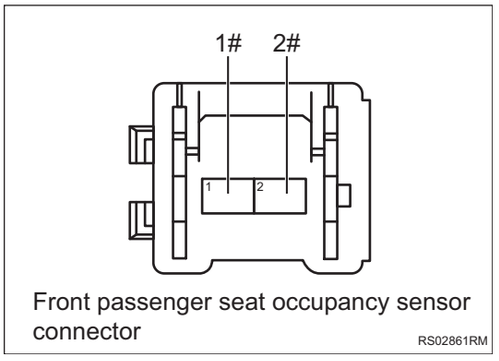
Standard value

Detector connection	Detection conditions	Specified state
Front passenger seat occupancy sensor connector 1# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

2	**Check the front passenger seat occupancy sensor harness and connector for circuit shorted to each other**



Front passenger seat occupancy sensor connector

RS02861RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Front passenger seat occupancy sensor connector 1# -front passenger seat occupancy sensor connector 2#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Replace the front passenger seat occupancy sensor**

(a) Replace the front passenger seat occupancy sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace ACU (See page RS-218)**

DTC	**B1A0B00**	**Deployment data record full: no writable space**
DTC	**B1A0C00**	**Existence of front deployment data record**
DTC	**B1A0D00**	**Existence of side deployment data record**
DTC	**B1A0E00**	**Existence of side deployment data record**
DTC	**B1A0F00**	**Existence of rear deployment data record**
DTC	**B1A1000**	**Existence of pedestrian protection deployment data record**
DTC	**B1A1149**	**SDM internal IMU fault**
DTC	**B1A1100**	**SDM internal IMU EOL fault**
DTC	**B1A1249**	**SDM internal power failure**
DTC	**B1A1209**	**SDM internal fault -acceleration sensor**
DTC	**B1A1296**	**SDM internal fault - ignition circuit**
DTC	**B1A1200**	**SDM internal fault-control function module**

Description

When there is a fault inside the ACU, the ACU records DTC.

DTC	DTC detection conditions	Faulty location
B1A0B00	(a) Control unit fault.	• ACU
B1A0C00	(a) Control unit fault.	• ACU
B1A0D00	(a) Control unit fault.	• ACU
B1A0E00	(a) Control unit fault.	• ACU
B1A0F00	(a) Control unit fault.	• ACU
B1A1000	(a) Control unit fault.	• ACU
B1A1149	(a) Control unit fault.	• ACU
B1A1100	(a) Control unit fault.	• ACU
B1A1249	(a) Control unit fault.	• ACU
B1A1209	(a) Control unit fault.	• ACU
B1A1296	(a) Control unit fault.	• ACU
B1A1200	(a) Control unit fault.	• ACU

Inspection procedure

1	**Clear DTC**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

RS

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace ACU (See page RS-218)**

OK

2	**End**

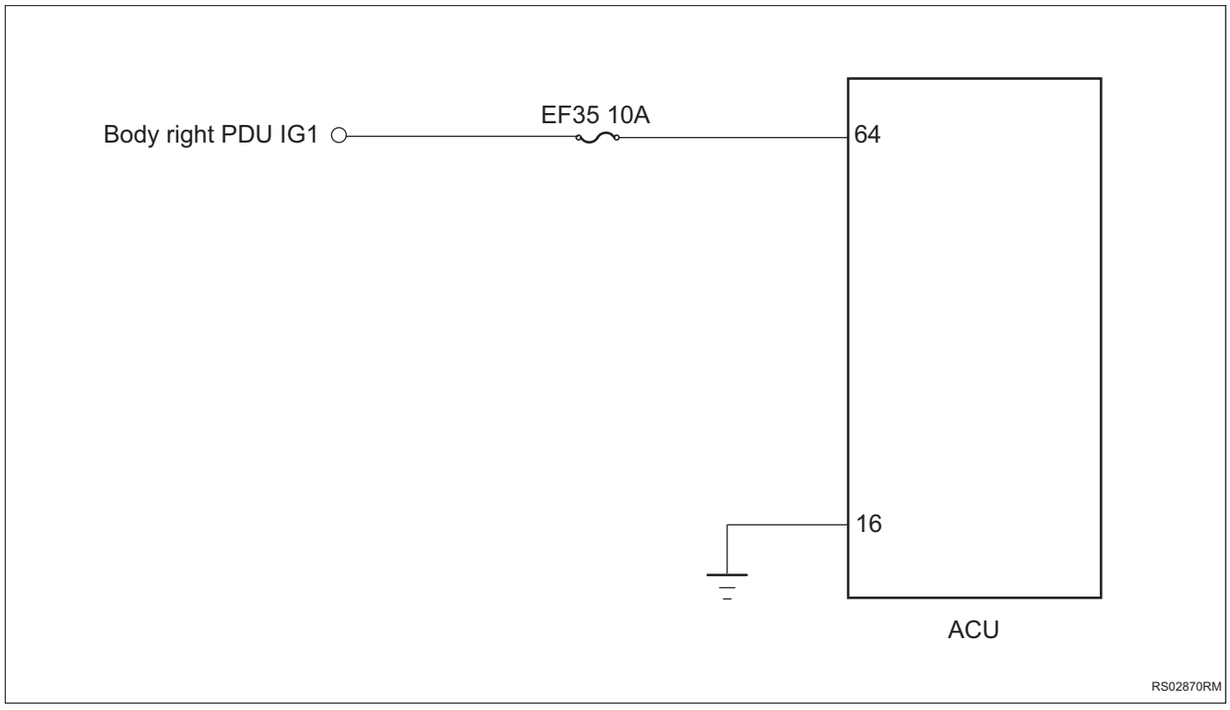
DTC	B1A1417	Battery voltage high
DTC	B1A1516	Battery voltage low

Description

When the ACU power supply voltage exceeds the normal operating range, ACU records DTC.

DTC	DTC detection conditions	Faulty location
B1A1417	(a) The power supply voltage is outside the normal range.	• ACU • Harness and connector • Charging system
B1A1516	(a) The power supply voltage is outside the normal range.	• ACU • Harness and connector • Charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the engine and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG	Overhaul the charging system

OK

RS

2	**Check the ACU fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the ACU fuse.

(d) Measure the resistance according to the values in the table below.

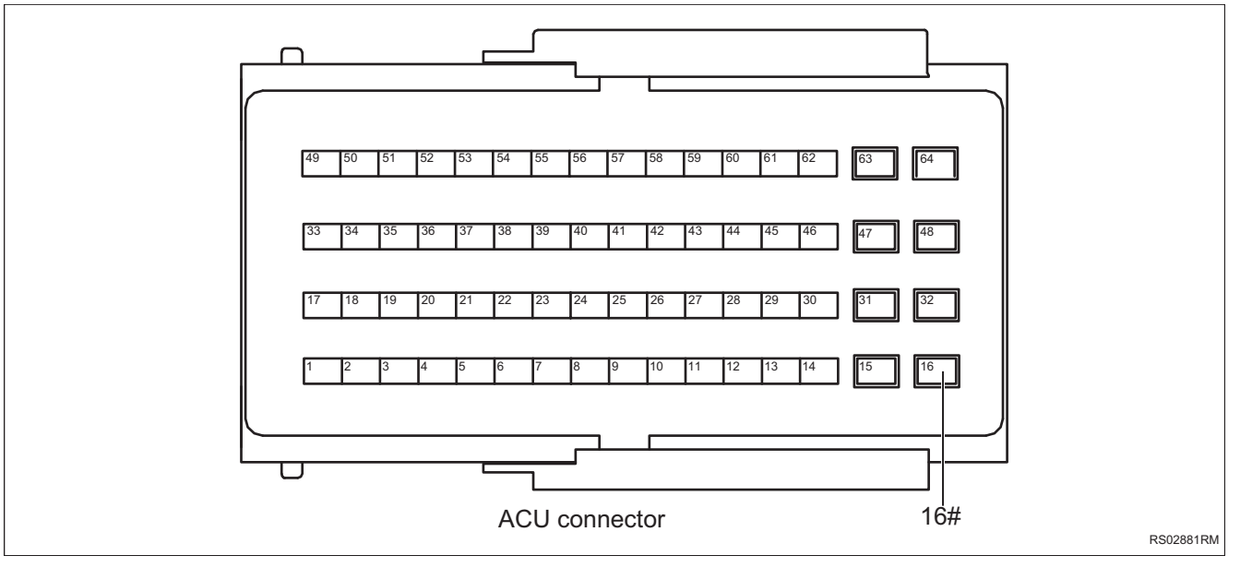
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG **Replace fuse**

OK

3	**Check ACU ground**



(a) Disconnect the ACU connector.

(b) Measure the resistance according to the values in the table below.

Standard value

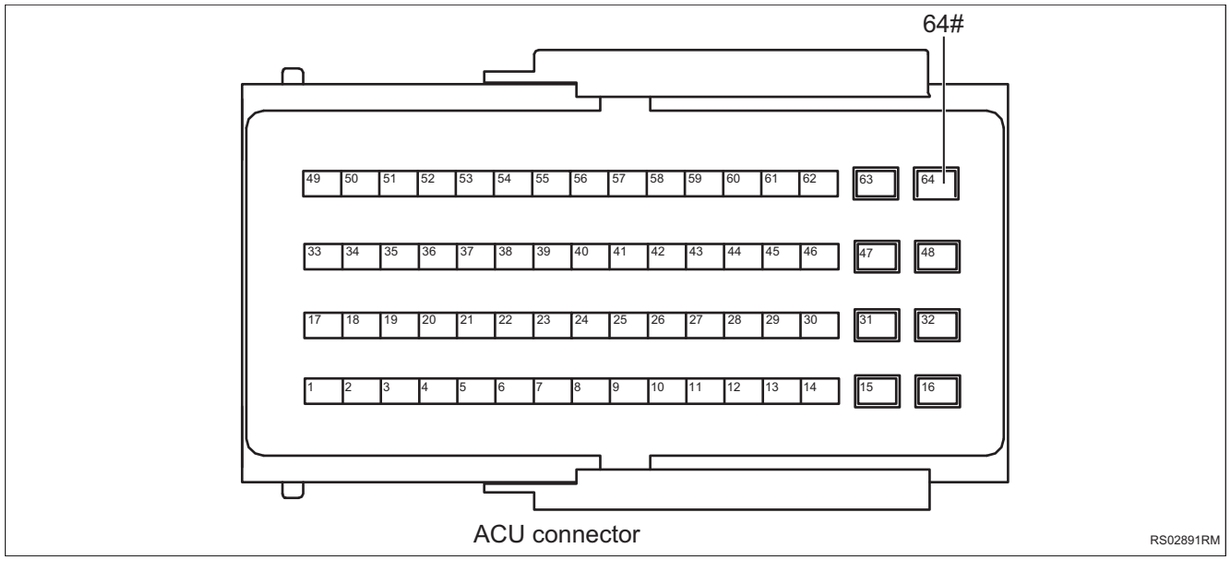
Detector connection	Detection conditions	Specified state
ACU connector 16# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

RS

OK

4	Check ACU power supply



(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACU connector 64# -body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	Replace ACU (See page RS-218)

RS

DTC	**U000188**	**Powertrain CAN bus off**
DTC	**U014687**	**GW node lost**
DTC	**U010087**	**ECM node lost**
DTC	**U010187**	**TCU node lost**
DTC	**U029387**	**HCU node lost**
DTC	**U112187**	**ESP message lost**
DTC	**U114087**	**BCM 1 message lost**
DTC	**U115587**	**Instrument cluster control unit message lost**
DTC	**U124587**	**IVI message lost**
DTC	**U123587**	**IFC message lost**
DTC	**U113187**	**EPS ECU message lost**
DTC	**U114687**	**GW message lost**

Description

When the communication between the ACU and other systems is abnormal or interrupted, the DTC ACU be recorded.

DTC	DTC detection conditions	Faulty location
U000188	(a) Abnormal or interrupted communication.	• Relevant system control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	
U010087	(a) Abnormal or interrupted communication.	
U010187	(a) Abnormal or interrupted communication.	
U029387	(a) Abnormal or interrupted communication.	
U112187	(a) Abnormal or interrupted communication.	
U114087	(a) Abnormal or interrupted communication.	
U115587	(a) Abnormal or interrupted communication.	
U124587	(a) Abnormal or interrupted communication.	
U123587	(a) Abnormal or interrupted communication.	
U113187	(a) Abnormal or interrupted communication.	
U114687	(a) Abnormal or interrupted communication.	

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

DTC	B1A1356	Internal system configuration mismatch

Description

When there is a fault inside the ACU, the ACU records DTC.

DTC	DTC detection conditions	Faulty location
B1A1356	(a) Configuration mismatch.	• ACU

Inspection procedure

1	Clear DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

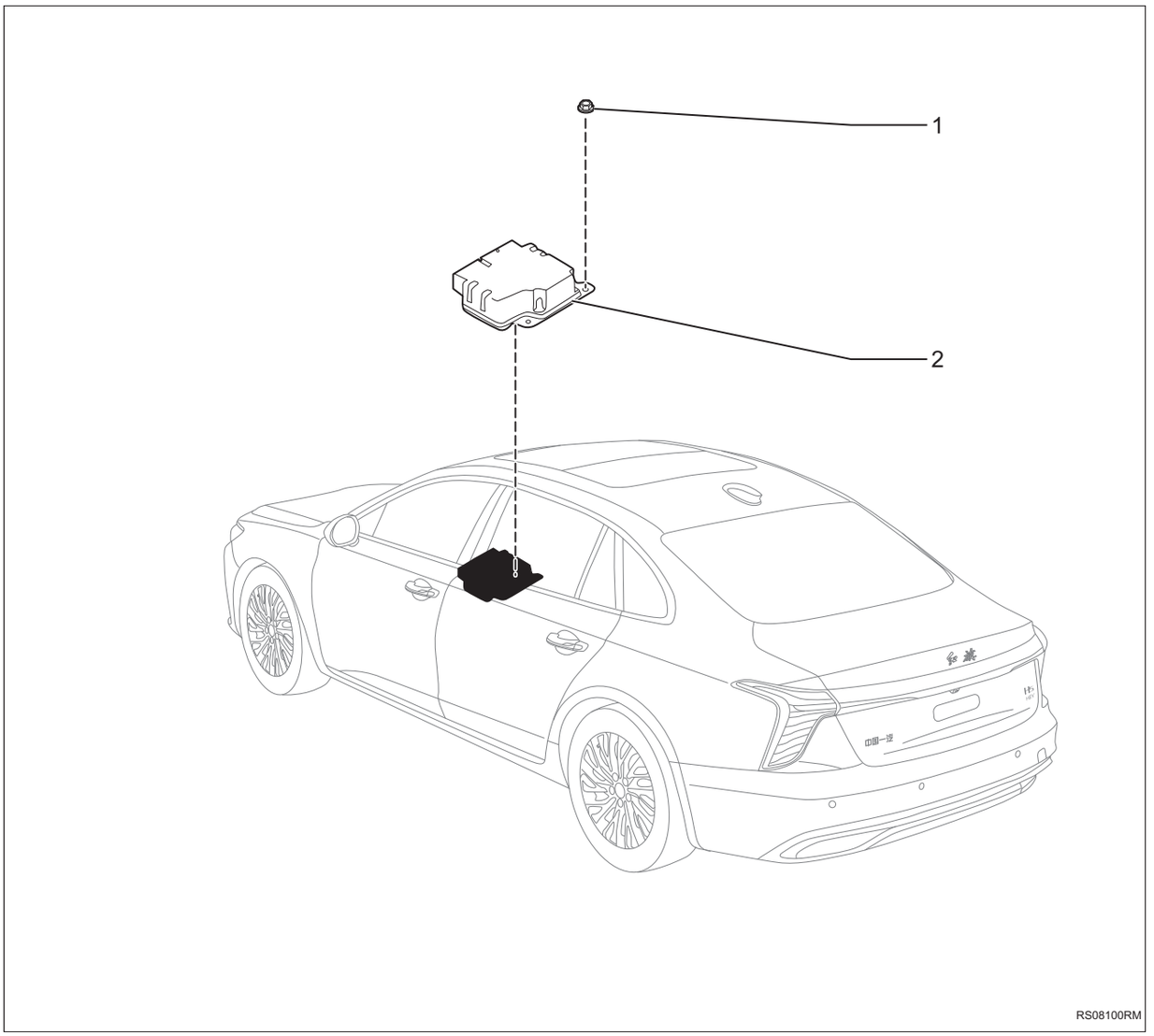
NG → **Replace ACU (See page RS-218)**

OK

2	End

ACU assembly

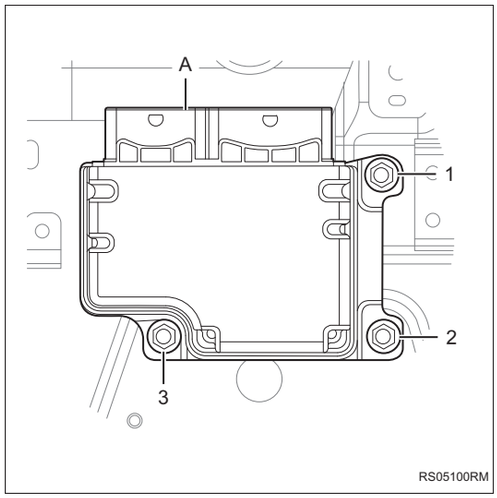
Parts



1. **Hexagon flange nut**
   - X3
   - Torque: 8 ~ 12 N · m
2. **ACU assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-17)**
2. **Remove the console assembly (See page IP-17)**
3. **Remove the ACU assembly**



(a) Disconnect the harness connector.

(b) Remove the nut -1-3- and remove the ACU assembly-A-.

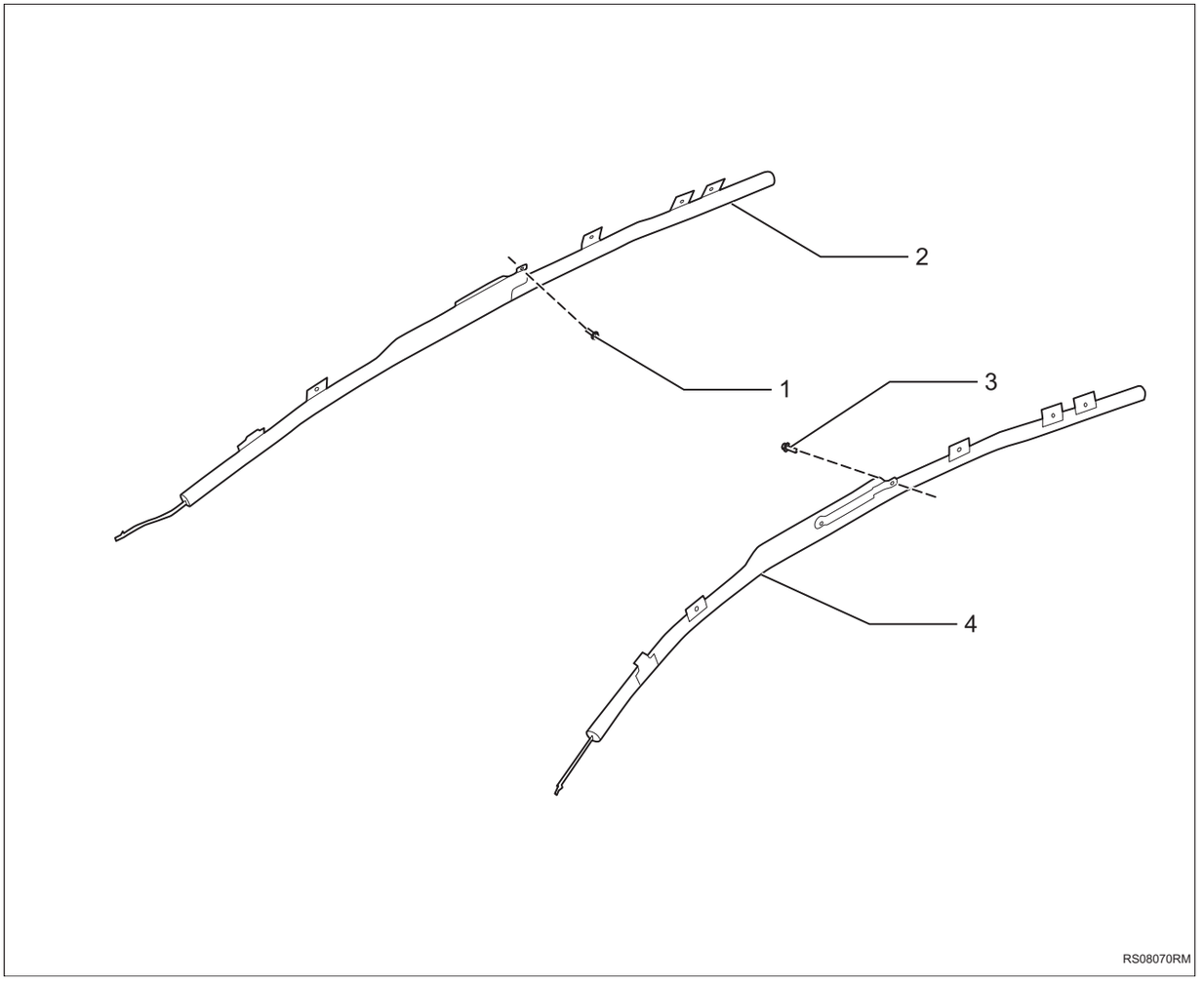
Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

(a) The connector should be pushed all the way to the limit position and locked until the click sound is heard.

Side curtain airbag assembly

Parts



1. **Hexagon flange bolt**
   - X5
   - Torque: 8 ~ 12 N · m
2. **Right side curtain airbag assembly**
3. **Hexagon flange bolt**
   - X5
   - Torque: 8 ~ 12 N · m
4. **Left side curtain airbag assembly**

Removal

Hint:

Tip: the removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

1. **Disconnect the battery - (See page CH-17)**

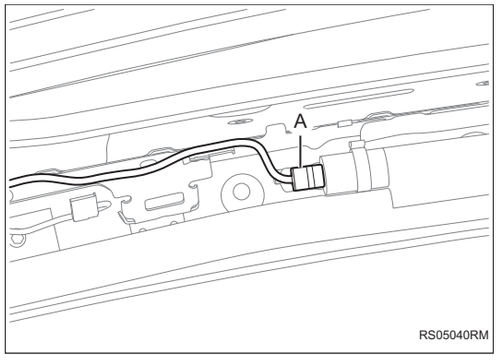
   Caution:

   - Wait 90 seconds after disconnecting the cable to prevent the airbag from deployment.

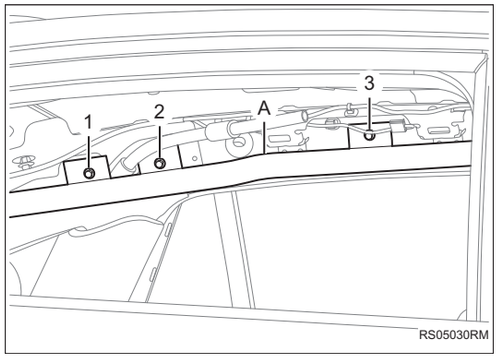
2. **Remove roof assembly (See page IR-44)**

3. **Remove side curtain airbag assembly**

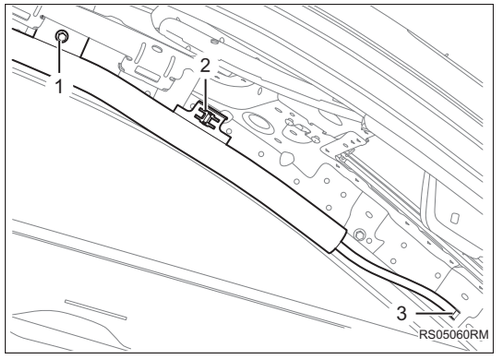
   (a) Disconnect the harness connector-A-.



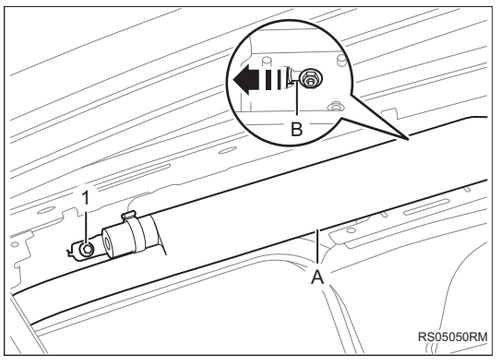
   (b) Remove the fixing bolts -1-3- of the side curtain airbag assembly -A-.



   (c) Detach the front retaining clip -2- and stop device -3- of the side curtain airbag assembly.



   (d) Remove the front fixing bolt -1- of the side curtain airbag assembly.



(e) Detach the central fixing bolt -1- of side curtain airbag assembly.

(f) Push the side curtain airbag stopper -B- in the direction of the - arrow- toward the front of the vehicle, and remove the side curtain airbag assembly -A-.

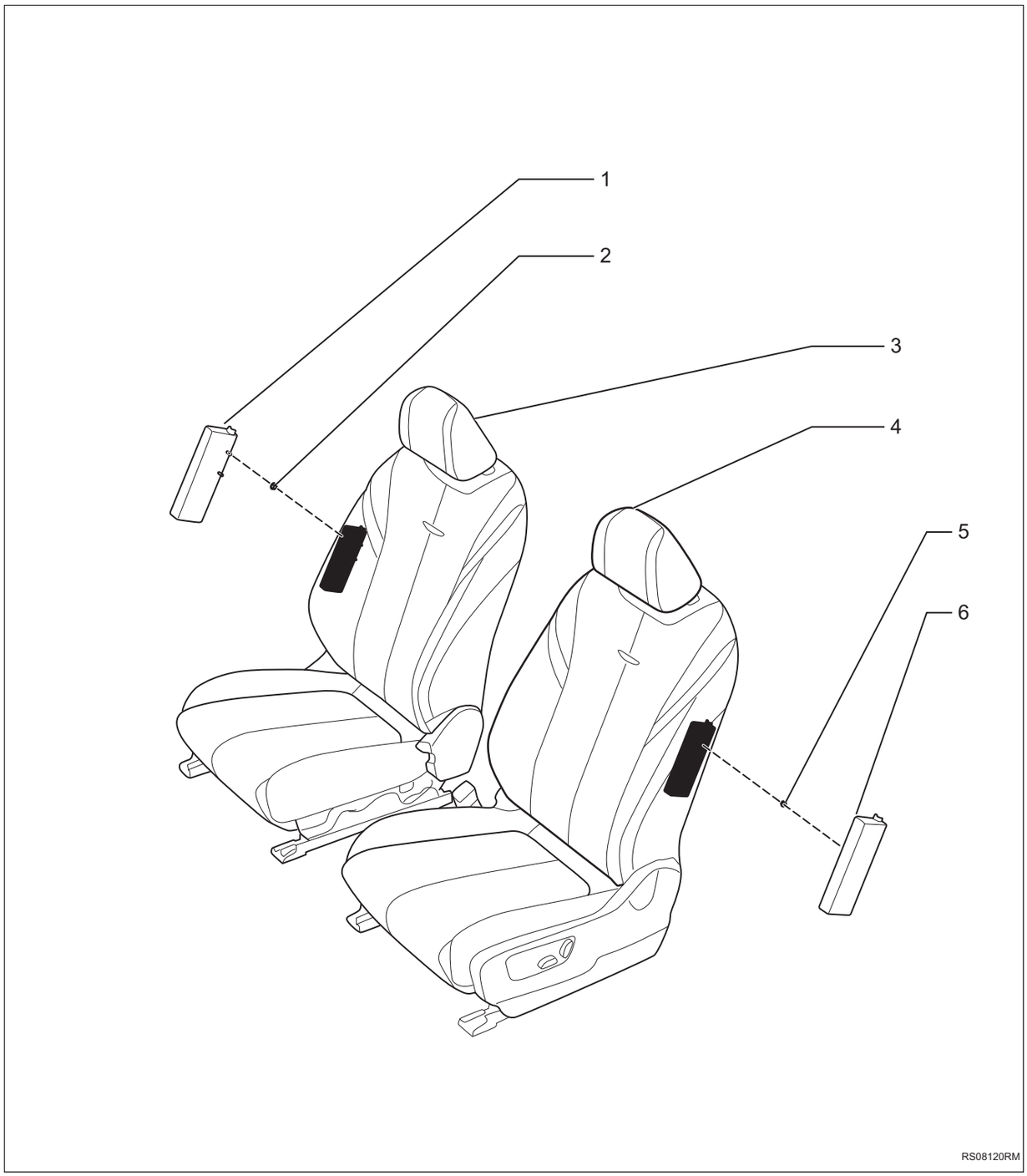
Installation

1. The installation procedure is the reverse of removal procedure, and the following points apply:

(a) The connector should be pushed all the way to the limit position and locked until the click sound is heard.

Front seat airbag

Parts



1. **Right front seat airbag assembly**
2. **Hexagon flange nut**
   - X2
   - Torque: 8 ~ 12 N · m
3. **Front passenger seat head restraint assembly**

4. **Driver seat head restraint assembly**
5. **Hexagon flange nut**
   - X2
   - Torque: 8 ~ 12 N · m
6. **Driver seat airbag assembly**

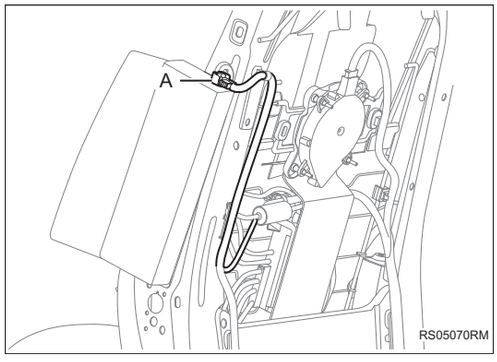
Removal

Hint:

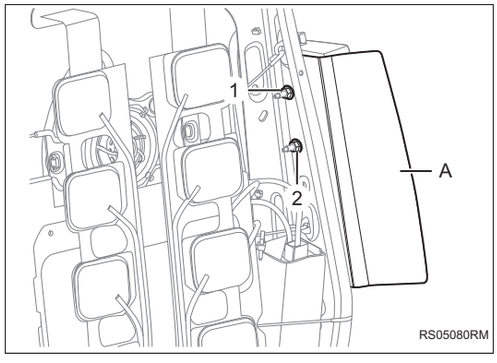
The removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

1. **Disconnect the battery negative terminal (See page CH-17)**
2. **Driver seat back covering assembly (See page SE-93)**
3. **Driver seat back foam assembly (See page SE-93)**
4. **Remove the driver seat airbag assembly**



(a) Disconnect the harness connector-A-.



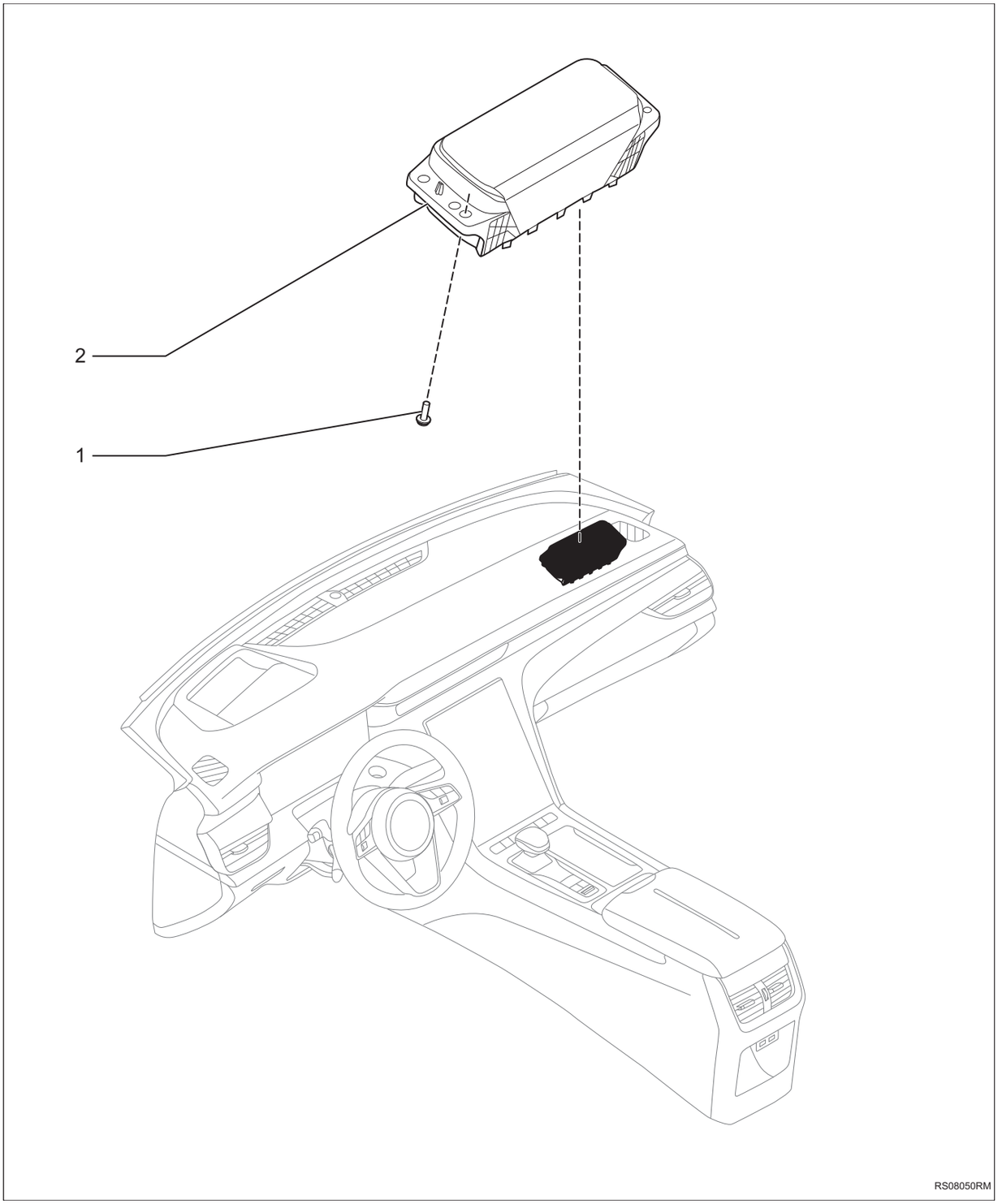
(b) Remove the nut -1-2- and remove the left front seat airbag assembly-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Front passenger airbag assembly

Parts



1. **Hexagon flange bolt**
   - X4

- Torque: 8~12 N · m

2. Front passenger airbag assembly

Removal

1. **Disconnect the battery negative terminal (See page CH-17)**

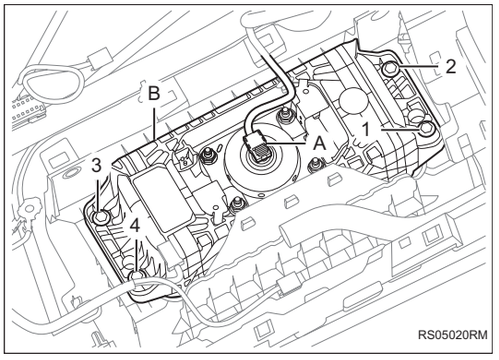
   Caution:

   - Wait 90 seconds after disconnecting the cable to prevent the airbag from deployment.

2. **Remove instrument panel assembly (See page IP-5)**

3. **Remove the front driver airbag assembly**

   (a) Disconnect the harness connector-A-.



   (b) Remove the bolts -1-4- and remove the front passenger airbag assembly -B-.

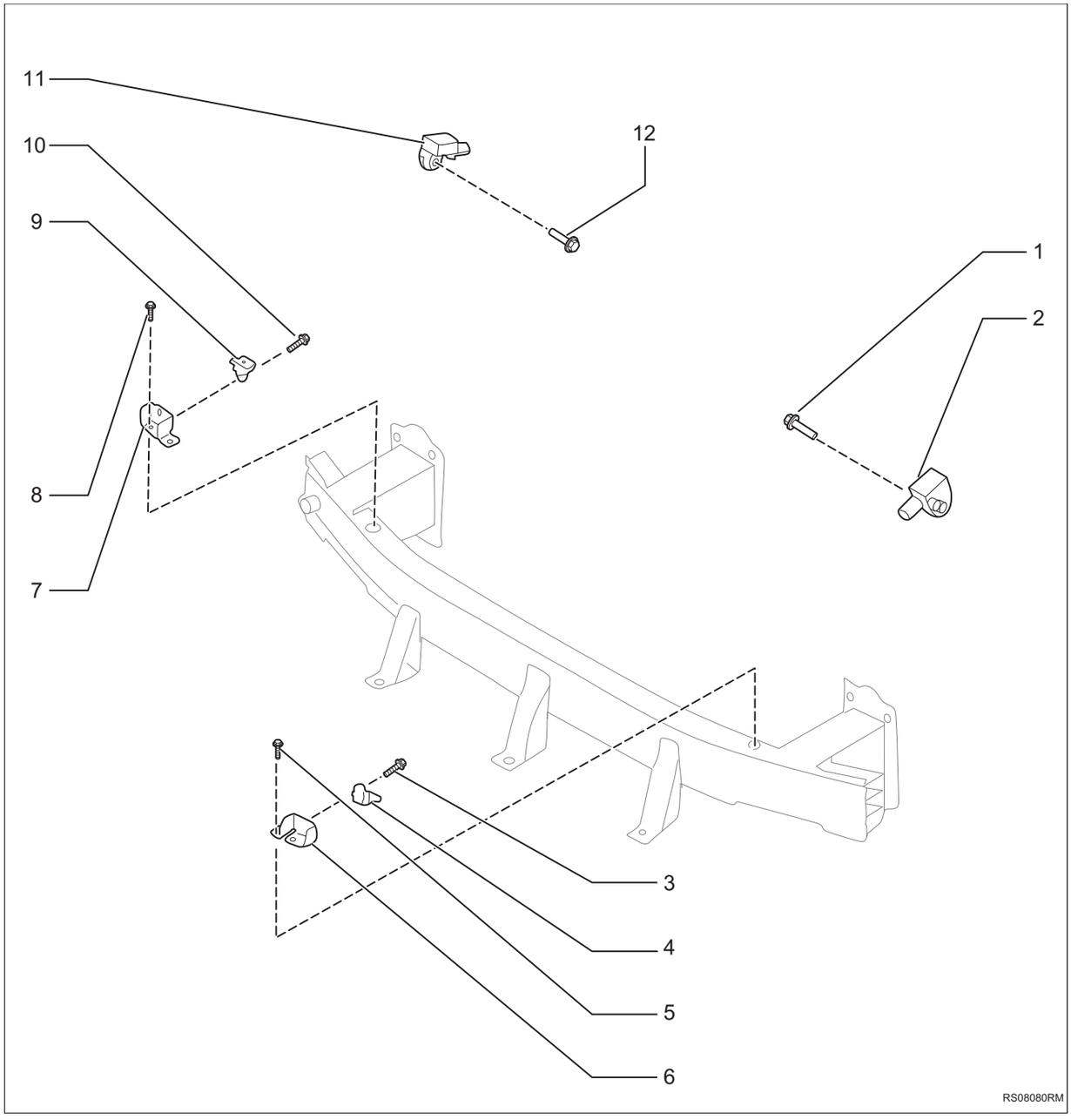
Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

   (a) The connector should be pushed all the way to the limit position and locked until the click sound is heard.

Acceleration impact sensor assembly

Parts



1. **Hexagon flange bolt**
   - Torque: 8 ~ 12 N · m
2. **Left middle acceleration impact sensor assembly**
3. **Hexagon flange bolt**
   - Torque: 8 ~ 12 N · m
4. **Left front acceleration impact sensor assembly**

5. **Hexagon flange bolt**
   - Torque: 8 ~ 12 N · m
6. **Left front acceleration impact sensor bracket**
7. **Right front acceleration impact sensor bracket**
8. **Hexagon flange bolt**
   - Torque: 8 ~ 12 N · m
9. **Right front acceleration impact sensor assembly**
10. **Hexagon flange bolt**
    - Torque: 8 ~ 12 N · m
11. **Right middle acceleration impact sensor assembly**
12. **Hexagon flange bolt**
    - Torque: 8 ~ 12 N · m

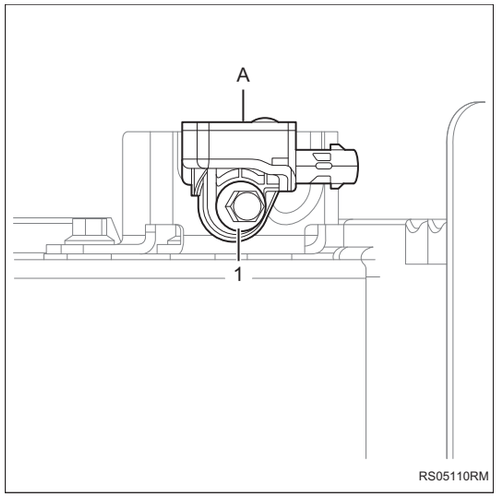
Remova

Hint:

The removal sequence on the right side is the same as that on the left side.

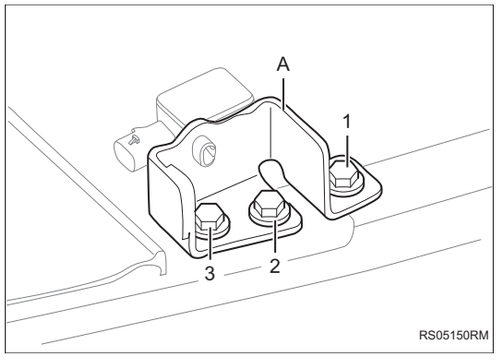
The order listed below applies to the left side.

1. **Disconnect the battery negative terminal (See page CH-17)**
2. **Remove front bumper (See page ET-7)**
3. **Remove front acceleration impact sensor assembly**



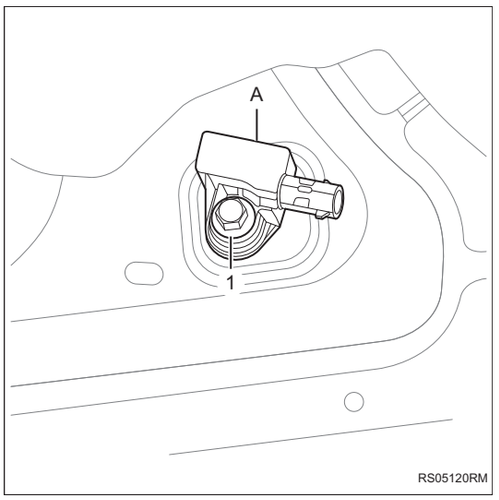
(a) Disconnect the harness connector.

(b) Remove the bolt -1-, and remove the front acceleration impact sensor assembly -A-.



(c) Remove the bolts -1-3-, and remove the front acceleration impact sensor bracket -A-.

4. **Remove B- pillar lower guard plate (See page IR-3)**
5. **Remove middle acceleration impact sensor assembly**



(a) Disconnect the harness connector.

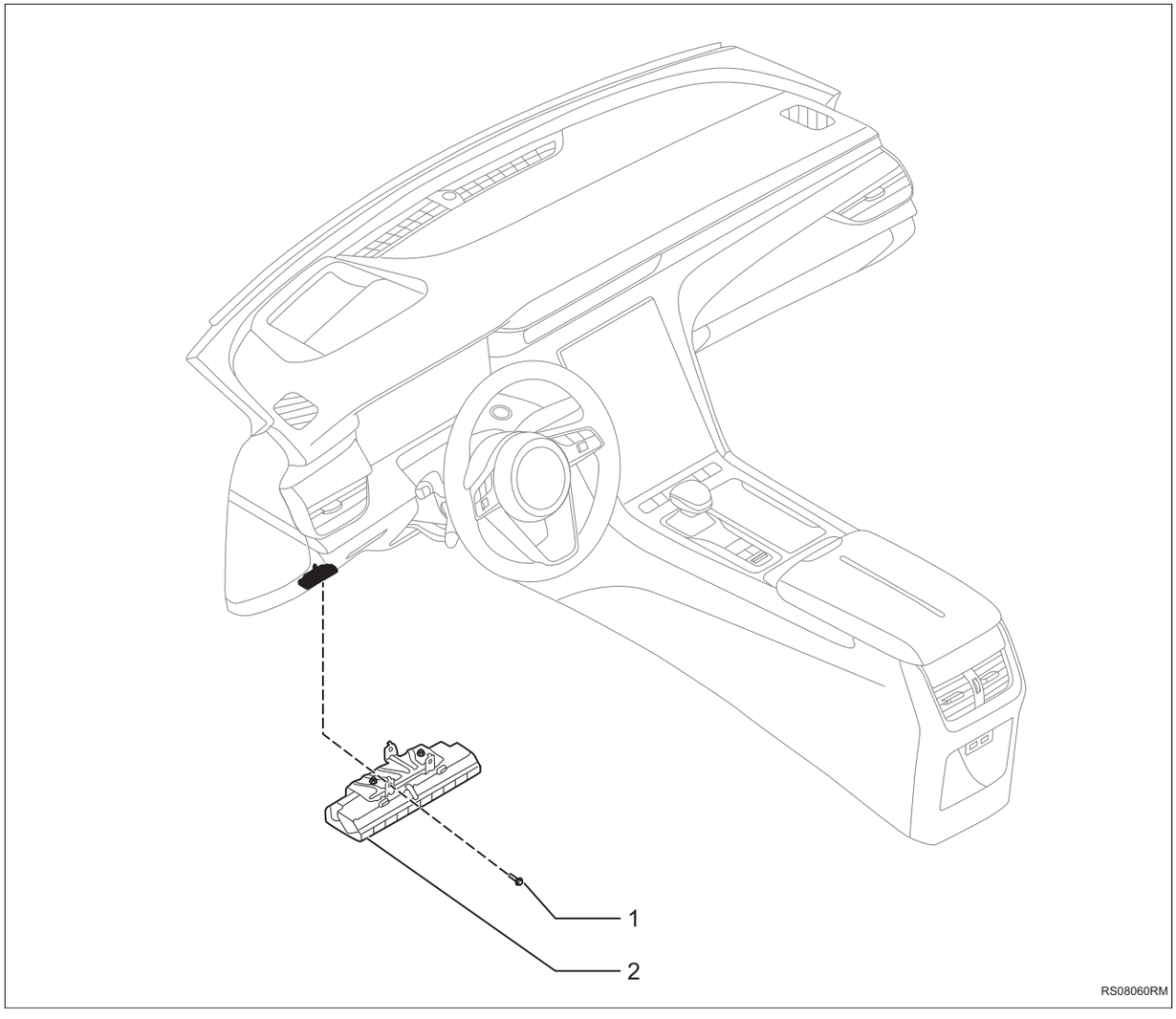
(b) Remove bolt -1- and remove middle acceleration impact sensor assembly -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Driver knee airbag

Parts



1. **Hexagon flange bolt**
   - X3
   - Torque: 8~12 N · m
2. **Driver knee airbag assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-17)**

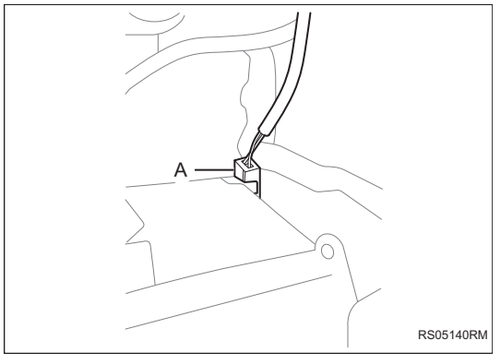
   Caution:

   - Wait 90 seconds after disconnecting the cable to prevent the airbag from deployment.

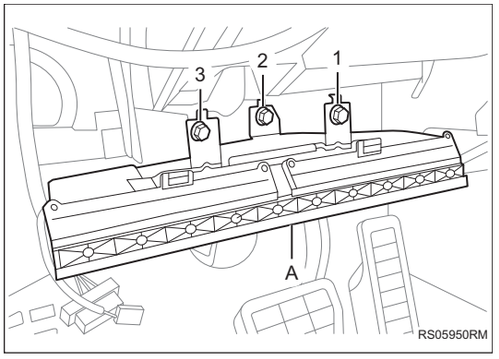
2. **Remove left lower guard plate assembly (See page IP-5)**

3. **Remove driver knee airbag**

   (a) Disconnect the harness connector-A-.



   (b) Remove the bolts -1-3-, and remove the driver knee airbag -A-.



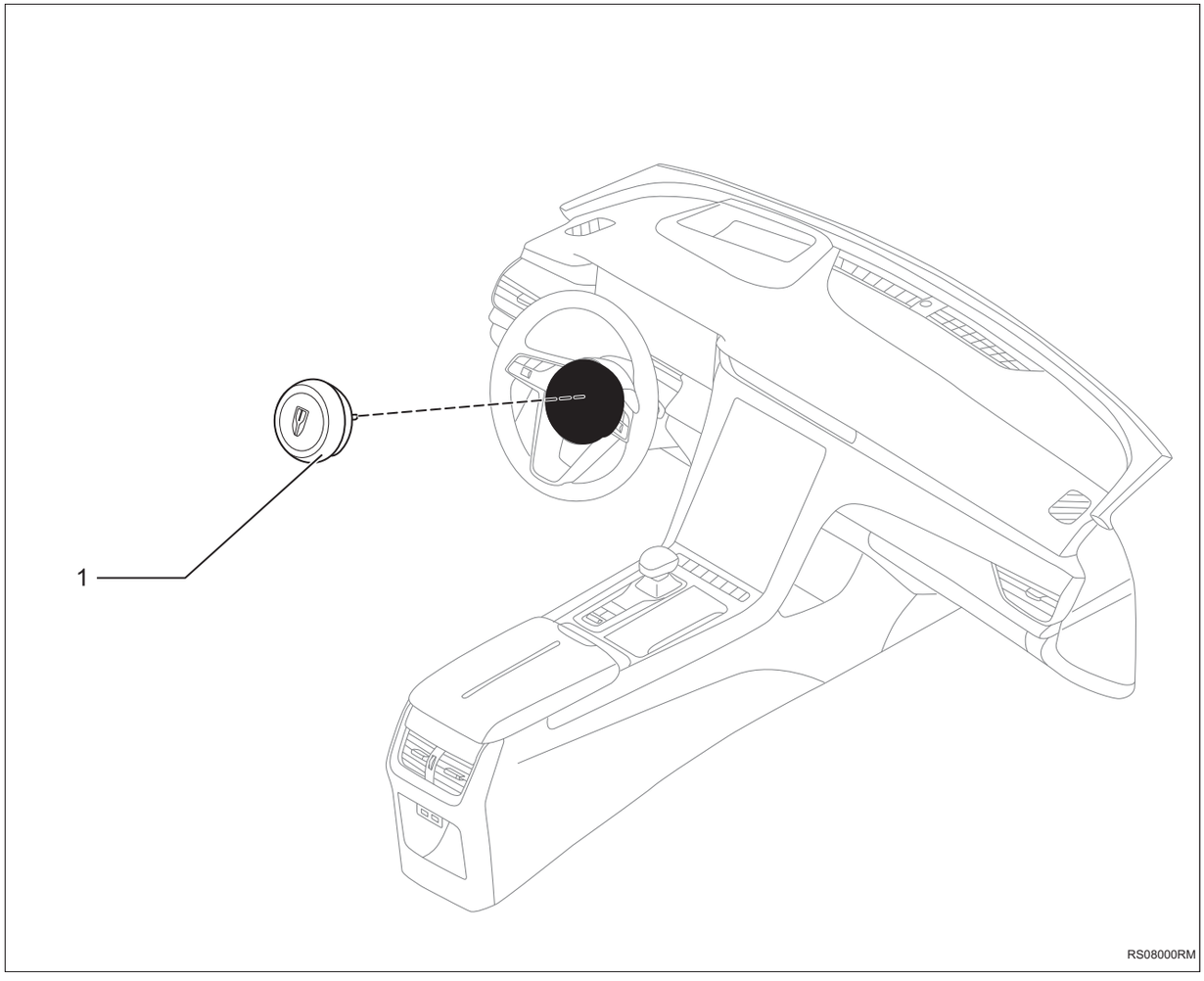
Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

   (a) The connector should be pushed all the way to the limit position and locked until the click sound is heard.

Driver airbag assembly

Parts



1. Driver airbag assembly

On-board inspection

1. Check driver airbag (vehicle without collision)

(a) Conduct diagnosis system check.

(b) Visually check for defects when the driver airbag is installed on the vehicle.

(1) Defects are as follows:

- Scratches on the surface and groove of steering wheel trim cover
- Small cracks on the surface and groove of steering wheel trim cover
- Obvious discoloration on the surface and groove of steering wheel trim cover

Hint:

If any defects are found, renew driver airbag.

2. Check driver airbag (vehicle in which the air bag is not deployed during collision)

(a) Conduct diagnosis system check

(b) Visually check for defects when the steering wheel trim cover is removed from the vehicle.

(1) Defects are as follows:

- Scratches on the surface and groove of steering wheel trim cover
- Small cracks on the surface and groove of steering wheel trim cover
- Obvious discoloration on the surface and groove of steering wheel trim cover
- Cracks or other damage on the connector
- Steering wheel assembly deformation
- The horn button contacts of the steering wheel trim cover are deformed
- When installing a new steering wheel trim cover to the steering wheel assembly, the steering wheel trim cover and the steering wheel assembly interfere with each other or the gap is uneven

Hint:

If any defects are found, renew driver airbag.

Removal

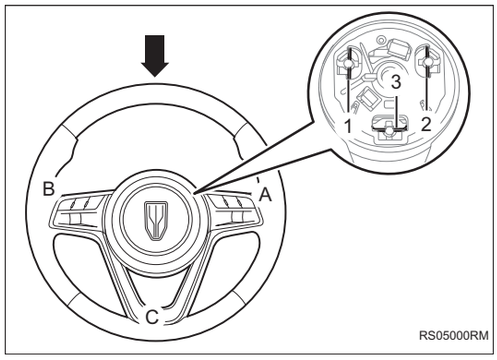
1. Disconnect the battery negative terminal (See page CH-17)

Caution:

- Wait 90 seconds after disconnecting the cable to prevent the airbag from deployment.

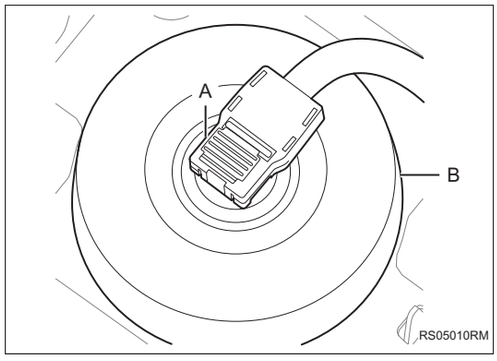
2. **Remove the steering column upper shroud (See page SR-4)**

3. **Remove the driver airbag assembly**



(a) Turn the steering wheel so that the steering wheel marks -A-C- face the above -arrow-positions respectively (about 12 o'clock direction).

(b) Use a suitable tool to detach the snap spring -1-3- from the hole under the steering wheel.



(c) Disconnect the harness connector -A-, and remove the driver airbag assembly -B-.

Installation

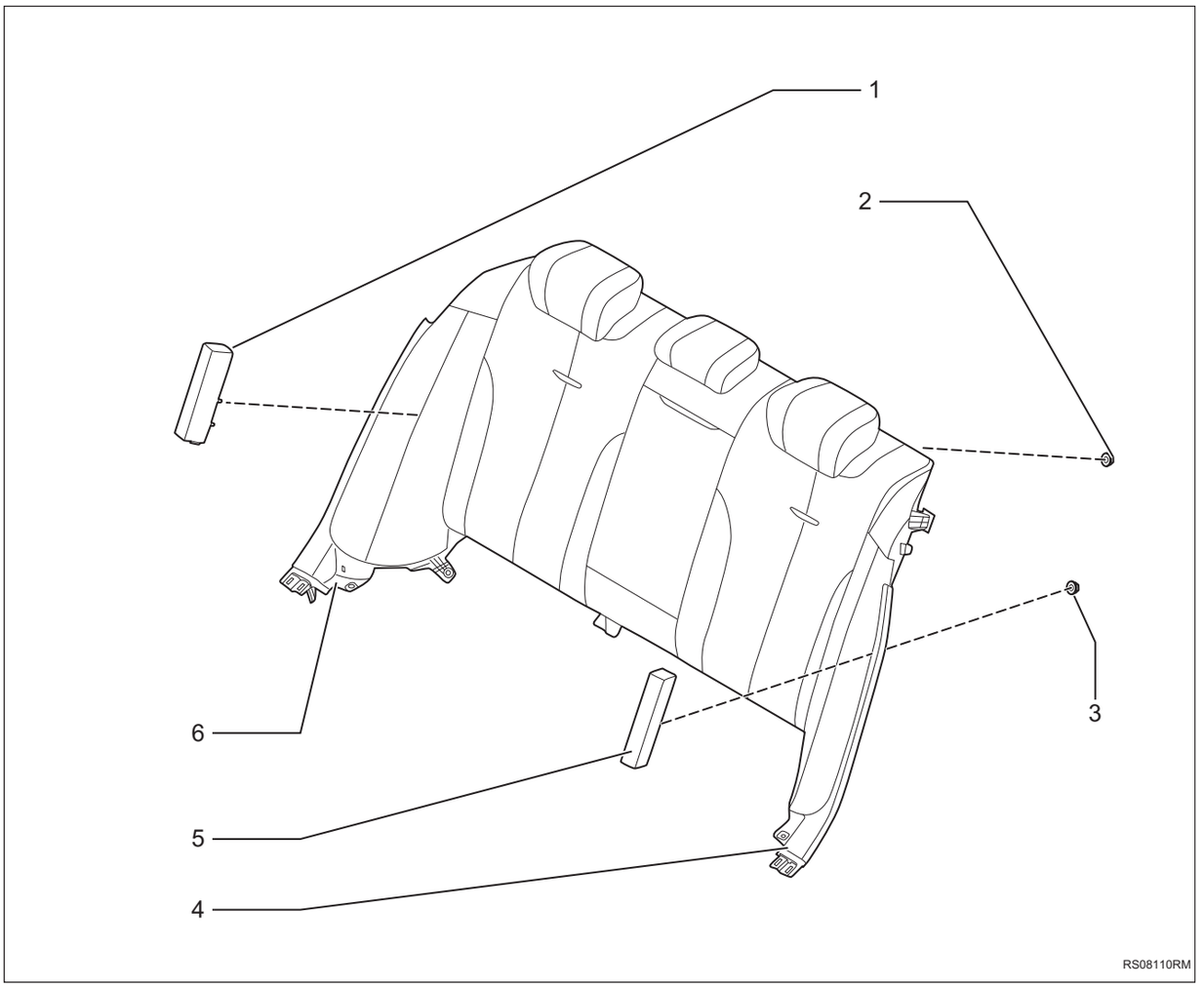
1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

(a) The connector should be pushed all the way to the limit position and locked until the click sound is heard.

(b) Place the driver airbag on the steering wheel and press it tightly until a click sound is heard.

Rear seat airbag

Parts



1. **Rear seat airbag assembly**
2. **Hexagon flange nut**
   - X2
   - Torque: 8 ~ 12 N · m
3. **Hexagon flange nut**
   - X2
   - Torque: 8 ~ 12 N · m
4. **Rear left seat back wing assembly**
5. **Rear left seat airbag assembly**
6. **Rear right seat back wing assembly**

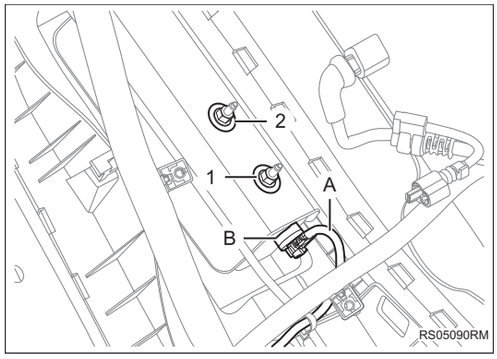
Removal

Hint:

The removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

1. **Disconnect the battery negative terminal (See page CH-17)**
2. **Remove the seat back wing assembly (See page SE-98)**
3. **Remove the rear seat airbag assembly**



(a) Disconnect the harness connector-A-.

(b) Remove the nut -1-2-, and remove the rear seat airbag assembly-B-.

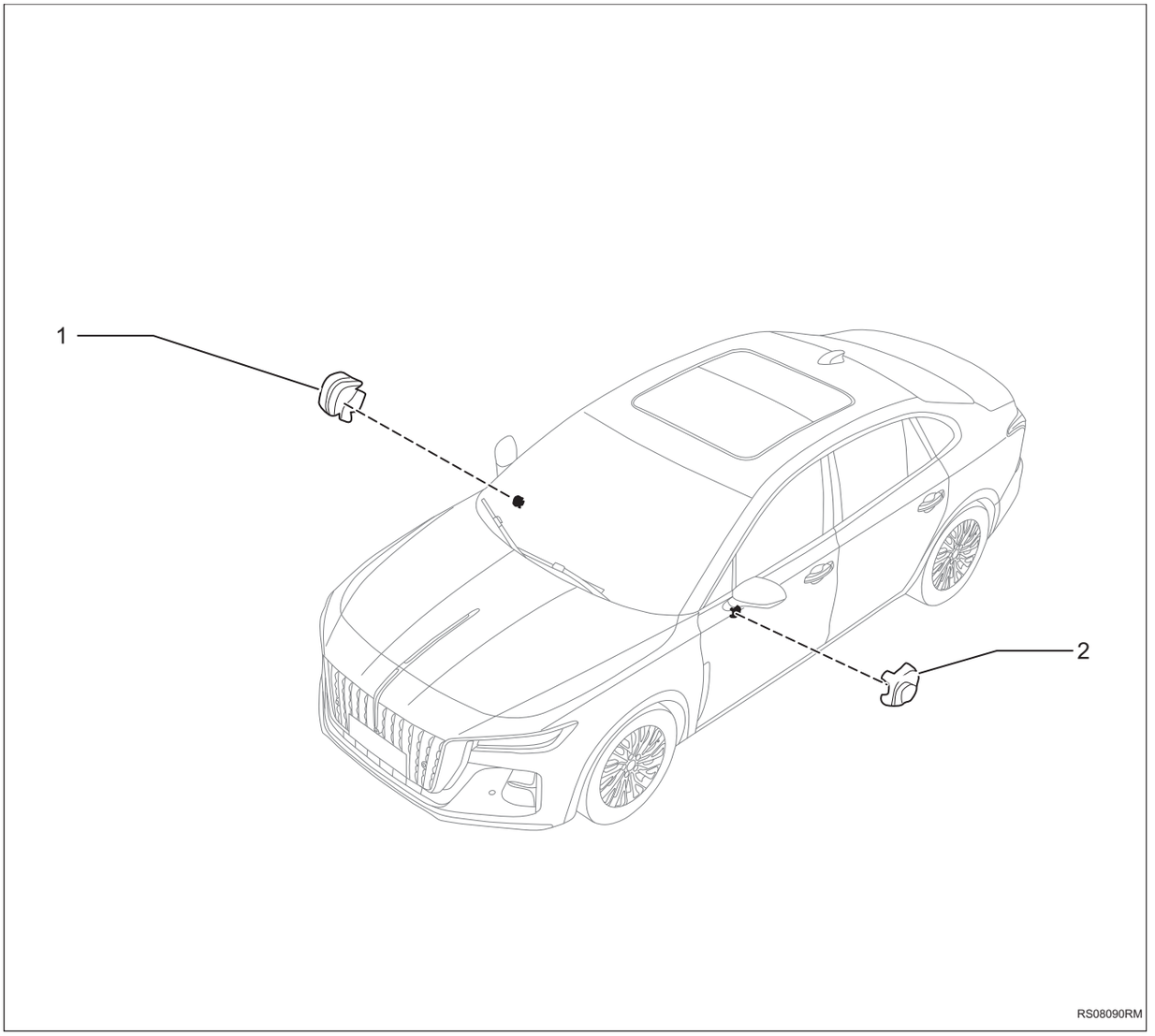
Installation

1. **The installation procedure is the reverse of removal procedure.**

RS

Pressure side impact sensor assembly

Parts



1. **Right pressure side impact sensor assembly**
2. **Left pressure side impact sensor assembly**

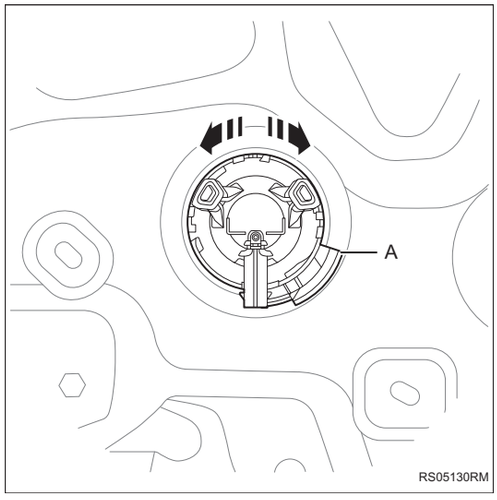
Removal

Hint:

the removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

1. **Disconnect the battery negative terminal (See page CH-17)**
2. **Remove front door guard plate (See page IR-8)**
3. **Remove pressure side impact sensor assembly**



(a) Disconnect the harness connector.

(b) Rotate in the direction of -arrow-and remove pressure side impact sensor assembly -A-.

Installation

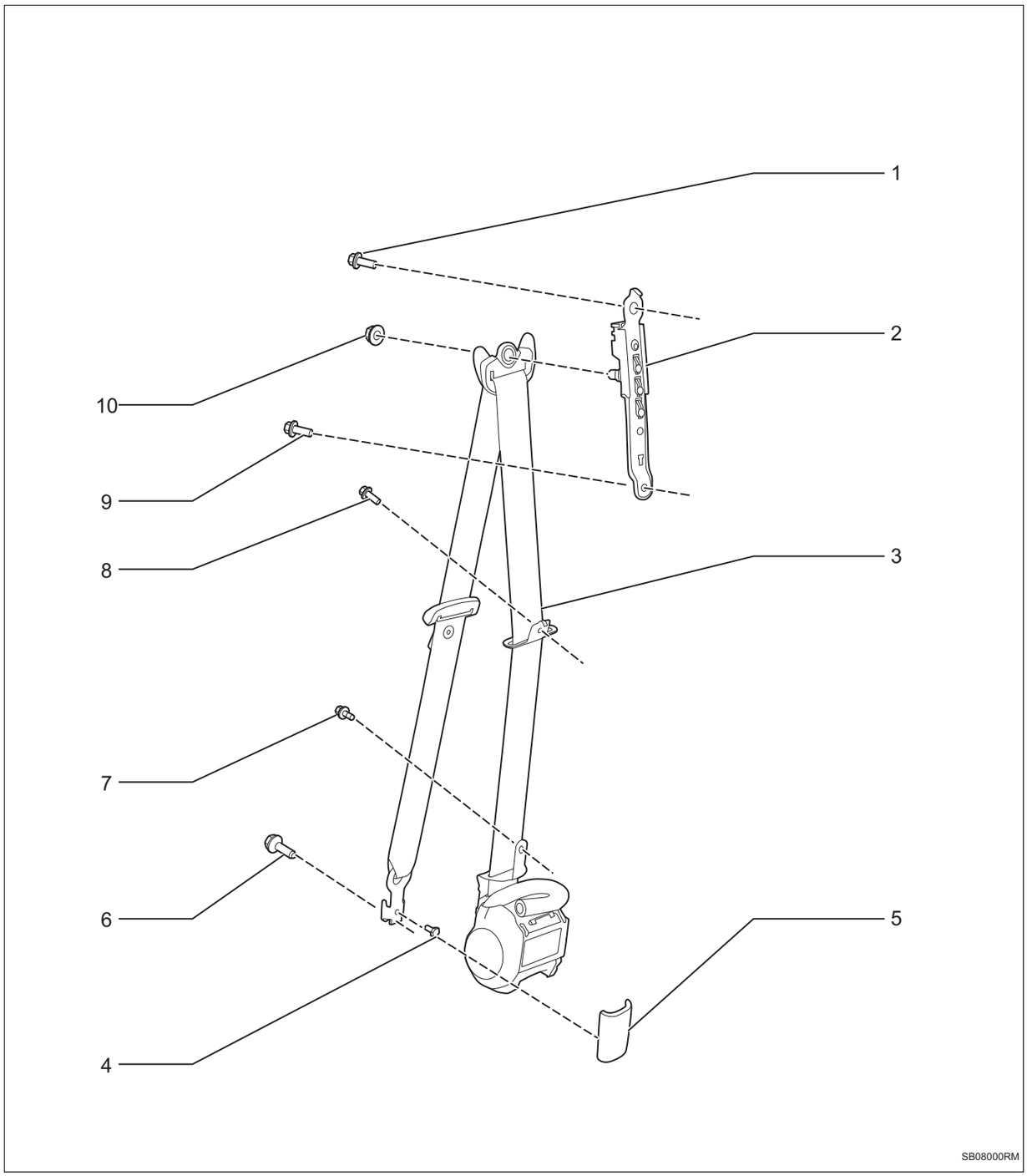
1. **The installation procedure is the reverse of removal procedure.**

Seat belt

Front seat belts SB-1
Parts SB-1
Removal SB-3
Installation SB-4
Rear seat belt SB-5
Parts SB-5
Removal SB-7
Installation SB-8

Front seat belts

Parts



1. **Hexagon flange bolt**
   - Torque: 39.2~54 N · m
2. **Height adjuster assembly**
3. **Drive seat belt assembly**
4. **Hexagon flange bolt**

- Torque: 4~6 N · m

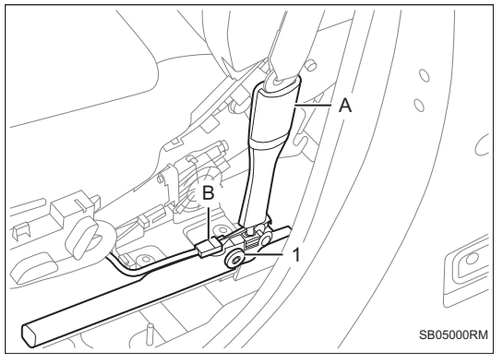
5. **Driver seat belt pretensioner buckle assembly cover**
6. **Hexagon flange bolt**
   - Torque: 39.2~54 N · m
7. **Hexagon flange bolt**
   - Torque: 8~12 N · m
8. **Hexagon flange bolt**
   - Torque: 8~12 N · m
9. **Hexagon flange bolt**
   - Torque: 39.2~54 N · m
10. **Hexagon flange nut**
    - Torque: 39.2~54 N · m

Removal

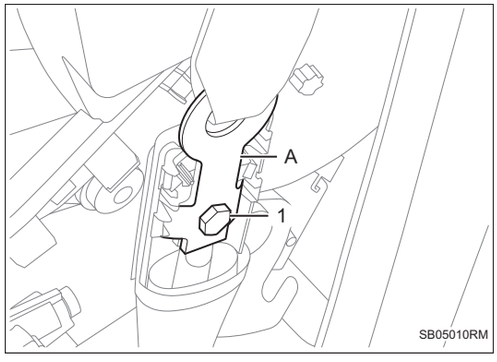
Hint:

The removal sequence on the right side is the same as that on the left side.

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove driver side seat belt pretensioner buckle assembly**



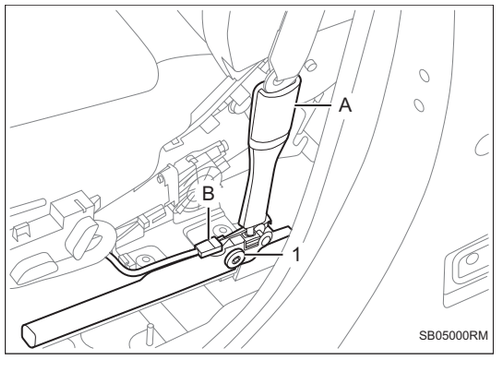
(a) Remove the driver side seat belt pretensioner buckle assembly cover -A-.



(b) Remove the bolt -1- and remove the seat belt -A-.

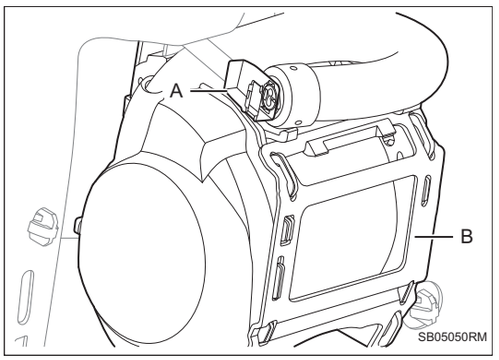
(c) Remove the left front guard plate of driver seat (See page SE-93)

(d) Disconnect the harness connector -B-.

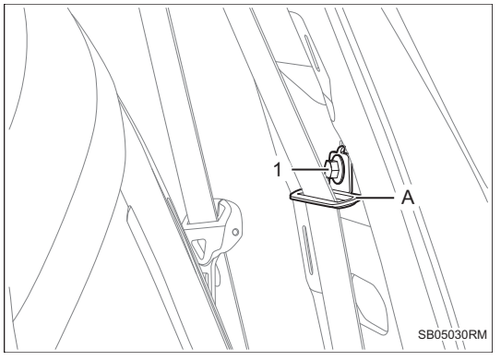


(e) Remove the bolt -1- and remove the seat belt pretensioner buckle assembly on the driver side.

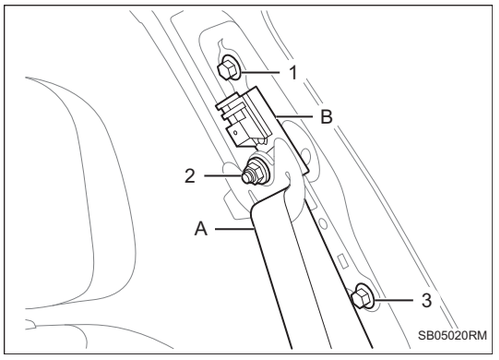
3. **Remove B-pillar upper guard plate (See page IR-3)**
4. **Remove B- pillar lower guard plate (See page IR-3)**
5. **Remove drive seat belt assembly**



(a) Disconnect the harness connector -A- of drive seat belt assembly -B-.

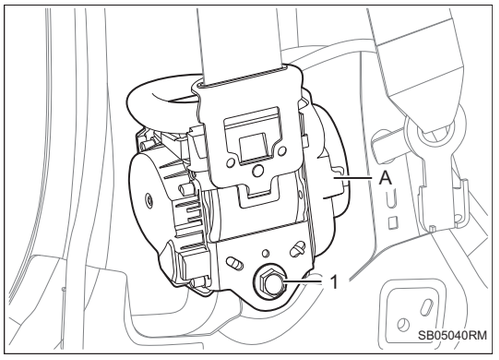


(b) Remove the bolt -1- and remove the seat belt limit bracket -A-.



(c) Remove the nut -2- and detach seat belt -A-.

(d) Remove the bolts -1- and -3-, and remove the height adjuster assembly -B-.



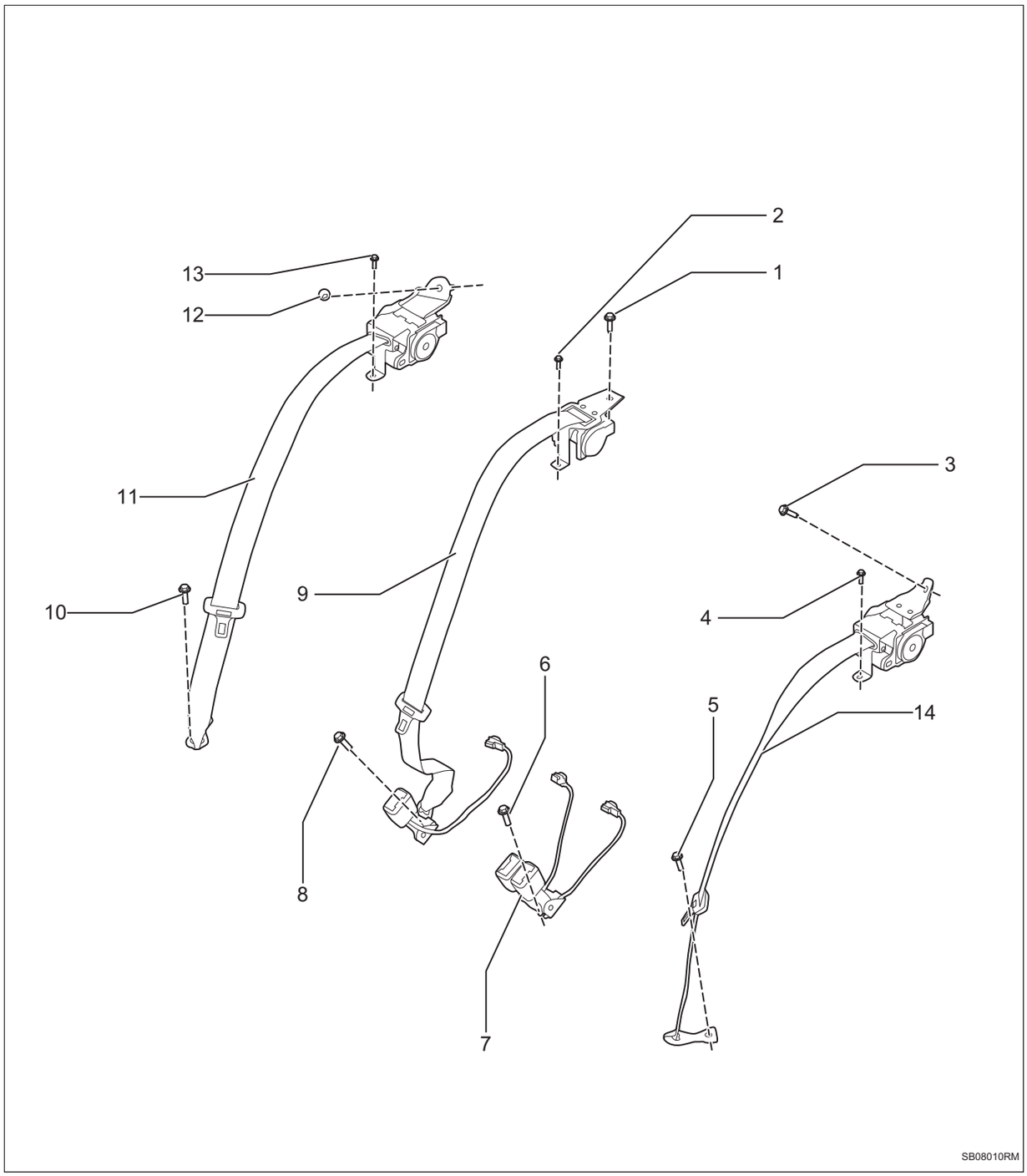
(e) Remove the bolt -1- and remove the drive seat belt assembly - A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Rear seat belt

Parts



1. **Hexagon flange bolt**
   - Torque: 39.2~54 N · m
2. **Hexagon flange bolt**
   - Torque: 8~12 N · m
3. **Hexagon flange bolt**

- Torque: 39.2~54 N · m

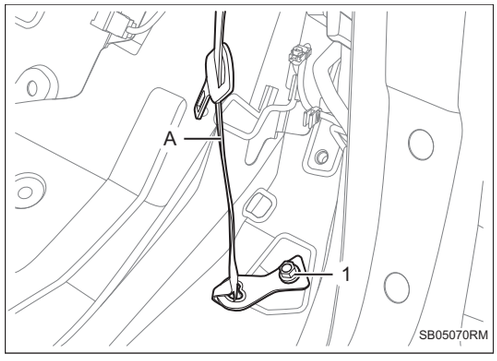
4. **Hexagon flange bolt**
   - Torque: 8~12 N · m
5. **Hexagon flange bolt**
   - Torque: 39.2~54 N · m
6. **Hexagon flange bolt**
   - Torque: 39.2~54 N · m
7. **Rear seat belt double buckle assembly**
8. **Hexagon flange bolt**
   - Torque: 39.2~54 N · m
9. **Rear seat middle seat belt assembly**
10. **Hexagon flange bolt**
    - Torque: 39.2~54 N · m
11. **Rear seat right seat belt assembly**
12. **Hexagon flange bolt**
    - Torque: 39.2~54 N · m
13. **Hexagon flange bolt**
    - Torque: 8~12 N · m
14. **Rear seat left seat belt assembly**

Removal

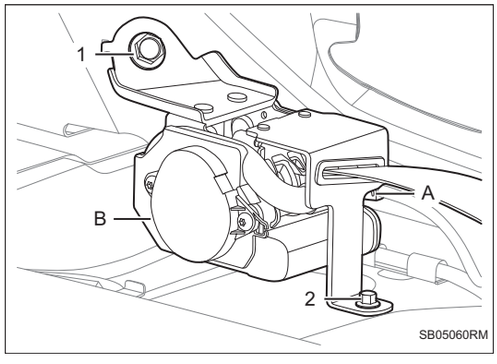
Hint:

The removal sequence on the right side is the same as that on the left side.

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the rear seat cushion assembly (See page SE-98)**
3. **Remove parcel shelf guard plate (See page IR-16)**
4. **Rear seat left seat belt assembly**



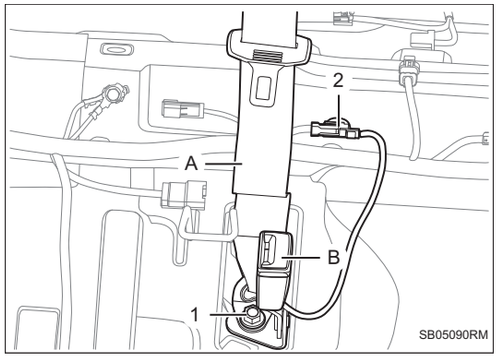
(a) Remove the bolt -1- and detach the left seat belt assembly -A- of the rear seat.



(b) Disconnect the harness connector-A-.

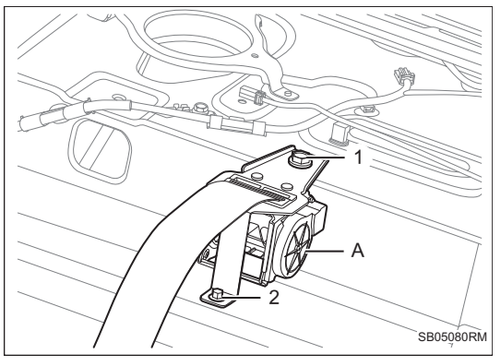
(c) Remove the bolt -1-2- and remove the left seat belt assembly -B- of the rear seat.

5. **Rear seat middle seat belt assembly**



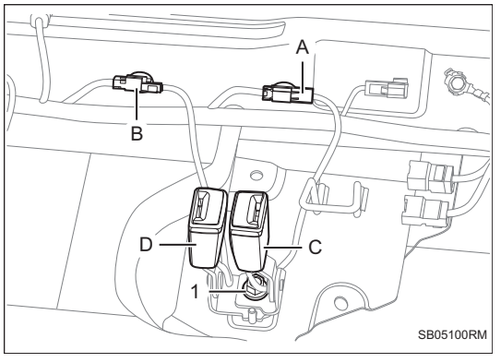
(a) Remove the bolt -1- and detach the rear seat middle seat belt assembly -A-.

(b) Disconnect the harness connector -2-, and remove the seat belt buckle assembly -B-.



(c) Remove the bolt -1-2-, and remove the rear seat middle seat belt assembly -A-.

6. Remove rear seat belt double buckle assembly



(a) Disconnect the harness connector-A-B-.

(b) Remove the bolt -1-, and remove the rear seat belt double buckle assembly -C-D-.

Installation

1. The installation procedure is the reverse of removal procedure.

ATC system

ATC AC-1

Precautions AC-1
Location of parts AC-7
System diagram AC-10
System description AC-12
Symptom chart AC-12
ECU terminal AC-15
DTC chart AC-16
B130014 .....AC-19
B130015 .....AC-19
B130071 .....AC-19
B130114 .....AC-25
B130115 .....AC-25
B130171 .....AC-25
B130214 .....AC-31
B130215 .....AC-31
B130271 .....AC-31
B130314 .....AC-36
B130315 .....AC-36
B130371 .....AC-36
B130414 .....AC-41
B130415 .....AC-41
B130514 .....AC-45
B130515 .....AC-45
B130614 .....AC-48
B130615 .....AC-48
B130715 .....AC-51
B130815 .....AC-51
B130914 .....AC-55
B130915 .....AC-55
B130A14 .....AC-58
B130A15 .....AC-58
B130B28 .....AC-61
B130C14 .....AC-65
B130C15 .....AC-65
B130E19 .....AC-70
B130F00 .....AC-74
B131087 .....AC-76
B131002 .....AC-76

B131187 .....AC-79
B131102 .....AC-79
B131287 .....AC-84
B131202 .....AC-84
U002888 .....AC-89
U014687 .....AC-89
U014087 .....AC-89
U010287 .....AC-89
U112187 .....AC-89
U110087 .....AC-89
U124587 .....AC-89
U115587 .....AC-89
U110187 .....AC-89
U129387 .....AC-89
U114687 .....AC-89
U300317 .....AC-90
U300316 .....AC-90

Refrigerant AC-94
On-board inspection AC-94
Replace AC-98

Front A/C control unit assembly AC-101
Parts AC-101
Removal AC-102
Installation AC-102

A/C filter element AC-103
Replace AC-103

Plasma generator assembly AC-104
Parts AC-104
Removal AC-105
Installation AC-105

Sunlight sensor assembly AC-106
Parts AC-106
Removal AC-107
Installation AC-107

Rain sensor assembly AC-108
Parts AC-108
Removal AC-109
Installation AC-109

Fragrance generator assembly AC-110
Parts AC-110
Removal AC-111

Installation AC-111
AQS assembly AC-112
Parts AC-112
Removal AC-113
Installation AC-113
PM2.5 sensor assembly AC-114
Parts AC-114
Removal AC-115
Installation AC-115
Inside temperature sensor assembly AC-116
Parts AC-116
Removal AC-117
Installation AC-117
Outside temperature sensor assembly AC-118
Parts AC-118
Removal AC-119
Installation AC-119
Compressor assembly AC-120
Parts AC-120
Part (HEV) AC-122
Removal AC-124
Installation AC-125
A/C pipeline AC-127
Parts AC-127
Removal AC-129
Installation AC-132
A/C condenser assembly AC-133
Parts AC-133
Removal AC-135
Installation AC-135
A/C air outlet assembly AC-136
Parts AC-136
Removal AC-138
Installation AC-140
Front HVAC Assembly AC-141
Parts AC-141
Removal AC-143
HVAC disassembly AC-143
Blower disassembly AC-151
Installation AC-153
Front A/C air duct AC-154

Parts AC-154
Removal AC-156
Installation AC-159

ATC

Precautions

1. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

2. General repair instructions

(a) When the part needs to be replaced or the connector needs to be disconnected during maintenance of A/C system, disconnect the battery negative cable.

(b) The door control system needs to be initialized after reconnecting the battery. And use the HQ-VDS to "clear the DTC" for all electronic control systems.

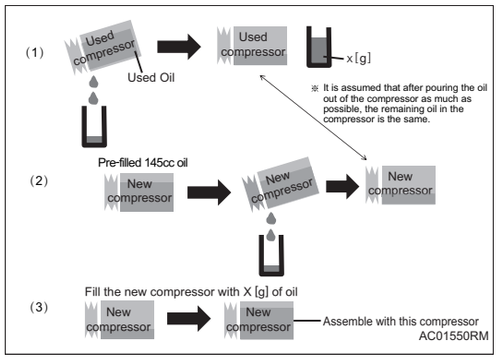
3. Do not open the high pressure manifold valve during compressor operation.

(a) Open and close the low-pressure valve only. If the high-pressure valve is opened, the refrigerant flows in reverse direction, causing the filling cylinder to rupture.

4. Do not run the engine and compressor without refrigerant, otherwise the inside of the compressor will be damaged, because the compressor parts are always running regardless of A/C system on or off.

5. The refrigerant must be R134a.

6. **Do not handle the refrigerant in a confined environment or near an open flame.**
7. **Use R134a specific equipment for recycling and filling. Always wear goggles when working.**
8. **Maintenance precautions:**
   (a) If the liquid refrigerant splashes into the eyes or onto the skin:
      (1) Wash these parts with plenty of cold water and do not rub eyes or skin.
      (2) Apply clean Vaseline to the skin.
      (3) Immediately go to the hospital for professional treatment.
9. **It is forbidden to heat the container for storing refrigerant or expose the container to open fire, and do not cause the container for storing refrigerant to fall or be impacted.**
10. **Do not run the compressor when the refrigerant in the refrigerant system is insufficient.**
11. **Take care not to add excessive refrigerant into the system.**
   (a) If the refrigerant is overfilled, it will cause problems such as insufficient cooling and compressor liquid impact.
12. **Pay attention to checking whether the A/C system leaks.**
   (a) The A/C system shall be checked for leakage on time in accordance with the owner's manual.
13. **Compressor oil.**
   (a) Compressor oil grade: SP-10 or equivalent.
   (b) Due to the high moisture absorption of the compressor oil, the A/C components should be immediately isolated from the air with plugs or plastic tape when they are removed.
14. **General precautions:**
   (a) When detecting the battery voltage during the test, do not keep the positive and negative probes of the detector too close to avoid short circuit.



Function check

1. Check compressor oil amount

(a) Replace the compressor.

(1) After the old compressor is removed, pour all the compressor oil in the compressor into the measuring cup (the poured oil X [g]).

(2) If the new compressor is pre-filled with compressor oil, pour all the compressor oil into a clean measuring cup.

(3) Add X[g] new oil (the same amount of oil poured out from the old compressor) to the new compressor.

(4) If no compressor oil is pre-filled in the new compressor, X[g] new oil needs to be added.

Hint:

The amount of oil pre-filled in the compressor is about 75 ml. During operation, prevent foreign matter and moisture from entering the compressor and compressor oil.

(b) Replace other A/C system assembly components

(1) When replacing the condenser, add about 20 ml of compressor oil.

(2) When installing a new evaporator, add 20 ml of compressor oil.

(3) When replacing the refrigerant pipeline, add 5 ml of compressor oil for each pipe replaced.

(c) Compressor oil specifications

(1) Use the specified compressor oil, otherwise the compressor will be damaged.

Applicable vehicle	**Compressor oil grade**	**Standard capacity**
Conventional vehicle	SP-10 or equivalent	75cm 3

2. Check condenser assembly

(a) When the radiator fins of the condenser assembly are dirty, clean them with water and then blow them dry with compressed air.

(b) When the radiator fins of the condenser assembly are bent, straighten them with screwdriver or pliers.

Caution:

Do not damage the condenser assembly fins.

3. Check whether the refrigerant gas leaks

(a) Use a halogen leak detector to check whether there is air leakage at the joint of the piping.

(b) When there is air leakage at the joint of piping, confirm the torque of standard parts for the joint of piping.

4. Change the refrigerant

(a) Recover the refrigerant in cooling system

(1) Start engine.

(2) Operate the cooler compressor under the conditions indicated below:

Item	Conditions
Engine speed	Idling
Operating time	Compressor runs for 5-6 minutes

Most of the compressor oil in the various parts of A/C system is collected into the A/C compressor.

(3) Shut down the engine.

(4) Recover refrigerant from A/C system using refrigerant recovery unit.

Hint:

Please follow the manufacturer's instructions to use the refrigerant recovery unit.

(b) Fill the A/C system with refrigerant

(1) Use a vacuum pump or suitable equipment for vacuum cleaning.

(2) Fill the A/C system with refrigerant.

Applicable vehicle	**Refrigerant designation**	**Filling volume**
Conventional vehicle	HFC-134a	550 g ± 15 (g)

Hint:

- The amount of old oil separated after the refrigerant is recovered by the refrigerant recovery machine is recorded as (Y [g]), then the same amount of new oil (Y [g]) is added to the A/C system, and then the vacuum pumping is started.

Hint:

When using the refrigerant recovery unit, make sure there is enough refrigerant to fill the system. The refrigerant recovery unit can not recover 100% of the refrigerant in the air conditioning system.

(c) Compressor warm-up

(1) Run the compressor at low speed for 3-5 minutes to warm up the compressor.

Hint:

When turning on the A/C after removing and installing the A/C system pipeline (including the compressor), be sure to warm up the compressor to prevent damage.

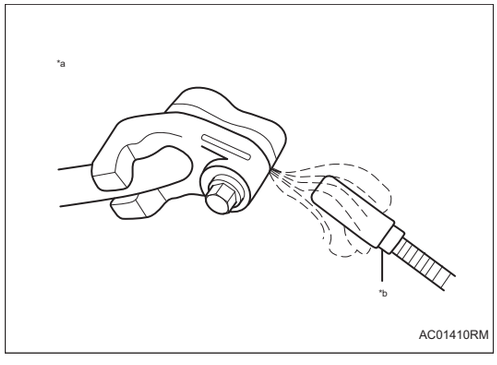
(d) Check whether the refrigerant is leaking.

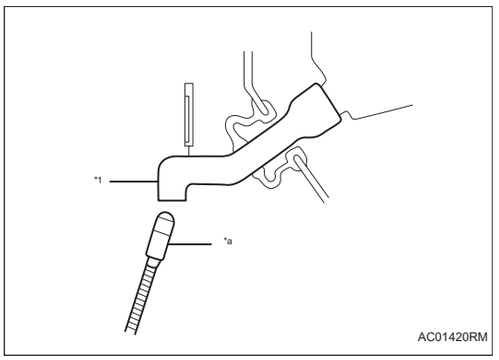
(1) After refilling the A/C system with refrigerant, check the refrigerant for leakage with a halogen leak detector.

(2) Test under the following conditions:

- Set the ignition switch to OFF position
- Ensure good ventilation (halogen leak detector may react to volatile gases that are not refrigerant, such as gasoline vapors and exhaust gases).
- Repeat the check two or three times.
- Measure the pressure to confirm that there is refrigerant remaining in the A/C system.

(3) Use the halogen leak detector to check the A/C system for refrigerant leakage.





(4) Power off the halogen leak detector, bring it close to the drain hose, and then turn on the detector.

Hint:

- After the blower motor stops, leave the cooling device under no load for more than 15 minutes.
- Place the halogen leak detector sensor under drain hose.
- When approaching the drain hose, ensure that the halogen leak detector does not react to volatile gases. If the interference of volatile gas cannot be avoided, the vehicle shall be raised to check for leakage.

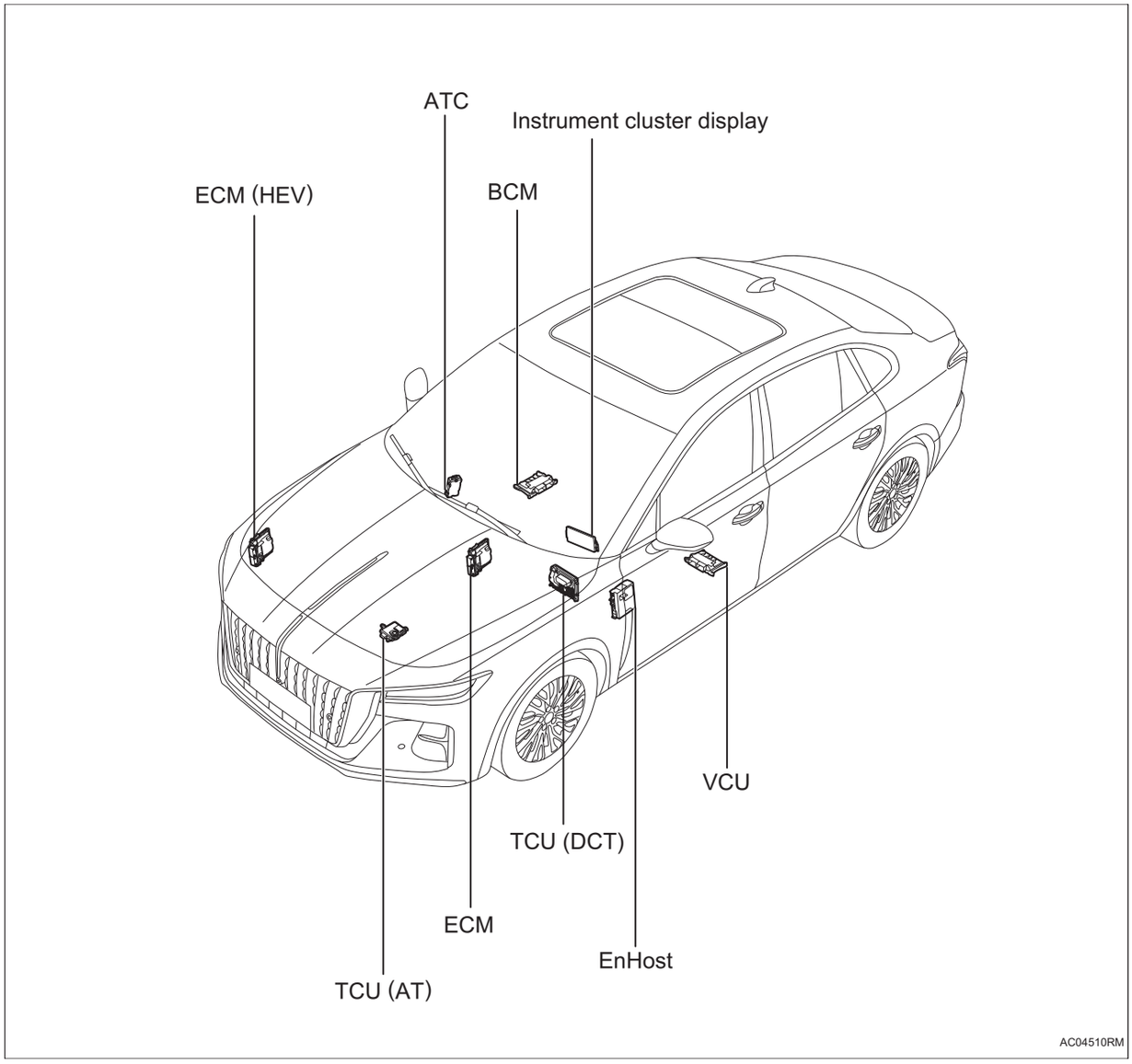
(5) If no refrigerant leakage is detected at the drain hose, remove the blower motor control unit from the cooling unit. Insert the halogen leak detector sensor into the unit and check for leaks.

(6) Disconnect the pressure sensor connector and condition it for about 20 minutes. Place the halogen leak detector sensor close to the pressure sensor and check for leaks.

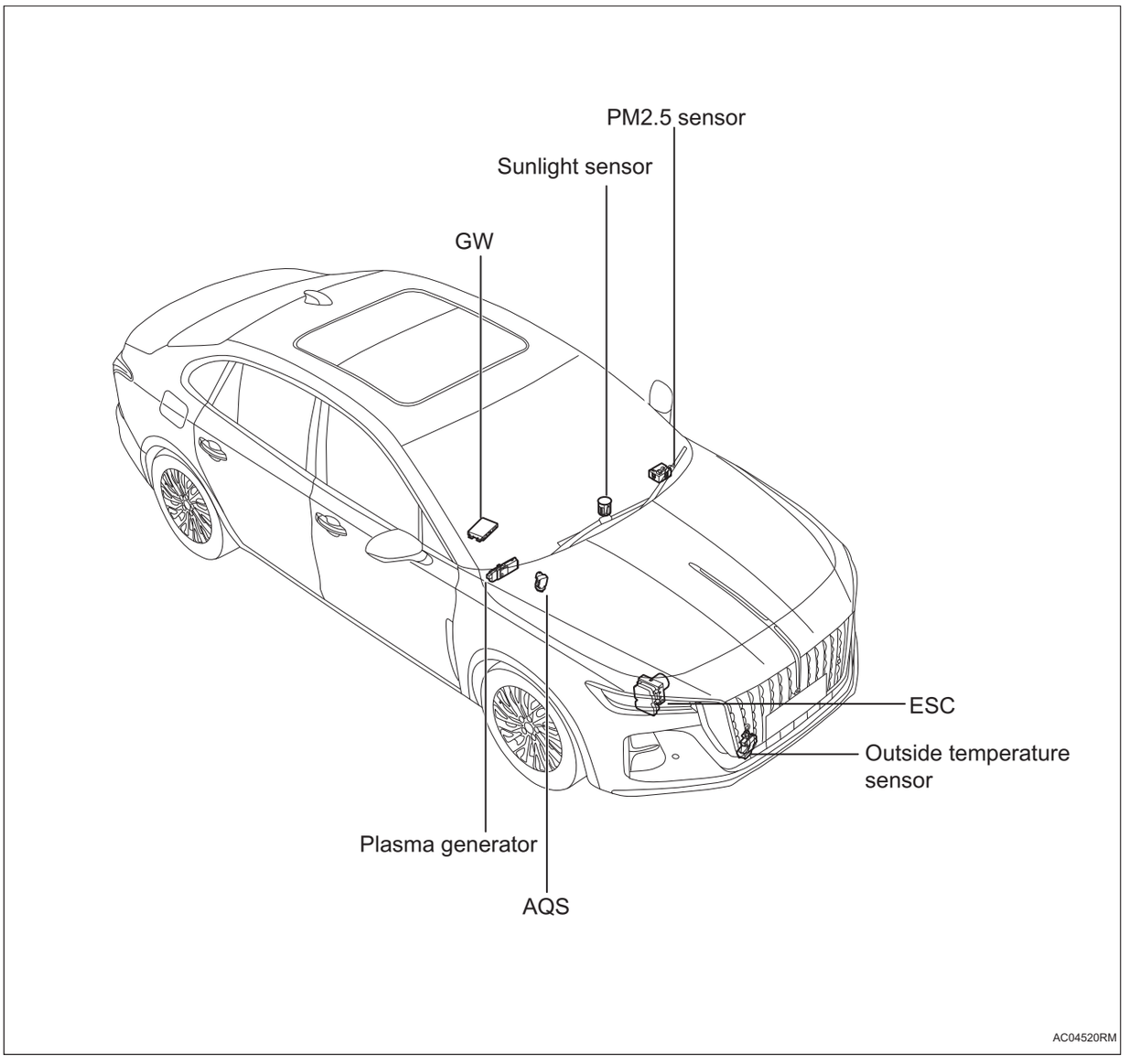
Hint:

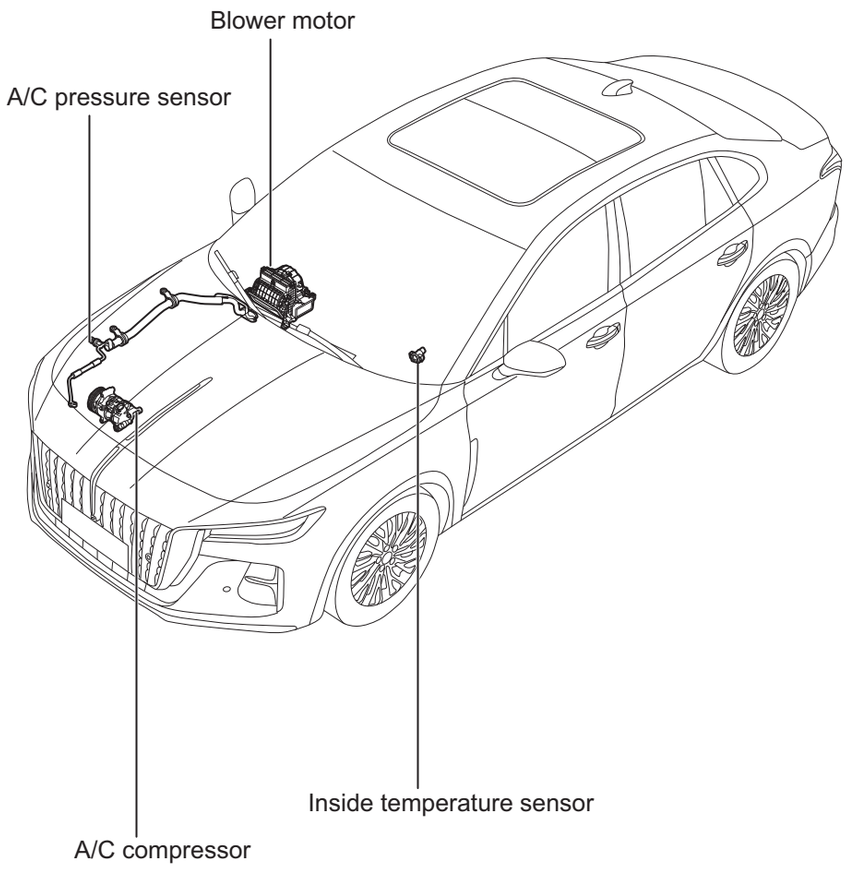
When checking for leakage, the presence of oil at the connection indicates that there is leakage.

Location of parts



AC

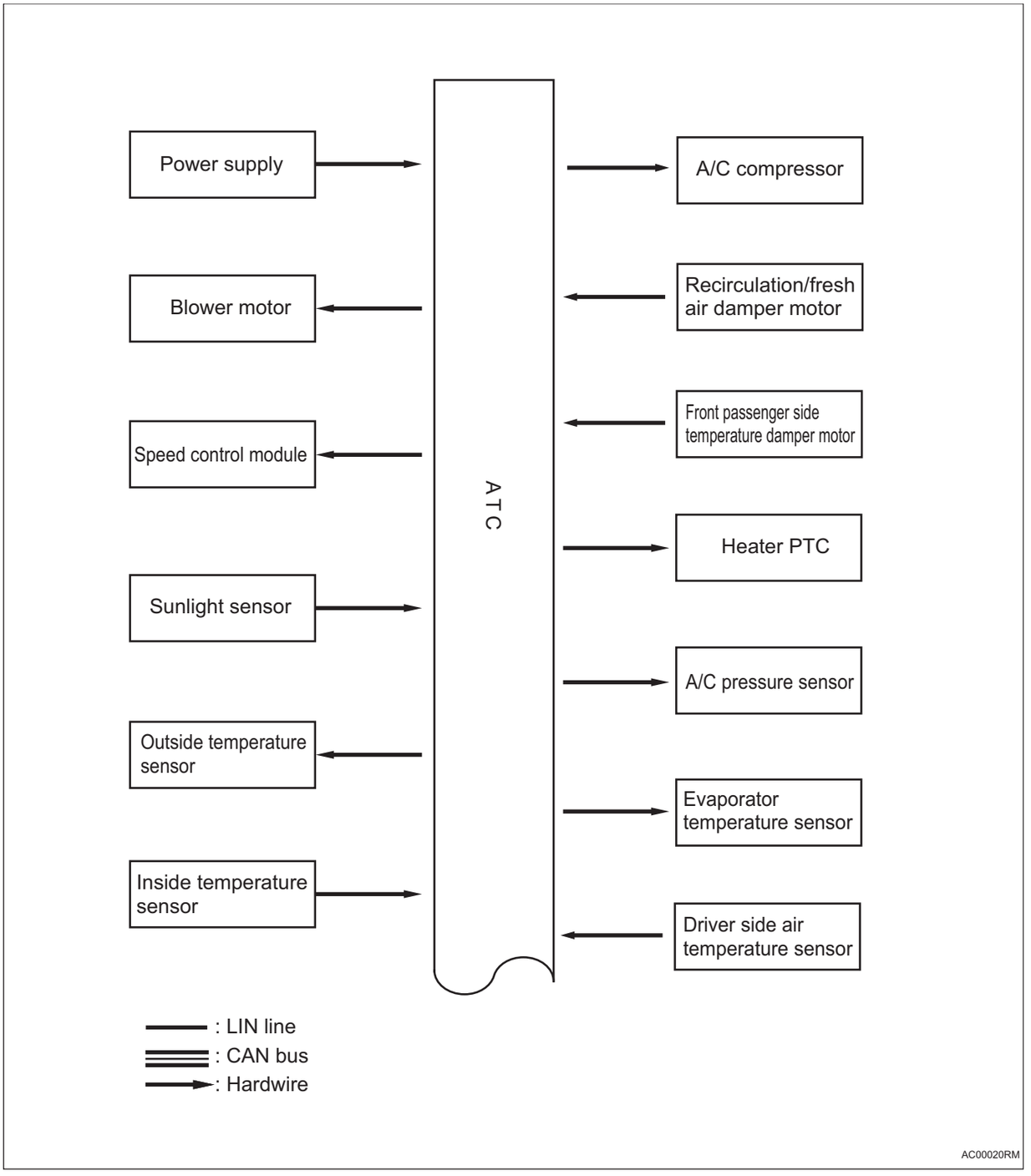

PM2.5 sensor
Sunlight sensor
GW
ESC
Outside temperature sensor
Plasma generator
AQS
AC04520RM

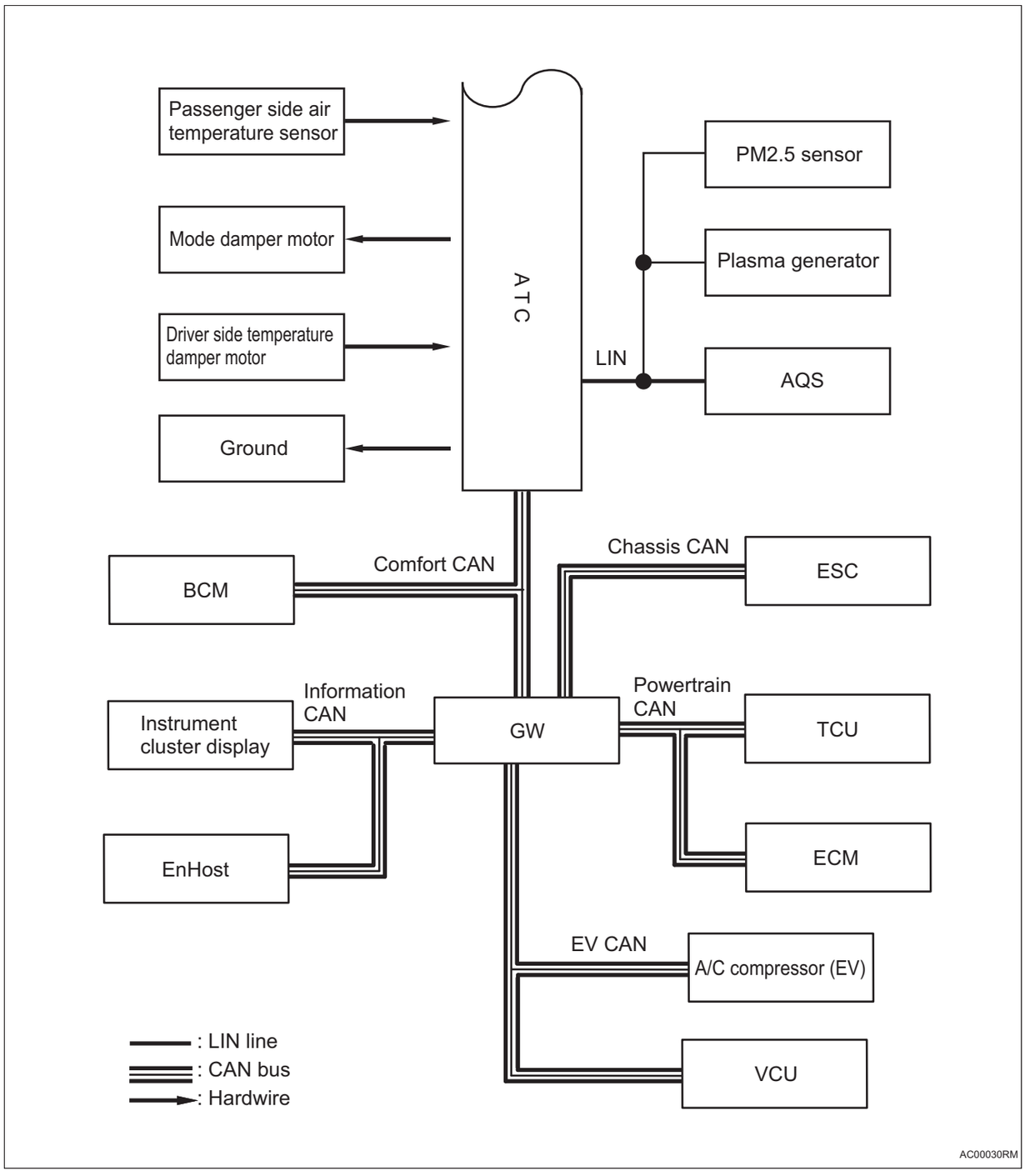

Blower motor
A/C pressure sensor
Inside temperature sensor
A/C compressor

AC04530RM

AC

System diagram




Passenger side air temperature sensor
Mode damper motor
Driver side temperature damper motor
Ground
ATC
LIN
PM2.5 sensor
Plasma generator
AQS
BCM
Comfort CAN
Chassis CAN
ESC
Instrument cluster display
Information CAN
GW
Powertrain CAN
TCU
EnHost
ECM
EV CAN
A/C compressor (EV)
VCU
: LIN line
: CAN bus
: Hardwire
AC00030RM

AC

System description

1. **Function brief description**

   (a) This vehicle is equipped with a dual temperature zone A/C system, which can provide the required driving environment for occupants by automatically adjusting the air outlet temperature, air volume, air outlet mode and air inlet mode according to the temperature set by the occupants in the vehicle, combined with the current interior temperature, ambient temperature, sunlight intensity, vehicle speed, water temperature and other environmental parameters.

   (b) Touch the IVI A/C setting column to enter the A/C interface.

   (c) The A/C system can be set through the A/C operation panel.

2. **AQS: The system automatically detects the air quality outside the vehicle. When the outside air is polluted, the A/C system automatically switches to recirculation to prevent the polluted air from entering the vehicle to ensure the air quality inside the vehicle.**

3. **Fragrance diffuser system: After selecting the appropriate fragrance diffuser mode and level, the system will cooperate with the A/C to improve the interior environment and improve the comfort of drivers and passengers.**

Symptom chart

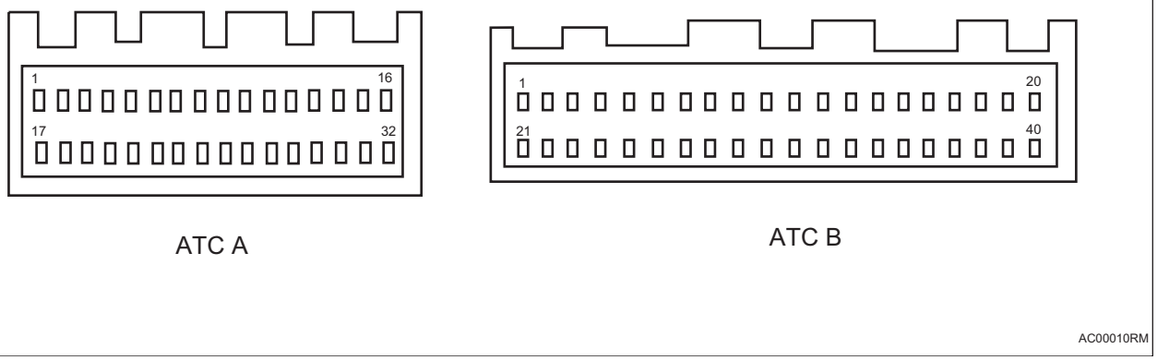
Fault	Possible location
A/C system inoperative	• Fuse • Related harness and connector • FCP • ATC
Switch operation failure	• FCP • ATC • Related harness and connector
Blower motor inoperative	• Blower • FCP • Related harness and connector • ATC • Speed control module

Fault	Possible location
Blower motor speed change failure	• Blower • FCP • Speed control module • ATC • Related harness and connector
No cold air	• Refrigerant capacity • Refrigerant pressure • A/C compressor • A/C harness assembly (evaporator downstream temperature sensor) • Temperature damper motor circuit (driver seat) • Temperature damper motor circuit (passenger seat) • A/C harness assembly circuit • Expansion valve • Cooling fan • Pressure sensor • Inside temperature sensor • Outside temperature sensor • ATC • FCP switch • CAN communication
No warm air	• Temperature damper motor circuit (driver seat) • Temperature damper motor circuit (passenger seat) • A/C harness assembly circuit • Heater PTC (for HEV model) • Electronic coolant pump (for HEV model) • Cooling system • Inside temperature sensor • Outside temperature sensor • ATC • CAN communication
Higher or lower than the set temperature	• Refrigerant capacity • Refrigerant pressure • Sunlight sensor • Inside temperature sensor • Outside temperature sensor • Temperature damper motor circuit (driver seat) • Temperature damper motor circuit (passenger seat) • Recirculation/fresh air damper servo motor circuit • Expansion valve • Cooling fan • ATC • CAN communication
Temperature adjustment failure	• ATC • FCP • CAN communication

Fault	Possible location
Unable to switch air outlet mode	• Mode damper motor circuit • FCP • ATC
Unable to switch air inlet mode	• Recirculation/fresh air damper motor circuit • FCP • ATC
Difference between left and right air outlet temperature (the same set temperature)	• Temperature damper motor circuit (driver seat) • Temperature damper motor circuit (passenger seat) • Sunlight sensor • ATC
No memory working state	• ATC

ECU terminal

ATC



ATC A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Ground	17	PTC Control (for HEV model)
2	—	18	—
3	—	19	—
4	—	20	—
5	Blower positive feedback	21	A/C relay
6	Blower negative feedback	22	—
7	Blower control signal	23	—
8	5V power supply	24	—
9	—	25	—
10	—	26	—
11	—	27	—
12	—	28	—
13	—	29	—
14	—	30	—
15	—	31	—
16	—	32	—

ATC B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Motor reference ground	21	Ground
2	Temperature and pressure sensor ground	22	—
3	—	23	—
4	Recirculation/fresh air damper servo motor position	24	—

ATC B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
5	Mode damper position feedback	25	—
6	Right air mixing damper position signal	26	—
7	Left air mixing damper position signal	27	—
8	Pressure signal	28	—
9	Front passenger side temperature sensor (for HEV model)	29	Mode motor panel air outlet → defroster
10	Driver side temperature sensor (for HEV model)	30	Right air mixing damper motor hot → cold
11	Right sunlight intensity signal	31	—
12	Left sunlight intensity signal	32	Mode motor defroster → panel air outlet
13	Outside temperature sensor	33	Air supply mode motor outer → inner
14	Evaporator temperature signal	34	Air supply mode motor inner → outer
15	Inside temperature sensor	35	—
16	—	36	Right air mixing damper motor cold → hot
17	LIN	37	Left air mixing damper motor hot → cold
18	CAN_L	38	Left air mixing damper motor cold → hot
19	CAN_H	39	External control compressor (for conventional vehicles)
20	Ground	40	B+

DTC chart

DTC	Description	Reference page
B130A14	Front passenger side floor air outlet temperature sensor circuit shorted to ground (for HEV model)	(See page AC-58)
B130A15	Front passenger side floor air outlet temperature sensor circuit shorted to power supply or open (for HEV model)	(See page AC-58)
B130B28	Large difference between blower voltage feedback value and target value	(See page AC-61)
B130C14	Pressure sensor circuit shorted to ground	(See page AC-65)
B130C15	Pressure sensor circuit shorted to power supply or open	(See page AC-65)
B130E19	Compressor fault	(See page AC-70)
B130F00	Electric compressor fault	(See page AC-74)
B130014	Driver side temperature adjusting motor circuit shorted to ground	(See page AC-19)

DTC	Description	Reference page
B130015	Driver side temperature adjusting motor circuit shorted to power supply or open	(See page AC-19)
B130071	Driver side temperature adjustment motor stalling	(See page AC-19)
B130114	Front passenger side temperature adjusting motor circuit shorted to ground	(See page AC-25)
B130115	Front passenger side temperature adjusting motor circuit shorted to power supply or open	(See page AC-25)
B130171	Front passenger side temperature adjustment motor stalling	(See page AC-25)
B130214	Air outlet mode adjusting motor circuit shorted to ground	(See page AC-31)
B130215	Air outlet mode adjusting motor circuit shorted to power supply or open	(See page AC-31)
B130271	Air outlet mode adjusting motor stalling	(See page AC-31)
B130314	Circulating damper motor circuit shorted to ground	(See page AC-36)
B130315	Circulating damper motor circuit shorted to power supply or open	(See page AC-36)
B130371	Circulating damper motor stalling	(See page AC-36)
B130414	Inside temperature sensor circuit shorted to ground	(See page AC-41)
B130415	Inside temperature sensor circuit shorted to power supply or open	(See page AC-41)
B130514	Outside temperature sensor circuit shorted to ground	(See page AC-45)
B130515	Outside temperature sensor circuit shorted to power supply or open	(See page AC-45)
B130614	Evaporator temperature sensor circuit shorted to ground	(See page AC-48)
B130615	Evaporator temperature sensor circuit shorted to power supply or open	(See page AC-48)
B130715	Driver side sunlight sensor circuit shorted to power supply	(See page AC-51)
B130815	Front passenger side sunlight sensor circuit shorted to power supply	(See page AC-51)
B130914	Driver side floor air outlet temperature sensor circuit shorted to ground (for HEV model)	(See page AC-55)
B130915	Driver side floor air outlet temperature sensor circuit shorted to power supply or open (for HEV model)	(See page AC-55)
B131087	Lost communication with AQS	(See page AC-76)
B131002	AQS response error	(See page AC-76)
B131187	Lost communication with PM2.5	(See page AC-79)
B131102	PM2.5 response error	(See page AC-79)
B131287	Lost communication with ION	(See page AC-84)
B131202	ION response error	(See page AC-84)

DTC	Description	Reference page
U300317	Control unit power supply overvoltage	(See page AC-90)
U300316	Control unit power supply undervoltage	(See page AC-90)
U002888	Comfort CAN bus off	(See page AC-89)
U014687	GW node lost	(See page AC-89)
U014087	BCM 1 node lost	(See page AC-89)
U010287	A/C compressor node lost	(See page AC-89)
U112187	ESP message lost	(See page AC-89)
U110087	ECM message lost	(See page AC-89)
U124587	IVI message lost	(See page AC-89)
U115587	Instrument cluster control unit message lost	(See page AC-89)
U110187	TCU message lost	(See page AC-89)
U129387	HCU message lost	(See page AC-89)
U114687	GW message lost	(See page AC-89)

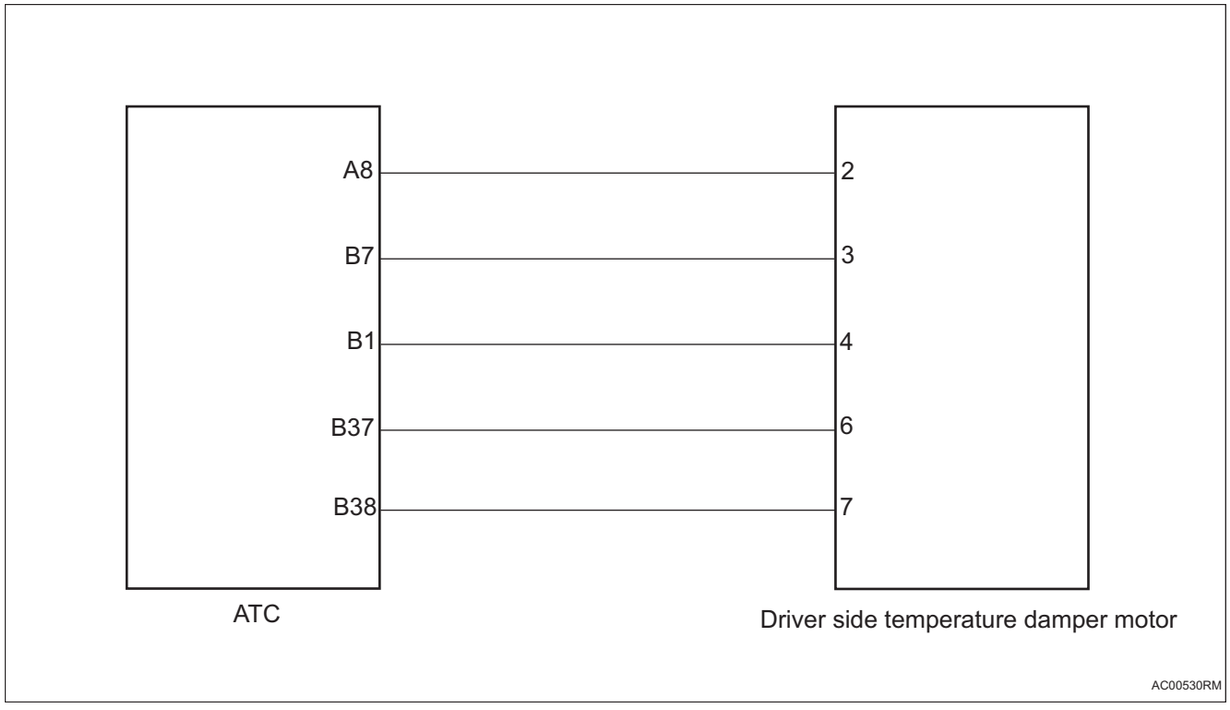
DTC	B130014	Driver side temperature adjusting motor circuit shorted to ground
DTC	B130015	Driver side temperature adjusting motor circuit shorted to power supply or open
DTC	B130071	Driver side temperature adjustment motor stalling

Description

When the driver side temperature damper motor circuit is shorted or open or the motor is stalling, the ATC records the DTC.

DTC	DTC detection conditions	Faulty location
B130014	(a) Motor circuit shorted to power supply.	• ATC • Harness and connector • Driver side temperature damper motor
B130015	(a) Motor circuit shorted to ground or open.	• ATC • Harness and connector • Driver side temperature damper motor
B130071	(a) Motor stalling.	• Damper actuator • Damper flap • Harness and connector • Driver side temperature damper motor

Circuit diagram



Inspection procedure

1	Check damper actuator, damper flap and motor

(a) Check whether the damper actuator is running smoothly.

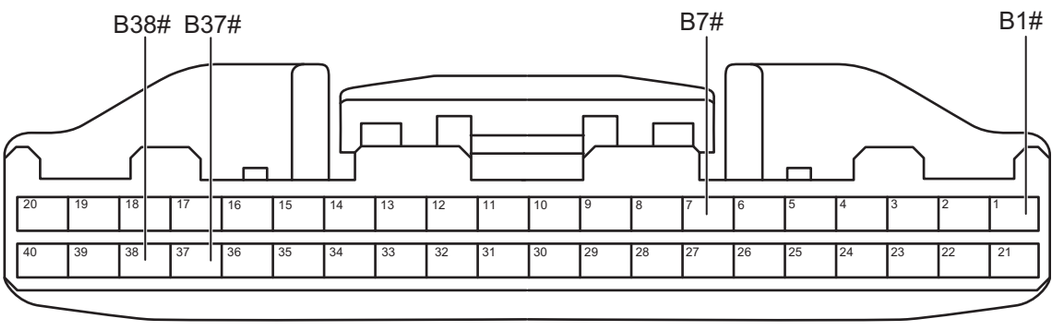
(b) Check the damper flap for seizure.

(c) Check whether the appearance of the motor is deformed and whether the rotation is smooth.

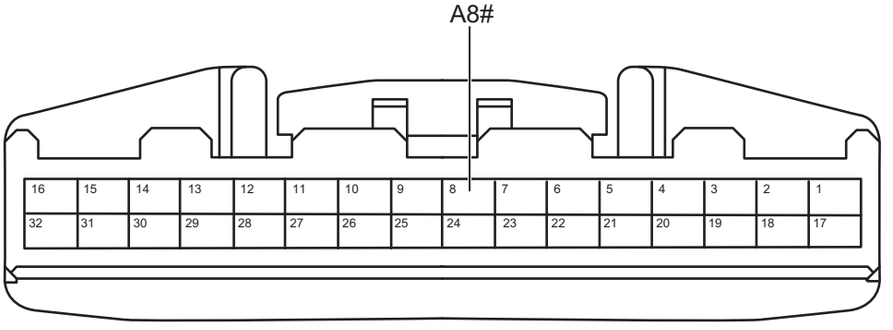
NG → **Replace faulty components**

OK

2	Check driver side temperature damper motor harness and connector for open circuit

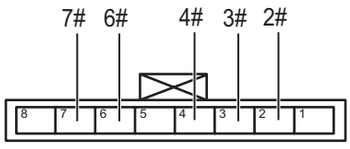


ATC B connector



ATC A connector

AC00541RM



Driver side temperature damper motor connector

AC00550RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ATC connector.

(d) Disconnect the driver side temperature damper motor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

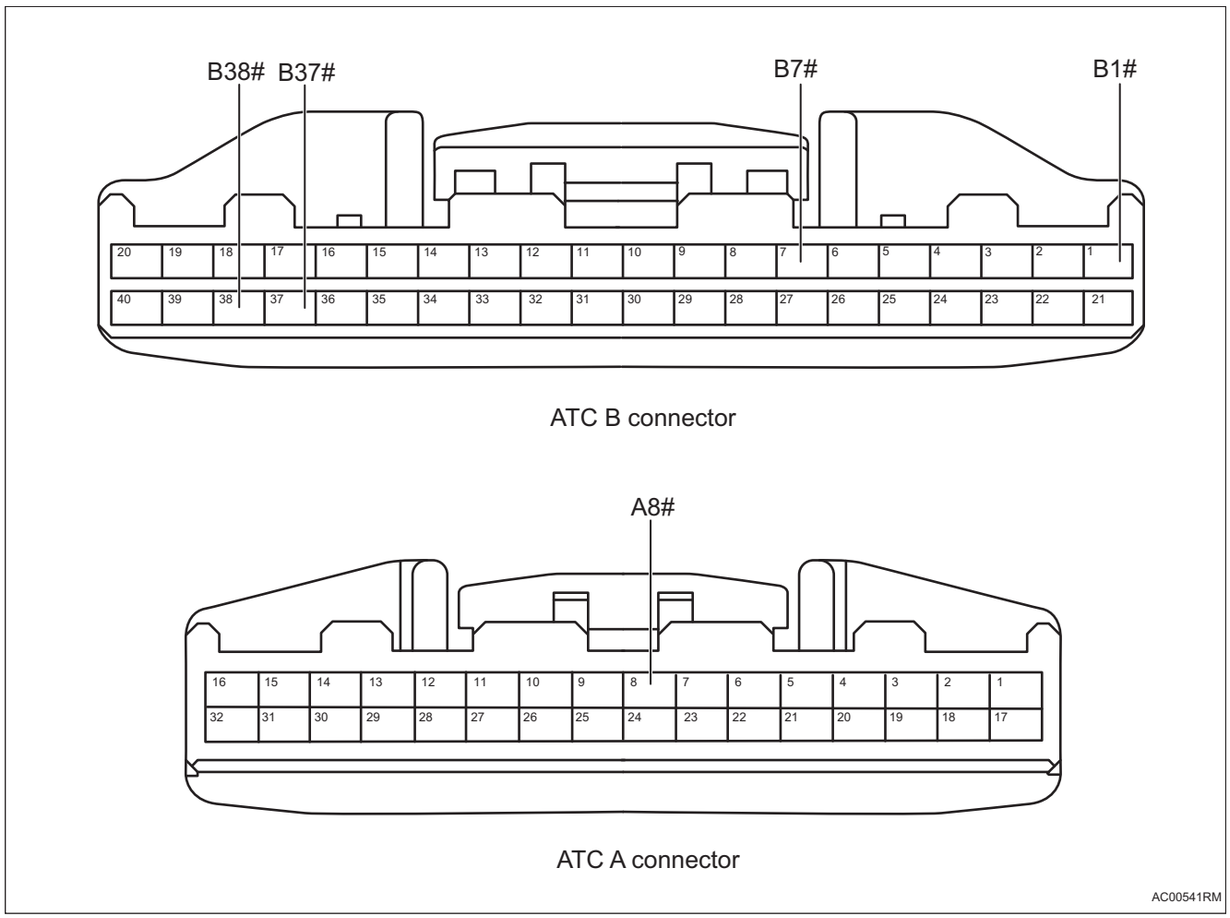
Detector connection	Detection conditions	Specified state
ATC connector A8# -driver side temperature damper motor connector 2#	Always connected	Less than 1Ω
ATC connector B7# -driver side temperature damper motor connector 3#	Always connected	Less than 1Ω
ATC connector B1# -driver side temperature damper motor connector 4#	Always connected	Less than 1Ω
ATC connector B37# -driver side temperature damper motor connector 6#	Always connected	Less than 1Ω
ATC connector B38# -driver side temperature damper motor connector 7#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	**Check driver side temperature damper motor harness and connector for circuit shorted to ground**

AC



(a) Measure the resistance according to the values in the table below.

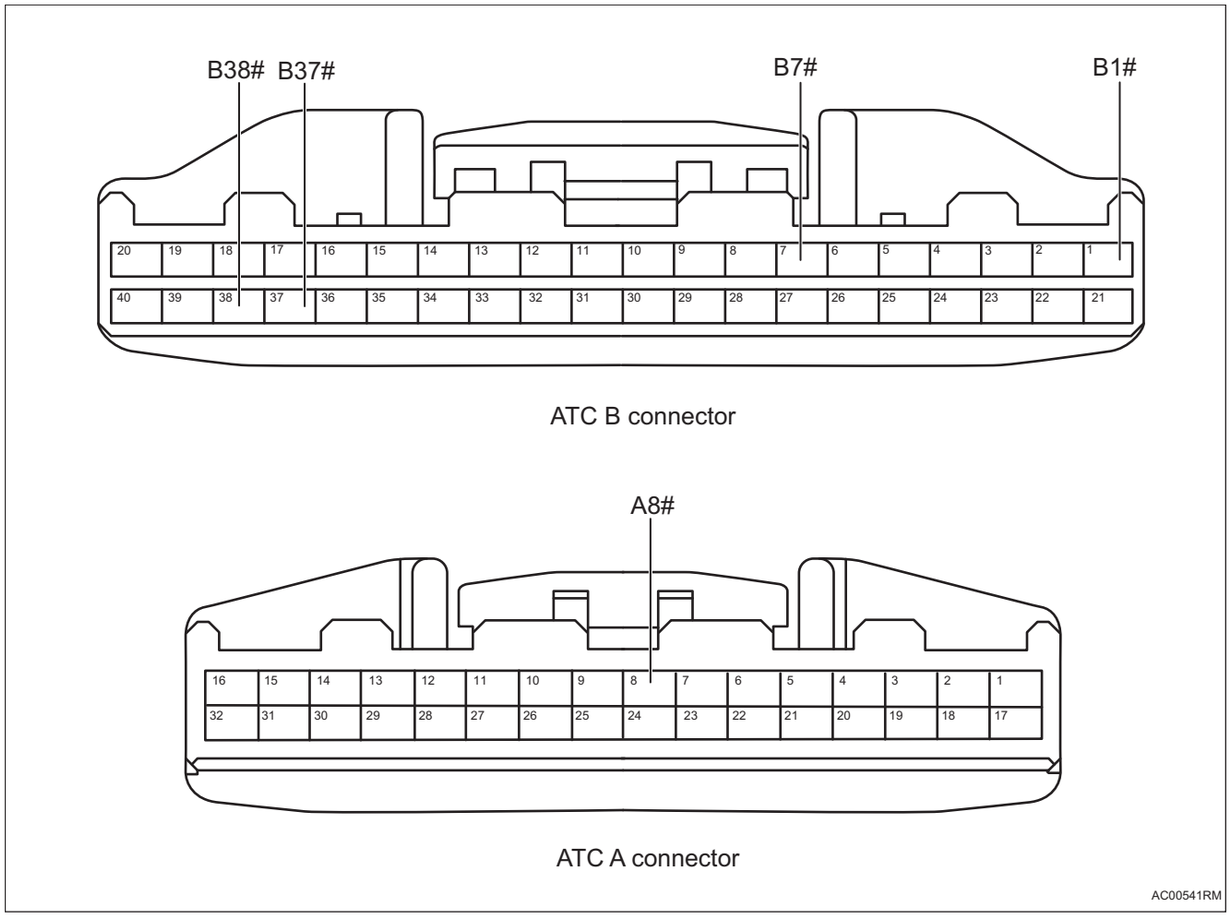
Standard value

Detector connection	Detection conditions	Specified state
ATC connector A8# -body GND	Always connected	10 KΩ or greater
ATC connector B1# -body GND	Always connected	10 KΩ or greater
ATC connector B7# -body GND	Always connected	10 KΩ or greater
ATC connector B37# -body GND	Always connected	10 KΩ or greater
ATC connector B38# -body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

4	Check driver side temperature damper motor harness and connector for circuit shorted to power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ATC connector A8# -body GND	The ignition switch is set to "ON"	Less than 1 V
ATC connector B1# -body GND	The ignition switch is set to "ON"	Less than 1 V
ATC connector B7# -body GND	The ignition switch is set to "ON"	Less than 1 V
ATC connector B37# -body GND	The ignition switch is set to "ON"	Less than 1 V

Detector connection	Detection conditions	Specified state
ATC connector B38# -body GND	The ignition switch is set to "ON"	Less than 1 V

AC

NG → **Repair or replace the harness and connector**

OK

5	**Replace the driver side temperature damper motor (See page AC-141)**

(a) Replace the driver side temperature damper motor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace the ATC (See page AC-101)**

OK

6	**End**

DTC	B130114	Front passenger side temperature adjusting motor circuit shorted to ground
DTC	B130115	Front passenger side temperature adjusting motor circuit shorted to power supply or open
DTC	B130171	Front passenger side temperature adjustment motor stalling

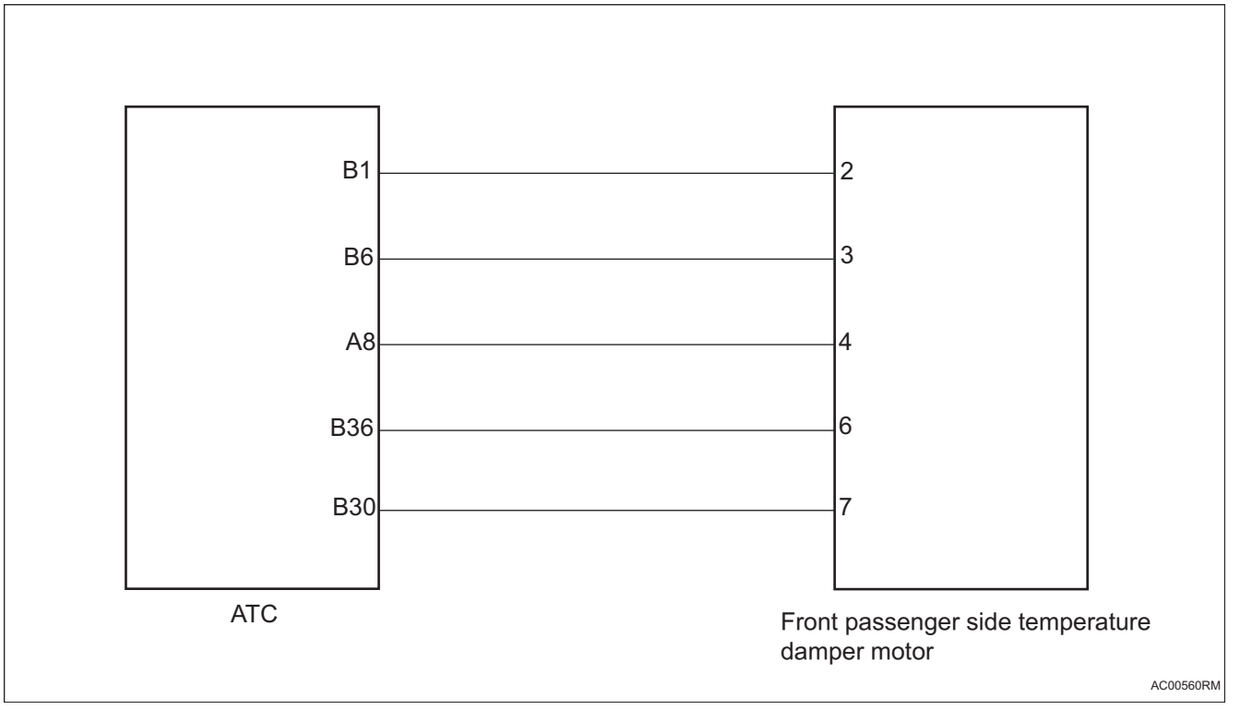
Description

When the front passenger side temperature damper motor circuit is shorted or open or the motor is stalling, the ATC records the DTC.

DTC	DTC detection conditions	Faulty location
B130114	(a) Motor circuit shorted to power supply.	• ATC • Harness and connector • Front passenger side temperature damper motor
B130115	(a) Motor circuit shorted to ground or open.	• ATC • Harness and connector • Front passenger side temperature damper motor
B130171	(a) Motor stalling.	• Damper actuator • Damper flap • Harness and connector • Front passenger side temperature damper motor

AC

Circuit diagram



Inspection procedure

1	**Check damper actuator, damper flap and motor**

(a) Check whether the damper actuator is running smoothly.

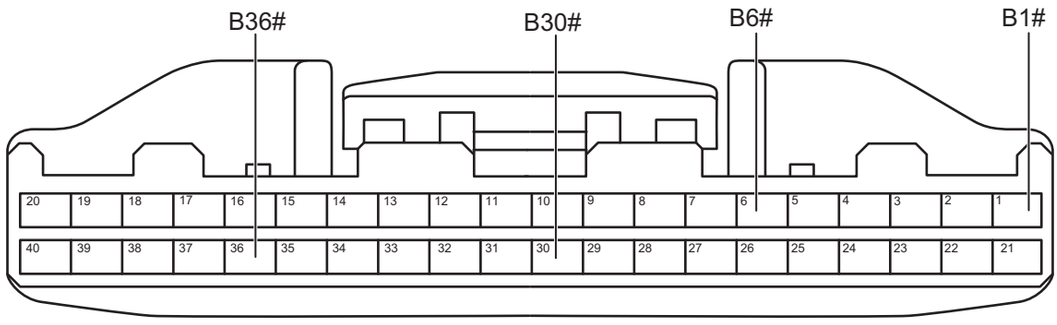
(b) Check the damper flap for seizure.

(c) Check whether the appearance of the motor is deformed and whether the rotation is smooth.

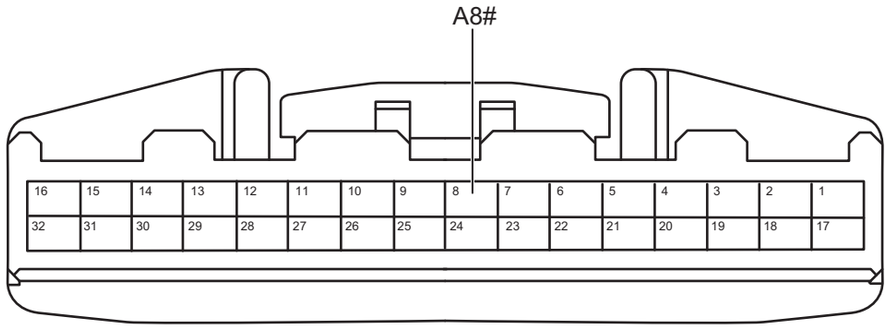
NG → **Replace faulty components**

OK

2	**Check front passenger side temperature damper motor harness and connector for open circuit**

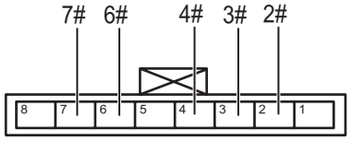


ATC B connector



ATC A connector

AC00571RM



Front passenger side temperature damper motor connector

AC00581RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ATC connector.

(d) Disconnect the front passenger side temperature damper motor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

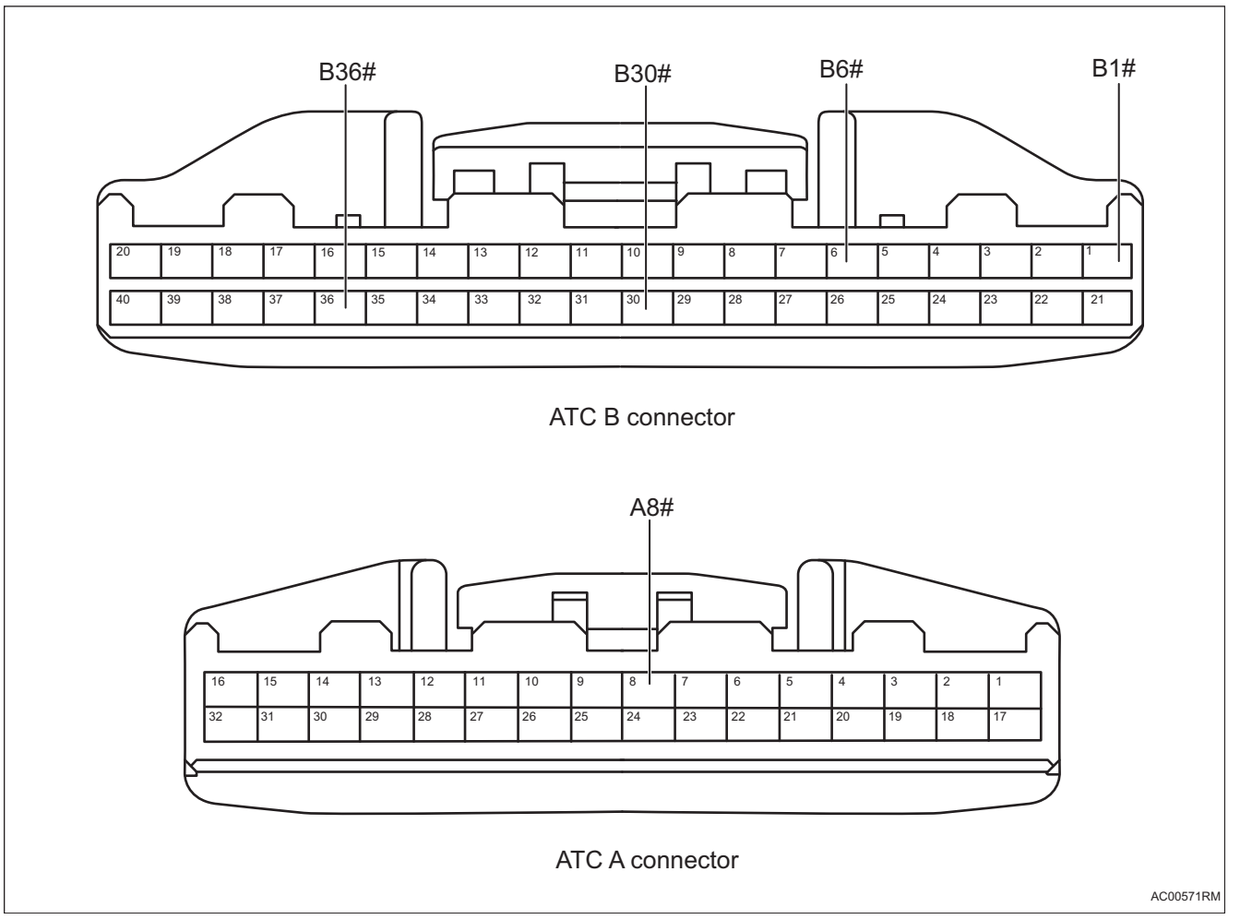
Detector connection	Detection conditions	Specified state
ATC connector B1# -front passenger side temperature damper motor connector 2#	Always connected	Less than 1Ω
ATC connector B6# -front passenger side temperature damper motor connector 3#	Always connected	Less than 1Ω
ATC connector A8# -front passenger side temperature damper motor connector 4#	Always connected	Less than 1Ω
ATC connector B36# -front passenger side temperature damper motor connector 6#	Always connected	Less than 1Ω
ATC connector B30# -front passenger side temperature damper motor connector 7#	Always connected	Less than 1Ω

NG | **Repair or replace the harness and connector**

OK

AC

3	**Check front passenger side temperature damper motor harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

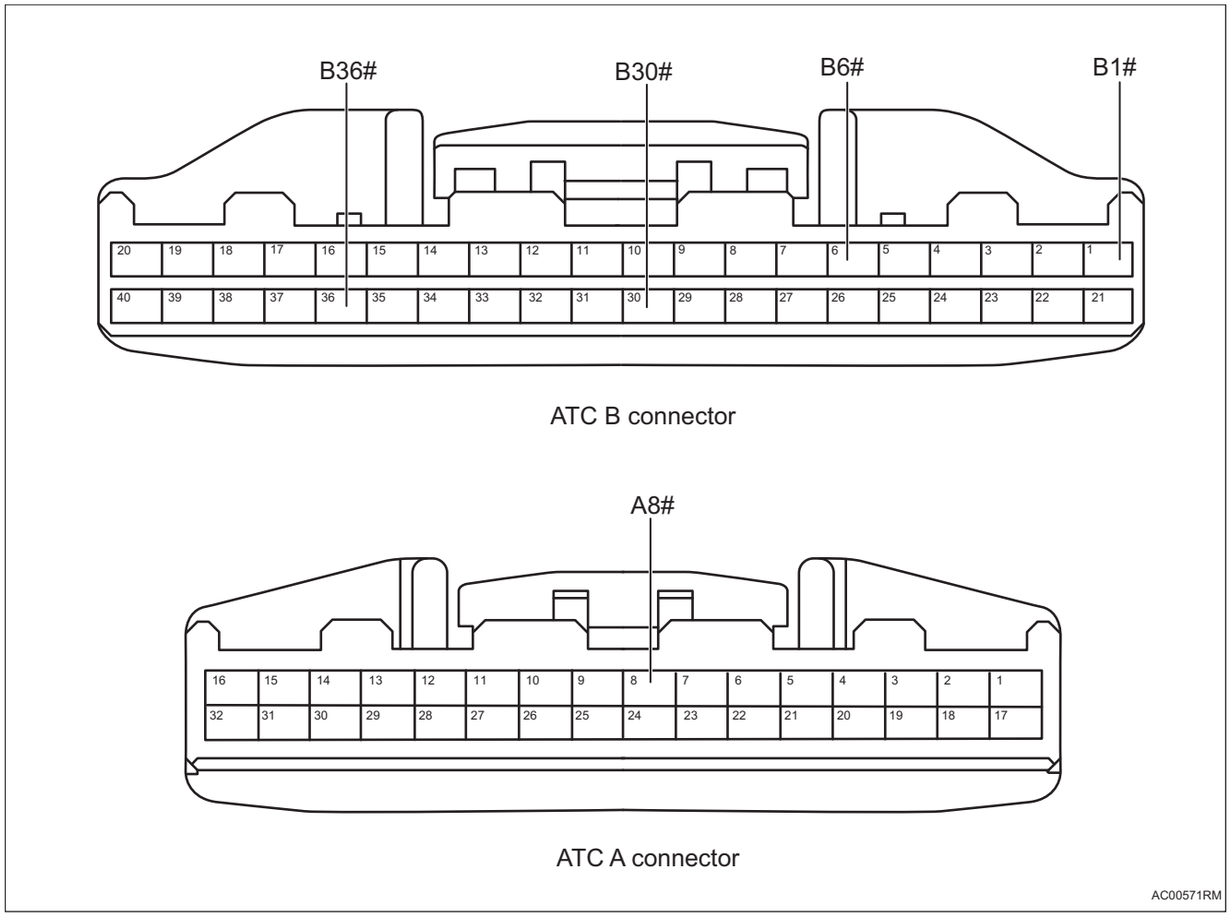
Standard value

Detector connection	Detection conditions	Specified state
ATC connector A8# -body GND	Always connected	10 KΩ or greater
ATC connector B1# -body GND	Always connected	10 KΩ or greater
ATC connector B6# -body GND	Always connected	10 KΩ or greater
ATC connector B30# -body GND	Always connected	10 KΩ or greater
ATC connector B36# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check front passenger side temperature damper motor harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ATC connector A8# -body GND	The ignition switch is set to "ON"	Less than 1 V
ATC connector B1# -body GND	The ignition switch is set to "ON"	Less than 1 V

Detector connection	Detection conditions	Specified state
ATC connector B6# -body GND	The ignition switch is set to "ON"	Less than 1 V
ATC connector B30# -body GND	The ignition switch is set to "ON"	Less than 1 V
ATC connector B36# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the front passenger side temperature damper motor (See page AC-141)**

(a) Replace the front passenger side temperature damper motor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace the ATC (See page AC-101)**

OK

6	**End**

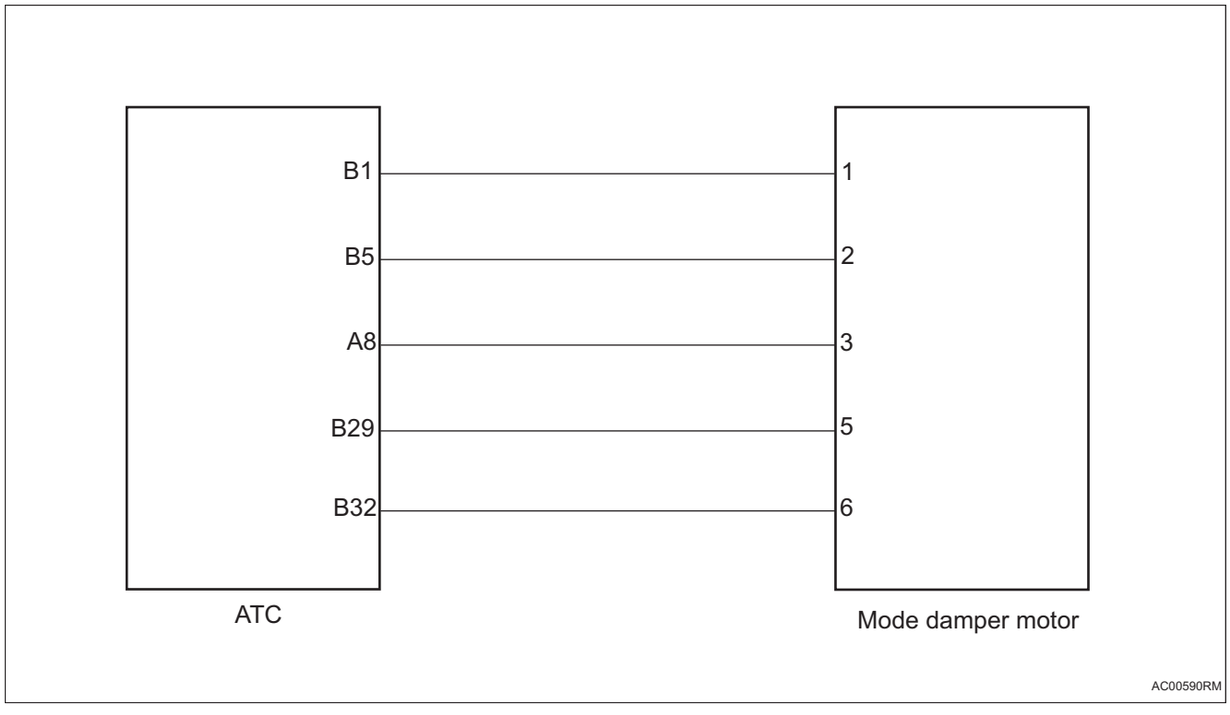
DTC	B130214	Air outlet mode adjusting motor circuit shorted to ground
DTC	B130215	Air outlet mode adjusting motor circuit shorted to power supply or open
DTC	B130271	Air outlet mode adjusting motor stalling

Description

When the mode damper motor circuit is shorted or open or the motor is stalling, the ATC records the DTC.

DTC	DTC detection conditions	Faulty location
B130214	(a) Motor circuit shorted to power supply.	• ATC • Harness and connector • Mode damper motor
B130215	(a) Motor circuit shorted to ground or open.	• ATC • Harness and connector • Mode damper motor
B130271	(a) Motor stalling.	• Damper actuator • Damper flap • Harness and connector • Mode damper motor

Circuit diagram



Inspection procedure

1	Check damper actuator, damper flap and motor

(a) Check whether the damper actuator is running smoothly.

(b) Check the damper flap for seizure.

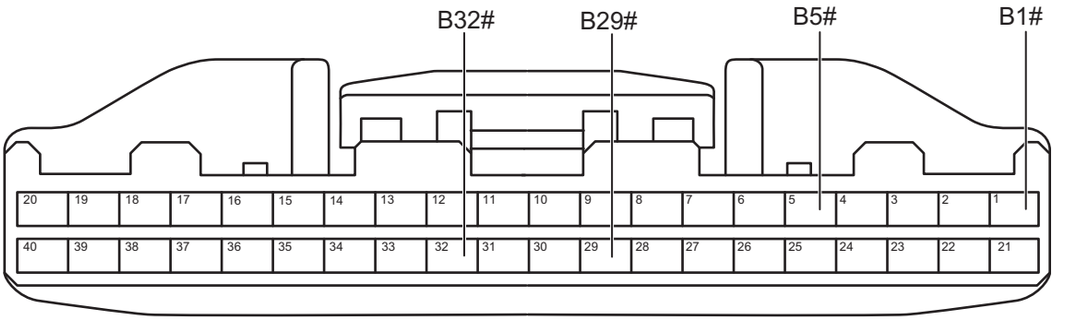
(c) Check whether the appearance of the motor is deformed and whether the rotation is smooth.

AC

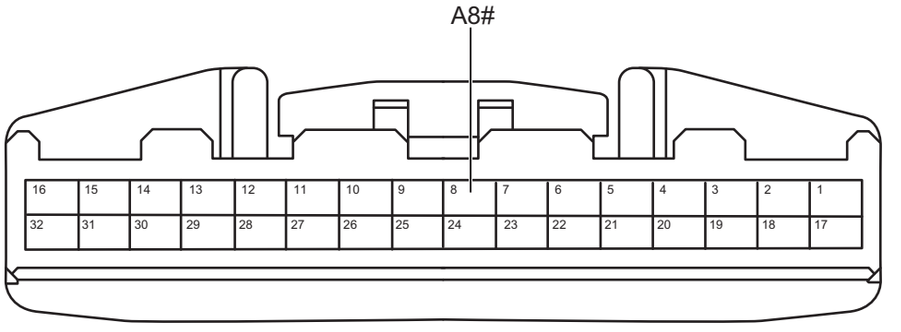
NG | **Replace faulty components**

OK

2	**Check mode damper motor harness and connector for open circuit**

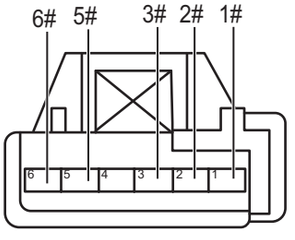


ATC B connector



ATC A connector

AC00601RM



Mode damper motor connector

AC00610RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ATC connector.

(d) Disconnect the mode damper motor connector.

(e) Measure the resistance according to the values in the table below.

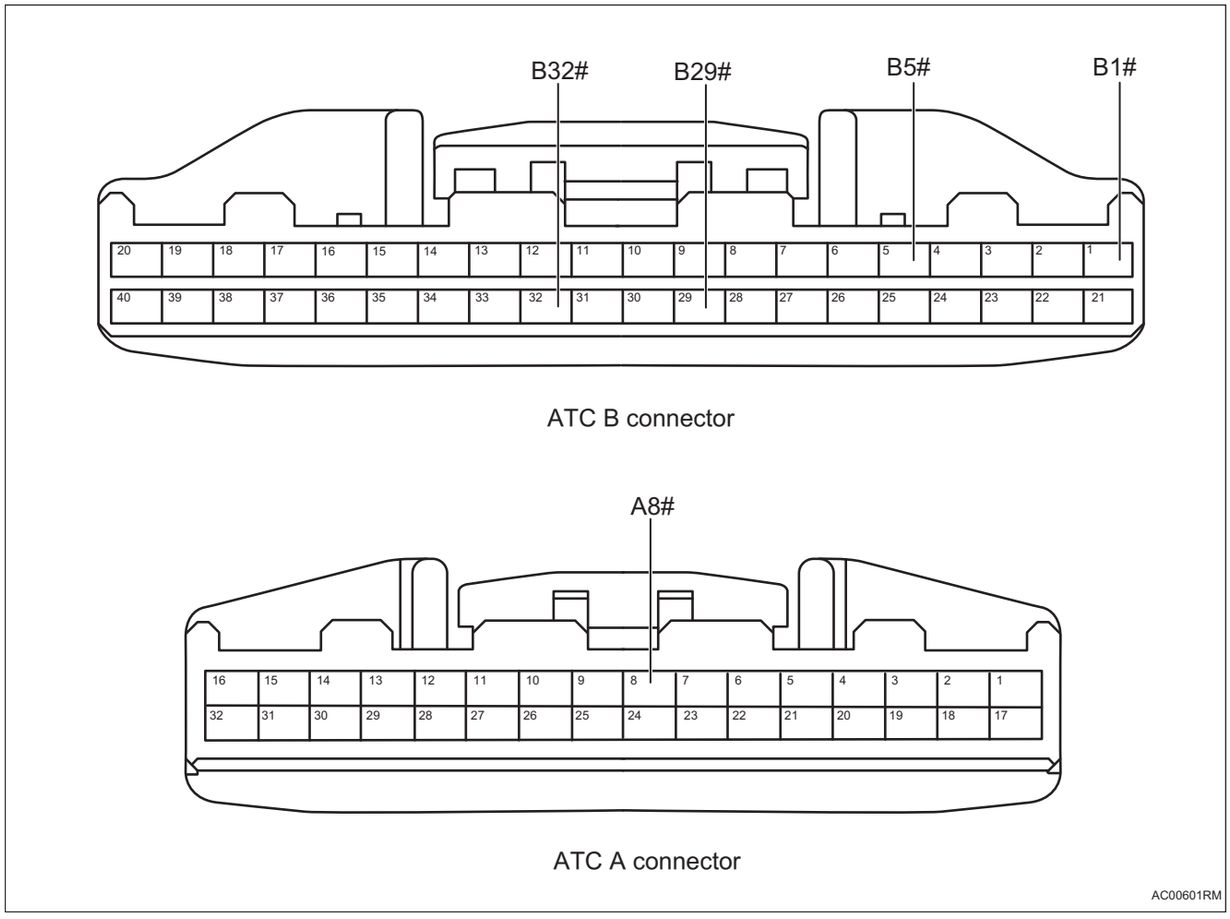
Standard value

Detector connection	Detection conditions	Specified state
ATC connector B1# -mode damper motor connector 1#	Always connected	Less than 1Ω
ATC connector B5# -mode damper motor connector 2#	Always connected	Less than 1Ω
ATC connector A8# -mode damper motor connector 3#	Always connected	Less than 1Ω
ATC connector B29# -mode damper motor connector 5#	Always connected	Less than 1Ω
ATC connector B32# -mode damper motor connector 6#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	Check mode damper motor harness and connector for circuit shorted to ground



(a) Measure the resistance according to the values in the table below.

Standard value

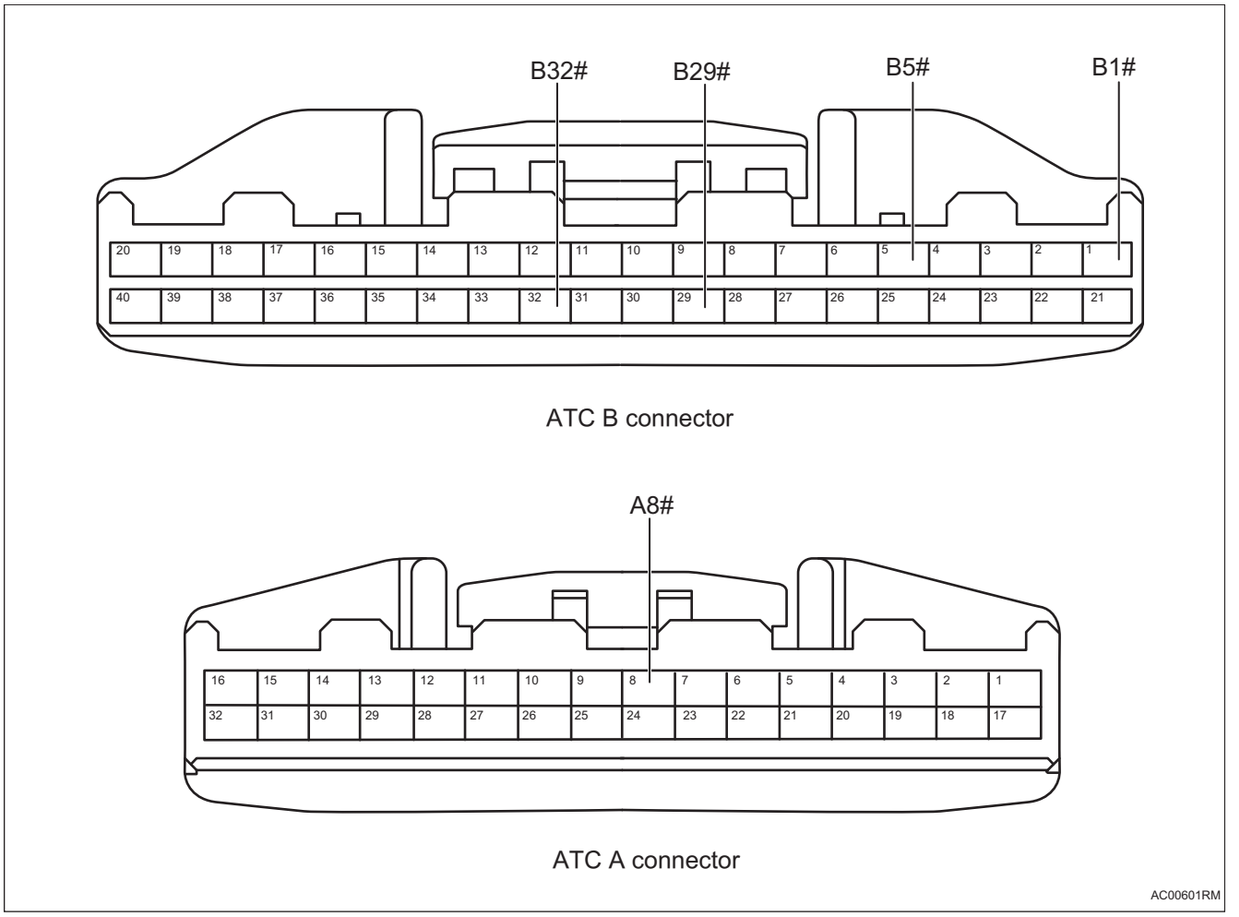
AC

Detector connection	Detection conditions	Specified state
ATC connector A8# -body GND	Always connected	10 KΩ or greater
ATC connector B1# -body GND	Always connected	10 KΩ or greater
ATC connector B5# -body GND	Always connected	10 KΩ or greater
ATC connector B29# -body GND	Always connected	10 KΩ or greater
ATC connector B32# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check mode damper motor harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ATC connector A8# -body GND	The ignition switch is set to "ON"	Less than 1 V
ATC connector B1# -body GND	The ignition switch is set to "ON"	Less than 1 V
ATC connector B5# -body GND	The ignition switch is set to "ON"	Less than 1 V
ATC connector B29# -body GND	The ignition switch is set to "ON"	Less than 1 V
ATC connector B32# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the mode damper motor (See page AC-141)**

(a) Replace the mode damper motor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace the ATC (See page AC-101)**

OK

6	**End**

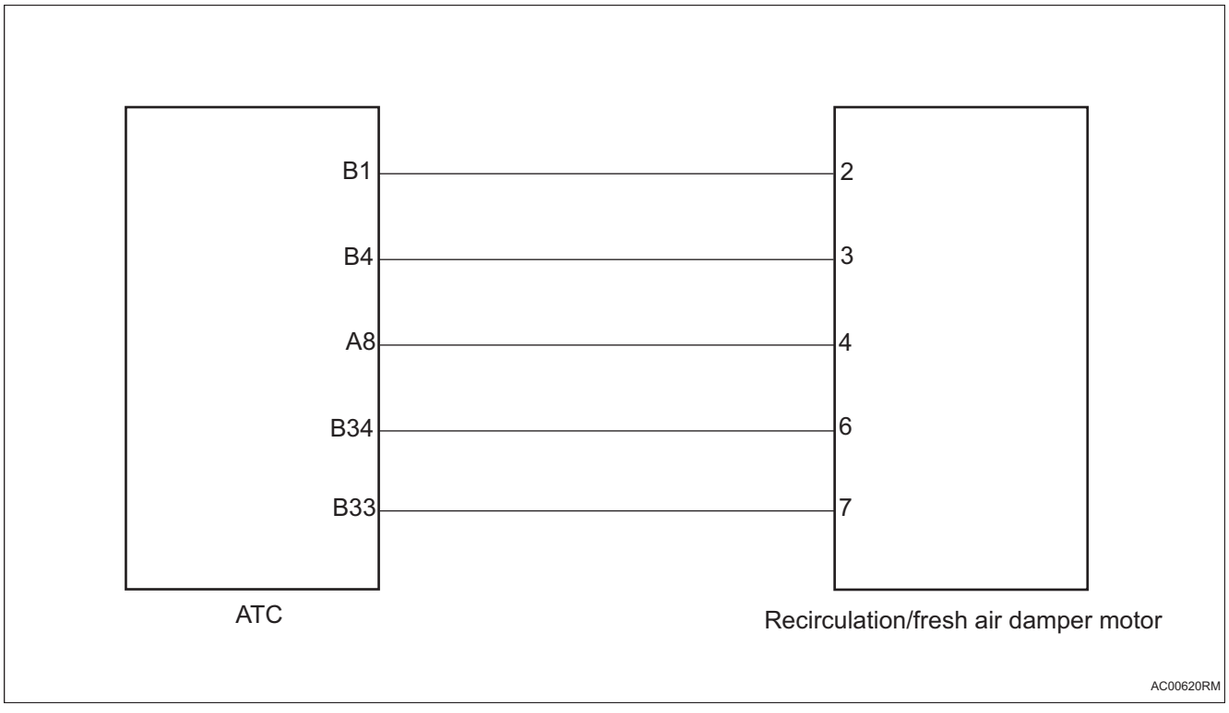
DTC	B130314	Circulating damper motor circuit shorted to ground
DTC	B130315	Circulating damper motor circuit shorted to power supply or open
DTC	B130371	Circulating damper motor stalling

Description

When the recirculation/fresh air damper motor circuit is shorted or open and the motor is stalling, the ATC records the DTC.

DTC	DTC detection conditions	Faulty location
B130314	(a) Motor circuit shorted to power supply.	• ATC • Harness and connector • Recirculation/fresh air damper motor
B130315	(a) Motor circuit shorted to ground or open.	• ATC • Harness and connector • Recirculation/fresh air damper motor
B130371	(a) Motor stalling.	• Damper actuator • Damper flap • Harness and connector • Recirculation/fresh air damper motor

Circuit diagram



Inspection procedure

1	Check damper actuator, damper flap and motor

(a) Check whether the damper actuator is running smoothly.

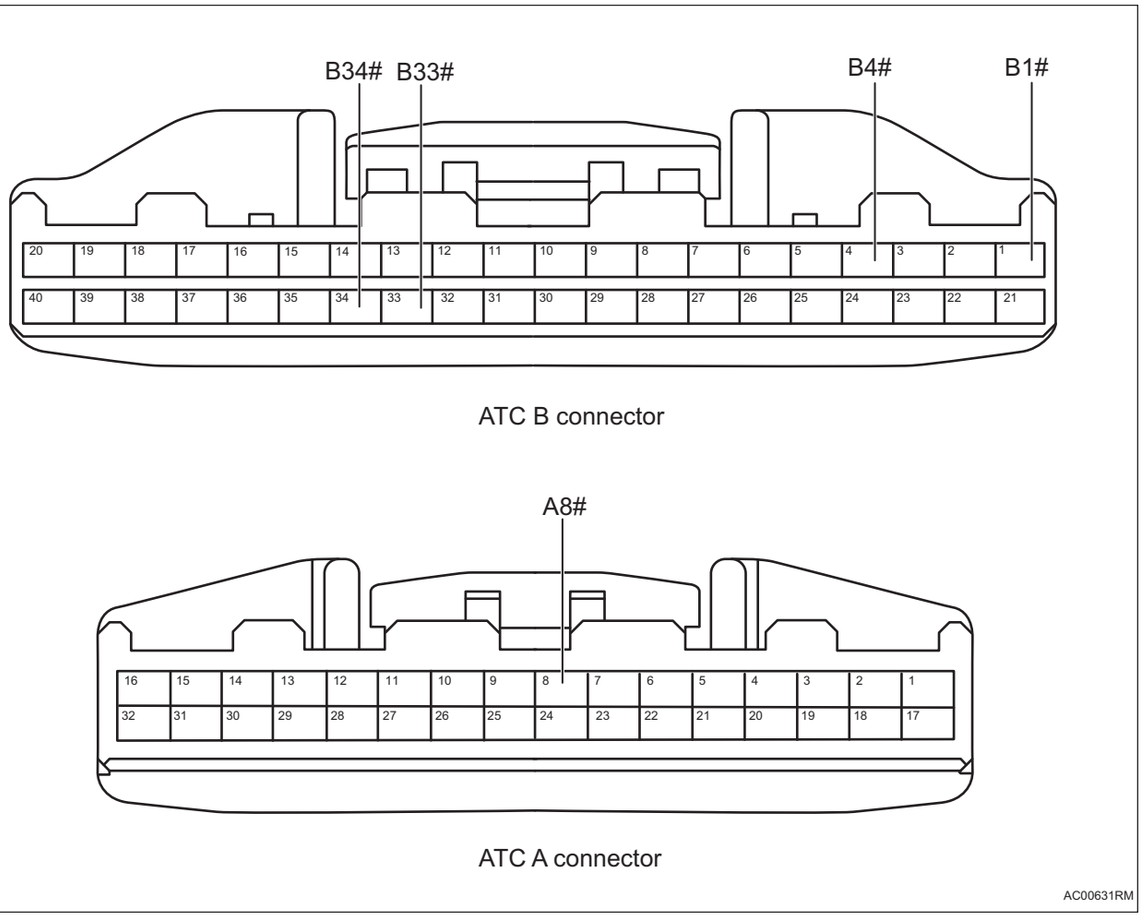
(b) Check the damper flap for seizure.

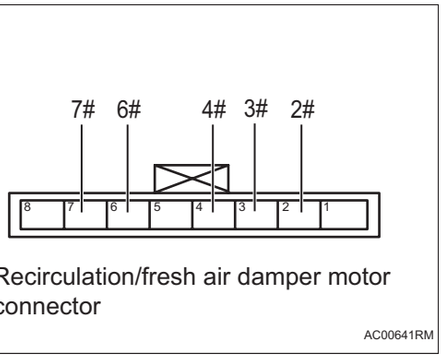
(c) Check whether the appearance of the motor is deformed and whether the rotation is smooth.

NG → **Replace faulty components**

OK

2	**Check recirculation/fresh air damper motor harness and connector for open circuit**





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ATC connector.

(d) Disconnect the recirculation/fresh air damper motor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

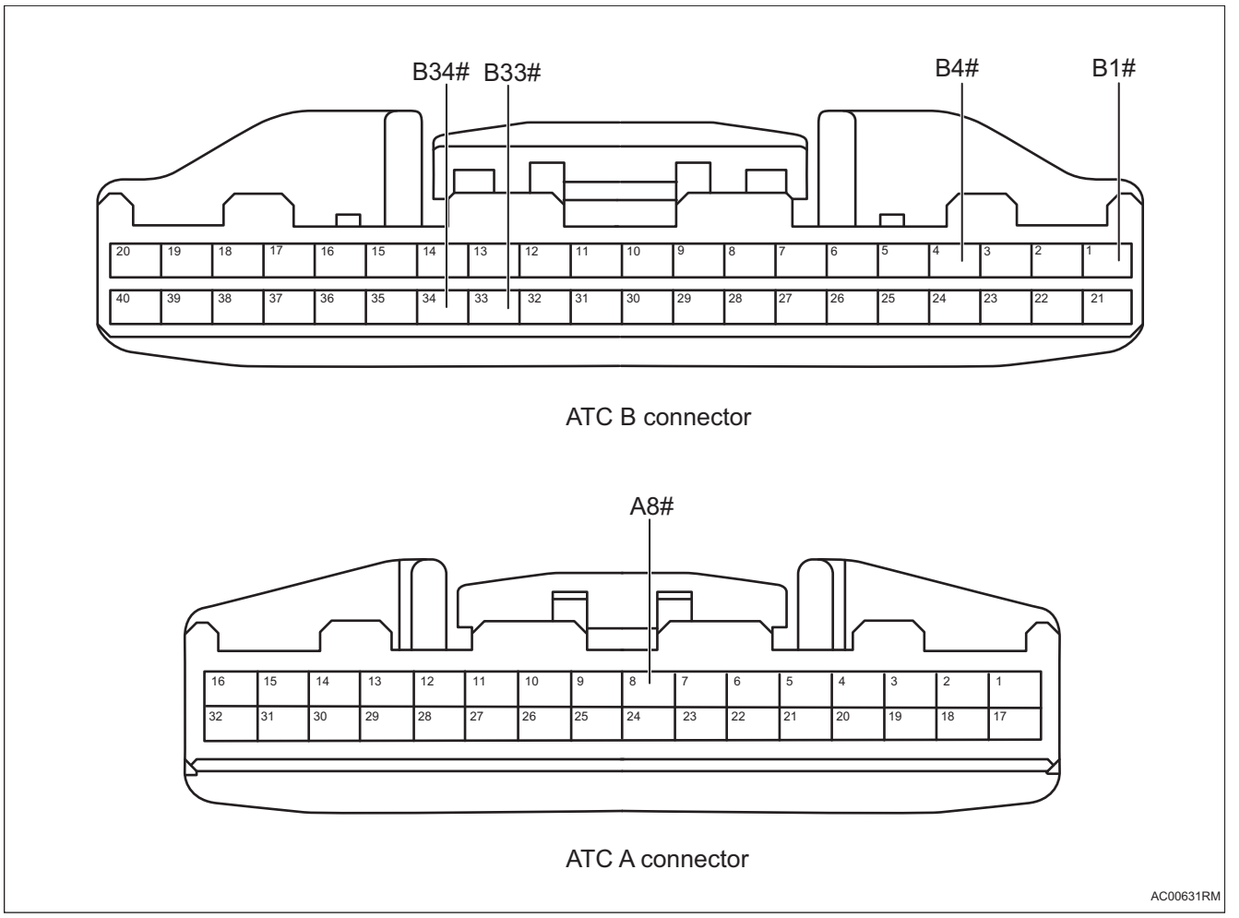
AC

Detector connection	Detection conditions	Specified state
ATC connector B1# -recirculation/fresh air damper motor connector 2#	Always connected	Less than 1Ω
ATC connector B4# -recirculation/fresh air damper motor connector 3#	Always connected	Less than 1Ω
ATC connector A8# -recirculation/fresh air damper motor connector 4#	Always connected	Less than 1Ω
ATC connector B34# -recirculation/fresh air damper motor connector 6#	Always connected	Less than 1Ω
ATC connector B33# -recirculation/fresh air damper motor connectors 7#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check recirculation/fresh air damper motor harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

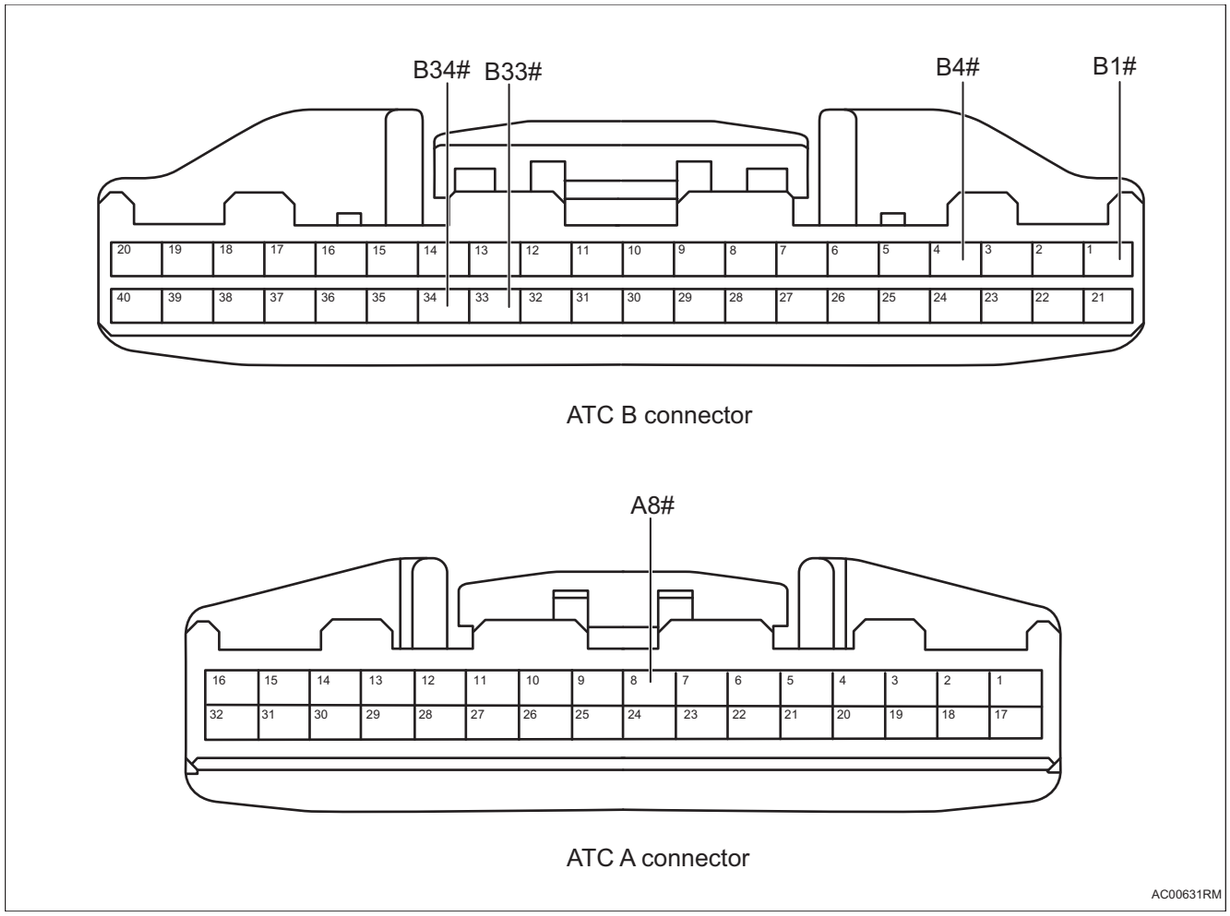
Standard value

Detector connection	Detection conditions	Specified state
ATC connector A8# -body GND	Always connected	10 KΩ or greater
ATC connector B1# -body GND	Always connected	10 KΩ or greater
ATC connector B4# -body GND	Always connected	10 KΩ or greater
ATC connector B33# -body GND	Always connected	10 KΩ or greater
ATC connector B34# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check recirculation/fresh air damper motor harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

AC

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ATC connector A8# -body GND	The ignition switch is set to "ON"	Less than 1 V
ATC connector B1# -body GND	The ignition switch is set to "ON"	Less than 1 V
ATC connector B4# -body GND	The ignition switch is set to "ON"	Less than 1 V
ATC connector B33# -body GND	The ignition switch is set to "ON"	Less than 1 V
ATC connector B34# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the recirculation/fresh air damper motor (See page AC-141)**

(a) Replace the recirculation/fresh air damper motor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace the ATC (See page AC-101)**

OK

6	**End**

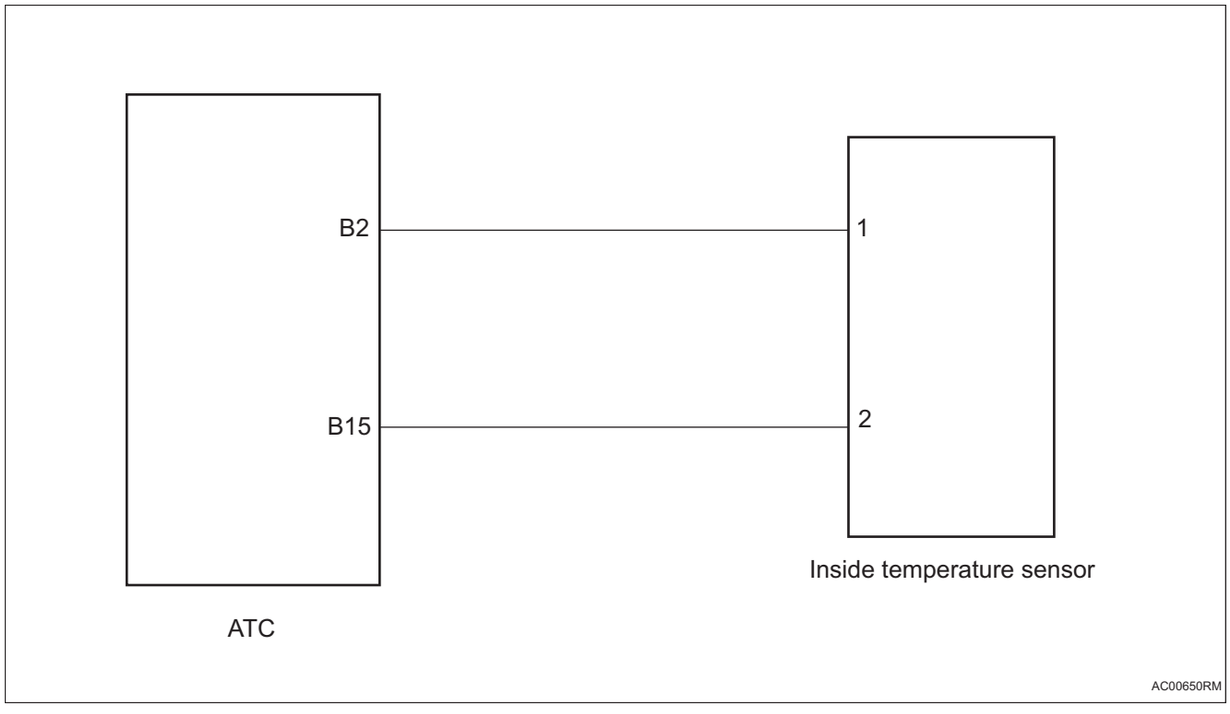
DTC	B130414	Inside temperature sensor circuit shorted to ground
DTC	B130415	Inside temperature sensor circuit shorted to power supply or open

Description

When the inside temperature sensor circuit is shorted or open, the ATC records the DTC.

DTC	DTC detection conditions	Faulty location
B130414	(a) Inside temperature sensor circuit shorted to ground.	• ATC • Harness and connector • Inside temperature sensor
B130415	(a) inside temperature sensor circuit shorted to power supply or open.	• ATC • Harness and connector • Inside temperature sensor

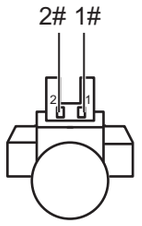
Circuit diagram



Inspection procedure

1	Check the inside temperature sensor resistance

AC



Inside temperature sensor

AC00680RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the inside temperature sensor connector.

(d) Measure the resistance according to the values in the table below.

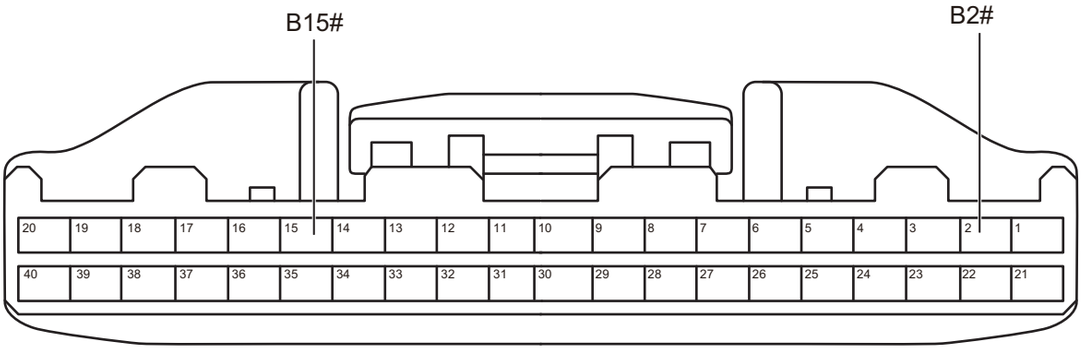
Standard value

Detector connection	Detection conditions	Specified state
Inside temperature sensor 1# -inside temperature sensor 2#	-10 ℃	10.96 ~ 12.88KΩ
	0 ℃	6.616 ~ 7.535KΩ
	10 ℃	4.119 ~ 4.555KΩ
	20 ℃	2.639 ~ 2.839KΩ
	30 ℃	1.715 ~ 1.844KΩ

NG → **Replace the inside temperature sensor (See page AC-116)**

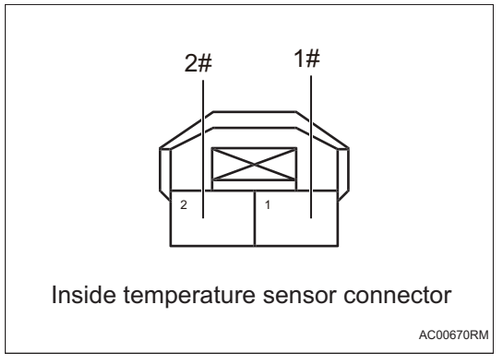
OK

2	Check inside temperature sensor harness and connector for open circuit



ATC B connector

AC00661RM



(a) Disconnect the ATC connector.

(b) Measure the resistance according to the values in the table below.

Standard value

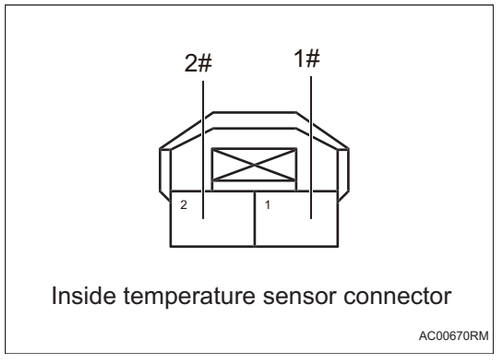
Detector connection	Detection conditions	Specified state
ATC connector B15# -inside temperature sensor connector 2#	Always connected	Less than 1Ω
ATC connector B2# -inside temperature sensor connector 1#	Always connected	Less than 1Ω

AC

NG → **Repair or replace the harness and connector**

OK

3 **Check inside temperature sensor harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

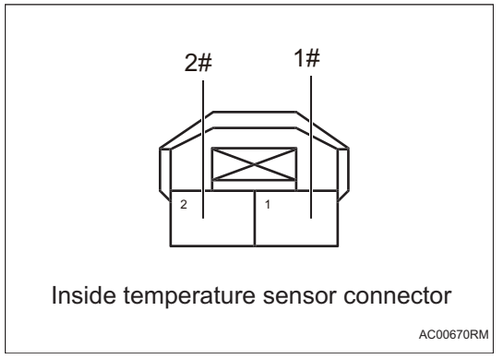
Standard value

Detector connection	Detection conditions	Specified state
Inside temperature sensor connector 1# - body GND	Always connected	10 KΩ or greater
Inside temperature sensor connector 2# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4 **Check inside temperature sensor harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Inside temperature sensor connector 1# - body GND	The ignition switch is set to "ON"	Less than 1 V

Detector connection	Detection conditions	Specified state
Inside temperature sensor connector 2# - body GND	The ignition switch is set to "ON"	Less than 1 V

AC

NG → **Repair or replace the harness and connector**

OK

5	**Replace the ATC (See page AC-101)**

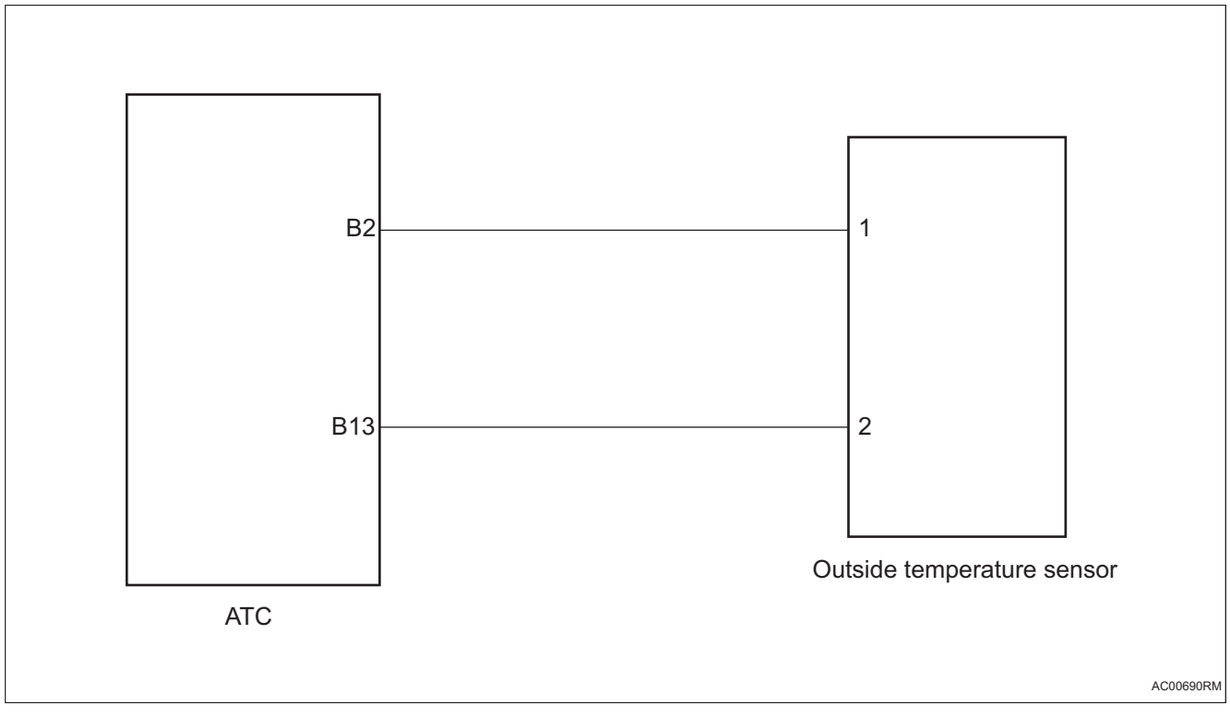
DTC	B130514	Outside temperature sensor circuit shorted to ground
DTC	B130515	Outside temperature sensor circuit shorted to power supply or open

Description

When the outside temperature sensor circuit is shorted or open, the ATC records the DTC.

DTC	DTC detection conditions	Faulty location
B130514	(a) Outside temperature sensor circuit shorted to ground.	• ATC • Harness and connector • Outside temperature sensor
B130515	(a) Outside temperature sensor circuit shorted to power supply or open.	• ATC • Harness and connector • Outside temperature sensor

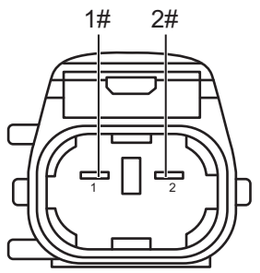
Circuit diagram



Inspection procedure

1	Check the outside temperature sensor resistance

AC



Outside temperature sensor

AC00700RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the outside temperature sensor connector.

(d) Measure the resistance according to the values in the table below.

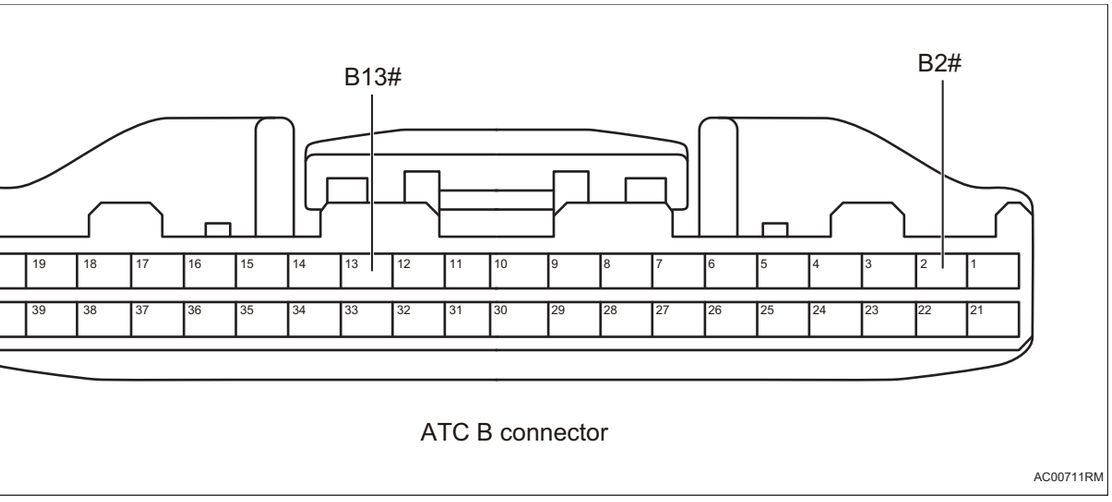
Standard value

Detector connection	Detection conditions	Specified state
Outside temperature sensor 1# -outside temperature sensor 2#	20 ℃	2.436 ~ 2.636KΩ

NG **Replace the outside temperature sensor (See page AC-118)**

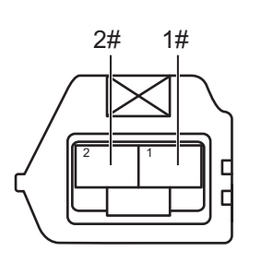
OK

2	Check outside temperature sensor harness and connector for open circuit



ATC B connector

AC00711RM



Outside temperature sensor connector

AC00720RM

(a) Disconnect the ATC connector.

(b) Measure the resistance according to the values in the table below.

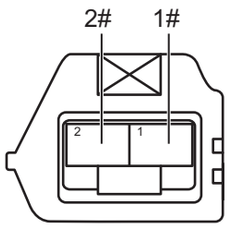
Standard value

Detector connection	Detection conditions	Specified state
ATC connector B13# -outside temperature sensor connector 2#	Always connected	Less than 1Ω
ATC connector B2# -outside temperature sensor connector 1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check outside temperature sensor harness and connector for circuit shorted to ground



Outside temperature sensor connector

AC00720RM

(a) Measure the resistance according to the values in the table below.

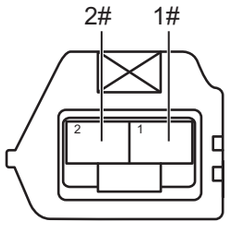
Standard value

Detector connection	Detection conditions	Specified state
Outside temperature sensor connector 1# - body GND	Always connected	10 KΩ or greater
Outside temperature sensor connector 2# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check outside temperature sensor harness and connector for circuit shorted to power supply



Outside temperature sensor connector

AC00720RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Outside temperature sensor connector 1# - body GND	The ignition switch is set to "ON"	Less than 1 V
Outside temperature sensor connector 2# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Replace the ATC (See page AC-101)

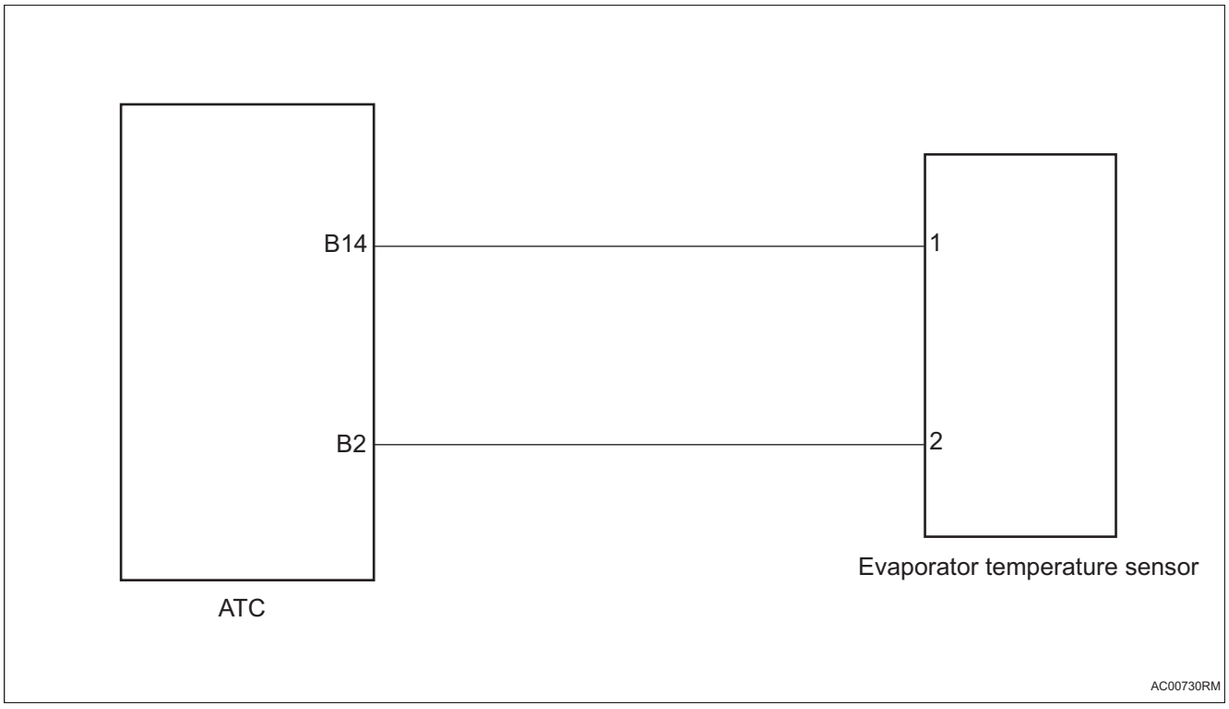
DTC	**B130614**	**Evaporator temperature sensor circuit shorted to ground**
DTC	**B130615**	**Evaporator temperature sensor circuit shorted to power supply or open**

Description

When the evaporator temperature sensor circuit is shorted or open, the ATC records the DTC.

DTC	DTC detection conditions	Faulty location
B130614	(a) Evaporator temperature sensor circuit shorted to ground.	• ATC • Harness and connector • Evaporator temperature sensor
B130615	(a) Evaporator temperature sensor circuit shorted to power supply or open.	• ATC • Harness and connector • Evaporator temperature sensor

Circuit diagram



Inspection procedure

1	**Check the evaporator temperature sensor**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the evaporator temperature sensor connector.

(d) Measure the resistance according to the values in the table below.

Standard value

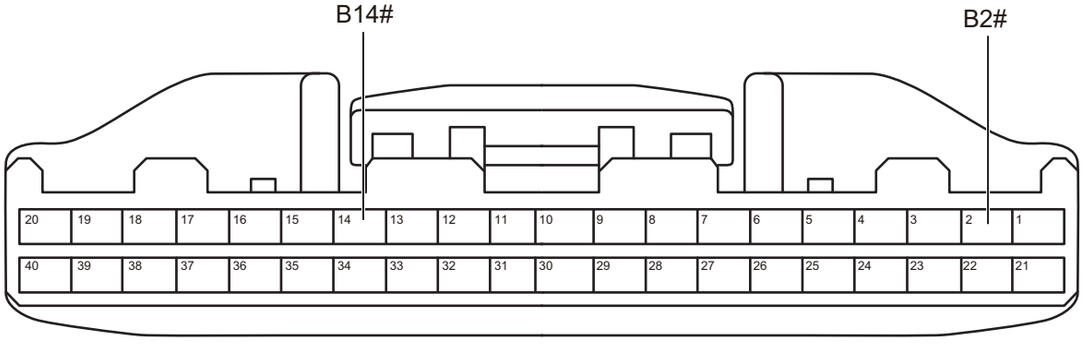
Detector connection	Detection conditions	Specified state
Evaporator temperature sensor 1# - evaporator temperature sensor 2#	0 ℃	6650 ~ 6850Ω
	15 ℃	3178 ~ 3324Ω

AC

NG → **Replace the evaporator temperature sensor (See page AC-141)**

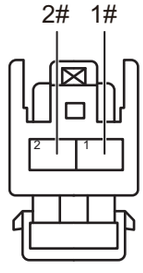
OK

2 Check evaporator temperature sensor harness and connector for open circuit



ATC B connector

AC00751RM



Evaporator temperature sensor connector

AC00760RM

(a) Disconnect the ATC connector.

(b) Disconnect the evaporator temperature sensor harness connector.

(c) Measure the resistance according to the values in the table below.

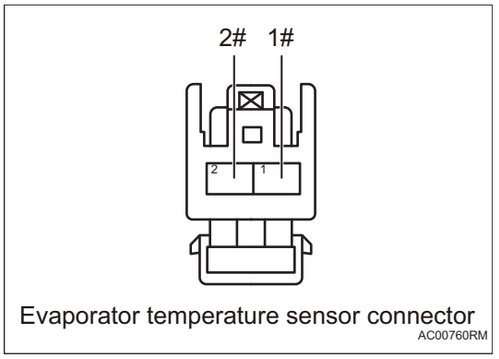
Standard value

Detector connection	Detection conditions	Specified state
ATC connector B14# -evaporator temperature sensor harness connector 1#	Always connected	Less than 1Ω
ATC connector B2# -evaporator temperature sensor harness connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check evaporator temperature sensor harness and connector for circuit shorted to ground



Evaporator temperature sensor connector
AC00760RM

(a) Measure the resistance according to the values in the table below.

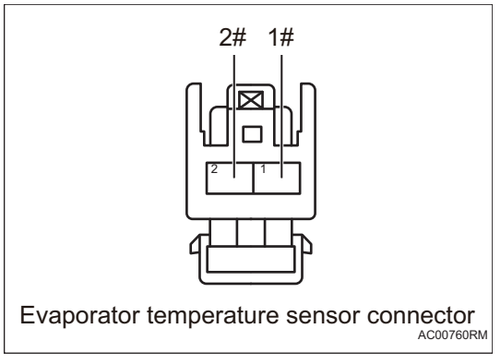
Standard value

Detector connection	Detection conditions	Specified state
Evaporator temperature sensor harness connector 1# -body GND	Always connected	10 KΩ or greater
Evaporator temperature sensor harness connector 2# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check evaporator temperature sensor harness and connector for circuit shorted to power supply



Evaporator temperature sensor connector
AC00760RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Evaporator temperature sensor harness connector 1# -body GND	The ignition switch is set to "ON"	Less than 1 V
Evaporator temperature sensor harness connector 2# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Replace the ATC (See page AC-101)

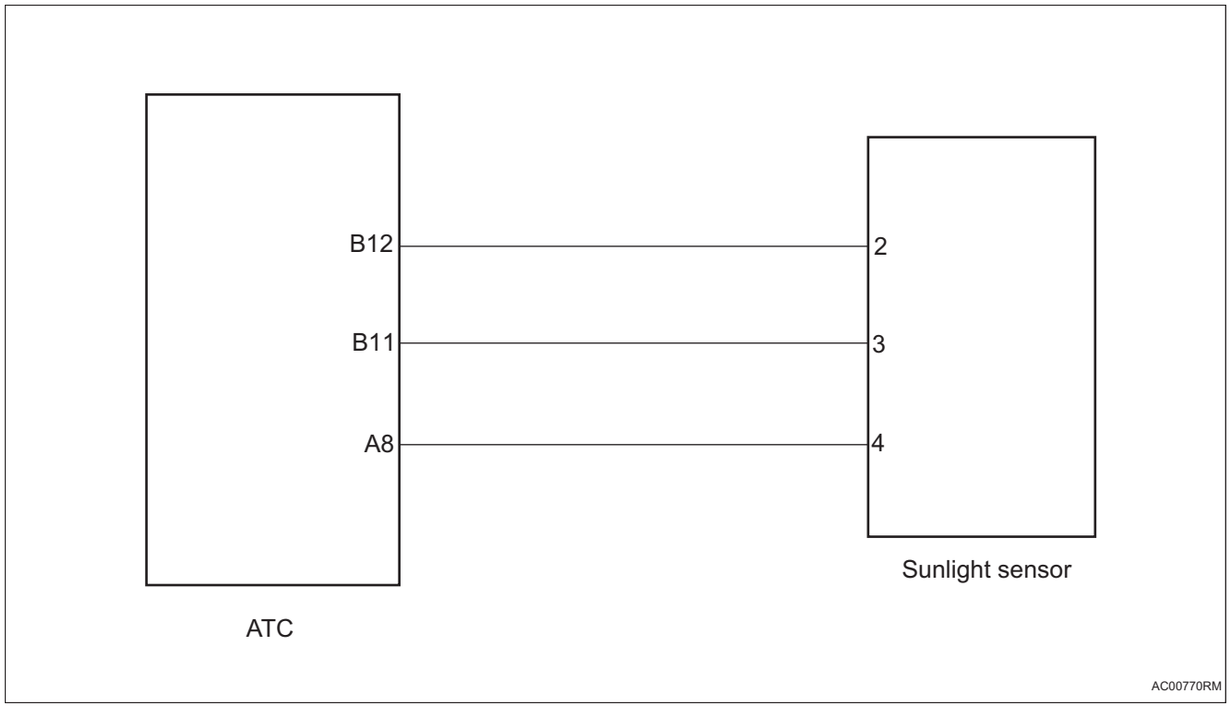
DTC	B130715	Driver side sunlight sensor circuit shorted to power supply
DTC	B130815	Front passenger side sunlight sensor circuit shorted to power supply

Description

When sunlight sensor circuit is shorted to power supply, the ATC records the DTC.

DTC	DTC detection conditions	Faulty location
B130715	(a) Driver side sunlight sensor circuit shorted to power supply.	• ATC • Harness and connector • Sunlight sensor
B130815	(a) Front passenger side sunlight sensor circuit shorted to power supply.	• ATC • Harness and connector • Sunlight sensor

Circuit diagram



Inspection procedure

1	Check the sunlight sensor

(a) Place the vehicle in the shade and measure and record the sensor output voltage.

(b) Place the vehicle in the sun and measure and record the sensor output voltage.

(c) Compare the voltage values of the two measurements.

AC

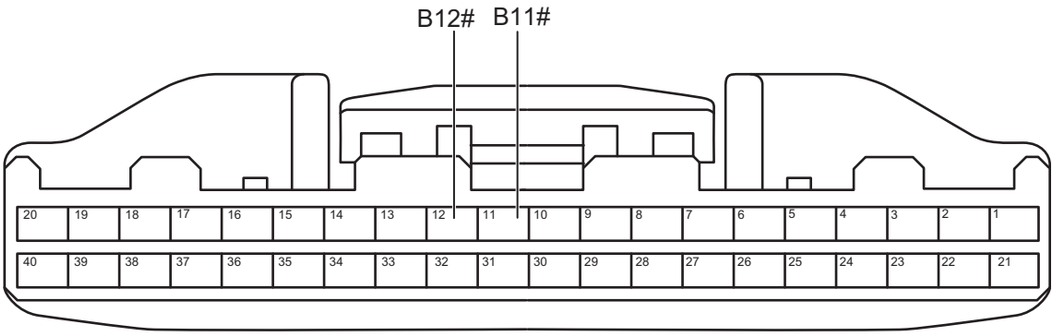
Criteria:

There is a change in the voltage value between the two measurements.

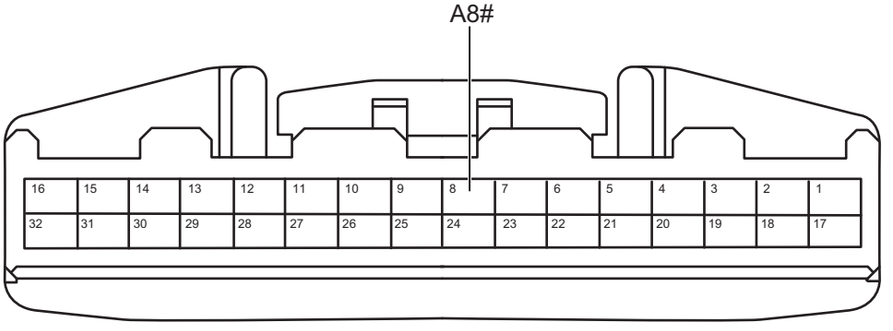
NG → **Replace the sunlight sensor (See page AC-106)**

OK

2	Check sunlight sensor harness and connector for open circuit

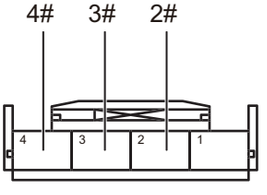


ATC B connector



ATC A connector

AC00781RM



Sunlight sensor connector

AC00790RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ATC connector.

(d) Disconnect the sunlight sensor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

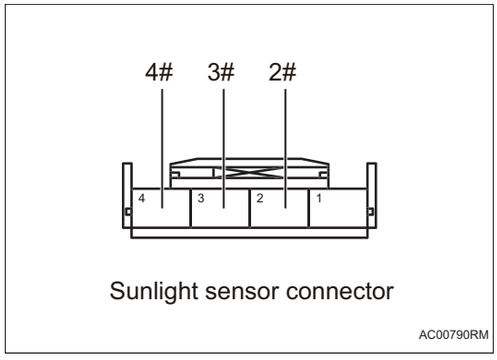
Detector connection	Detection conditions	Specified state
ATC connector B12# -sunlight sensor connector 2#	Always connected	Less than 1Ω
ATC connector B11# -sunlight sensor connector 3#	Always connected	Less than 1Ω
ATC connector A8# -sunlight sensor connector 4#	Always connected	Less than 1Ω

AC

NG → **Repair or replace the harness and connector**

OK

3 Check the sunlight sensor harness and connector for circuit shorted to ground



(a) Measure the resistance according to the values in the table below.

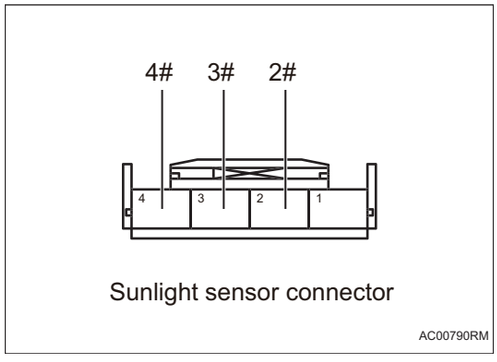
Standard value

Detector connection	Detection conditions	Specified state
Sunlight sensor connector 2# -body GND	Always connected	10 KΩ or greater
Sunlight sensor connector 3# -body GND	Always connected	10 KΩ or greater
Sunlight sensor connector 4# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4 Check the sunlight sensor harness and connector for circuit shorted to power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Sunlight sensor connector 2# -body GND	The ignition switch	is set to "ON" Less than 1 V
Sunlight sensor connector 3# -body GND	The ignition switch	is set to "ON" Less than 1 V

Detector connection	Detection conditions	Specified state
Sunlight sensor connector 4# -body GND	The ignition switch	is set to "ON" Less than 1 V

AC

NG → **Repair or replace the harness and connector**

OK

5	**Replace the ATC (See page AC-101)**

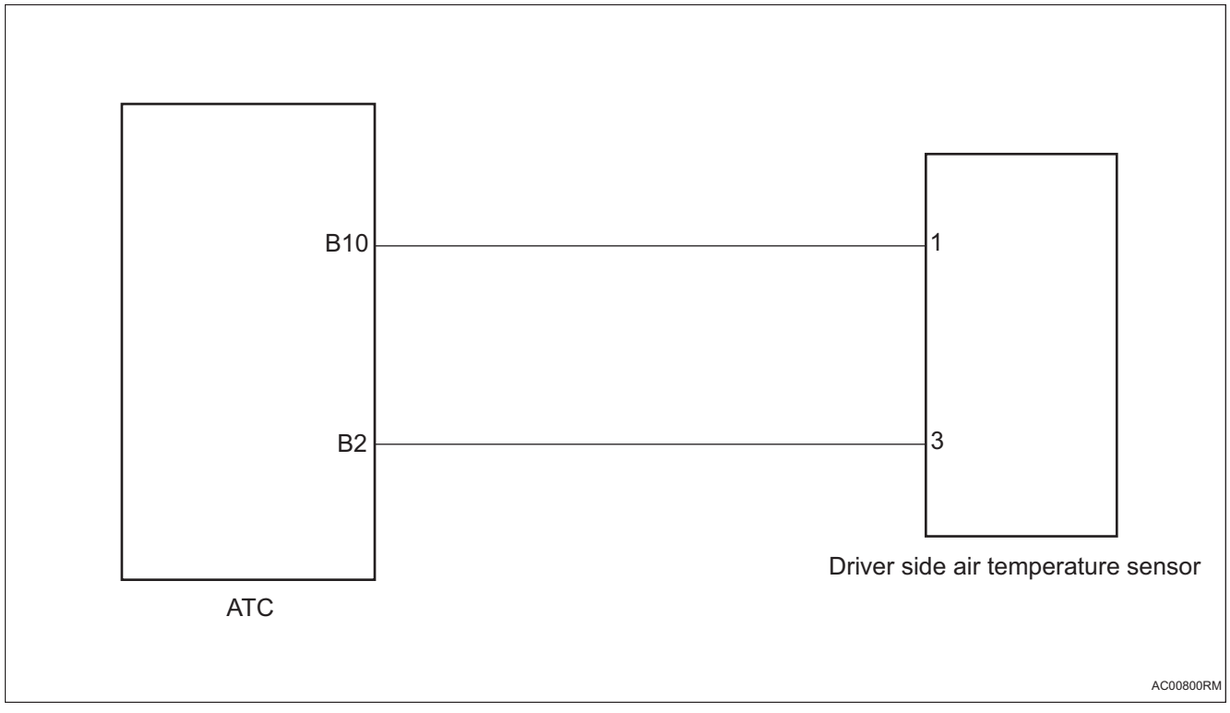
DTC	B130914	Driver side floor air outlet temperature sensor circuit shorted to ground (for HEV model)
DTC	B130915	Driver side floor air outlet temperature sensor circuit shorted to power supply or open (for HEV model)

Description

When the driver side air temperature sensor circuit is shorted or open, the ATC records the DTC.

DTC	DTC detection conditions	Faulty location
B130914	(a) Driver side floor air outlet temperature sensor circuit shorted to ground.	• ATC • Harness and connector • Driver side air temperature sensor
B130915	(a) Driver side floor air outlet temperature sensor circuit shorted to power supply or open.	• ATC • Harness and connector • Driver side air temperature sensor

Circuit diagram



Inspection procedure

1	Check driver side air temperature sensor

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the driver side air temperature sensor connector.

(d) Measure the resistance according to the values in the table below.

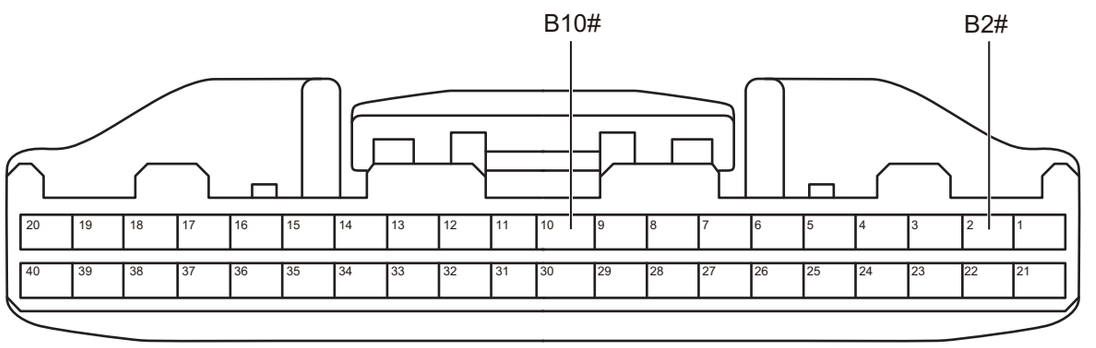
Standard value

Detector connection	Detection conditions	Specified state
Driver side air temperature sensor 1# -driver side air temperature sensor 3#	0 ℃	9697 ~ 9893Ω
	15 ℃	4644 ~ 4795Ω

NG → **Replace the driver side air temperature sensor (See page AC-141)**

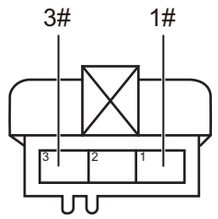
OK

2 Check driver side air temperature sensor harness and connector for open circuit



ATC B connector

AC00821RM



Driver side air temperature sensor connector

AC00830RM

(a) Disconnect the ATC connector.

(b) Disconnect the driver side air temperature sensor harness connector.

(c) Measure the resistance according to the values in the table below.

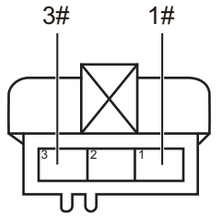
Standard value

Detector connection	Detection conditions	Specified state
ATC connector B10# -driver side air temperature sensor harness connector 1#	Always connected	Less than 1Ω
ATC connector B2# -driver side air temperature sensor harness connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check driver side air temperature sensor harness and connector for circuit shorted to ground



Driver side air temperature sensor connector

AC00830RM

(a) Measure the resistance according to the values in the table below.

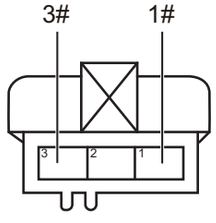
Standard value

Detector connection	Detection conditions	Specified state
Driver side air temperature sensor harness connector 1# -body GND	Always connected	10 KΩ or greater
Driver side air temperature sensor harness connector 3# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check driver side air temperature sensor harness and connector for circuit shorted to power supply



Driver side air temperature sensor connector

AC00830RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Driver side air temperature sensor harness connector 1# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver side air temperature sensor harness connector 3# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Replace the ATC (See page AC-101)

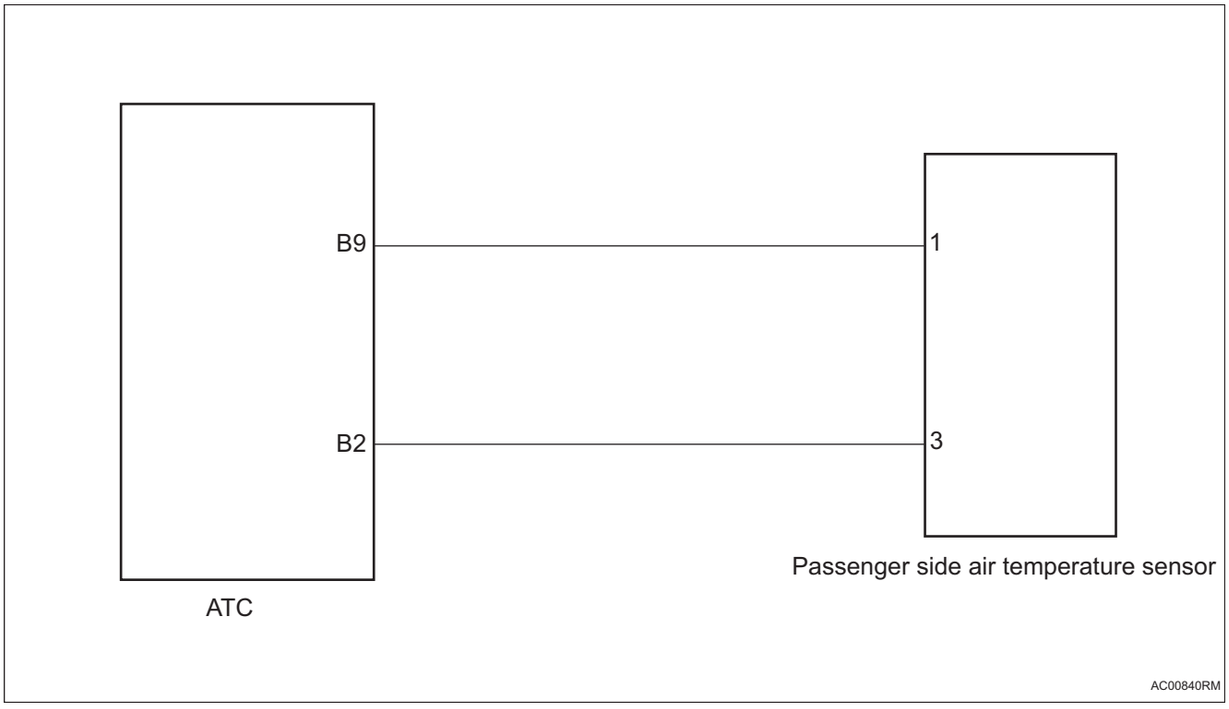
DTC	B130A14	Front passenger side floor air outlet temperature sensor circuit shorted to ground (for HEV model)
DTC	B130A15	Front passenger side floor air outlet temperature sensor circuit shorted to power supply or open (for HEV model)

Description

When passenger side air temperature sensor circuit is shorted or open, the ATC will record DTC.

DTC	DTC detection conditions	Faulty location
B130A14	(a) Front passenger side floor air outlet temperature sensor circuit shorted to ground.	• ATC • Harness and connector • Passenger side air temperature sensor
B130A15	(a) Front passenger side floor air outlet temperature sensor circuit shorted to power supply or open.	• ATC • Harness and connector • Passenger side air temperature sensor

Circuit diagram



Inspection procedure

1	Check passenger side air temperature sensor

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the passenger side air temperature sensor connector.

(d) Measure the resistance according to the values in the table below.

Standard value

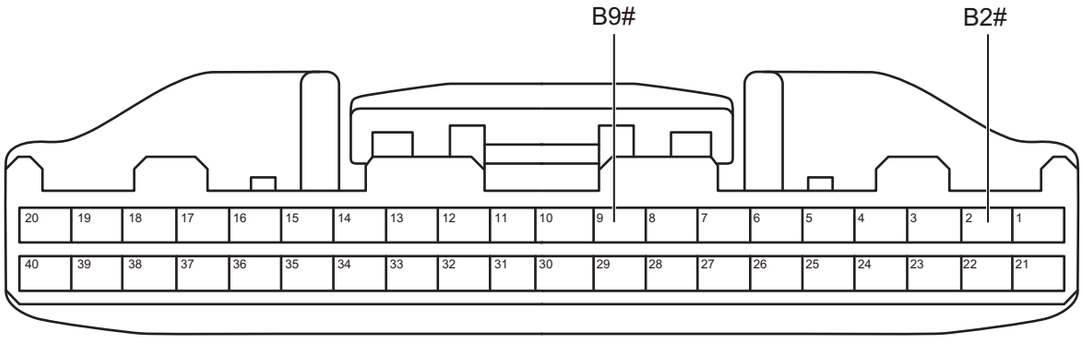
Detector connection	Detection conditions	Specified state
Passenger side air temperature sensor #1 - passenger side air temperature sensor #3	0 ℃	9697 ~ 9893Ω
	15 ℃	4646 ~ 4773Ω

AC

NG → **Replace the passenger side air temperature sensor (See page AC-141)**

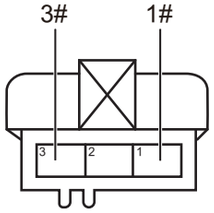
OK

2 Check passenger side air temperature sensor harness and connector for open circuit



ATC B connector

AC00861RM



Passenger side air temperature sensor connector

AC00871RM

(a) Disconnect the ATC connector.

(b) Disconnect the passenger side air temperature sensor harness connector.

(c) Measure the resistance according to the values in the table below.

Standard value

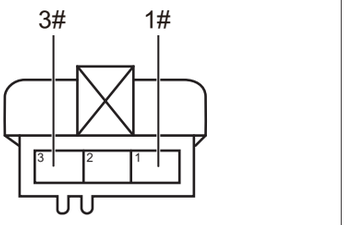
Detector connection	Detection conditions	Specified state
ATC connector B9# -passenger side air temperature sensor harness connector 1#	Always connected	Less than 1Ω
ATC connector B2# -passenger side air temperature sensor harness connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

AC

3	**Check passenger side air temperature sensor harness and connector for circuit shorted to ground**



Passenger side air temperature sensor connector

AC00871RM

(a) Measure the resistance according to the values in the table below.

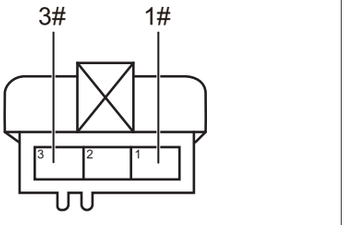
Standard value

Detector connection	Detection conditions	Specified state
Passenger side air temperature sensor harness connector 1# -body GND	Always connected	10 KΩ or greater
Passenger side air temperature sensor harness connector 3# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check passenger side air temperature sensor harness and connector for circuit shorted to power supply**



Passenger side air temperature sensor connector

AC00871RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Passenger side air temperature sensor harness connector 1# -body GND	The ignition switch is set to "ON"	Less than 1 V
Passenger side air temperature sensor harness connector 3# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the ATC (See page AC-101)**

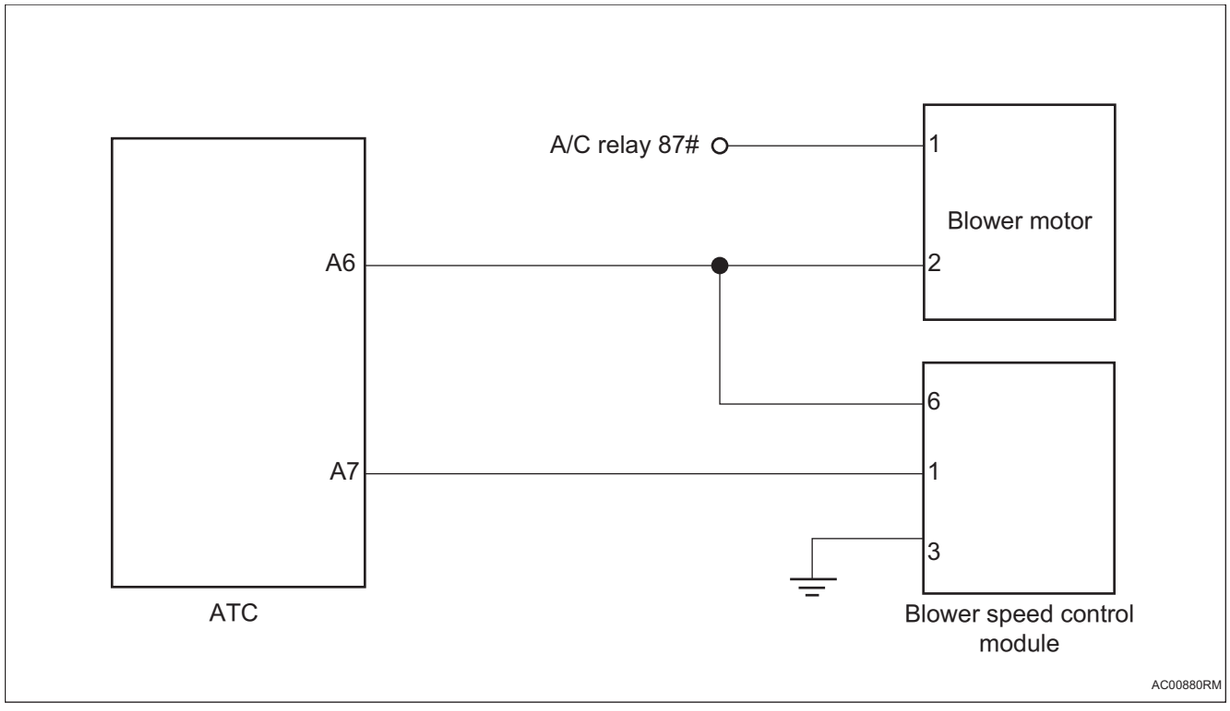
DTC	B130B28	Large difference between blower voltage feedback value and target value

Description

When there is a large difference between the blower voltage feedback and the target value, the ATC will record DTC.

DTC	DTC detection conditions	Faulty location
B130B28	(a) Large difference between blower voltage feedback value and target value.	• ATC • Harness and connector • Blower motor • Blower speed control module

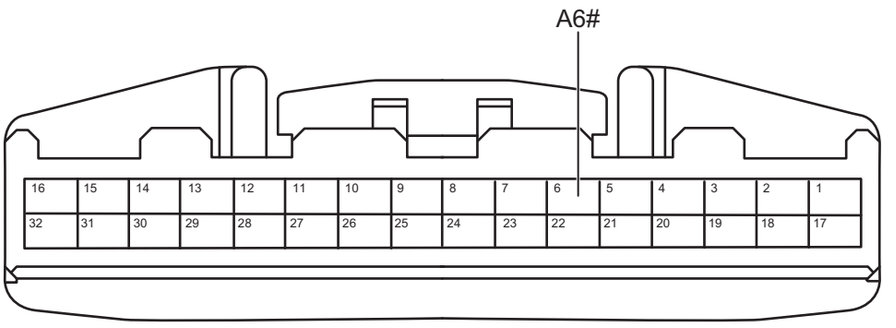
Circuit diagram



Inspection procedure

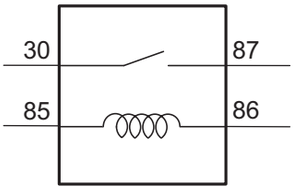
1	Check blower motor harness and connector

AC

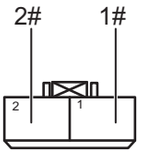


ATC A connector

AC00891RM



A/C relay connector



Blower motor connector

AC00900RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ATC connector.

(d) Disconnect the blower motor connector.

(e) Measure the resistance according to the values in the table below.

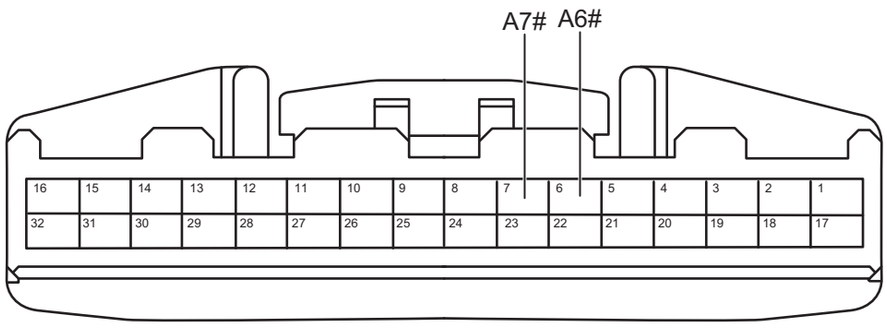
Standard value

Detector connection	Detection conditions	Specified state
ATC connector A6# -blower motor harness connector 2#	Always connected	Less than 1Ω
Blower motor harness connector 1# -A/C relay 87#	Always connected	Less than 1Ω
Blower motor harness connector 2# - B +	Always connected	10 KΩ or greater
Blower motor harness connector 2# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

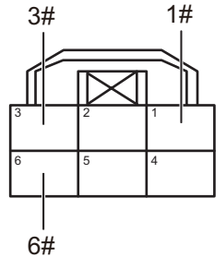
OK

2	**Check the blower speed control module harness and connector**



ATC A connector

AC00911RM



Blower speed control module connector

AC00920RM

(a) Disconnect the blower speed control module connector.

(b) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ATC connector A6# -blower speed control module connector 6#	Always connected	Less than 1Ω
ATC connector A7# -blower speed control module connector 1#	Always connected	Less than 1Ω
Blower speed control module connector 3# - body GND	Always connected	Less than 1Ω
Blower speed control module connector 6# - B+	Always connected	10 KΩ or greater
Blower speed control module connector 6# - body GND	Always connected	10 KΩ or greater
Blower speed control module connector 3# - B+	Always connected	10 KΩ or greater
Blower speed control module connector 3# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Replace the blower motor (See page AC-141)**

(a) Replace the blower motor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

OK → **End**

AC

NG

4	**Replace the blower speed control module (See page AC-141)**

(a) Replace the blower speed control module.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace the ATC (See page AC-101)**

OK

5	**End**

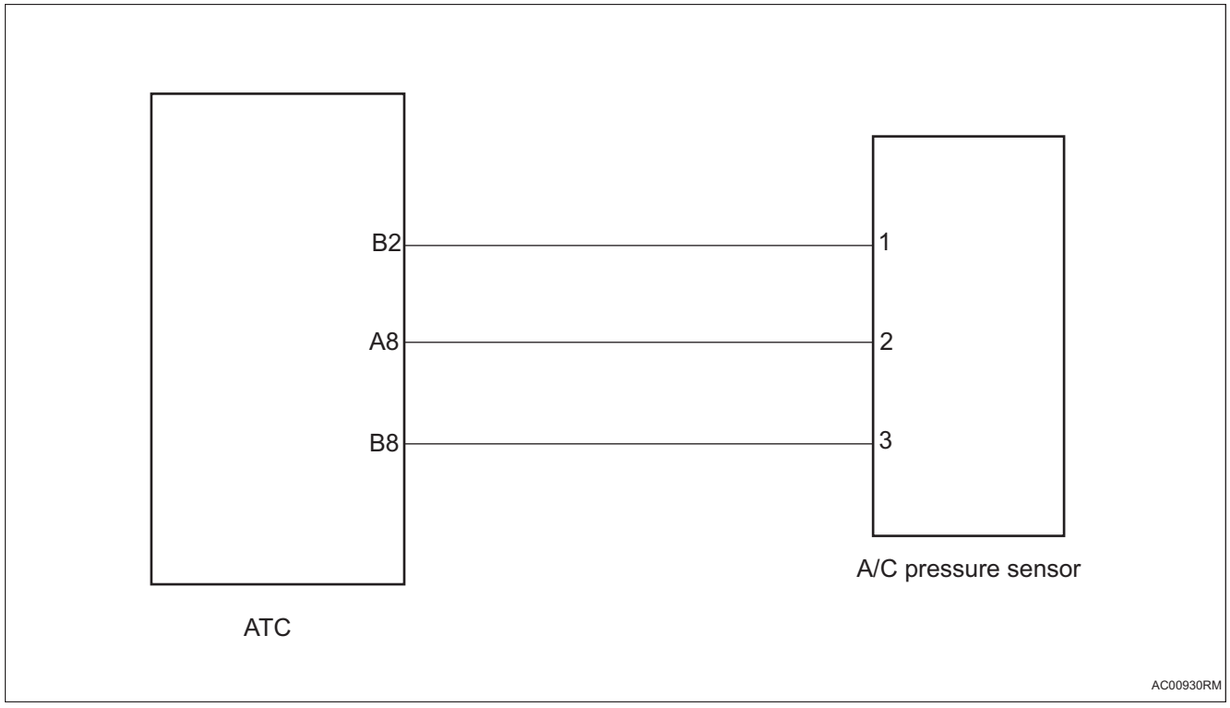
DTC	B130C14	Pressure sensor circuit shorted to ground
DTC	B130C15	Pressure sensor circuit shorted to power supply or open

Description

When A/C pressure sensor circuit is shorted or open, the ATC will record DTC.

DTC	DTC detection conditions	Faulty location
B130C14	(a) Pressure sensor circuit shorted to ground.	• ATC • Harness and connector • A/C pressure sensor • Cooling system • A/C system pipeline • Expansion valve
B130C15	(a) Pressure sensor circuit shorted to power supply or open.	• ATC • Harness and connector • A/C pressure sensor • Cooling system • A/C system pipeline • Expansion valve

Circuit diagram



Inspection procedure

1	Check the AC system pressure

(a) Check whether the system is leaking.

(b) Check whether the system pressure is normal.

NG → **Repair according to the fault**

OK

AC

2	Check cooling system

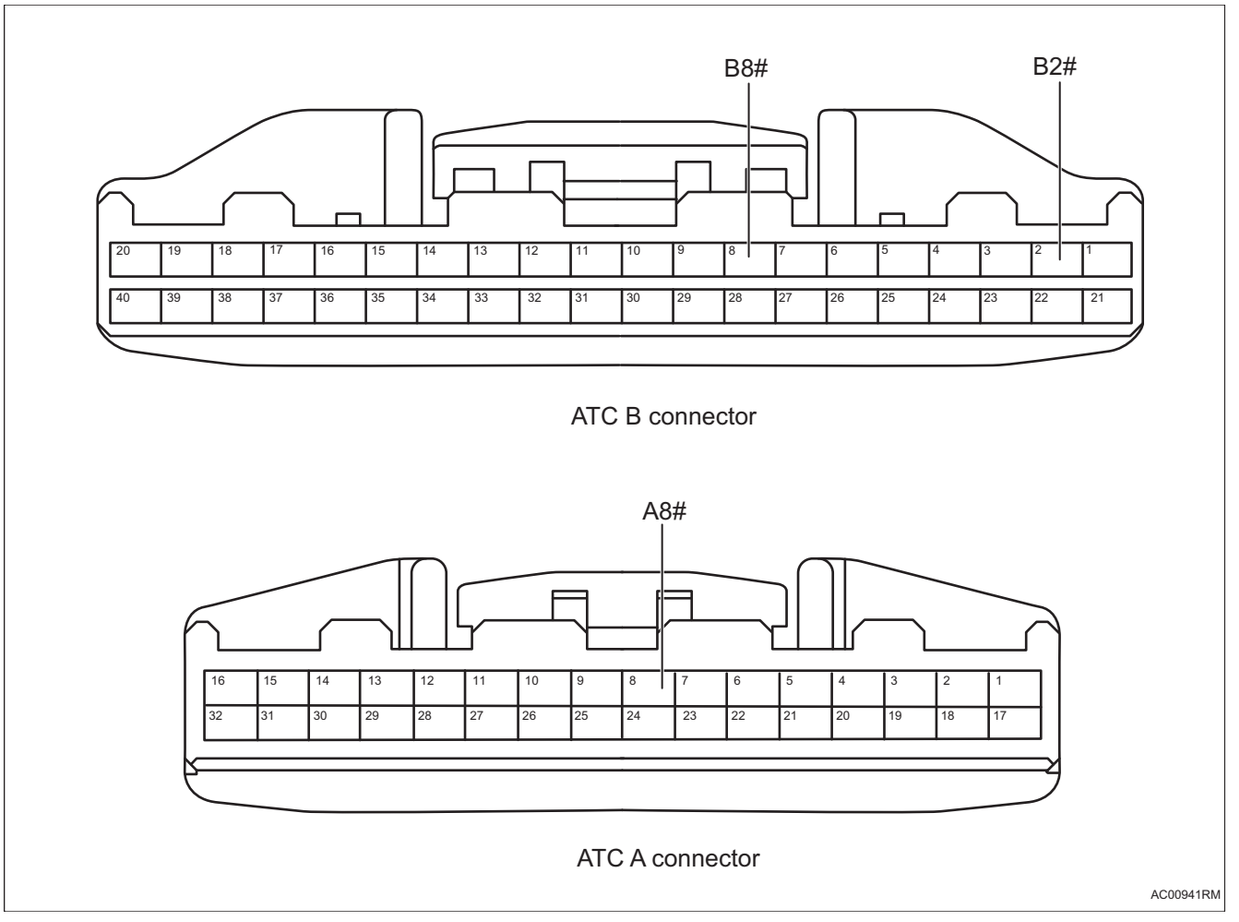
(a) Check whether the cooling system is leaking or blocked.

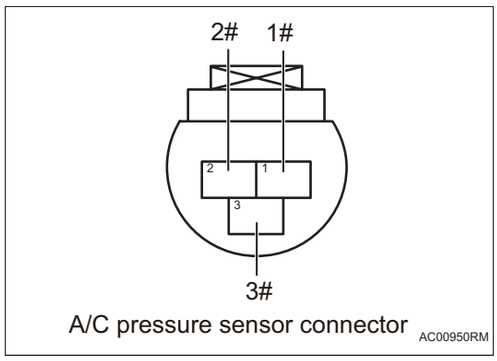
(b) Check whether the electronic fan control system is normal.

NG → **Repair according to the fault**

OK

3	Check A/C pressure sensor harness and connector for open circuit





A/C pressure sensor connector AC00950RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ATC connector.

(d) Disconnect the A/C pressure sensor connector.

(e) Measure the resistance according to the values in the table below.

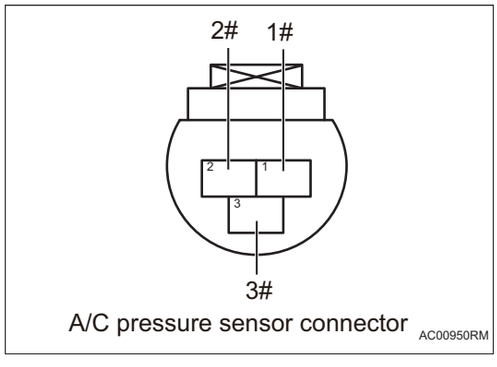
Standard value

Detector connection	Detection conditions	Specified state
ATC connector B8# -A/C pressure sensor connector 3#	Always connected	Less than 1Ω
ATC connector A8# -A/C pressure sensor connector 2#	Always connected	Less than 1Ω
ATC connector B2# -A/C pressure sensor connector 1#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

4	Check A/C pressure sensor harness and connector for circuit shorted to ground



A/C pressure sensor connector AC00950RM

(a) Measure the resistance according to the values in the table below.

Standard value

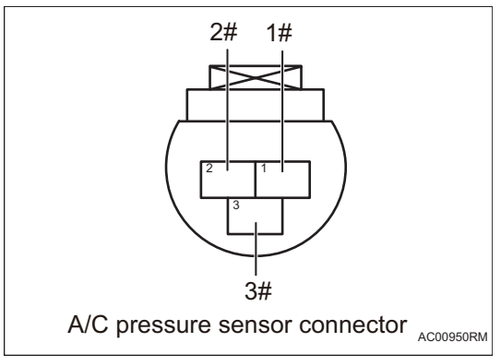
Detector connection	Detection conditions	Specified state
A/C pressure sensor connector 2# - body GND	Always connected	10 KΩ or greater
A/C pressure sensor connector 3# - body GND	Always connected	10 KΩ or greater
A/C pressure sensor connector 1# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

5	Check A/C pressure sensor harness and connector for circuit shorted to power supply

AC



A/C pressure sensor connector AC00950RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
A/C pressure sensor connector 1# - body GND	The ignition switch is set to "ON"	Less than 1 V
A/C pressure sensor connector 2# - body GND	The ignition switch is set to "ON"	Less than 1 V
A/C pressure sensor connector 3# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	Check the A/C pressure sensor

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Connect the ATC connector.

(d) Connect A/C pressure sensor connector.

(e) Start the vehicle and set the A/C to cooling state.

(f) Read the pressure value of the pressure sensor.

Standard value: 0.176Mpag ~ 3.025Mpag

NG → **Replace the A/C pressure sensor (See page AC-127)**

OK

7	Replace the expansion valve (See page AC-141)

(a) Replace the expansion valve.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace the ATC (See page AC-101)**

OK

8	**End**

DTC	B130E19	Compressor fault

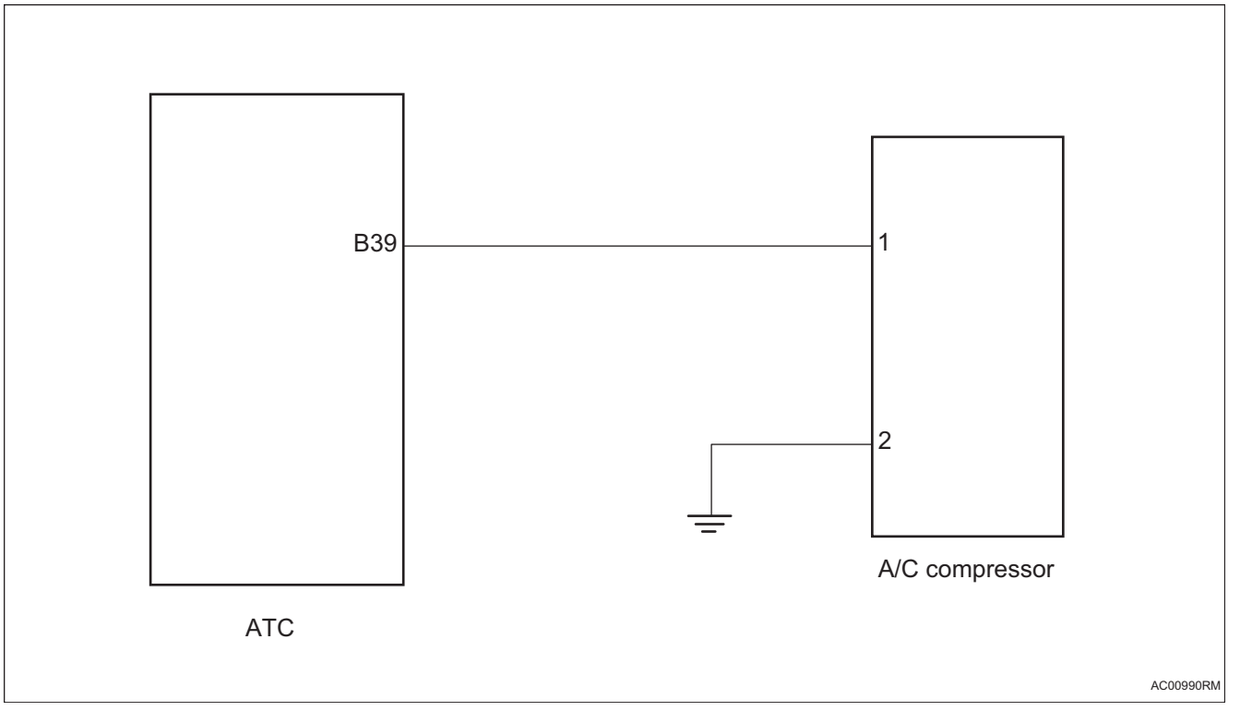
Description

When a compressor failure is detected, the ATC records DTC.

AC

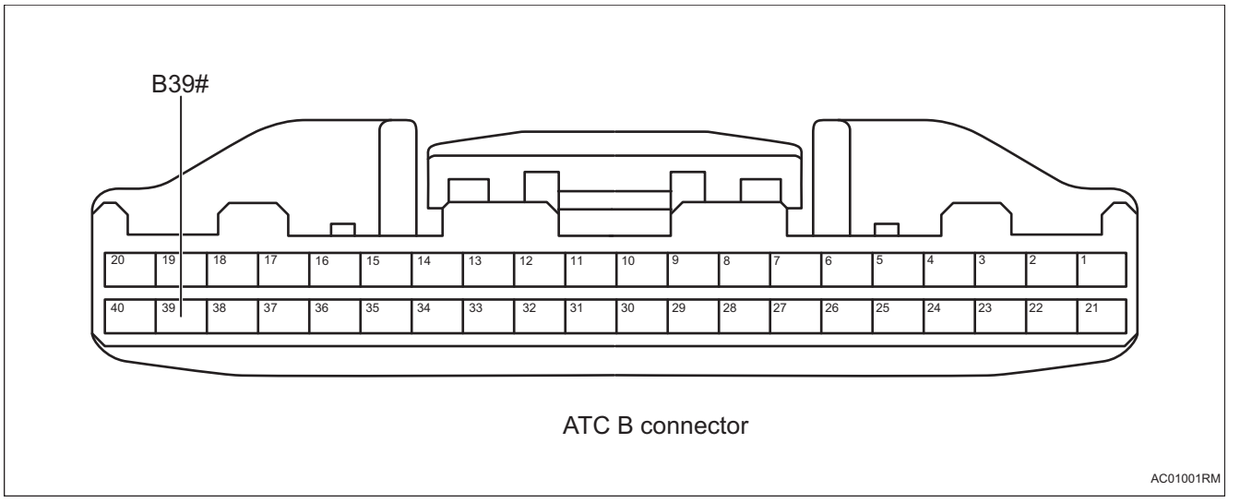
DTC	DTC detection conditions	Faulty location
B130E19	(a) Compressor fault.	• ATC • Harness and connector • A/C compressor

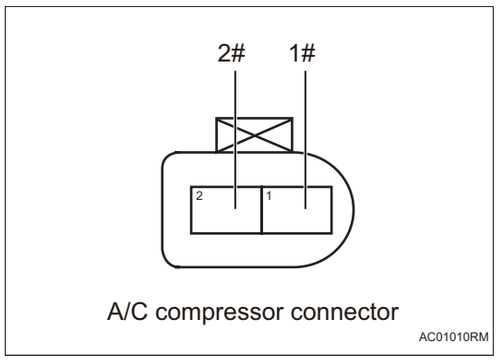
Circuit diagram



Inspection procedure

1	Check A/C compressor harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ATC connector.

(d) Disconnect the A/C compressor connector.

(e) Measure the resistance according to the values in the table below.

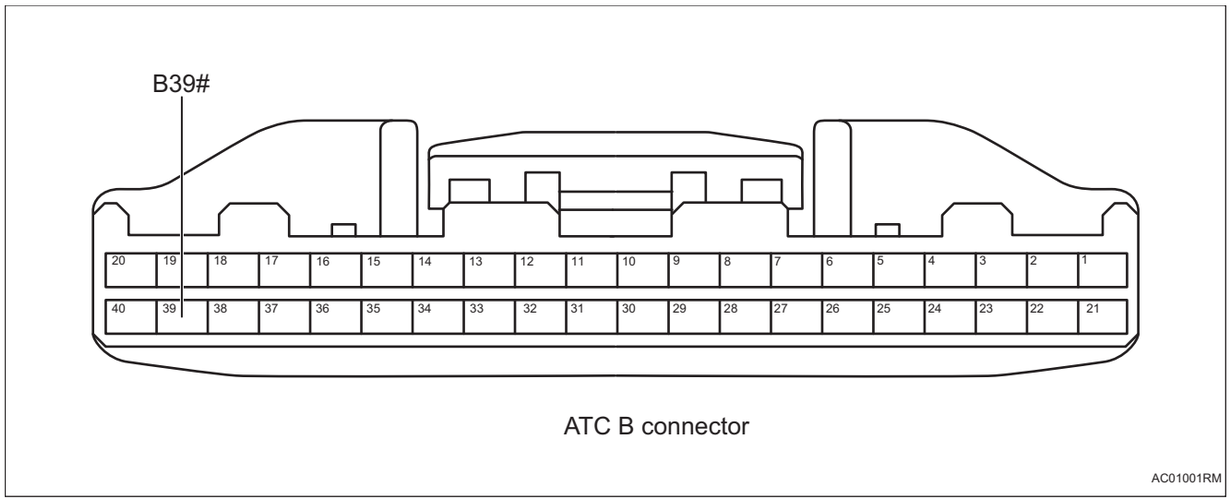
Standard value

Detector connection	Detection conditions	Specified state
A/C compressor connector 2# - body GND	Always connected	Less than 1Ω
ATC connector B39# -A/C compressor connector 1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2 Check A/C compressor harness and connector for circuit shorted to ground



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ATC connector B39# - body GND	Always connected	10 KΩ or greater

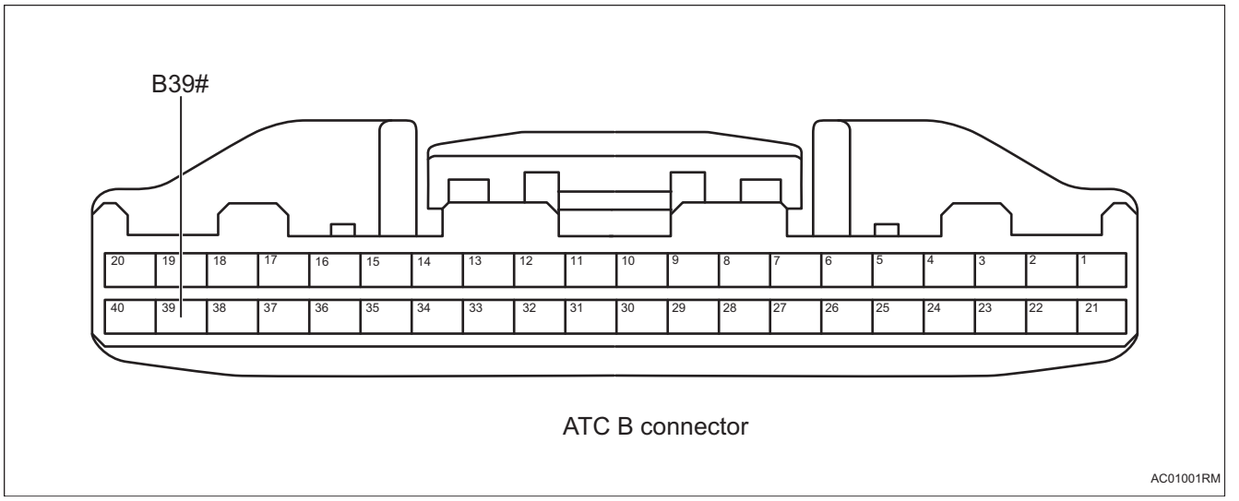
NG → **Repair or replace the harness and connector**

AC

OK

3	Check the A/C compressor harness and connector for circuit shorted to power supply

AC



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ATC connector B39# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	Replace the A/C compressor (See page AC-120)

(a) Replace the A/C compressor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace the ATC (See page AC-101)**

OK

5	End

DTC	B130F00	Electric compressor fault

Description

When a compressor failure is detected, the ATC records DTC.

AC

DTC	DTC detection conditions	Faulty location
B130F00	(a) Electric compressor failure.	• ATC • Harness and connector • Electric A/C compressor • High-voltage harness and connector

Inspection procedure

1	Check the electric A/C compressor high voltage system

(a) Check whether the high-voltage harness and connector are properly connected.

(b) Check whether the high-voltage harness and connector are damaged.

(c) Check whether the high-voltage power supply system is normal.

NG → **Repair according to the fault**

OK

2	Check the electric A/C compressor low pressure harness and connector

(a) Check whether the electric A/C compressor low voltage harness and connector are properly connected.

(b) Check whether the electric A/C compressor low voltage harness and connector are short-circuited or open.

NG → **Repair or replace the harness and connector**

OK

3	Replace the electric A/C compressor (See page AC-122)

(a) Replace the electric A/C compressor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace the ATC (See page AC-101)**

OK

4	**End**

DTC	B131087	Lost communication with AQS
DTC	B131002	AQS response error

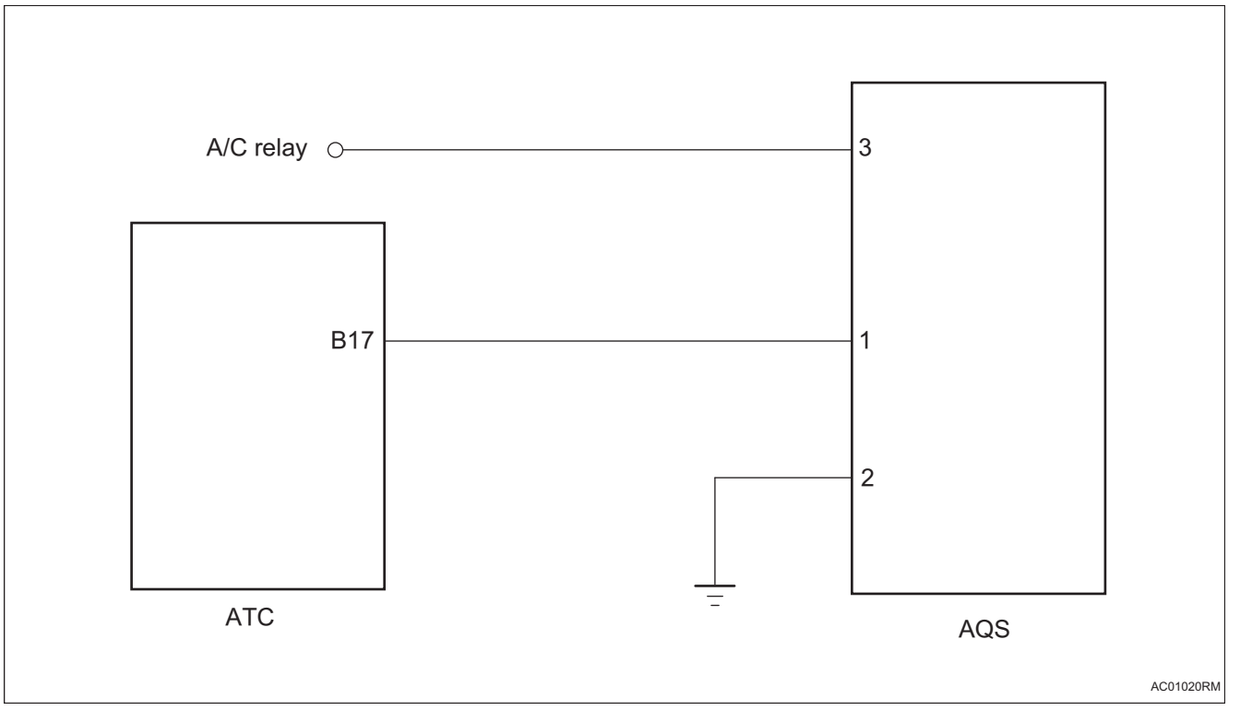
Description

AC

In case of abnormal communication or response error of AQS, the ATC will record the DTC.

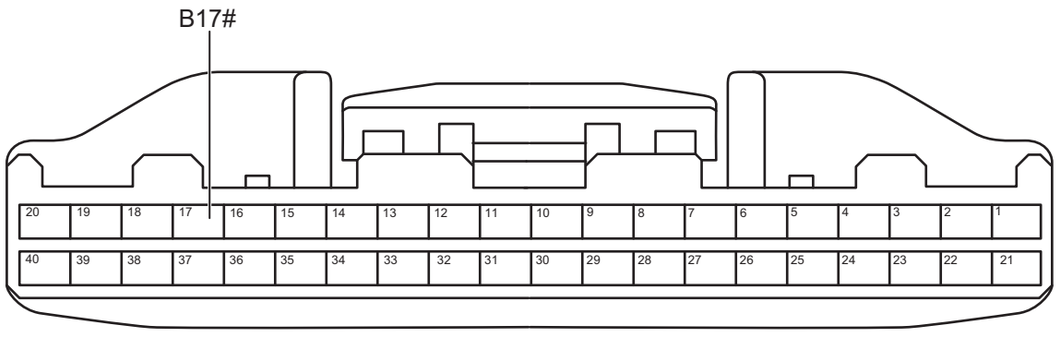
DTC	DTC detection conditions	Faulty location
B131087	(a) Lost communication with AQS.	• ATC • Harness and connector • AQS
B131002	(a) AQS response error.	• ATC • Harness and connector • AQS

Circuit diagram



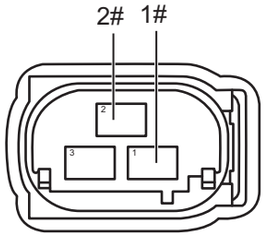
Inspection procedure

1	Check AQS harness and connector



ATC B connector

AC01031RM



AQS connector

AC01040RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ATC connector.

(d) Disconnect the AQS connector.

(e) Measure the resistance according to the values in the table below.

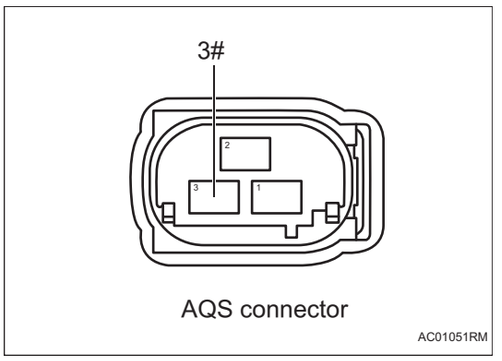
Standard value

Detector connection	Detection conditions	Specified state
ATC connector B17# -AQS connector 1#	Always connected	Less than 1Ω
AQS connector 2# - body GND	Always connected	Less than 1Ω
AQS connector 1# - body GND	Always connected	10 KΩ or greater
AQS connector 1# - B +	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

2	**Check the AQS power supply**



(a) Connect the ATC connector.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
AQS connector 3# - body GND	A/C relay engaged	Battery voltage

NG → **Repair or replace the harness and connector, fuse and relay**

OK

3	**Check AQS (See page AC-112)**

(a) Replace the AQS.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read the DTC again.

Critical:

No DTC is output

NG → **Replace the ATC (See page AC-101)**

OK

4	**End**

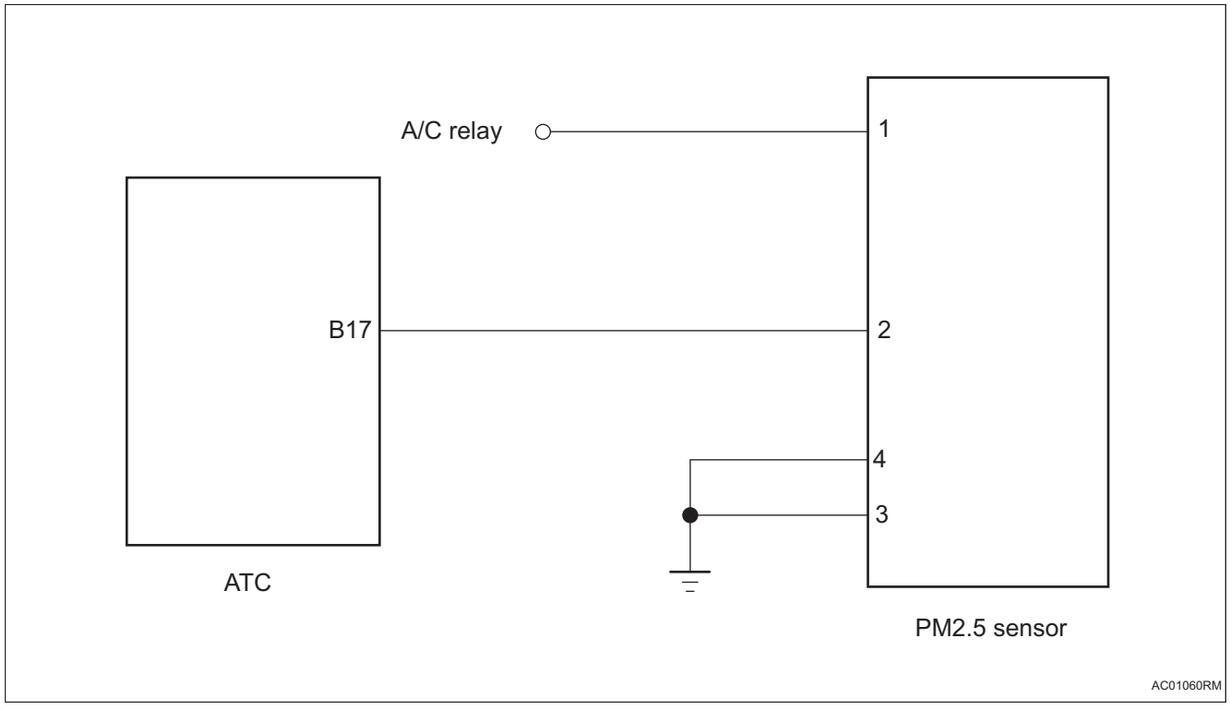
DTC	B131187	Lost communication with PM2.5
DTC	B131102	PM2.5 response error

Description

When the PM2.5 sensor fails, the ATC records DTC.

DTC	DTC detection conditions	Faulty location
B131187	(a) Lost communication with PM2.5 sensor.	• ATC • Harness and connector • PM2.5 sensor
B131102	(a) PM2.5 response error.	• ATC • Harness and connector • PM2.5 sensor

Circuit diagram



Inspection procedure

1	Check PM2.5 sensor

(a) Turn on the A/C system.

(b) Press the PM2.5 button.

(c) Check the PM2.5 sensor according to the instrument cluster display.

Criteria:

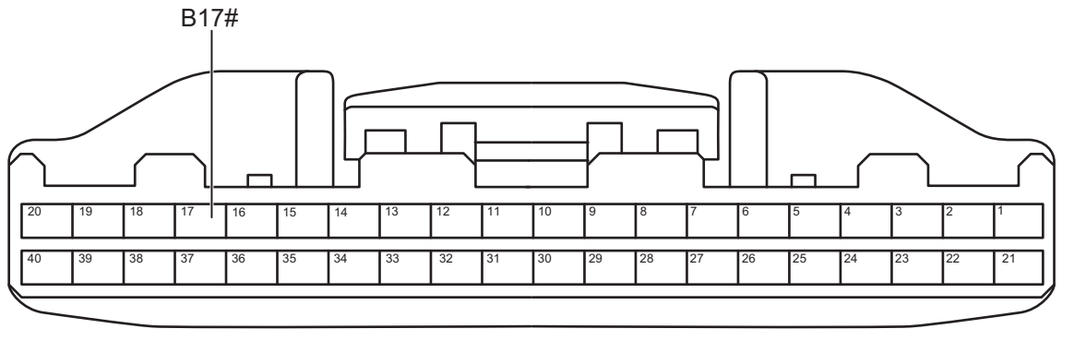
The PM2.5 value displayed on the instrument cluster shall not exceed 1000 after it is stable.

NG → **Replace the PM2.5 sensor (See page AC-114)**

OK

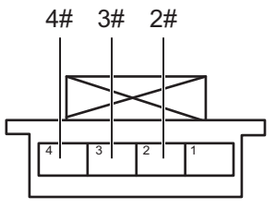
AC

2	Check PM2.5 sensor harness and connector for open circuit



ATC B connector

AC01031RM



PM 2.5 sensor connector

AC01070RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ATC connector.

(d) Disconnect the PM2.5 sensor connector.

(e) Measure the resistance according to the values in the table below.

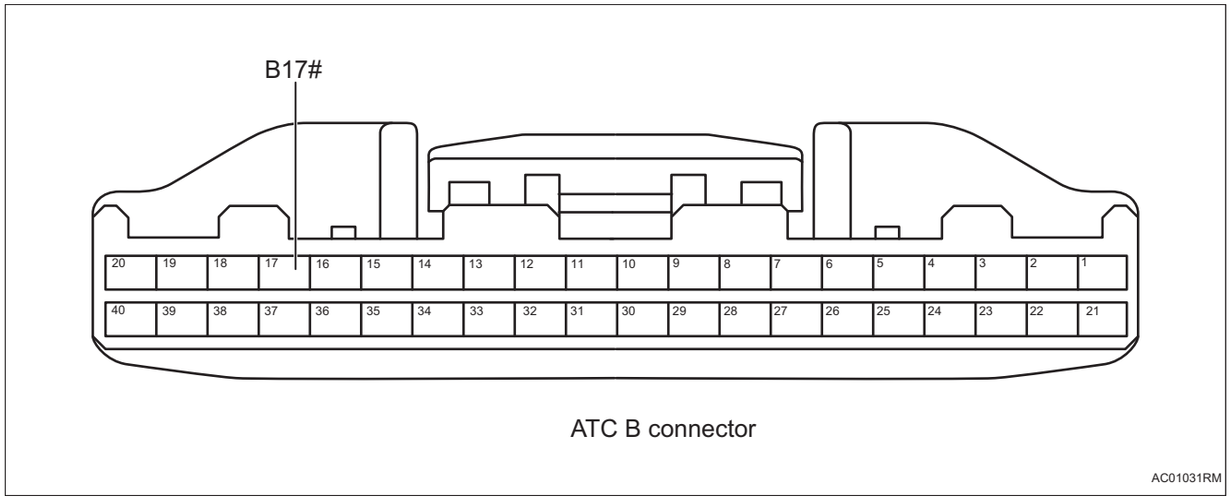
Standard value

Detector connection	Detection conditions	Specified state
ATC connector B17# - PM2.5 sensor connector 2#	Always connected	Less than 1Ω
PM2.5 sensor connector 3# - body GND	Always connected	Less than 1Ω
PM2.5 sensor connector 4# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check the PM2.5 sensor harness and connector for circuit shorted to ground



(a) Measure the resistance according to the values in the table below.

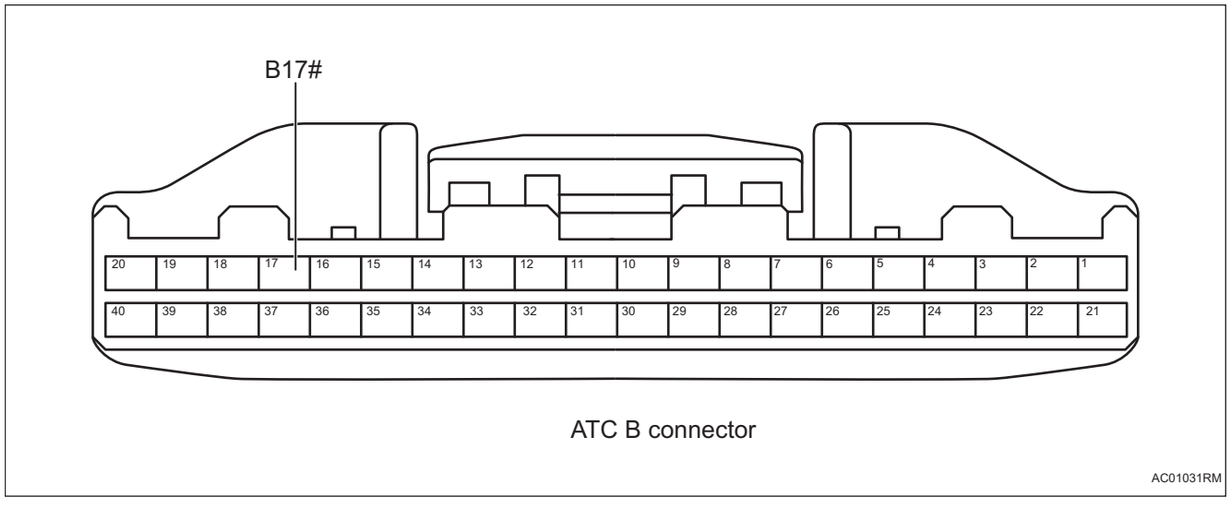
Standard value

Detector connection	Detection conditions	Specified state
ATC connector B17# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check the PM2.5 sensor harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

AC

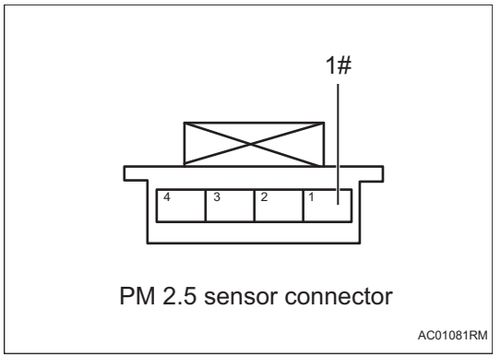
Standard value

Detector connection	Detection conditions	Specified state
ATC connector B17# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Check the PM2.5 sensor power supply



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Connect the ATC connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PM2.5 sensor connector 1# - body GND	A/C relay engaged	Battery voltage

NG → **Repair or replace harness or connector**

OK

6	Replace the PM2.5 sensor (See page AC-114)

(a) Replace the PM2.5 sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace the ATC (See page AC-101)**

OK

7	End

DTC	B131287	Lost communication with ION
DTC	B131202	ION response error

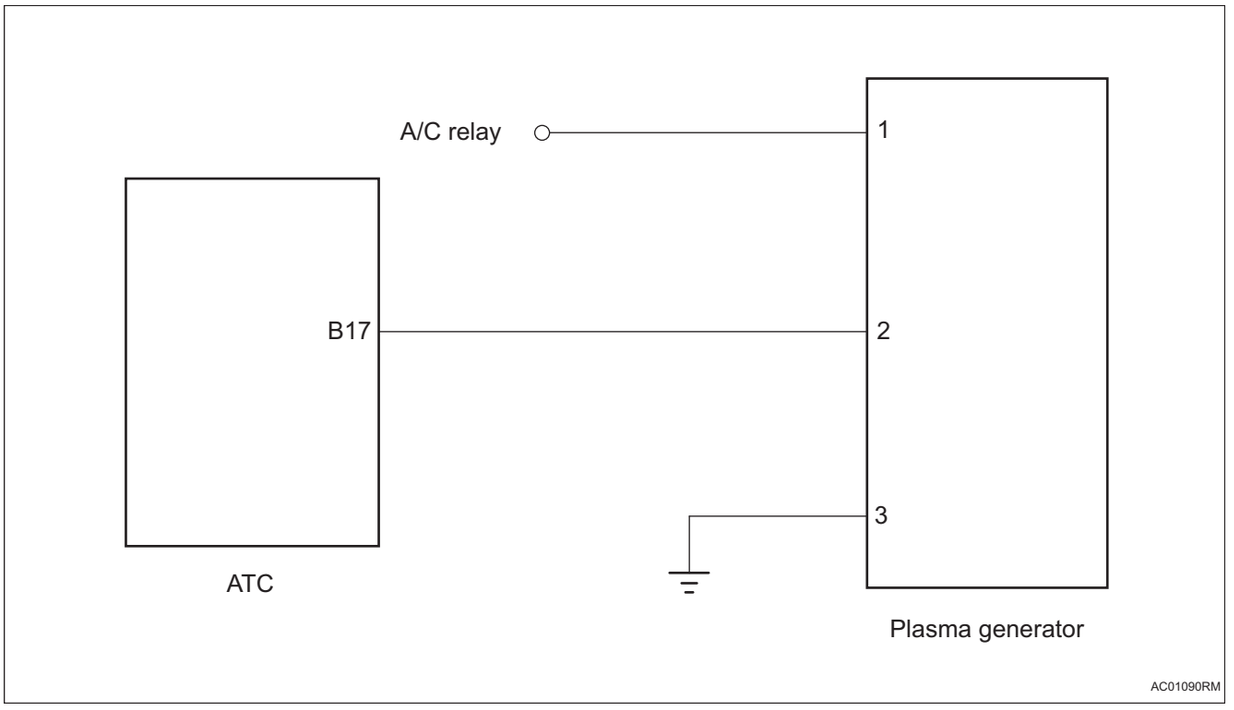
Description

AC

When the plasma generator fails, the ATC records DTC.

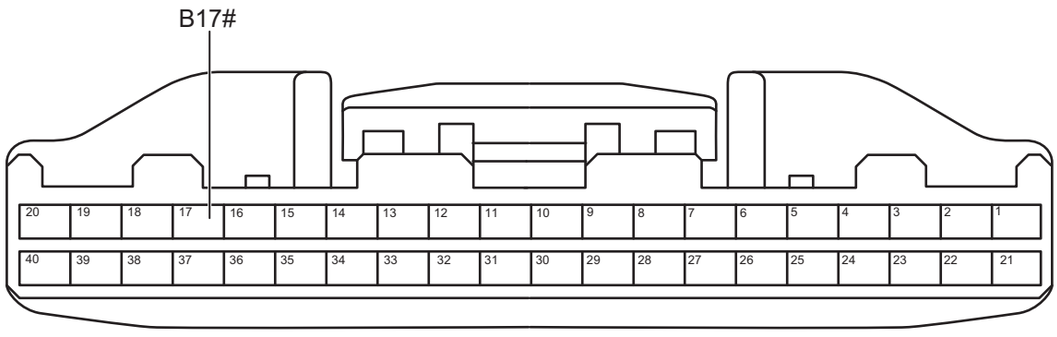
DTC	DTC detection conditions	Faulty location
B131287	(a) Plasma generator failure.	• ATC • Harness and connector • Plasma generator
B131202	(a) Plasma generator failure.	• ATC • Harness and connector • Plasma generator

Circuit diagram



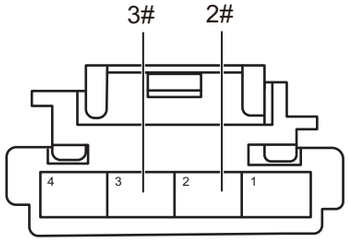
Inspection procedure

1	Check plasma generator harness and connector for open circuit



ATC B connector

AC01031RM



Plasma generator connector

AC01100RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ATC connector.

(d) Disconnect the plasma generator connector.

(e) Measure the resistance according to the values in the table below.

Standard value

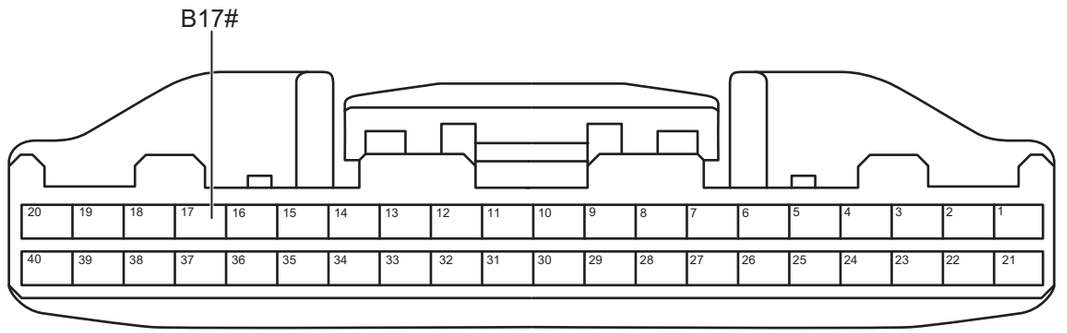
Detector connection	Detection conditions	Specified state
ATC connector A17# -plasma generator connector 2#	Always connected	Less than 1Ω
Plasma generator connector 3# - body GND	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

2	**Check the plasma generator harness and connector for circuit shorted to ground**

AC



ATC B connector

AC01031RM

(a) Measure the resistance according to the values in the table below.

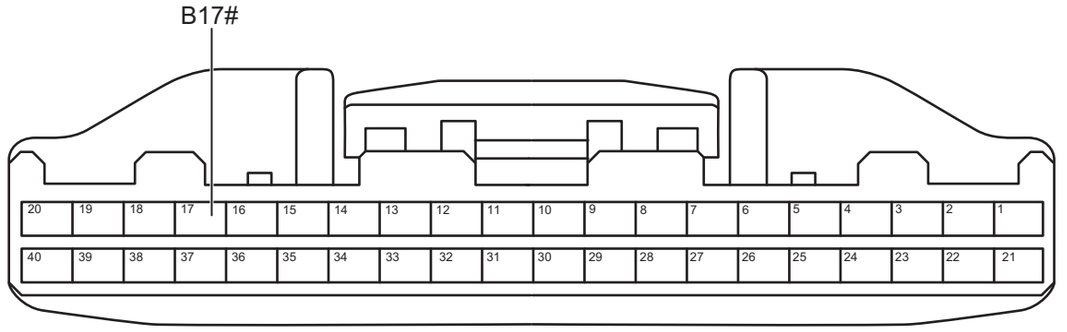
Standard value

Detector connection	Detection conditions	Specified state
ATC connector B17# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check the plasma generator harness and connector for circuit shorted to power supply**



ATC B connector

AC01031RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

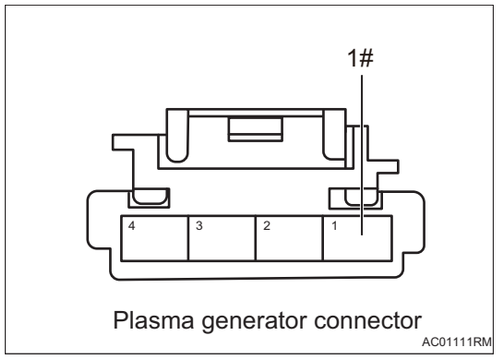
Standard value

Detector connection	Detection conditions	Specified state
ATC connector B17# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	Check the plasma generator power supply



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Connect the ATC connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Plasma generator connector 1# - body GND	A/C relay engaged	Battery voltage

NG → **Repair or replace harness or connector**

OK

5	Replace the plasma generator (See page AC-104)

(a) Replace the plasma generator.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace the ATC (See page AC-101)**

OK

6	End

DTC	U002888	Comfort CAN bus off
DTC	U014687	GW node lost
DTC	U014087	BCM 1 node lost
DTC	U010287	A/C compressor node lost
DTC	U112187	ESP message lost
DTC	U110087	ECM message lost
DTC	U124587	IVI message lost
DTC	U115587	Instrument cluster control unit message lost
DTC	U110187	TCU message lost
DTC	U129387	HCU message lost
DTC	U114687	GW message lost

Description

When the communication between ATC and other control units is abnormal or interrupted, ATC will record DTC.

DTC	DTC detection conditions	Faulty location
U002888	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U014687	(a) Abnormal or interrupted communication.	
U014087	(a) Abnormal or interrupted communication.	
U010287	(a) Abnormal or interrupted communication.	
U112187	(a) Abnormal or interrupted communication.	
U110087	(a) Abnormal or interrupted communication.	
U124587	(a) Abnormal or interrupted communication.	
U115587	(a) Abnormal or interrupted communication.	
U110187	(a) Abnormal or interrupted communication.	
U129387	(a) Abnormal or interrupted communication.	
U114687	(a) Abnormal or interrupted communication.	

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

DTC	U300317	Control unit power supply overvoltage
DTC	U300316	Control unit power supply undervoltage

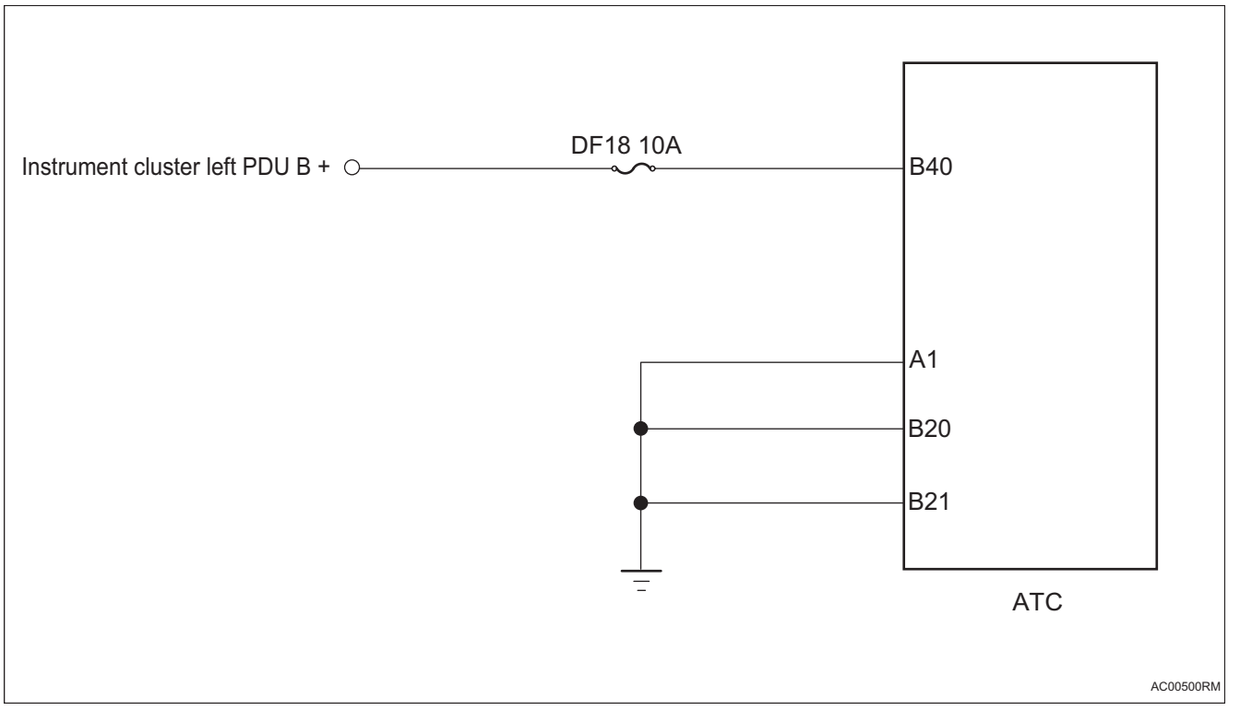
Description

AC

When the ATC power supply voltage exceeds the normal range, the ATC records the DTC.

DTC	DTC detection conditions	Faulty location
U300317	(a) Control unit power supply overvoltage.	• ATC • Harness and connector • Battery/charging system
U300316	(a) Control unit power supply undervoltage.	• ATC • Harness and connector • Battery/charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery + - battery -	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2	**Check ATC fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the ATC fuse.

(d) Measure the resistance according to the values in the table below.

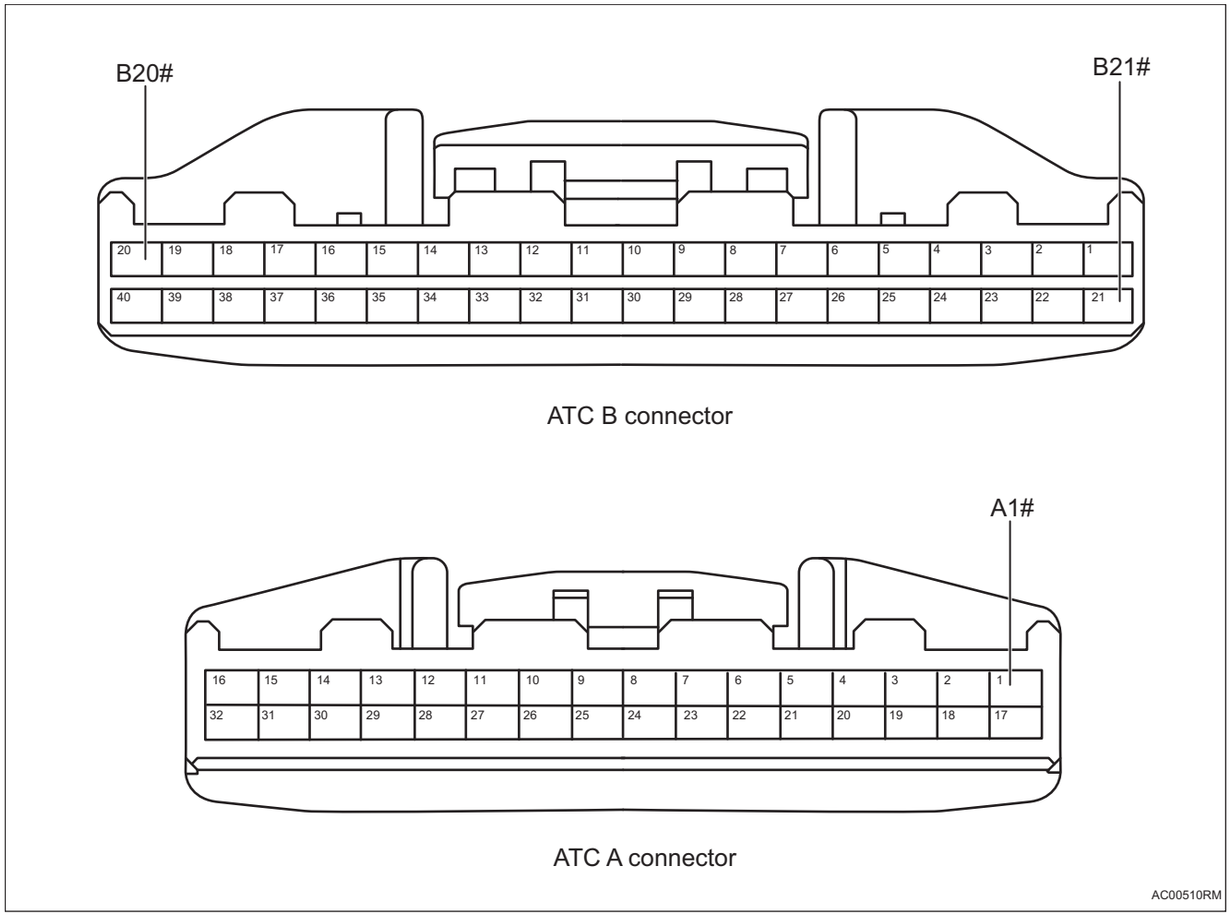
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG **Replace fuse**

OK

3	**Check ATC ground**



(a) Disconnect the ATC connector.

(b) Measure the resistance according to the values in the table below.

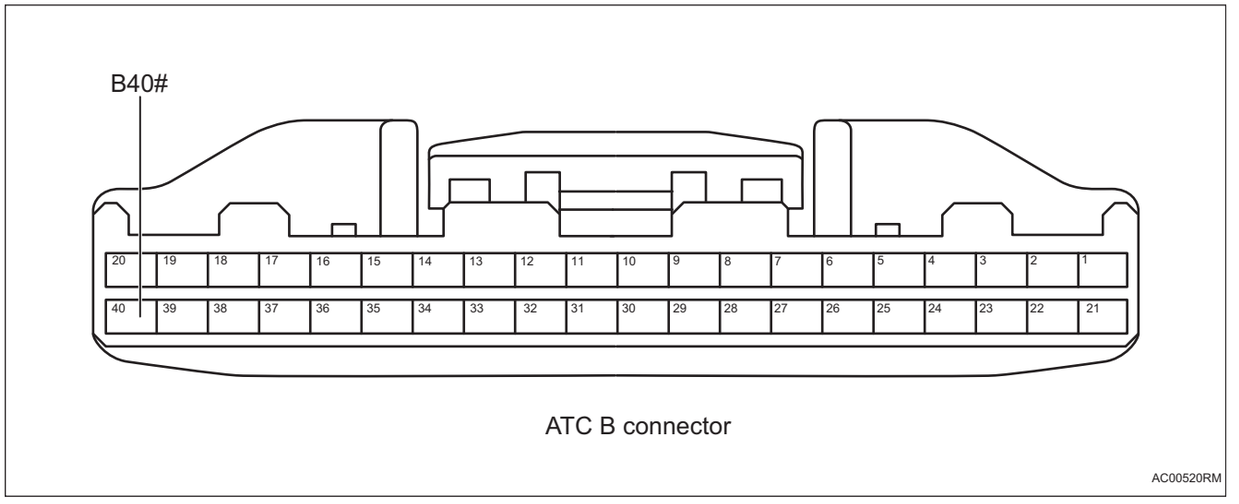
Standard value

Detector connection	Detection conditions	Specified state
ATC connector A1# - body GND Always	connected	Less than 1Ω
ATC connector B20# - body GND Always	connected	Less than 1Ω
ATC connector B21# - body GND Always	connected	Less than 1Ω

NG → **Repair and replace harness or connector**

OK

4	Check ATC power supply



(a)

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ATC connector B40# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace harness or connector**

OK

5	Replace the ATC (See page AC-101)

AC

Refrigerant

On-board inspection

1. Use the manifold pressure gauge assembly to check the refrigerant pressure.

Hint:

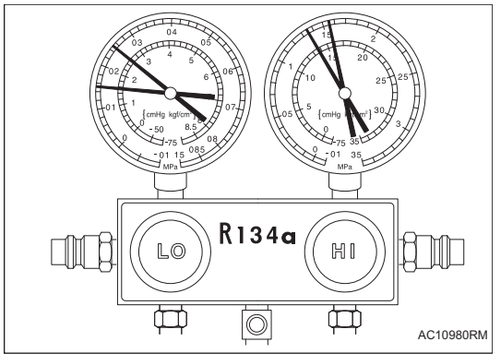
The following examples are manifold gauge assembly readings and corresponding A/C system faults.

(a) Read the manifold gauge pressure when the following conditions are met:

- Park the vehicle in the shade.
- The door is fully open.
- Engine runs at 2000 rpm.
- Turn on the A/C switch.
- A/C is switched to recirculation mode.
- The temperature is set to the lowest value.
- The blower speed is set to high speed.
- The air inlet temperature is 30°C to 35°C.

(b) The A/C system works properly.

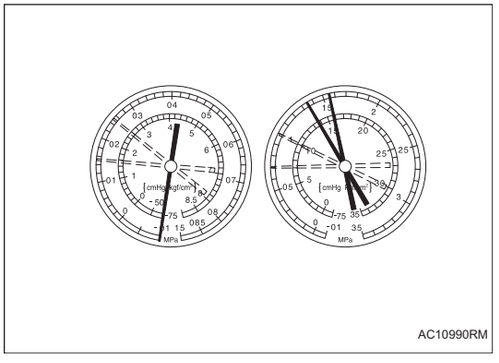
(1) Pressure gauge reading



Standard value	
LV side	0.25 to 0.35 MPa
HV side	1.45 to 2.35 MPa

(c) The A/C system works abnormally.

(1) During operation, the pressure on the low pressure side is cycled between normal and vacuum



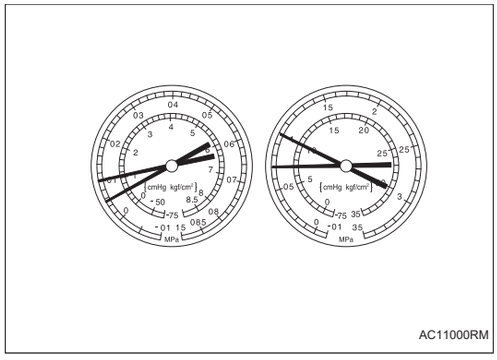
Symptom	A/C system performs cooling function intermittently, ultimately cannot perform cooling.
Possible causes	Moisture in the A/C system freezes in the expansion valve orifice, causing the refrigerant to temporarily stop circulating
	After the system stops, warm up again, the ice melts and the work temporarily returns to normal
Diagnosis	Moisture saturation in cooler dryer (integrated in condenser tank)
	Moisture in the A/C system freezes in the expansion valve orifice, hindering the refrigerant circulation

Corrective action	Replace the cooler dryer
	Clear moisture from A/C system by repeatedly bleeding the air
	Refill the A/C system with a proper amount of new or purified refrigerant

Hint:

In the above example, moisture is present in the A/C system.

(2) Low pressure on both low pressure side and high pressure side



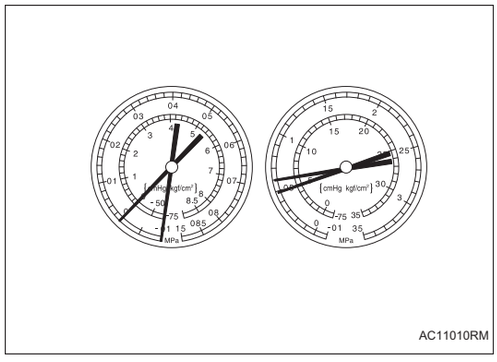
AC11000RM

Symptom	Poor cooling performance
	A/C system cannot provide cooling effectively
Possible causes	A/C system refrigerant leakage
Diagnosis	Insufficient refrigerant
	Refrigerant leakage
Corrective action	Check refrigerant for leaks and repair if necessary
	Refill the A/C system with a proper amount of new or purified refrigerant
	If the gauge indicates that the pressure is close to 0, it is necessary to drain the A/C system after repairing the leak

Hint:

In the above example, there is a refrigerant deficiency.

(3) Low pressure on both low pressure side and high pressure side

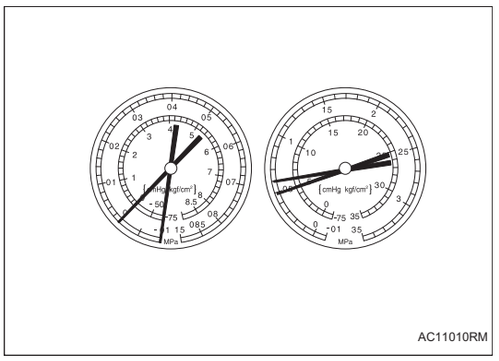


AC11010RM

Symptom	A/C system cannot perform cooling function effectively (occasional system cooling function).
	Frost or condensation can be seen on both sides of the reservoir / dryer or expansion valve pipeline.
Possible causes	Moisture or dirt in the A/C system impedes refrigerant flow
	Expansion valve stuck in closed position
Diagnosis	Refrigerant does not circulate
Corrective action	Replace the expansion valve
	Replace condenser
	Empty the A/C system and refill it with a proper amount of new or purified refrigerant

Hint:

In the above example, the refrigerant circulation is poor.



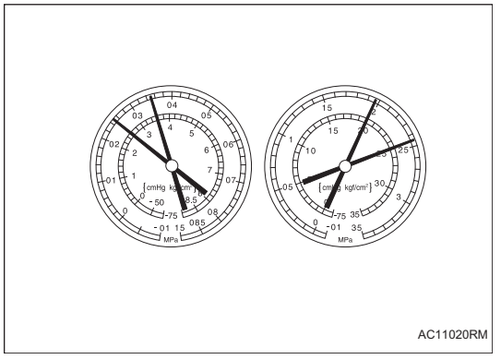
AC11010RM

(4) Vacuum on low pressure side, and very low pressure on high pressure side

Symptom	A/C system cannot perform cooling function effectively (occasional system cooling function).
	Frost or condensation can be seen on both sides of the reservoir / dryer or expansion valve pipeline.
Possible causes	Moisture or dirt in the A/C system impedes refrigerant flow
	Expansion valve stuck in closed position
Diagnosis	Refrigerant does not circulate
Corrective action	Replace the expansion valve
	Replace condenser
	Empty the A/C system and refill it with a proper amount of new or purified refrigerant

Hint:

In the above example, the refrigerant does not circulate.



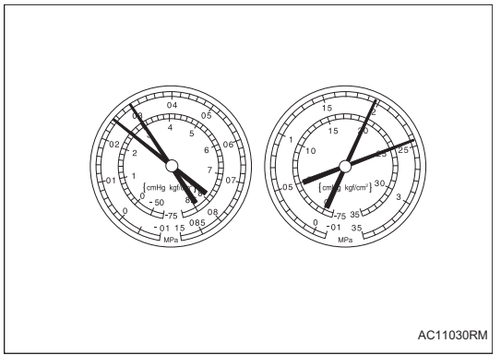
AC11020RM

(5) Too high pressure on both low pressure side and high pressure side

Symptom	A/C system cannot provide cooling effectively
Possible causes	Insufficient performance due to excessive refrigerant
	Poor cooling effect of condenser
Diagnosis	Excessive A/C system refrigerant due to overfilling of refrigerant during refilling
	Insufficient condenser cooling effect due to blocked condenser fins or cooling fan failure
Corrective action	Clean condenser
	Check the working conditions of condenser cooling fan
	If the above corrective actions are normal, check the amount of the refrigerant and refill the A/C system with an appropriate amount of new or purified refrigerant

Hint:

In the above example, the A/C system is overfilled or the cooling effect of the condenser is insufficient.



AC11030RM

(6) Too high pressure on both low pressure side and high pressure side

Symptom	A/C system cannot perform cooling function.
	Low pressure line is overheated and cannot be touched
Possible causes	Air in A/C system
Diagnosis	Air in A/C system
	Insufficient vacuum cleaning when draining the A/C system

Corrective action	Replace the cooler dryer
	Check whether the compressor oil is dirty or insufficient.
	Empty the A/C system and refill it with new or purified refrigerant

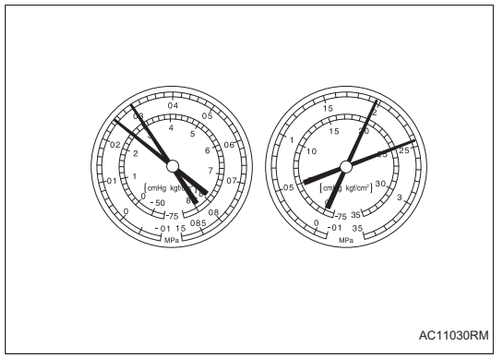
Hint:

These instrument cluster indications appear when the A/C system is turned on and then refilled before the system is emptied.

Caution:

In the above example, there is air in the A/C system.

(7) Too high pressure on both low pressure side and high pressure side

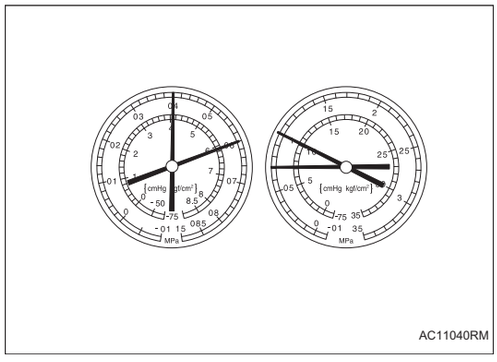


Symptom	A/C system cannot provide cooling effectively
	There is frost or a lot of condensation in the low-pressure side pipeline
Possible causes	Expansion valve stuck in open position or refrigerant metering error
Diagnosis	Excessive refrigerant in low-pressure line
	Expansion valve opening too large
Corrective action	Replace the expansion valve

Hint:

In the above example, the expansion valve is faulty.

(8) Too high pressure on both low pressure side and high pressure side or too low pressure on high pressure side

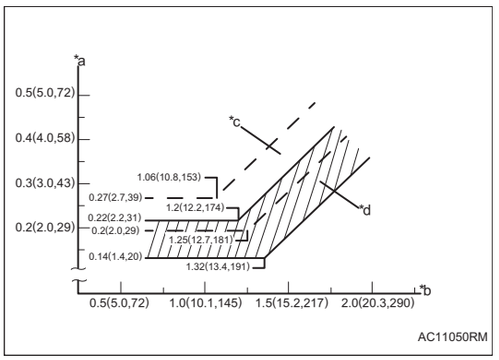


Symptom	A/C system cannot provide cooling effectively
Possible causes	Compressor internal leakage
Diagnosis	Low compression capacity
	Leakage from damaged valves or other compressor components
Corrective action	Replace the compressor

Hint:

In the above example, the compressor compression capacity is insufficient.

(d) Pressure gauge reading (reference)



*a	Pressure on low-pressure side 0.23 MPa
*b	Pressure on the high-pressure side 1.45 MPa
*c	Blower high-speed area
*d	Blower low-speed area

Replace

1. Recycling of refrigerant in cooling system

(a) Start the engine.

(b) Operate the cooler compressor under the conditions indicated below:

Item	Conditions
Operating time	3 minutes or more
Temperature setting	Coldest
Blower speed	High
Engine	Idling
A/C switch	Turning on

This allows most of the compressor oil from the various parts in A/C system to be collected into the A/C compressor.

Hint:

If A/C does not work due to compressor locking, there is no need to operate the cooler compressor.

(c) Stop the engine.

(d) Recover refrigerant from A/C system using refrigerant recovery unit.

Hint:

Please follow the manufacturer's instructions to use the refrigerant recovery unit.

2. Compressor oil specifications

(a) Use the specified compressor oil, otherwise the compressor will be damaged.

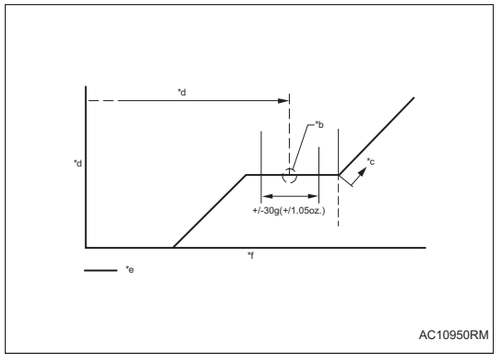
Applicable vehicle	**Compressor oil grade**	**Standard capacity**
Conventional vehicle	SP-10 or equivalent	75cm 3

3. Refrigerant designation

(a) Use the specified refrigerant, otherwise the compressor will be damaged.

Applicable vehicle	Refrigerant designation	Filling volume
Conventional vehicle	HFC-134a	550 g ± 15 (g)

(b) Perform vacuum cleaning with vacuum pump or suitable equipment, and fill the A/C system with refrigerant.



*a	Standard filling volume
*b	Average value within normal range
*c	Overfilling
*d	High voltage
*e	Auxiliary cooling system
*f	Refrigerant quantity

Hint:

- Do not turn on the A/C switch before filling the A/C system with refrigerant. Otherwise, it may make the compressor work without refrigerant, causing overheating of the compressor.
- The refrigerant level shall be checked according to the quantity (weight).

Hint:

When using the refrigerant recovery unit, make sure there is enough refrigerant to fill the system. The refrigerant recovery unit can not recover 100% of the refrigerant in the air conditioning system.

4. Warm up compressor

(a) Keep the A/C switch on for at least 2 minutes to allow the compressor to warm up.

Hint:

When turning on the A/C after removing and installing the A/C system pipeline (including the compressor), be sure to warm up the compressor to prevent damage.

5. Check whether the refrigerant leaks

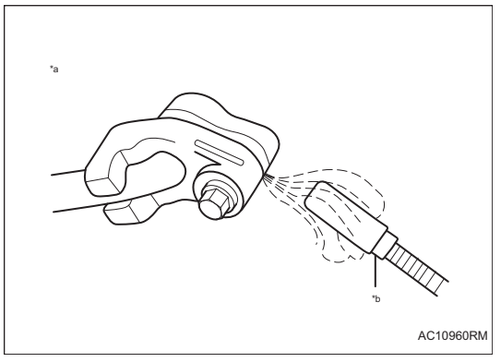
(a) After refilling the A/C system with refrigerant, check the refrigerant for leakage with a halogen leak detector.

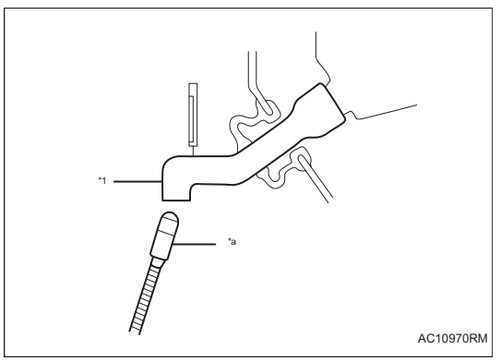
(b) Test under the following conditions:

- Set the ignition switch to OFF position

- Ensure good ventilation (halogen leak detector may react to volatile gases that are not refrigerants, such as gasoline vapors and exhaust gases).
- Repeat the check two or three times.
- Measure the pressure to confirm that there is refrigerant remaining in the A/C system.

(c) Use the halogen leak detector to check the A/C system for refrigerant leakage.





(d) Power off the halogen leak detector, bring it close to the drain hose, and then turn on the detector.

Hint:

- After the blower motor stops, leave the cooling device under no load for more than 15 minutes.
- Place the halogen leak detector sensor under drain hose.
- When approaching the drain hose, ensure that the halogen leak detector does not react to volatile gases. If the interference of volatile gas cannot be avoided, the vehicle shall be raised to check for leakage.

(e) If no refrigerant leakage is detected at the drain hose, remove the blower motor control unit from the cooling unit. Insert the halogen leak detector sensor into the unit and check for leaks.

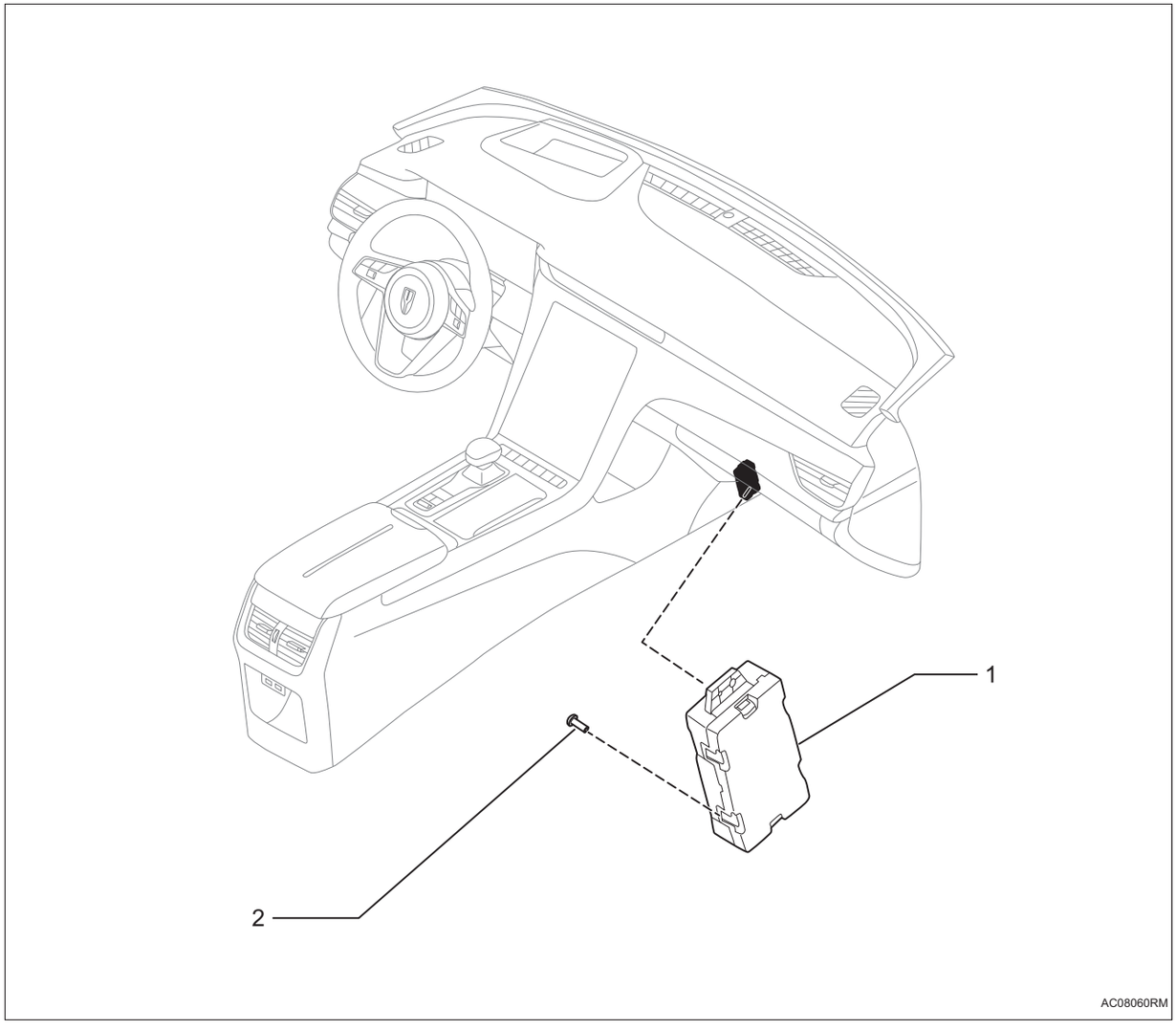
(f) Disconnect the pressure sensor connector and condition it for about 20 minutes. Place the halogen leak detector sensor close to the pressure sensor and check for leaks.

Hint:

When checking for leakage, the presence of oil at the connection indicates that there is leakage.

Front A/C control unit assembly

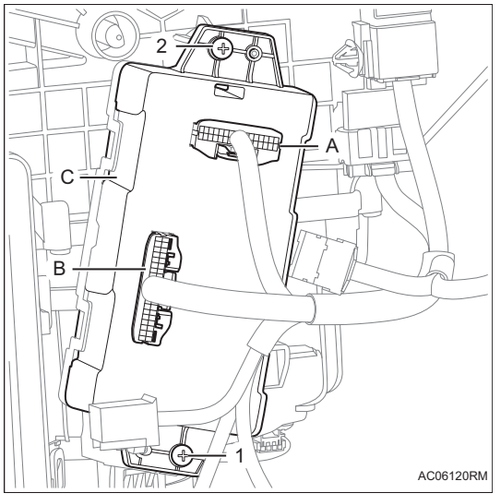
Parts



1. **A/C control unit assembly**
2. **Screw**
   - X2

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove glove box assembly (See page IP-5)**
3. **Removal of the right floor air outlet (See page AC-156)**
4. **Remove A/C control unit assembly**



(a) Disconnect the harness connector-A-B-.

(b) Remove the screws -1-2-, and remove the A/C control unit assembly -C-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

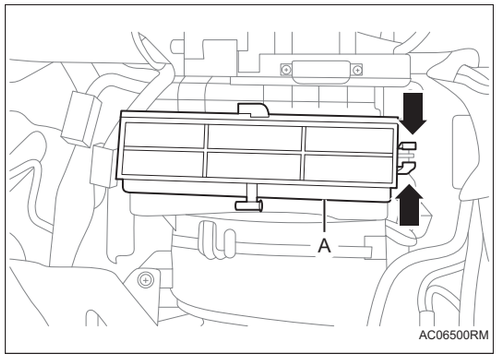
A/C filter element

Replace

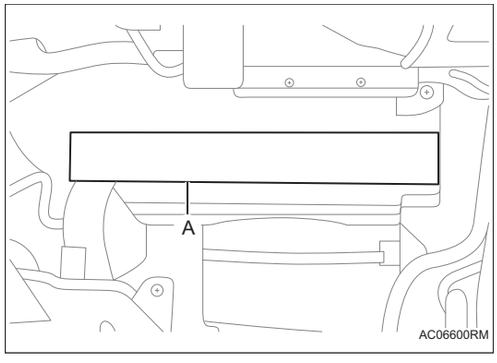
Hint:

Please set the A/C system to recirculation mode before removal.

1. **Open the glove box assembly**
2. **Remove A/C filter element**



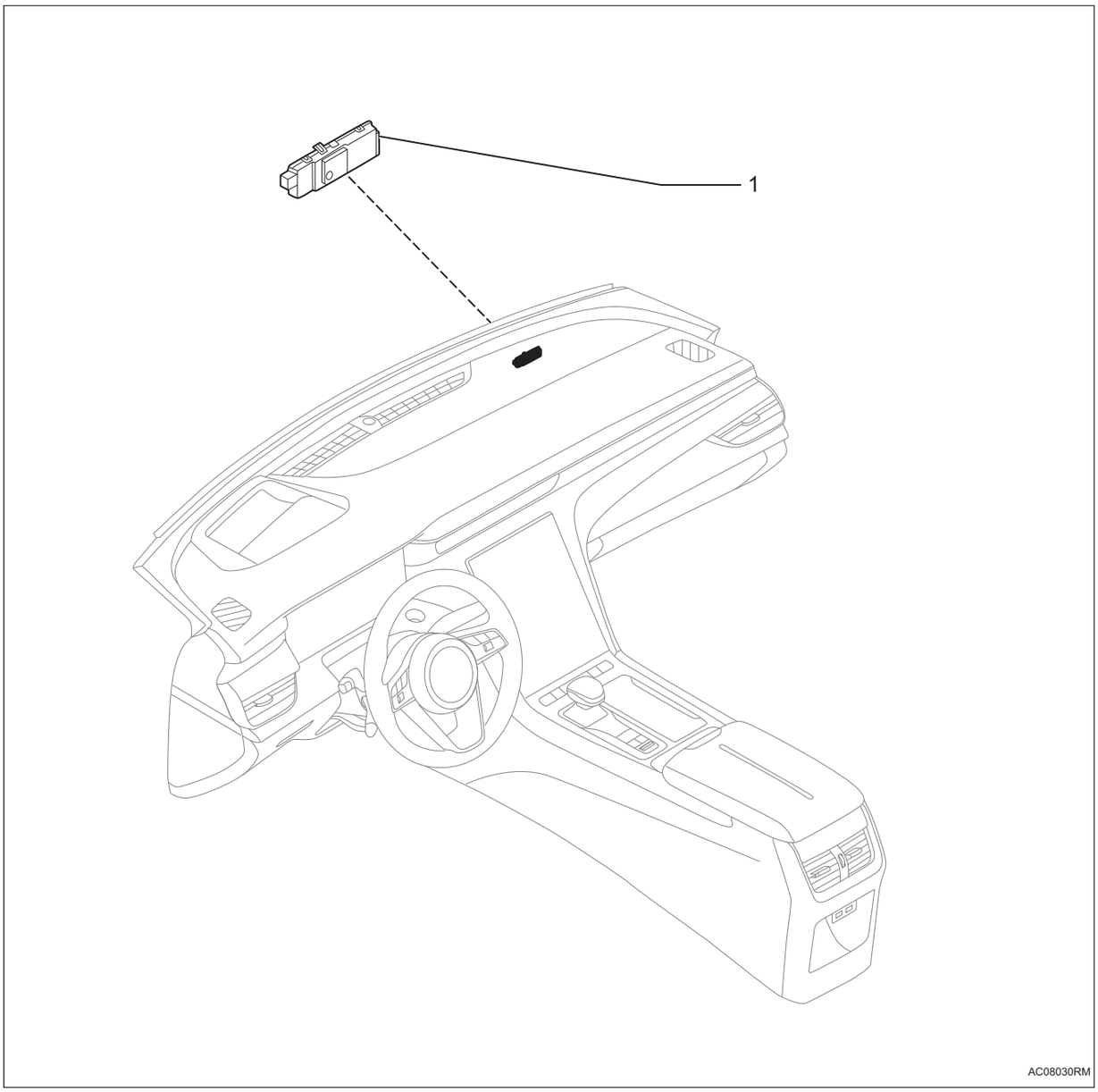
(a) Press the claw-arrow-, and remove the cover-A-.



(b) Pull the A/C filter element -A- outward.

Plasma generator assembly

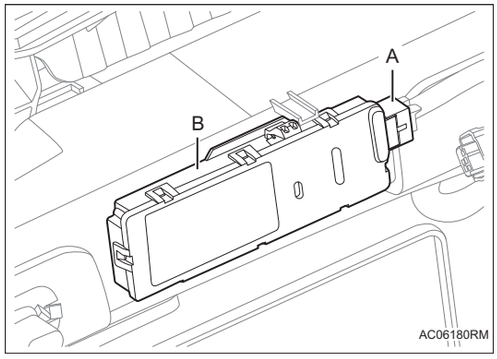
Parts



1. Plasma generator assembly

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove instrument panel assembly (See page IP-5)**
3. **Remove plasma generator assembly**
   (a) Disconnect the harness connector -A-, and remove the plasma generator assembly -B-.

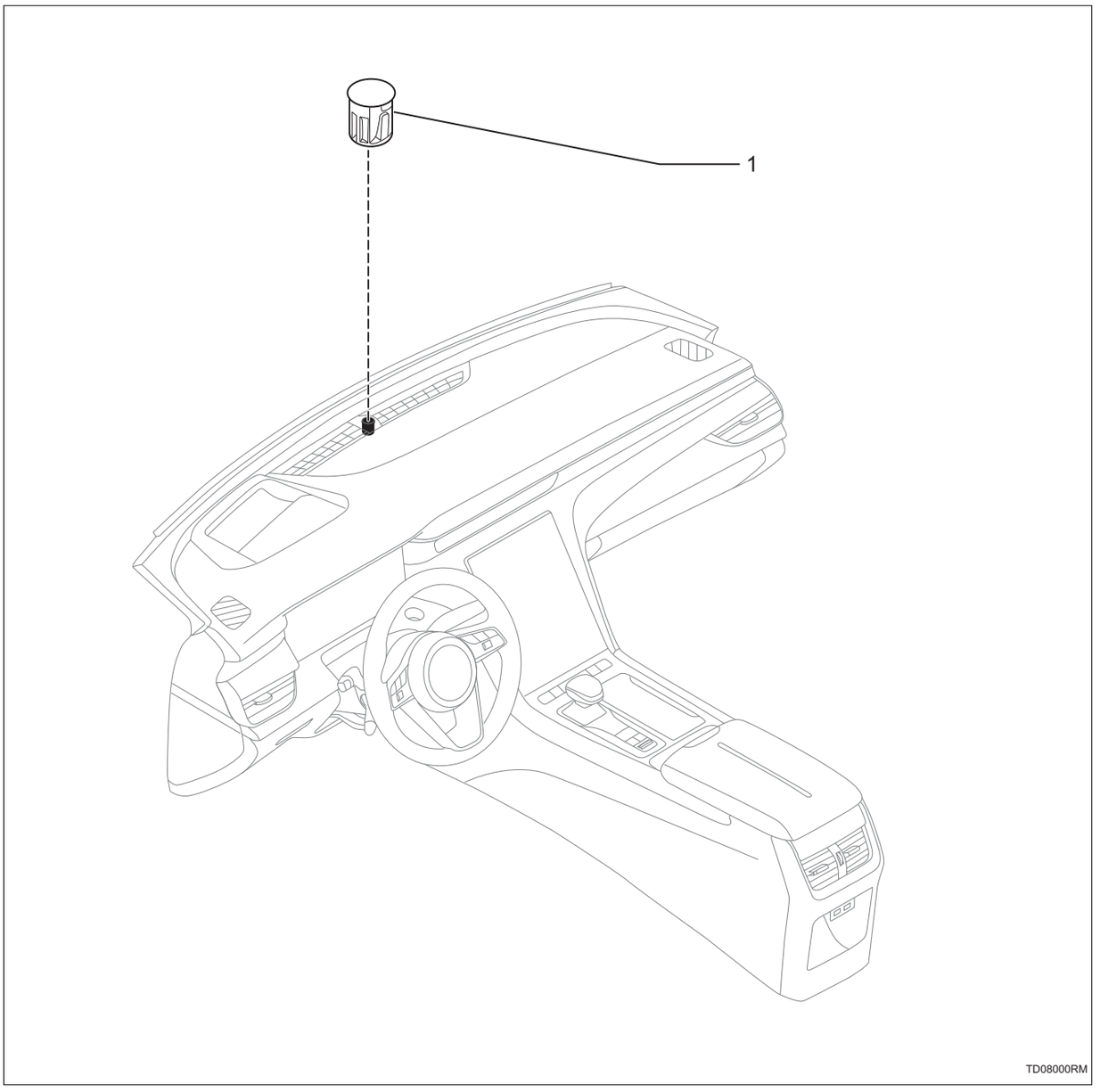


Installation

1. **The installation procedure is the reverse of removal procedure.**

Sunlight sensor assembly

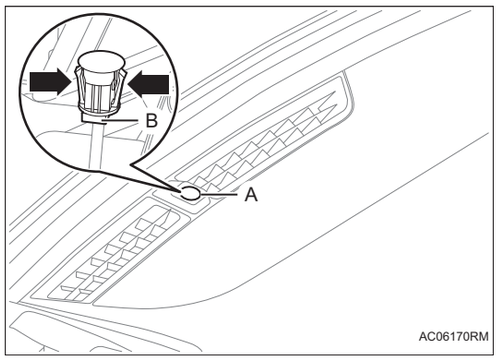
Parts



1. Sunlight sensor assembly

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the sunlight sensor assembly**



(a) Detach the two claws-arrow- and pull out the sunlight sensor assembly-A-.

Hint:

Do not remove the sunlight sensor assembly completely.

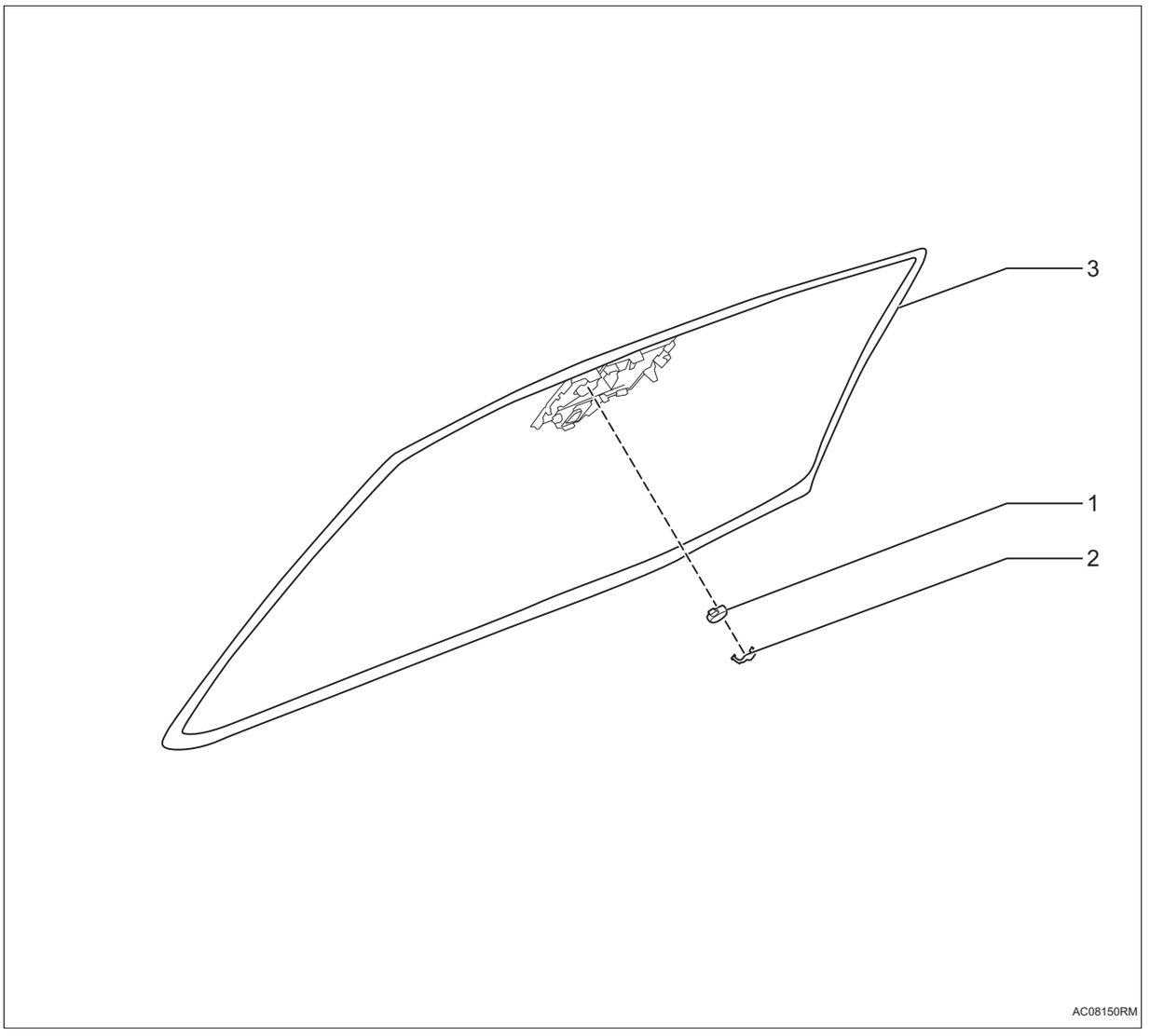
(b) Disconnect the sunlight sensor assembly harness connector -B-, and remove the sunlight sensor assembly -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Rain sensor assembly

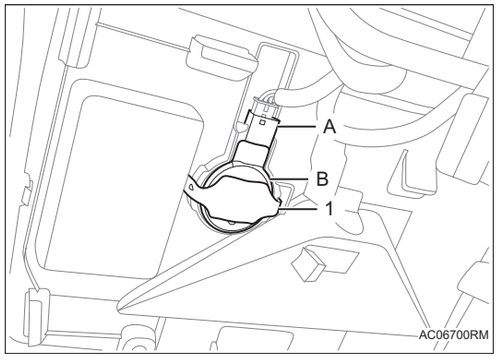
Parts



1. **Rain sensor assembly**
2. **Spring washer**
3. **Front windshield assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove interior rearview mirror trim cover II (See page IM-2)**
3. **Remove interior rearview mirror trim cover I (See page IM-2)**
4. **Remove rain sensor assembly**



(a) Remove the spring washer -1- and disconnect the harness connector -A-.

(b) Remove rain sensor assembly-B-.

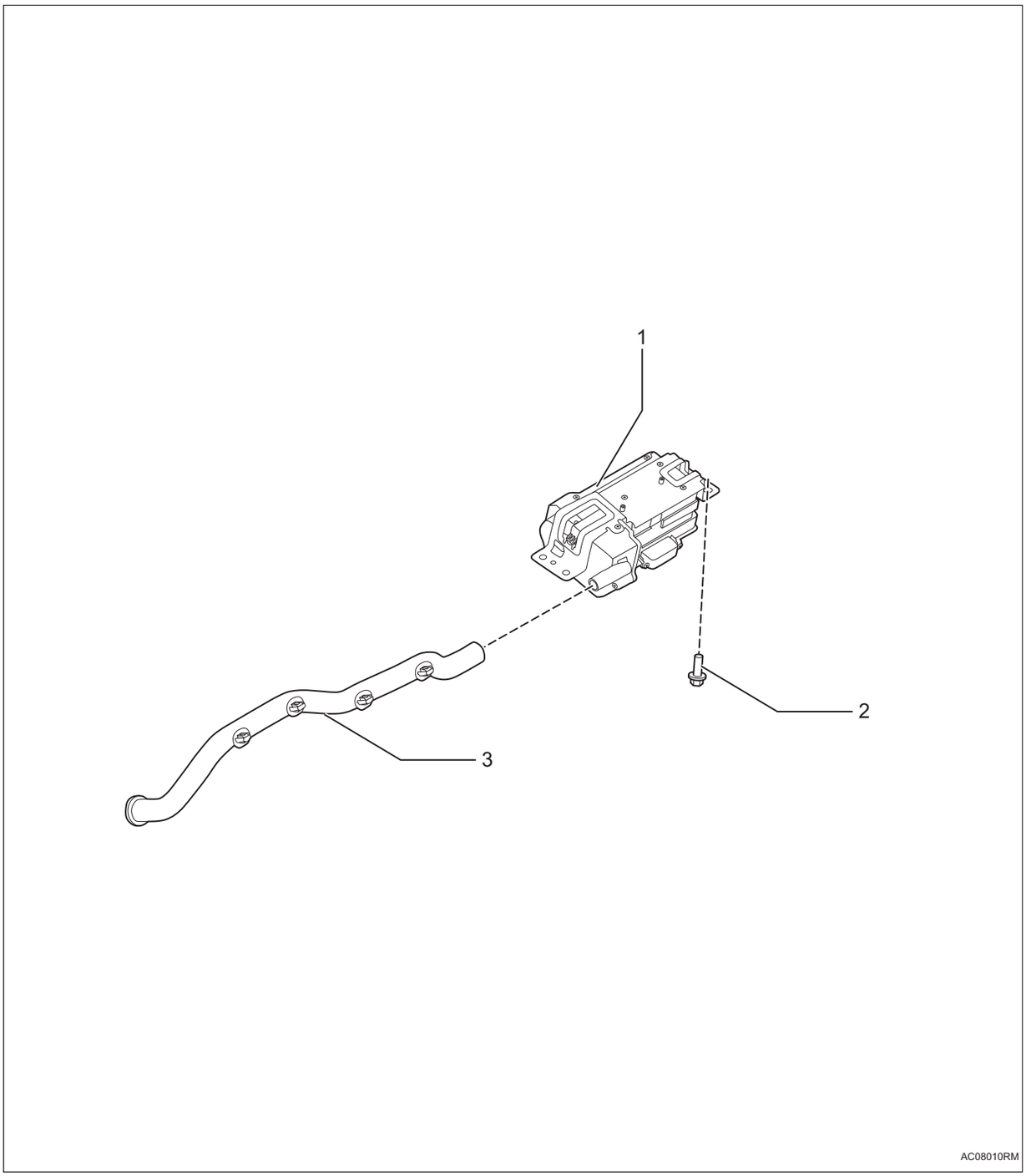
Installation

1. **The installation procedure is the reverse of removal procedure.**

Fragrance generator assembly

Parts

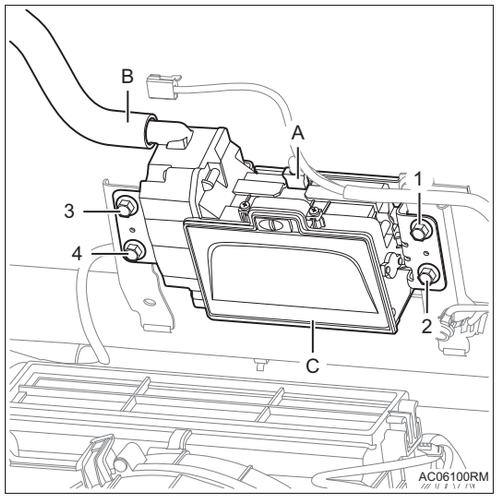
AC



1. **Fragrance generator assembly**
2. **Hexagon flange bolt**
   - X4
   - Torque: 8~12 N · m
3. **Fragrance hose assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove glove box assembly (See page IP-5)**
3. **Remove fragrance generator assembly**

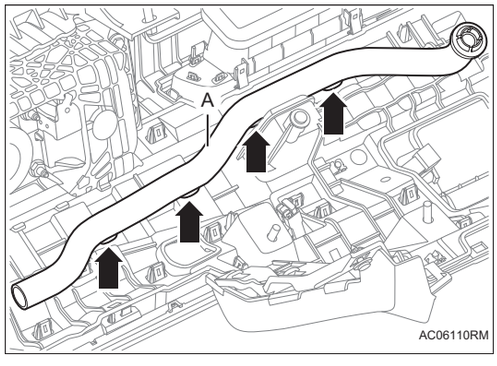


   (a) Disconnect the harness connector-A- of fragrance generator assembly.

   (b) Disconnect fragrance hose assembly -B-.

   (c) Remove the bolts -1-4- and remove the fragrance generator assembly -C-.

4. **Remove instrument panel body assembly (See page IP-5)**
5. **Remove fragrance hose assembly**



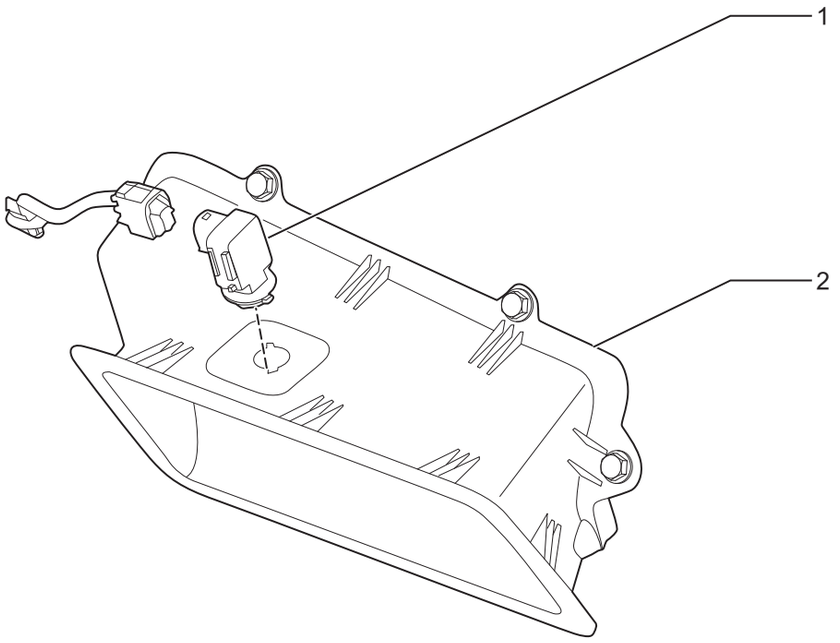
   (a) Detach clip -arrow- and remove fragrance hose assembly -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

AQS assembly

Parts

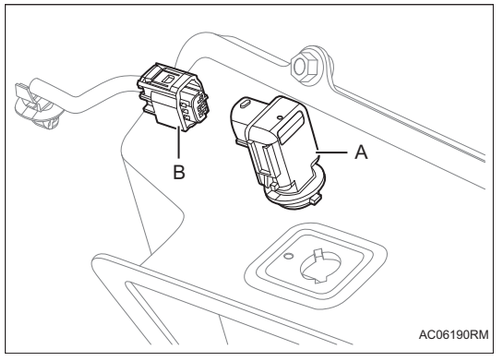


AC08130RM

1. **AQS assembly**
2. **Air inlet**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove instrument panel assembly (See page IP-5)**
3. **Remove AQS assembly**



(a) Disconnect the harness connector-B-.

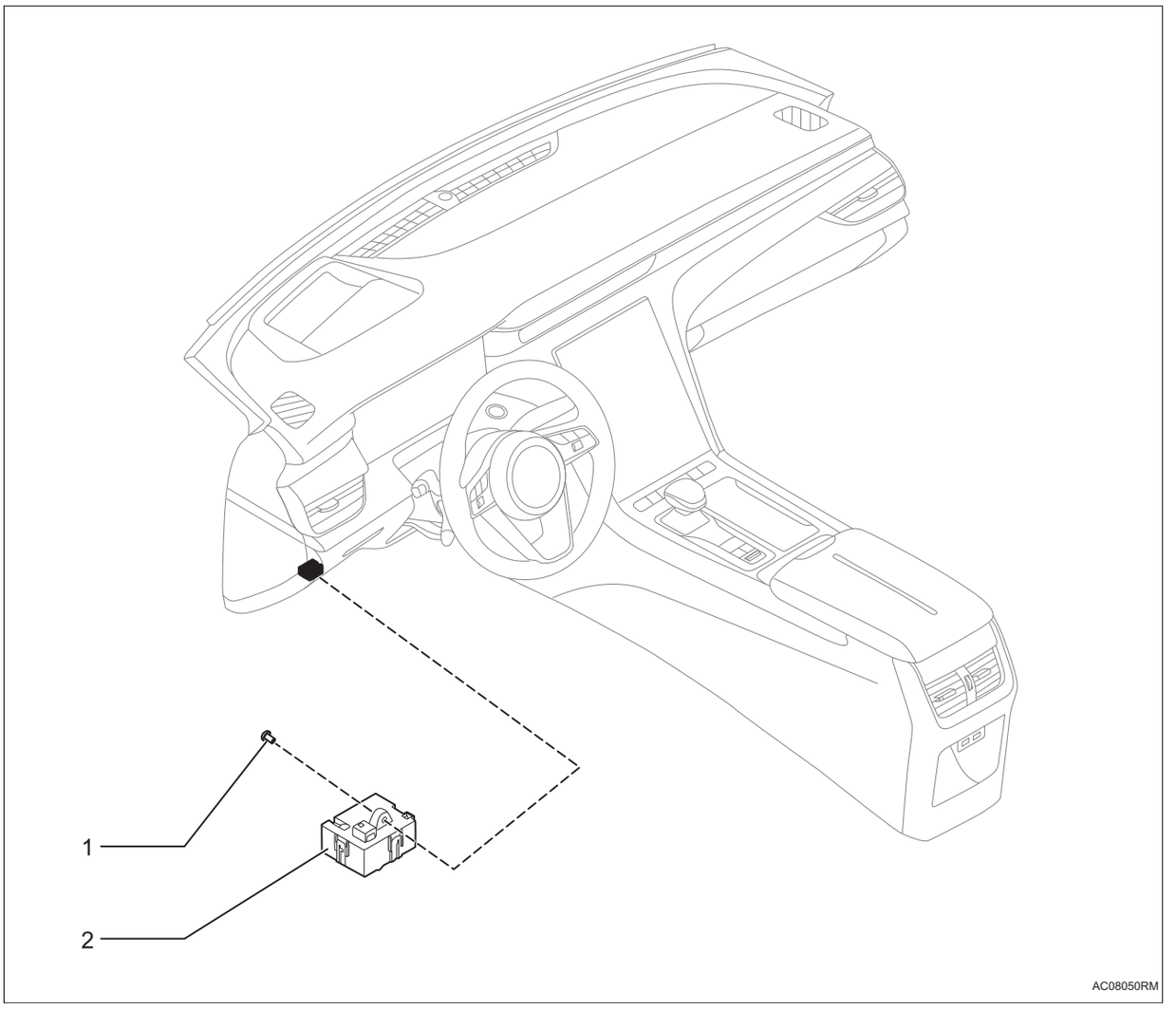
(b) Remove the AQS assembly-A- from the air inlet.

Installation

1. **The installation procedure is the reverse of removal procedure.**

PM2.5 sensor assembly

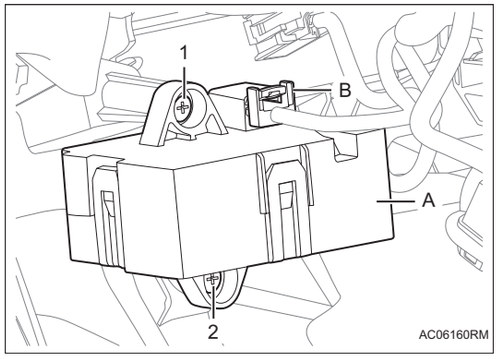
Parts



1. **Screw**
   - X2
2. **PM2.5 sensor assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove instrument panel left lower guard plate (See page IP-5)**
3. **Remove PM2.5 sensor assembly**



(a) Disconnect the harness connector-B- of PM2.5 sensor assembly.

(b) Remove the screws -1-2-, and remove the PM2.5 sensor assembly -A-.

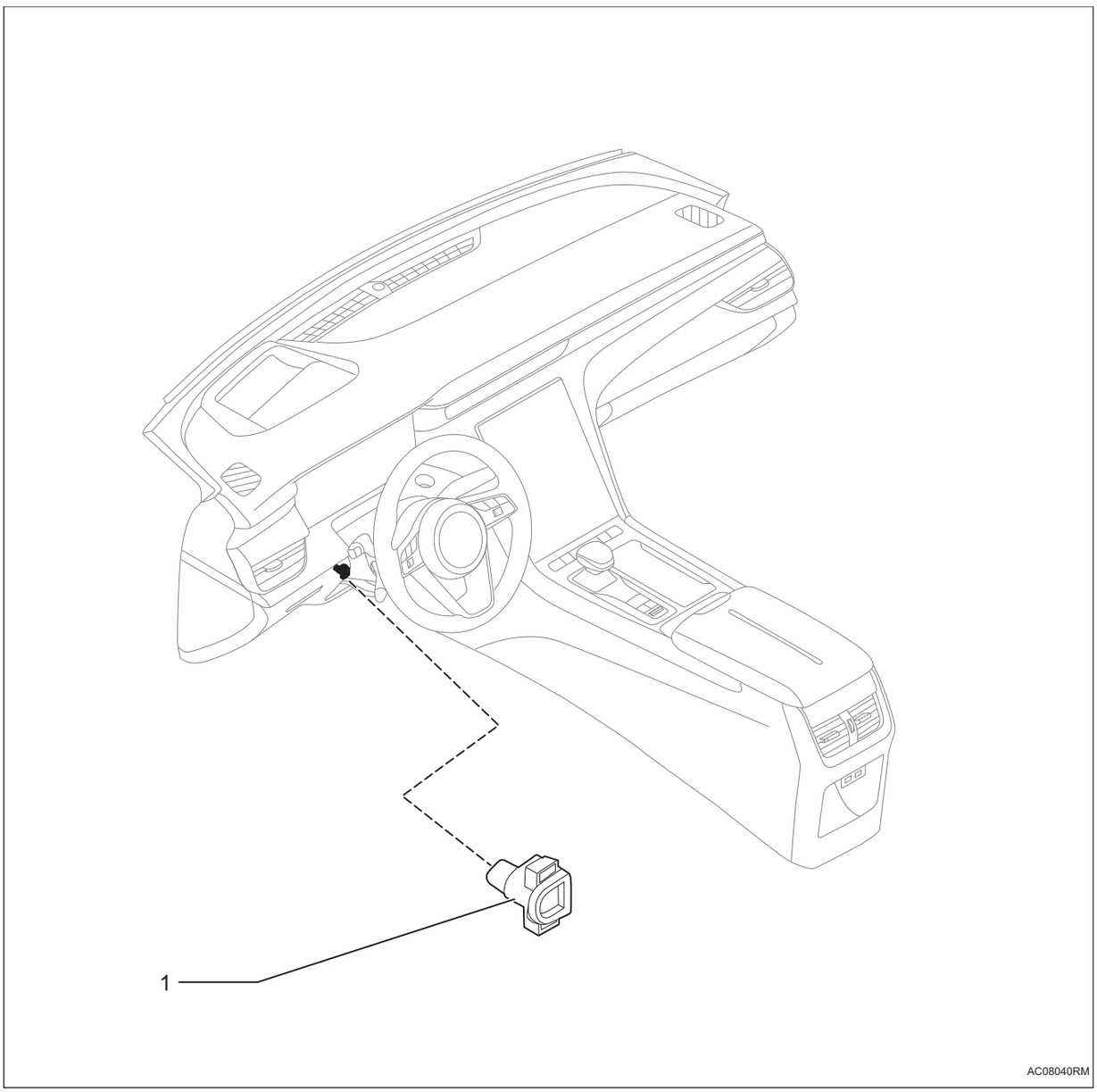
Installation

1. **The installation procedure is the reverse of removal procedure.**

Inside temperature sensor assembly

Parts

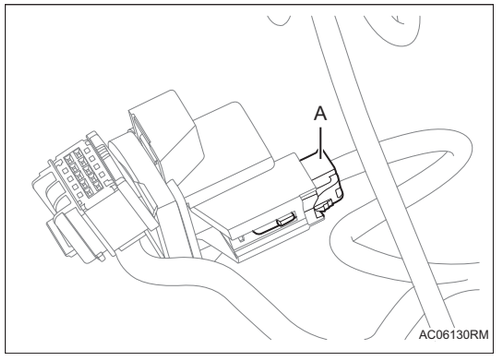
AC



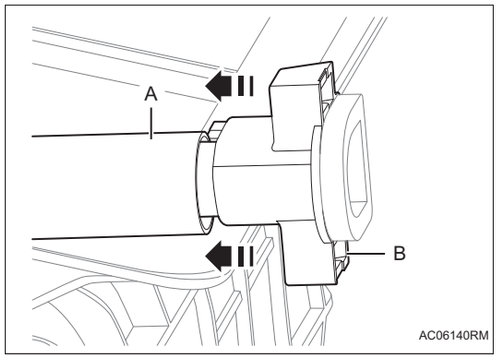
1. **Inside temperature sensor assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove instrument panel left lower guard plate (See page IP-5)**
3. **Remove inside temperature sensor assembly**



(a) Disconnect the harness connector-A-.



(b) Disconnect the inside temperature sensor assembly connection air pipe -A-.

(c) Use a tool to pry and remove the inside temperature sensor assembly -B- in the direction of the arrow.

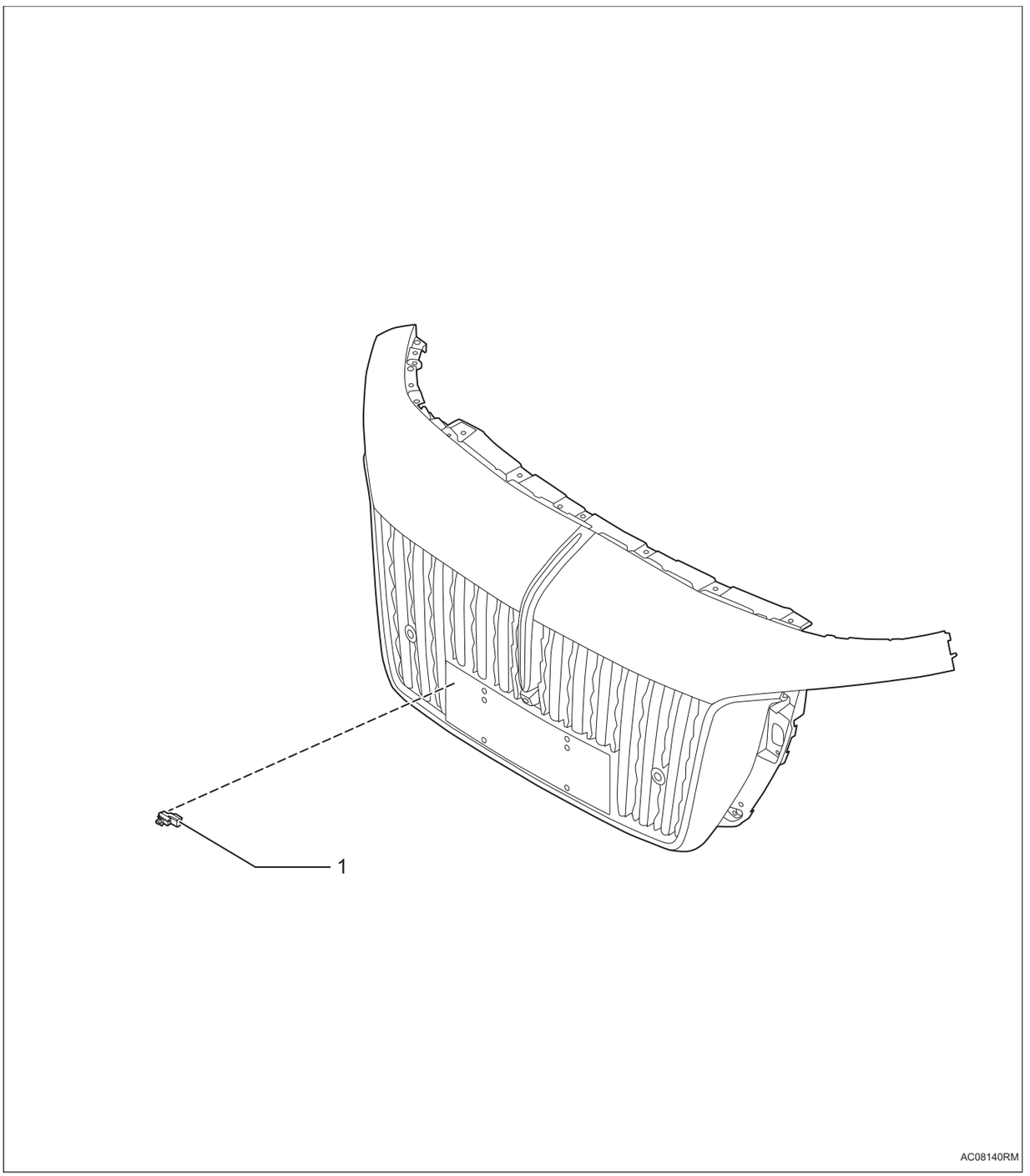
Installation

1. **The installation procedure is the reverse of removal procedure.**

Outside temperature sensor assembly

Parts

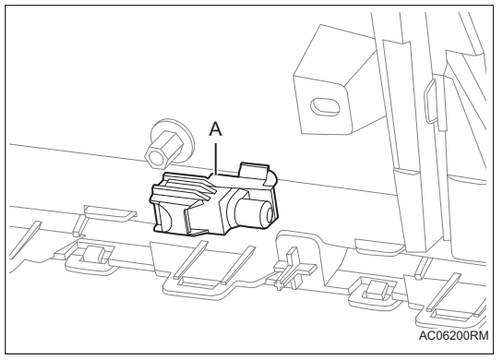
AC



1. Outside temperature sensor assembly

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the radiator grille (See page ET-29)**
3. **Remove outside temperature sensor assembly**
   (a) Disconnect the harness connector, and remove the outside temperature sensor assembly -A-.



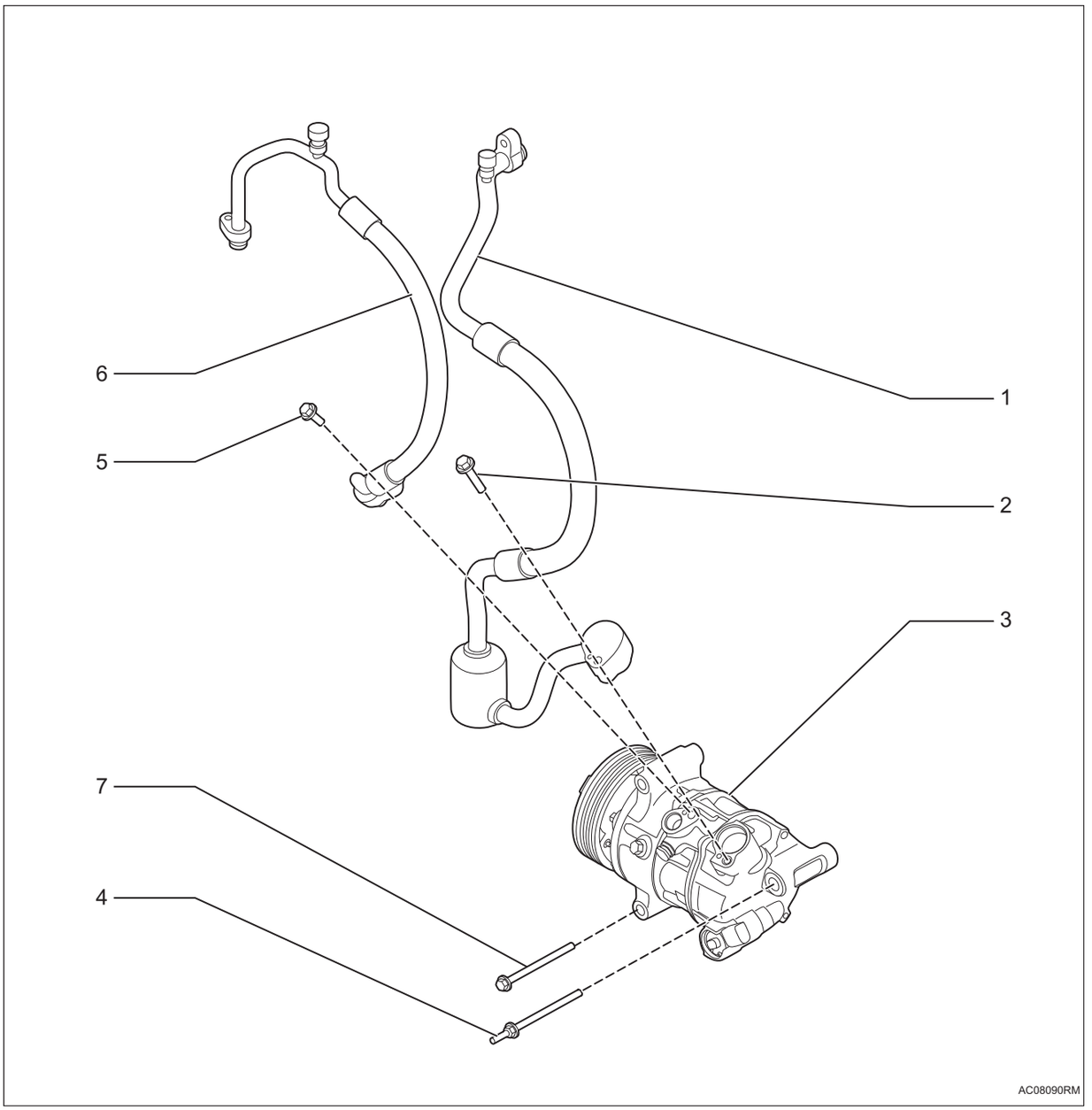
Installation

1. **The installation procedure is the reverse of removal procedure.**

Compressor assembly

Parts

AC

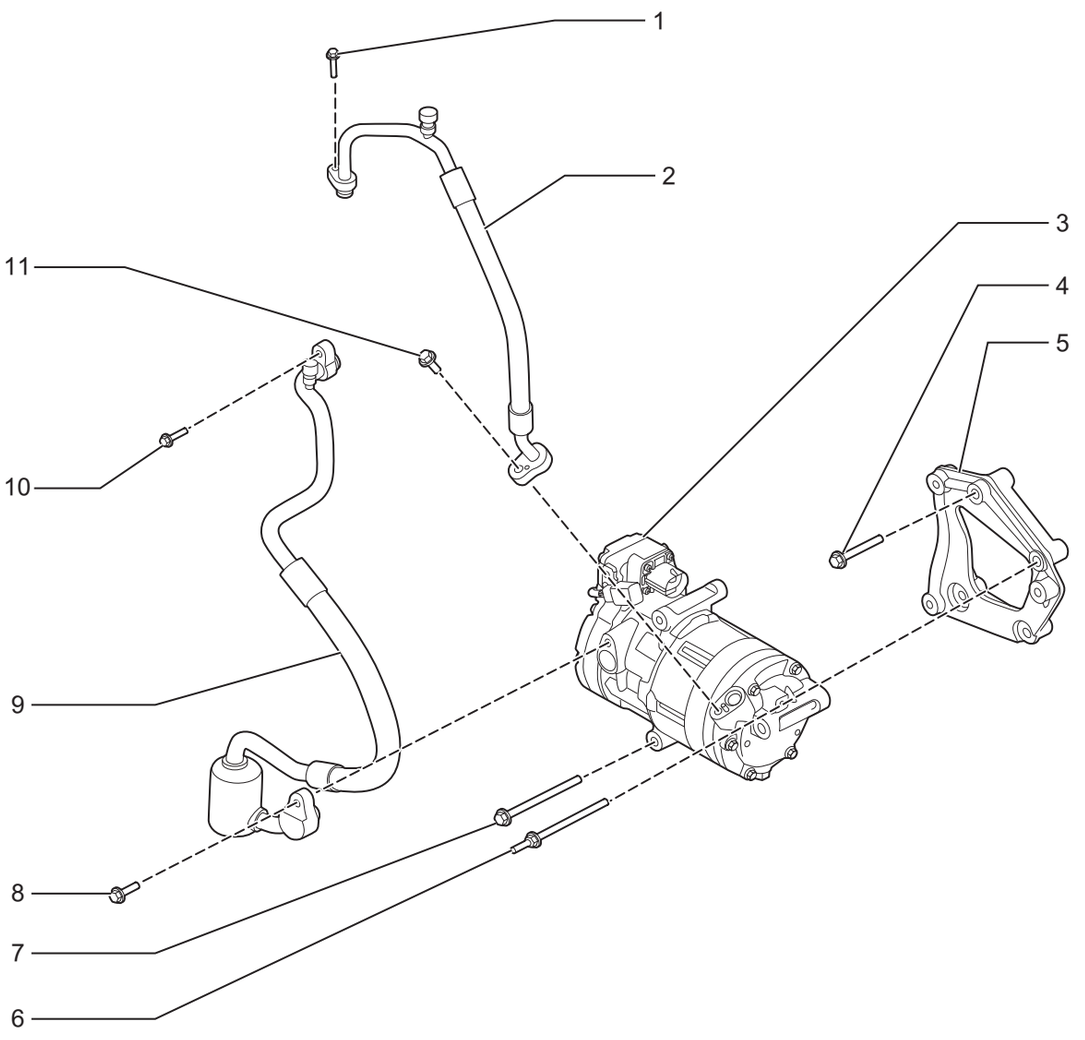


1. **Low-pressure hose assembly**
2. **Hexagon flange bolt**
   - Torque: 20~26 N · m
3. **Compressor assembly**
4. **Stud**
   - Torque: 20~26 N · m
5. **Hexagon flange bolt**
   - Torque: 20~26 N · m

6. **High-pressure hose assembly**
7. **Hexagon flange bolt**
   - X2
   - Torque: 20~26 N · m

AC

Part (HEV)



1. **Hexagon flange bolt**
   - Torque: 8~12 N · m
2. **High-pressure hose assembly**
3. **Electric compressor assembly**
4. **Hexagon flange bolt**
   - X4
   - Torque: 22~28 N · m
5. **Compressor bracket**
6. **Shaft shoulder stud**
   - Torque: 22~28 N · m

7. Hexagon flange bolt

- X2
- Torque: 22~28 N · m

8. Hexagon flange bolt

- Torque: 20~26 N · m

9. Low-pressure hose assembly

10. Hexagon flange bolt

- Torque: 8~12 N · m

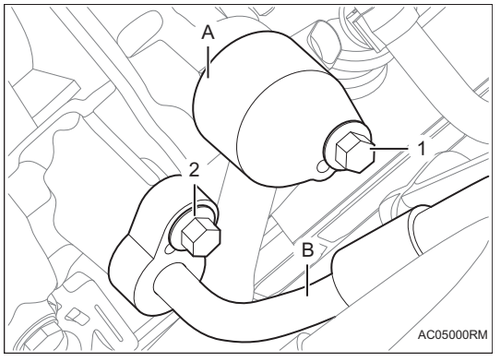
11. Hexagon flange bolt

- Torque: 20~26 N · m

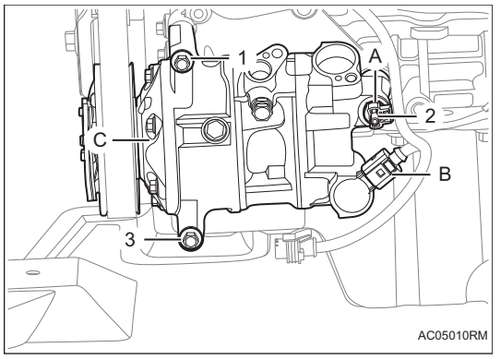
AC

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Recycle the refrigerant in cooling system (See page AC-98)**
3. **Remove the V-ribbed belt (See page EM-4)**
4. **Remove compressor assembly**



(a) Remove the bolt -1-2- and disconnect the compressor assembly connecting pipeline-A-B-.



(b) Disconnect the harness connector-B-.

(c) Detach the harness fixing clip -A-.

(d) Remove the bolts -1-3- and remove the compressor assembly -A-.

5. **After the vehicle is stationary, set the ignition switch to OFF (STOP) (only for HEV models).**
6. **Disconnect the battery negative terminal (only for HEV models) (See page CH-20)**

   Notice:

   Disconnect the battery negative terminal after waiting for 5s.

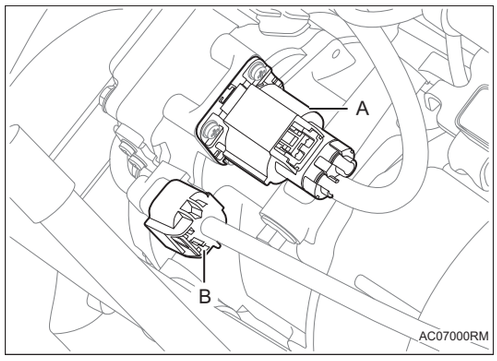
7. **Detach service switch (only for HEV models) (See page CH-1)**

   Notice:

   Detach the service switch and wait 5 min for the high voltage components to be discharged before proceeding.

   Wear insulating gloves.

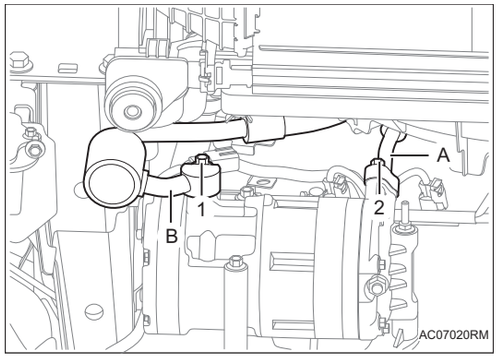
8. Remove electric compressor assembly (only for HEV models)



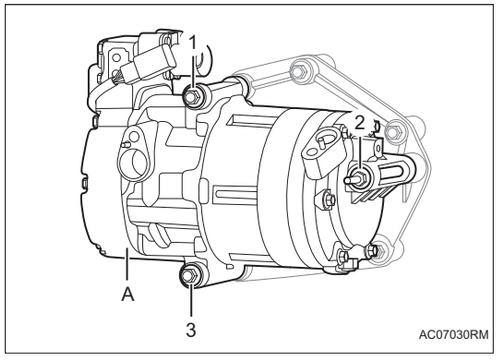
(a) Disconnect high-voltage harness connector-A- and low voltage harness connector-B-.

Notice:

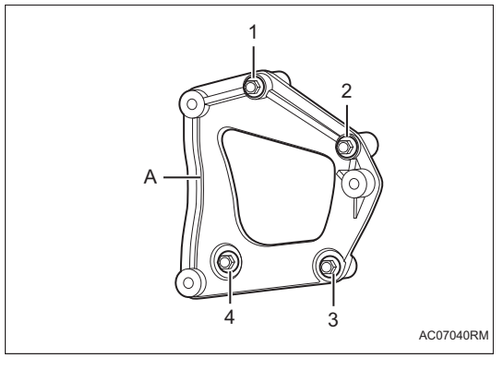
After disconnection, wrap the connector port with high-voltage insulating tape to prevent electric leakage.



(b) Remove the bolt -1-2- and disconnect the compressor assembly connecting pipeline-A-B-.



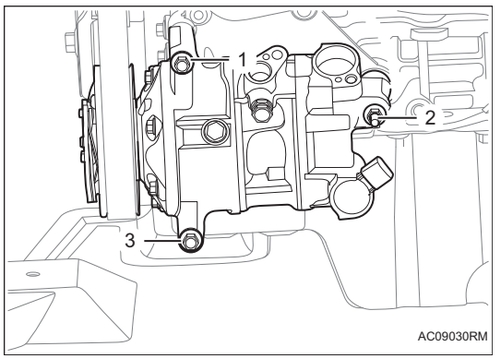
(c) Remove the bolts -1-3- and remove the compressor assembly -A-.



(d) Remove the bolts -1-4- and remove the compressor assembly bracket -A-.

Installation

1. The installation procedure is the reverse of removal procedure, and the following points apply:



Caution:

Apply the compressor oil thoroughly to the mounting surface of new O-ring.

2. Install compressor assembly

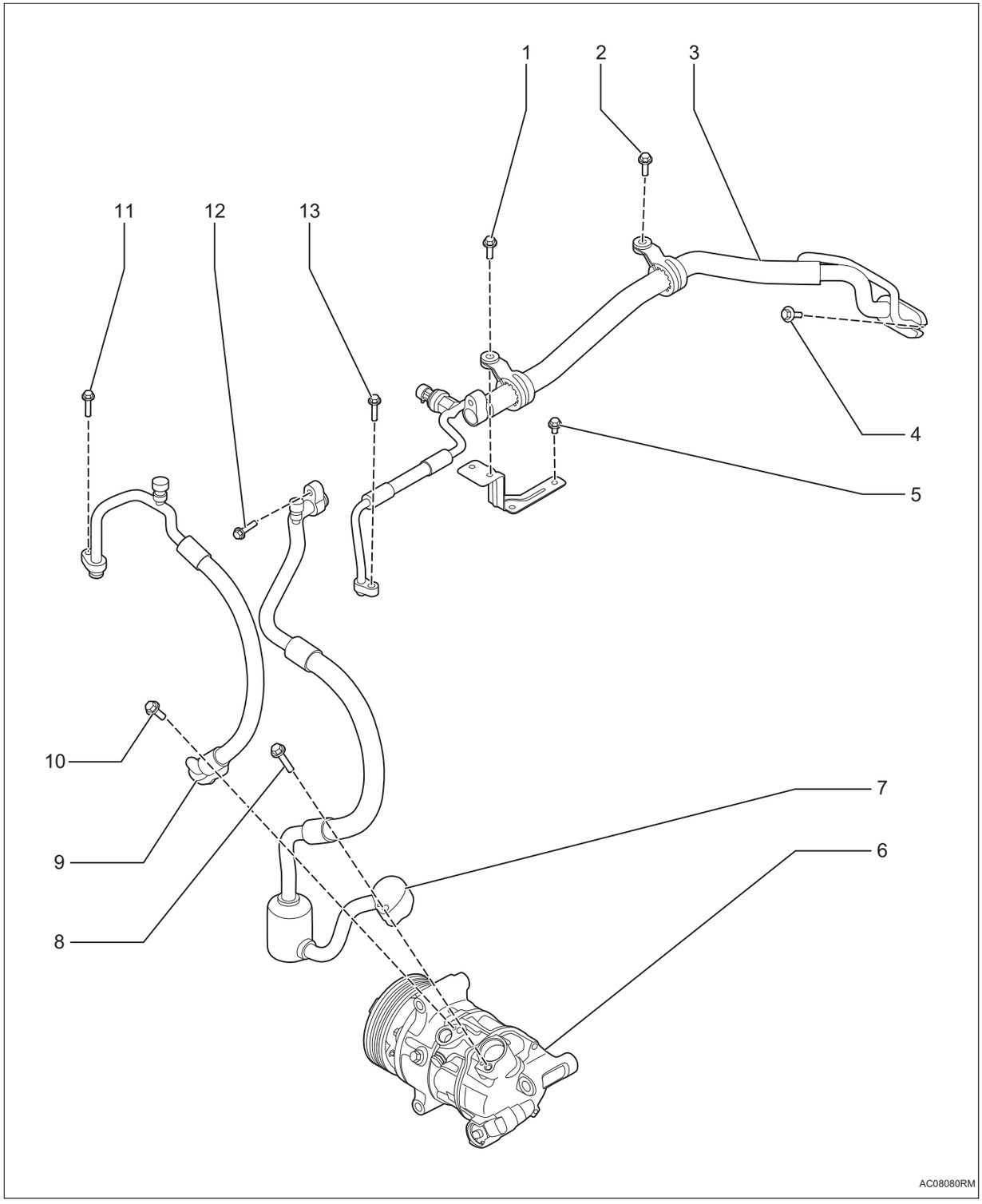
(a) Use the bolt-A- to install the compressor assembly -1-3-.

Caution:

When assembling the compressor, first pre-tighten bolt -1-, and then fasten the bolt in the sequence of -3-2-1.

A/C pipeline

Parts



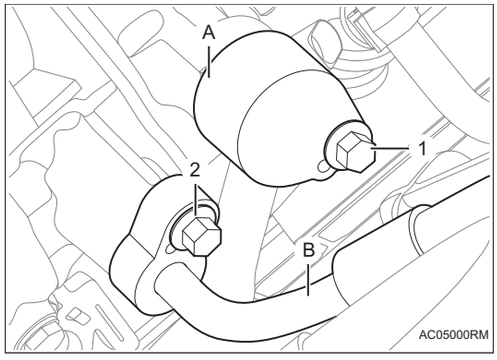
1. Hexagon flange bolt

- Torque: 8~12 N · m

2. **Hexagon flange bolt**
   - Torque: 8~12 N · m
3. **Heat exchanger assembly**
4. **Hexagon flange bolt**
   - Torque: 8~12 N · m
5. **Hexagon flange bolt**
   - X2
   - Torque: 8~12 N · m
6. **Compressor assembly**
7. **Low-pressure hose assembly**
8. **Hexagon flange bolt**
   - Torque: 20~26 N · m
9. **High-pressure hose assembly**
10. **Hexagon flange bolt**
    - Torque: 20~26 N · m
11. **Hexagon flange bolt**
    - Torque: 8~12 N · m
12. **Hexagon flange bolt**
    - Torque: 8~12 N · m
13. **Hexagon flange bolt**
    - Torque: 8~12 N · m

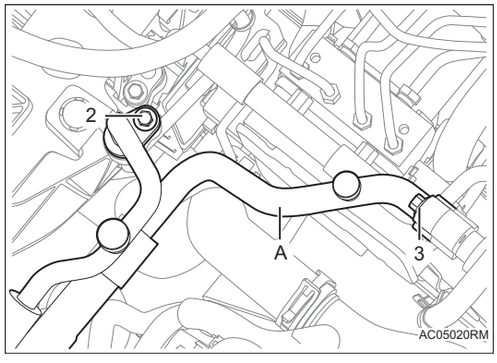
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Recycle the refrigerant in cooling system (See page AC-98)**
3. **Remove low-pressure hose assembly and high-pressure hose assembly**



(a) Remove the bolt -1- and disconnect the low-pressure hose assembly -A-.

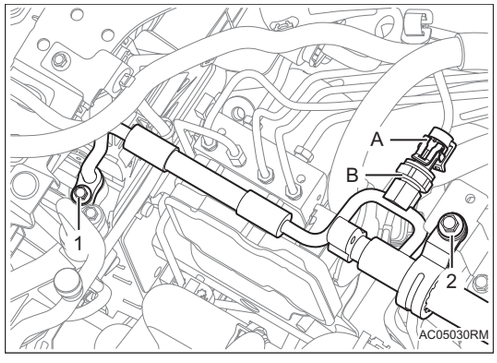
(b) Remove the bolt -2- and disconnect the high-pressure hose assembly -B-.



(c) Remove the bolt -2- and remove the high-pressure hose assembly.

(d) Remove the bolt -3- and remove the low-pressure hose assembly -A-.

4. **Remove heat exchanger assembly**



(a) Disconnect the harness connector -A-, and remove the A/C pressure sensor -B-.

(1) Check the A/C pressure sensor

(2) Connect the pressure measuring device to the high pressure side of the A/C.

(3) Start the vehicle, and turn on the AC switch.

(4) After the compressor operation starts, measure the pin voltage on the high and low voltage sides of the A/C pressure sensor. Normal continuity indicates normal condition.

(5) When the pressure is higher than 1.52 Mpa, measure the pin voltage on the medium pressure side of the A/C pressure sensor. Normal continuity indicates normal condition.

(6) Replace the sensor if it is inconsistent with the measurement.

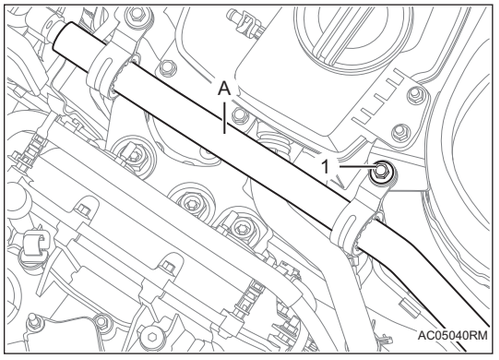
Warning:

The precondition for the measurement is that the pressure in the A/C system is higher than 0.0225 Mpa.

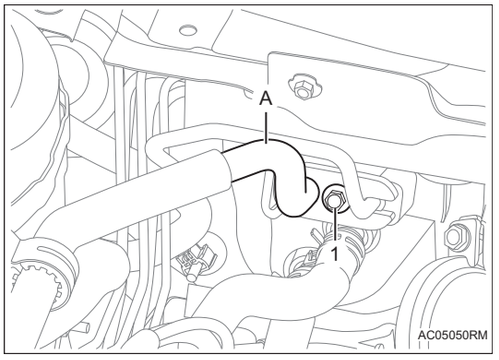
(b) Remove the bolt -1- and detach the heat exchanger assembly.

(c) Remove the fixing bolt -2- of the heat exchanger assembly.

(d) Remove the fixing bolt -1- of the heat exchanger assembly -A-.

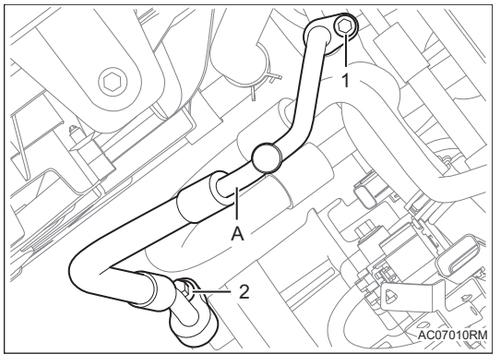


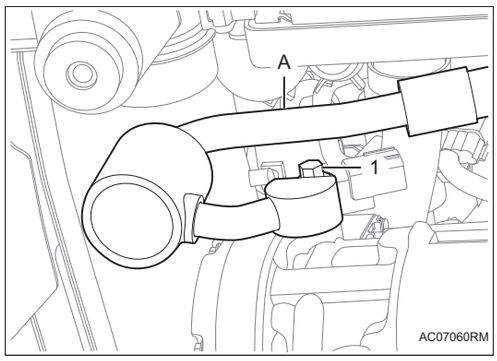
(e) Remove the bolt -1- and remove the heat exchanger assembly -A-.



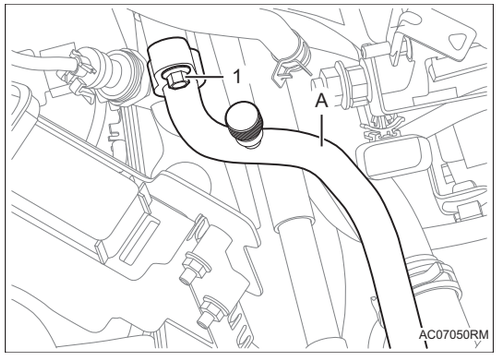
5. Remove low-pressure hose assembly and high-pressure hose assembly (only for HEV models)

(a) Remove the bolts -1-2-, and remove the high-pressure hose assembly -A-.



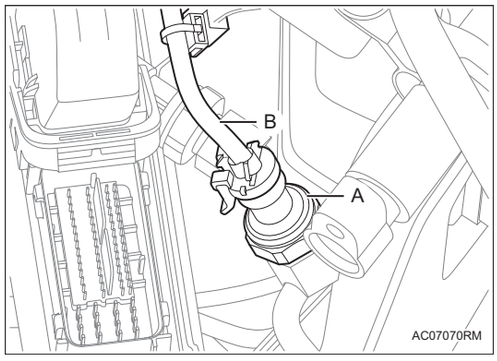


(b) Remove the bolt -1- and disconnect the low-pressure hose assembly -A-.

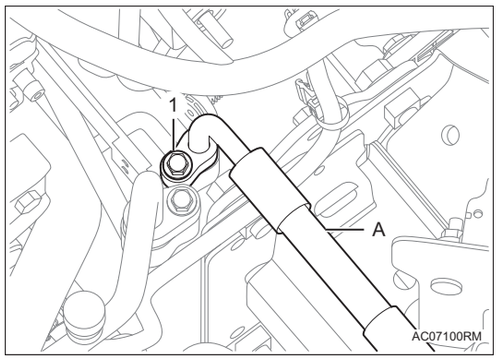


(c) Remove the bolt -1- and remove the low-pressure hose assembly -A-.

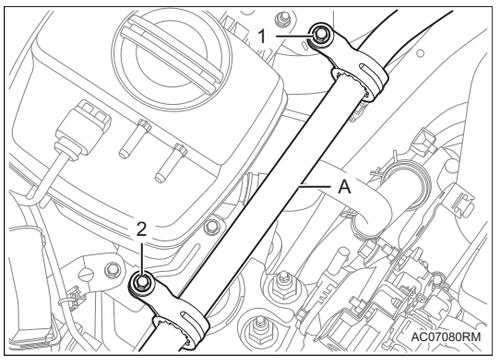
6. Remove heat exchanger assembly (only for HEV models)



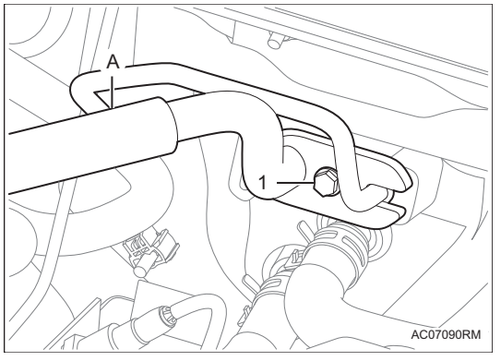
(a) Disconnect the harness connector -B- and remove the A/C pressure sensor -A-.



(b) Remove bolt -1- and detach the heat exchanger assembly -A-.



(c) Remove the fixing bolts -1-2- of the heat exchanger assembly -A-.



(d) Remove the bolt -1- and remove the heat exchanger assembly -A-.

Installation

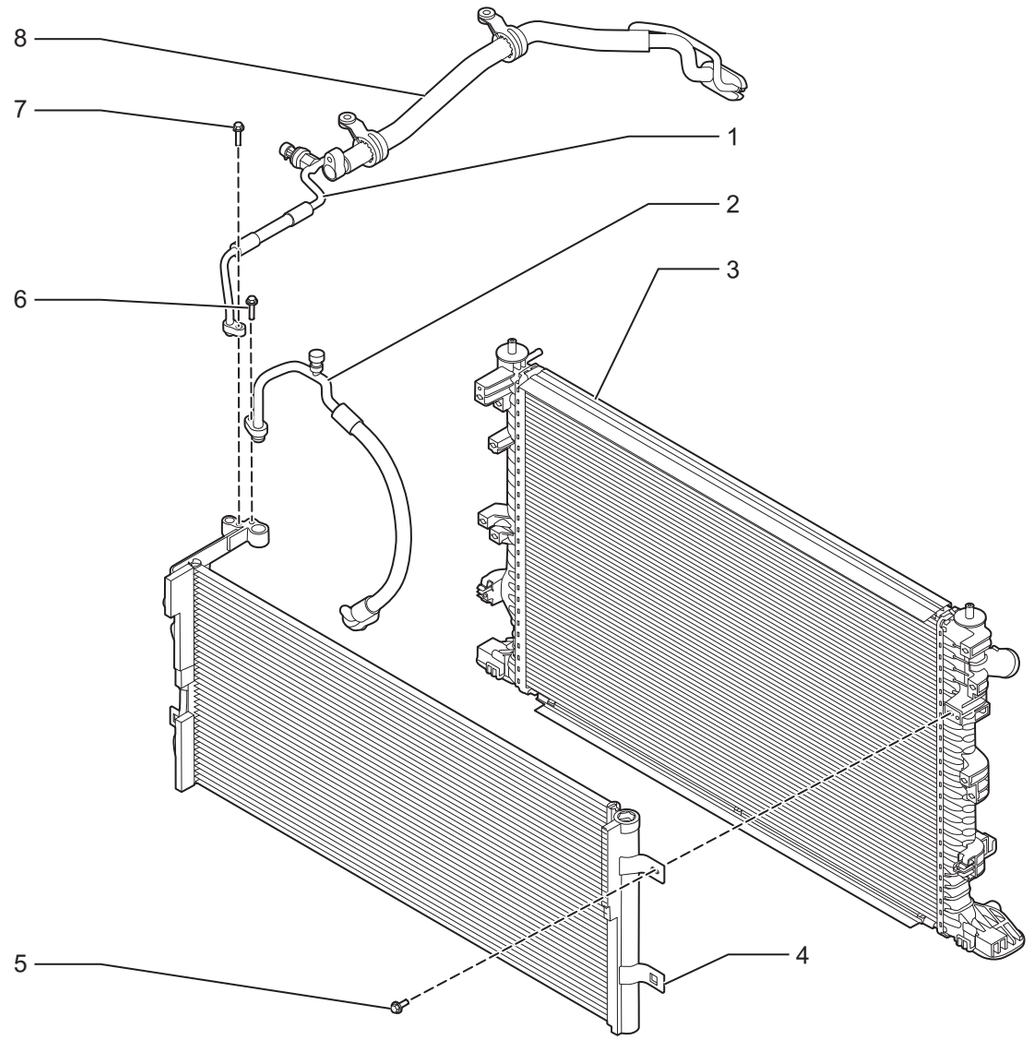
1. The installation procedure is the reverse of removal procedure, and the following points apply:

Caution:

Apply the compressor oil thoroughly to the mounting surface of new O-ring.

A/C condenser assembly

Parts



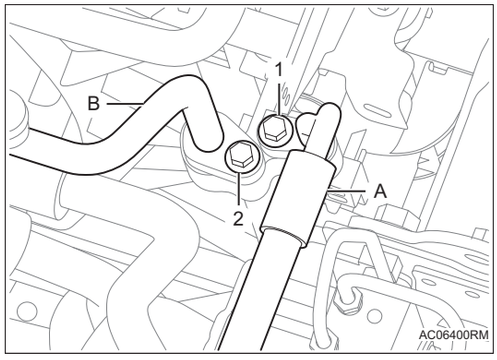
1. **Heat exchanger assembly**
2. **High-pressure hose assembly**
3. **Radiator assembly**
4. **Condenser assembly**
5. **Hexagon flange bolt**
   - X4
   - Torque: 8~12 N · m
6. **Hexagon flange bolt**

- Torque: 8~12 N · m

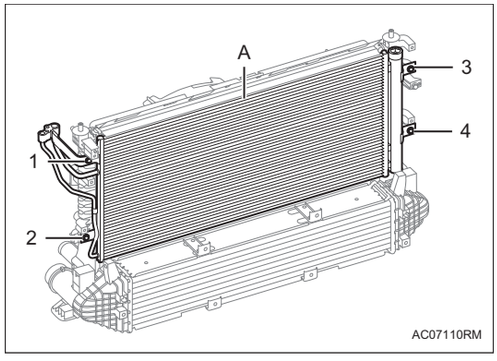
7. **Hexagon flange bolt**
   - Torque: 8~12 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove front bumper cover (See page ET-7)**
3. **Remove radiator assembly (only for HEV models) (See page CO-6)**
4. **Recycle the refrigerant in cooling system (See page AC-98)**
5. **Remove A/C condenser assembly**



(a) Remove the bolt -1-2- and detach the connecting line -A-B- of A/C condenser assembly.



(b) Remove the bolts -1-4- and remove the A/C condenser assembly -A-.

Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

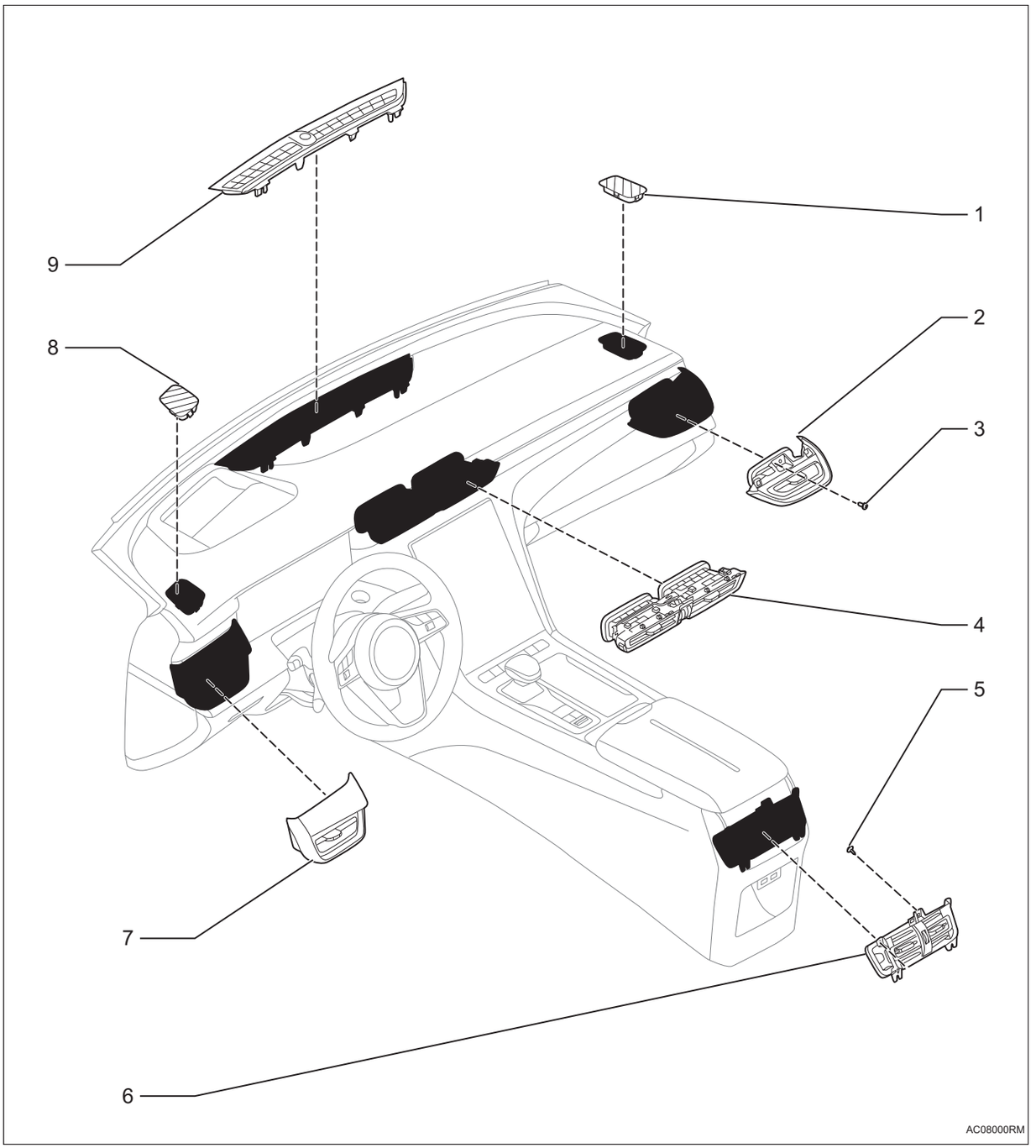
   Caution:

   Apply the compressor oil thoroughly to the mounting surface of new O-ring.

A/C air outlet assembly

Parts

AC



1. **Right defroster nozzle**
2. **Instrument panel right air outlet assembly**
3. **Screw**
4. **Instrument panel right upper trim strip with center air outlet assembly**
5. **Screw**

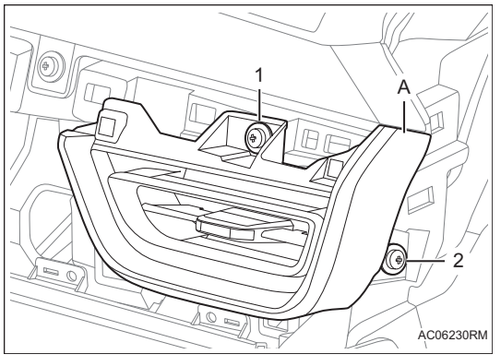
- X4

6. **Console air outlet assembly**
7. **Instrument panel left air outlet assembly**
8. **Left defroster nozzle**
9. **Central defroster nozzle**

AC

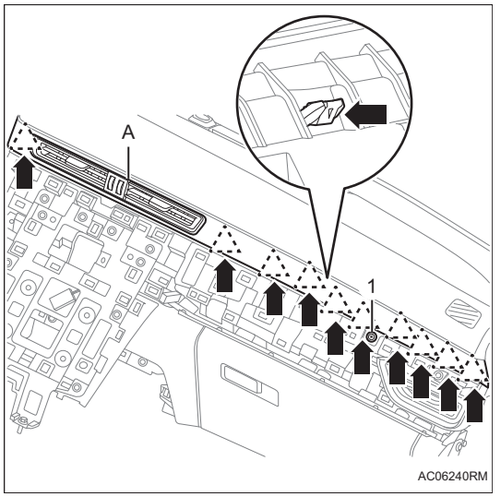
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the instrument panel right trim strip (See page IP-5)**
3. **Remove instrument panel right trim panel (See page IP-5)**
4. **Remove the right end cover (See page IP-5)**
5. **Remove instrument panel right air outlet assembly**



(a) Remove screw -1-2-, and remove instrument panel right air outlet assembly -A-.

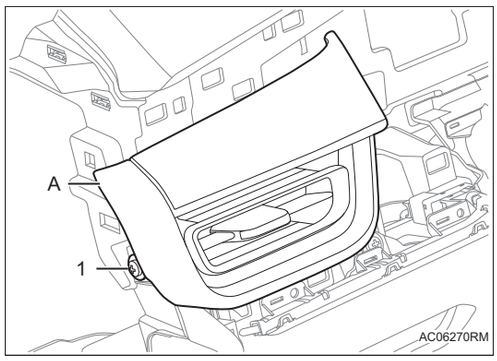
6. **Remove center air outlet assembly of right upper trim strip of instrument panel**



(a) Detach the claw -arrow- and remove the screw -1-.

(b) Remove the instrument panel right upper trim strip & center air outlet assembly-A-.

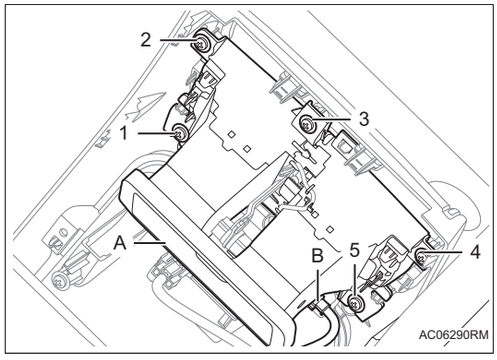
7. **Remove left end cover (See page IP-5)**
8. **Remove the instrument panel left upper trim strip (See page IP-5)**
9. **Remove instrument panel left trim strip (See page IP-5)**
10. **Remove the instrument panel left air outlet assembly**



(a) Remove screw -1- and remove instrument panel right air outlet assembly -A-.

11. Remove rear end plate assembly (See page IP-17)

12. Remove console air outlet assembly

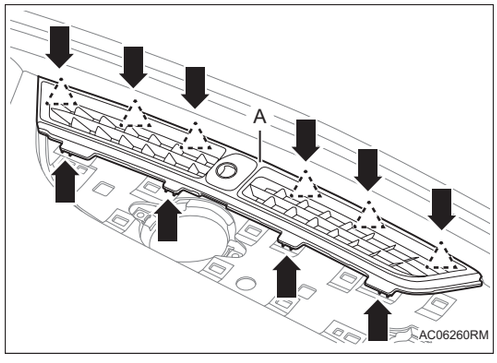


(a) Disconnect the harness connector-B- of console air outlet assembly.

(b) Remove screws -1-4- and remove console air outlet assembly -A-.

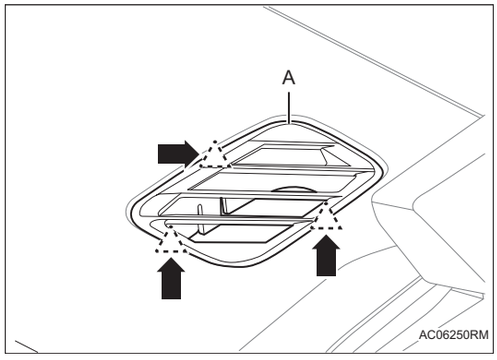
13. Remove center speaker cover (See page IP-5)

14. Remove central defroster nozzle

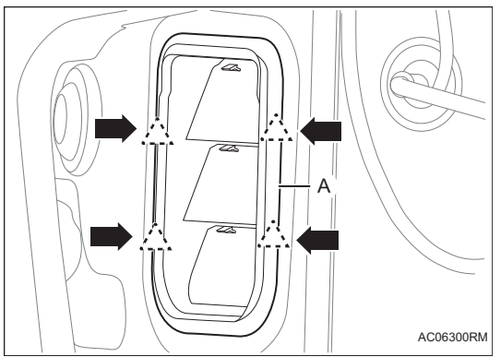


(a) Detach the claw-arrow- and remove the central defroster nozzle-A-.

15. Remove side defroster nozzle



(a) Detach the claw -arrow- and remove the side defroster nozzle -A-.



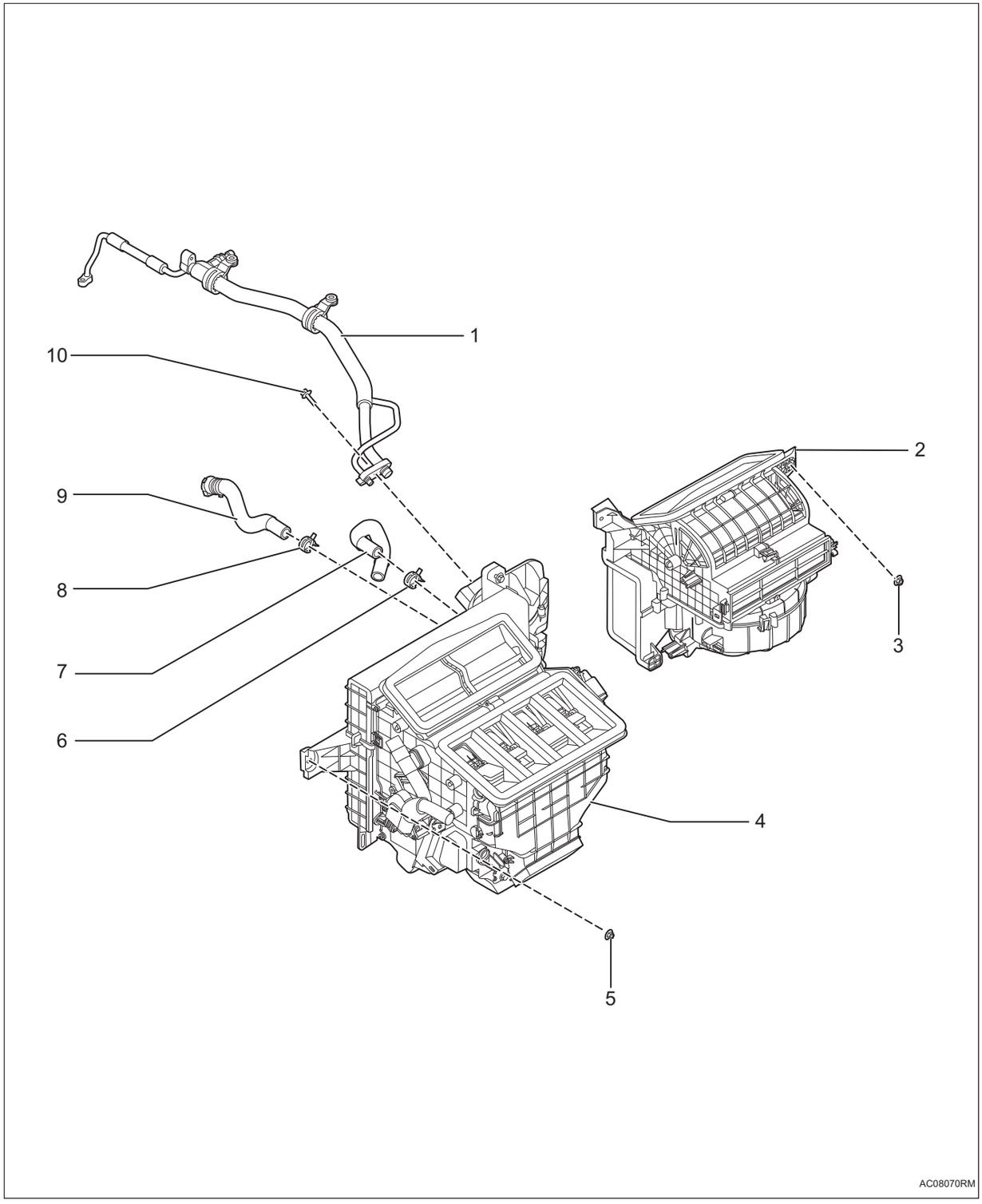
16. **Remove rear bumper cover (See page ET-21)**
17. **Remove air outlet assembly**
    (a) Detach the claw -arrow-, and remove the -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Front HVAC Assembly

Parts

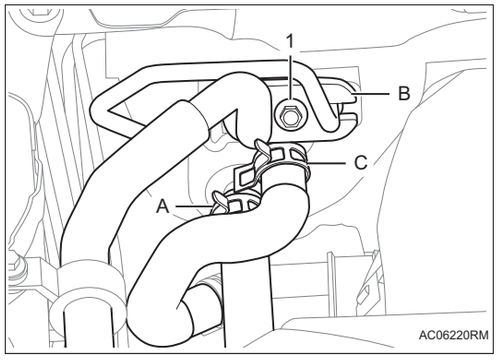


1. **A/C pipeline**
2. **Blower with case assembly**

3. **Hexagon flange nut**
   - X2
   - Torque: 6~8 N · m
4. **Front HVAC Assembly**
5. **Hexagon flange nut**
   - X3
   - Torque: 6~8 N · m
6. **Steel band spring hose clamp**
7. **Heater water inlet pipe assembly**
8. **Steel band spring hose clamp**
9. **Heater water outlet pipe assembly**
10. **Hexagon flange bolt**
    - Torque: 8~12 N · m

Removal

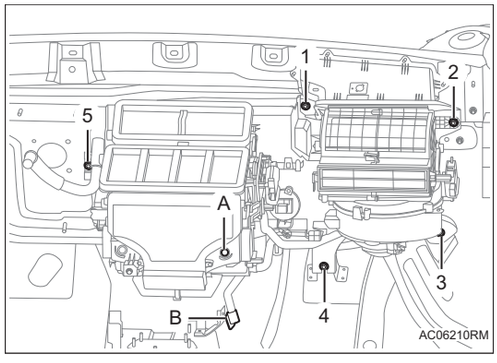
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Recycle the refrigerant in cooling system (See page AC-98)**
3. **Drain coolant (See page CO-2)**
4. **Remove the instrument panel assembly (See page IP-5)**
5. **Remove the instrument panel crossmember (See page IP-5)**
6. **Remove front HVAC assembly**



(a) Disconnect the heater water pipe -A-C-.

(b) Remove the bolt -1- and disconnect the A/C pipeline -B-.

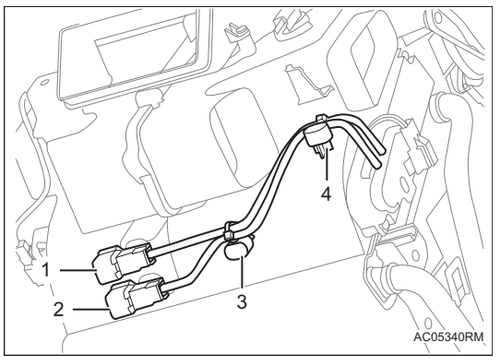
(c) Disconnect the front HVAC assembly drain pipe -B-.



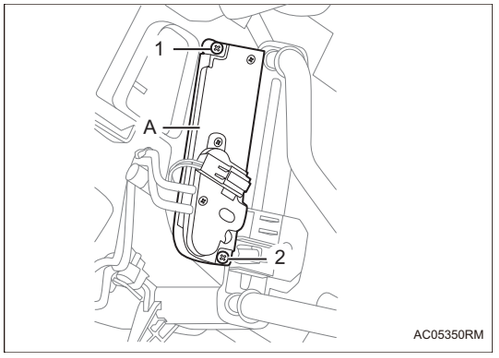
(d) Remove the nuts -1-5-, and remove the front HVAC Assembly -A-.

HVAC disassembly

1. **Remove PTC heater (only for HEV models)**



(a) Disconnect the harness connector -1-2- and detach the harness fixture -3-4-.

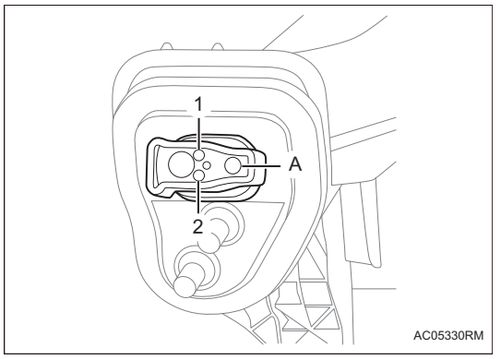


(b) Remove the screws -1-2-, and take the PTC heater-A-out of the housing.

Hint:

Pay attention to the direction of the harness to prevent harness from hindering the installation of the floor air outlet.

2. Remove expansion valve

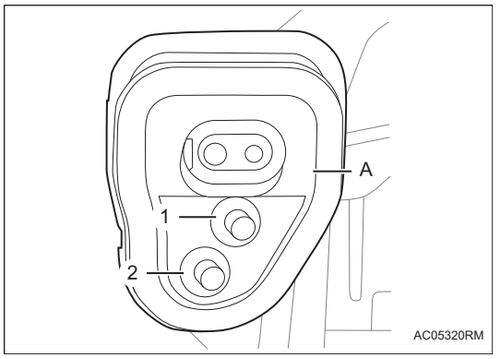


(a) Remove the screws -1-2-, and remove the expansion valve -A- .

Hint:

When installing the expansion valve bolt, ensure that the tool is perpendicular to the bolt to avoid slipping.

3. Remove front wall sealing sponge

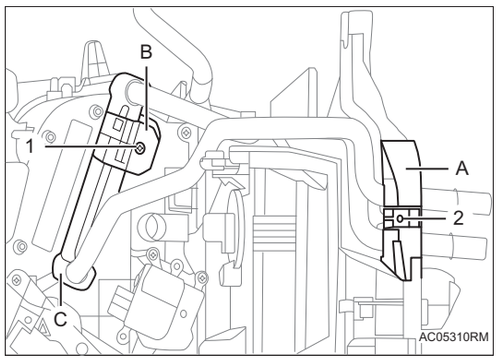


(a) Remove front wall sealing sponge-A-.

Hint:

When installing the front wall sponge, gently insert the heater pipe to prevent the sponge from tearing.

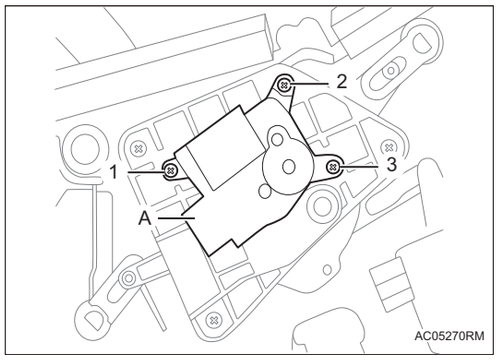
4. Remove heater assembly



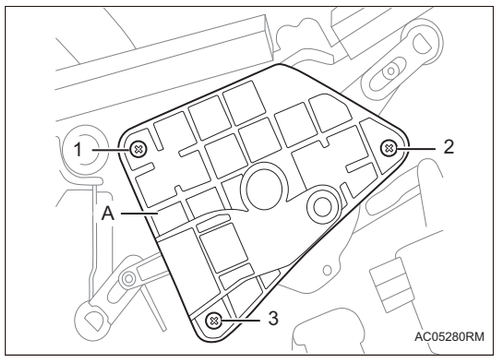
(a) Remove the screws -1-2- and detach the fixing brackets -A-B-.

(b) Remove the heater assembly -C- out of the box.

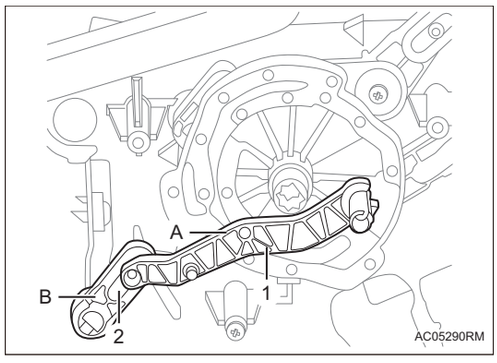
5. Remove mode damper motor and operating mechanism



(a) Remove the screws -1-3- and remove the mode damper motor -A-.

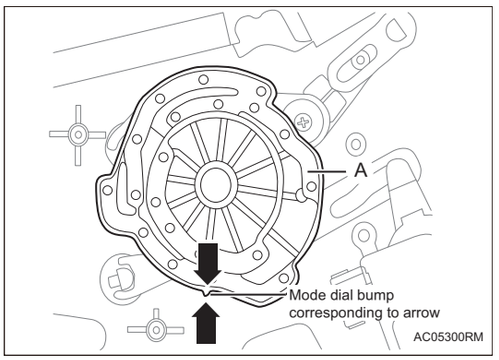


(b) Remove the screws -1-3-, and remove the mode panel cover -A-.



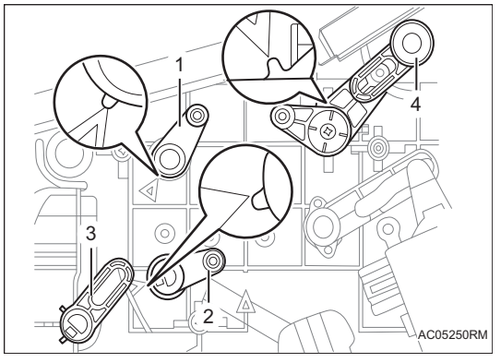
(c) Take out the sliding pin -1-2- of the rear panel connecting rod -A- from the slide of the mode panel and the rocker arm chute of the rear panel air outlet damper respectively.

(d) Remove the rear panel air outlet damper rocker arm -B-.

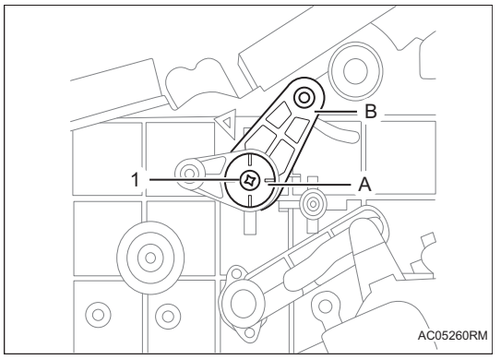


(e) Remove the mode panel -A-.

6. Remove each linkage of mode control unit

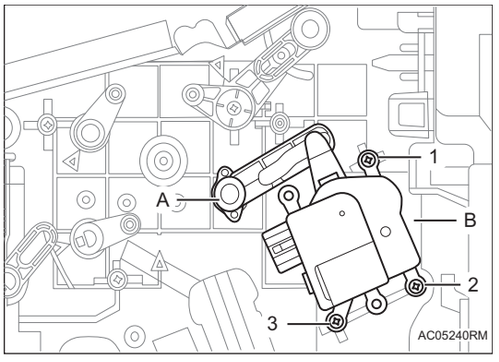


(a) Remove the connecting rod -1-4-.



(b) Remove the screw -1-, take down the connecting rod pressing piece -A-, and take out the defroster connecting rod -B-.

7. Remove right temperature servo motor and linkage



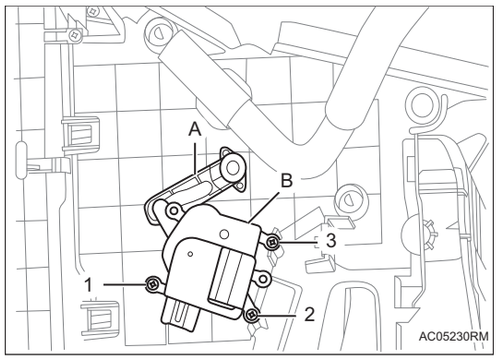
(a) Remove screws -1-3-, and remove right temperature servo motor -B-.

(b) Remove the right temperature damper connecting rod -A-.

Hint:

Install the right temperature servo motor to ensure that the motor output shaft fits with the connecting rod chute.

8. Remove left temperature servo motor and linkage



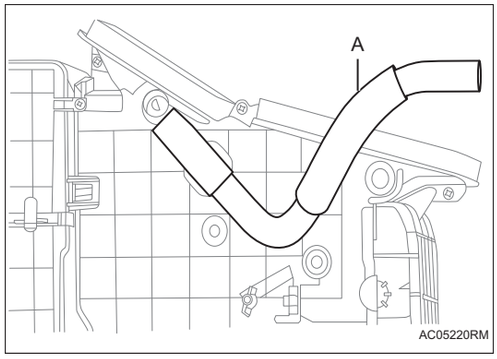
(a) Remove screws -1-3-, and remove left temperature servo motor -B-.

(b) Remove the left temperature damper connecting rod -A-.

Hint:

Install the left temperature servo motor to ensure that the motor output shaft fits with the connecting rod chute.

9. Remove air supply pipe assembly

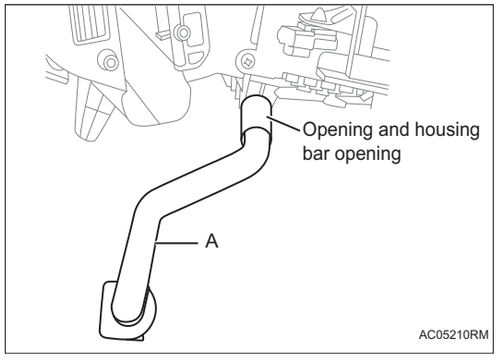


(a) Remove the air supply duct assembly-A-.

Hint:

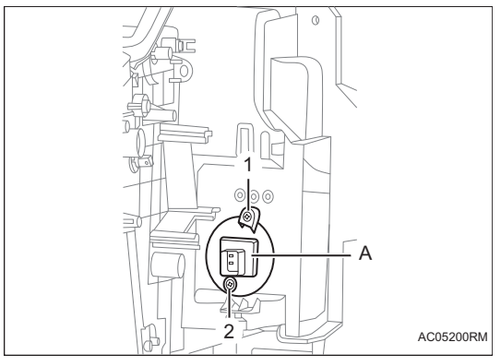
Pay attention to the installation direction of the air supply pipe.

10. Remove drain pipe assembly



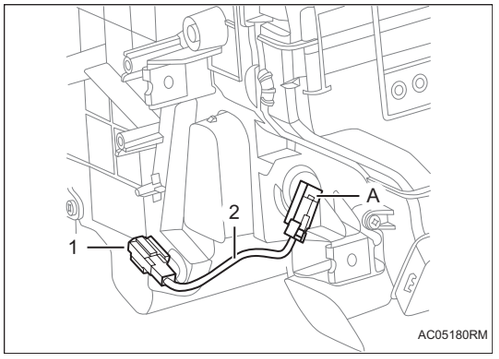
(a) Remove drain pipe assembly-A-.

11. Remove the speed control module

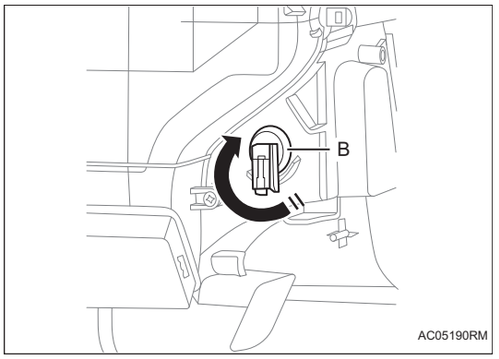


(a) Remove screw -1-2- and remove speed control module-A-.

12. Remove the floor air outlet temperature sensor

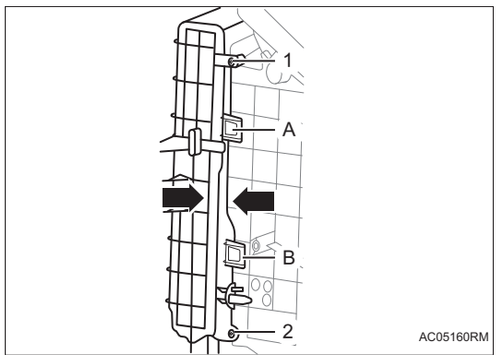


(a) Detach clips -1-2-and remove harness-A-.

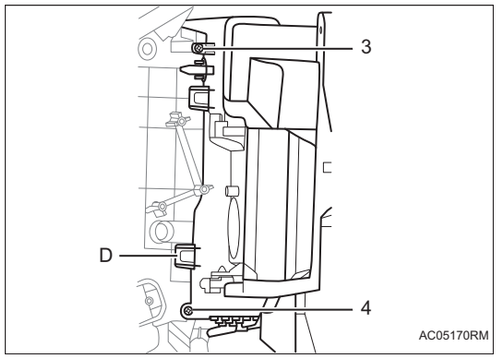


(b) Rotate the floor air outlet temperature sensor -B- as arrowed to remove the floor air outlet temperature sensor -B-.

13. Remove and separate the evaporator tank and distribution box

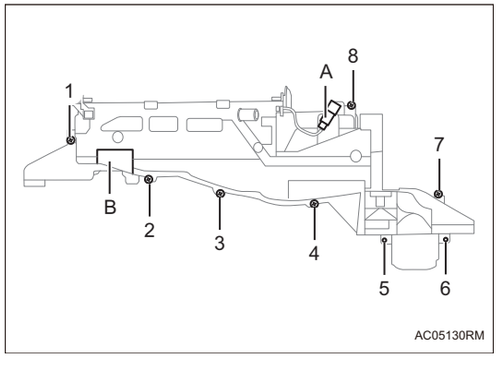


(a) Remove the screws -1-4- and detach the claws -A-D-.

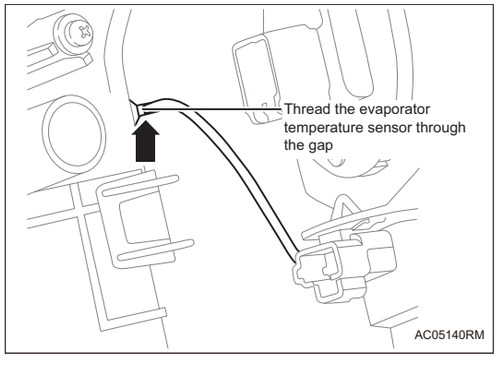


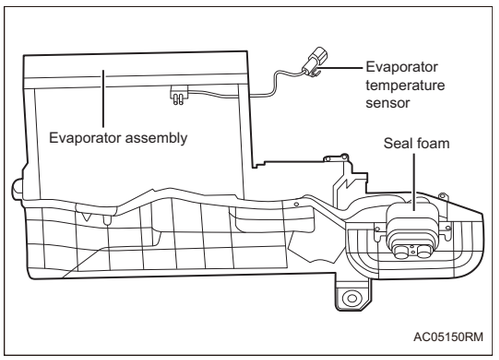
(b) Separate the evaporator box from the distribution box.

14. Remove the evaporator assembly



(a) Remove the screw -1-8-, detach the claw -A-, and remove the evaporator lower housing -B-.



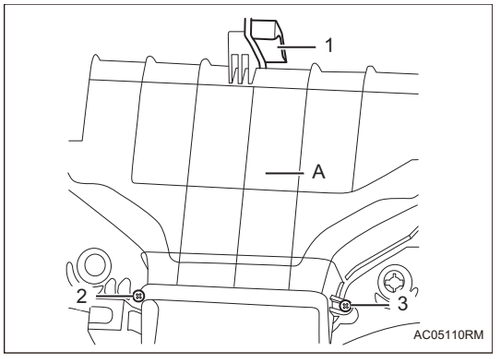


(b) Remove the evaporator assembly out of the housing.

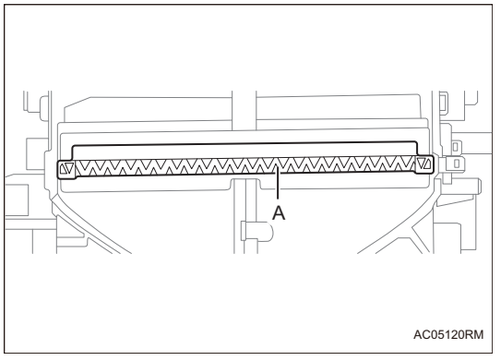
Hint:

The sealing sponge is installed in place.

15. Remove the rear panel air outlet and the rear panel air outlet damper

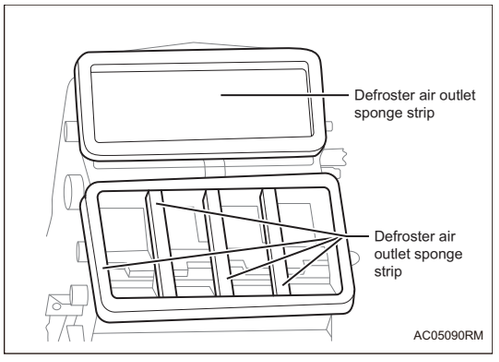


(a) Remove the screw -1-3- and remove the rear panel air outlet - A-.

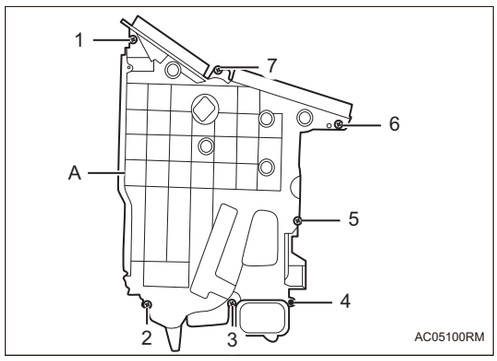


(b) Remove the rear panel air outlet damper -A-.

16. Remove the left distribution box

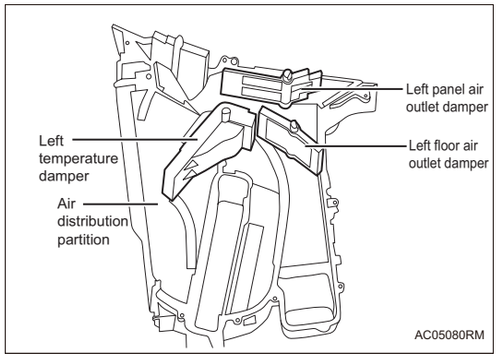


(a) Remove the defroster air outlet sponge strip.



(b) Remove the screws -1-7-, and remove the left distribution box- A-.

17. Remove the left temperature damper, left panel air outlet damper, left floor air outlet damper and central partition

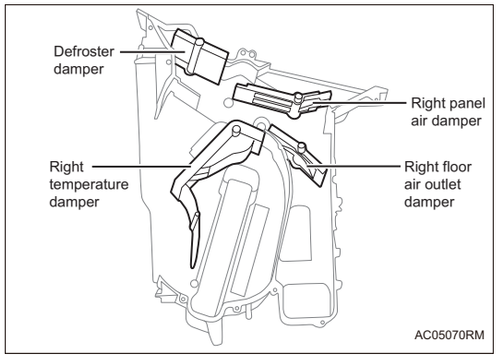


(a) Remove the left temperature damper, left panel air outlet damper, left floor air outlet damper and air partition.

Hint:

The damper installation status should be consistent with the picture Example: the damper mark and the housing mark are on the same side.

18. Remove the right temperature damper, right panel air damper, right floor air outlet damper and defroster damper



(a) Remove the right temperature damper, right panel air damper, right floor air outlet damper and defroster damper.

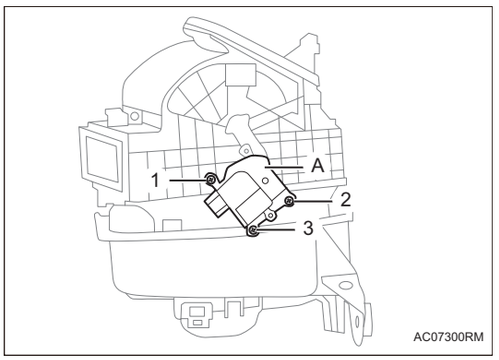
Hint:

The damper installation status should be consistent with the picture Example: the damper mark and the housing mark are on the same side.

19. The installation procedure is the reverse of removal procedure.

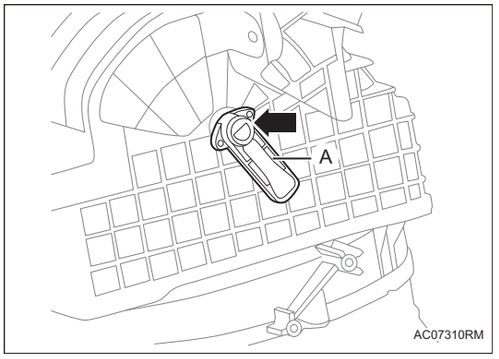
Blower disassembly

1. Remove the servo motor



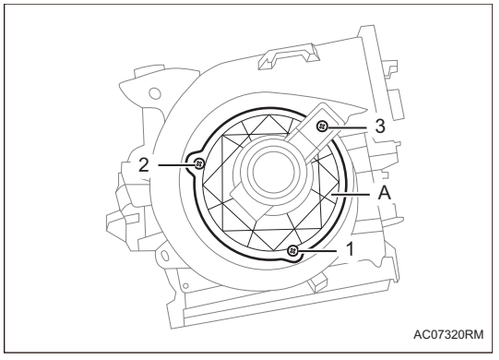
(a) Remove the screws -1-3- and remove the servo motor -A-.

2. Remove the damper rocker arm



(a) Remove the damper rocker arm -A- from the output shaft as arrowed.

3. Remove the blower

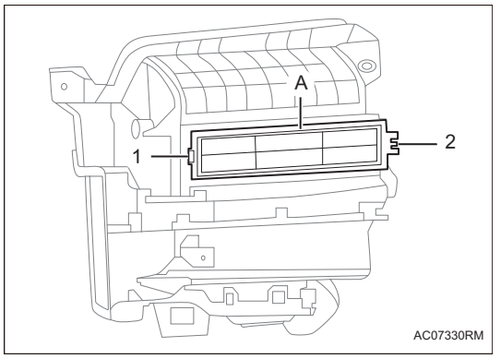


(a) Remove the screws -1-3- and remove the blower -A-.

Hint:

Do not grasp the position of fan blade by hand when taking the blower to avoid affecting the balance performance.

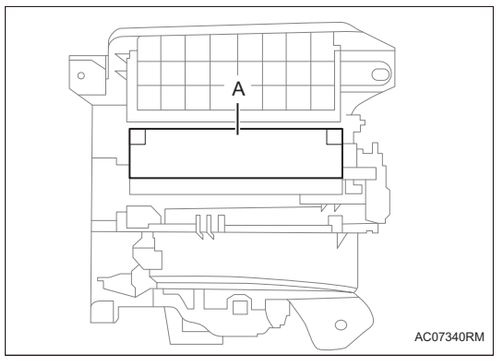
4. Remove the A/C filter element cover plate



(a) Press the claw -2- to detach the A/C filter element cover claw - 1-.

(b) Remove the A/C filter element cover plate clip-A-.

5. Remove the A/C filter element

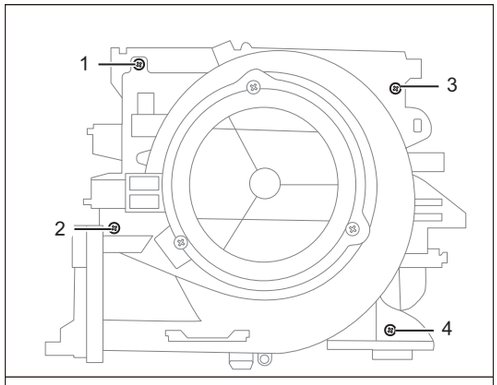


(a) Remove A/C filter element-A- from the blower housing.

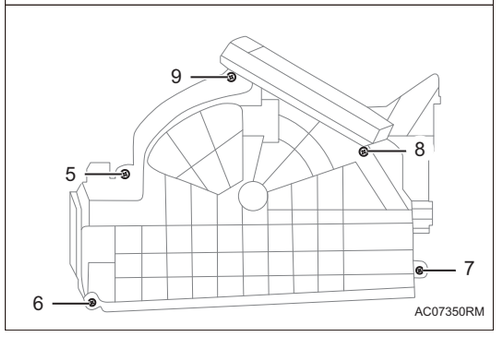
Hint:

The airflow direction is marked on the filter element and the filter element may not be installed reversely.

6. Remove the recirculation/fresh air damper



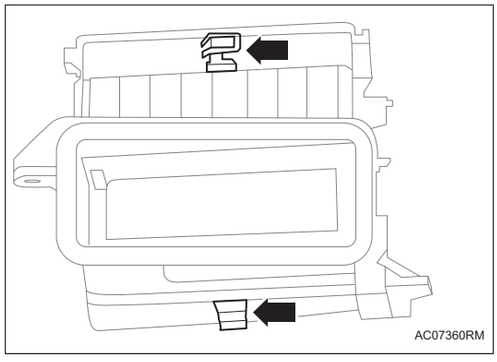
(a) Remove the screw -1-9-.



(b) Detach the housing locating claw -arrow-.

Hint:

There are directional requirements for recirculation/fresh air damper installation. There are sign "R" on the damper for the right side and "L" for the left side.



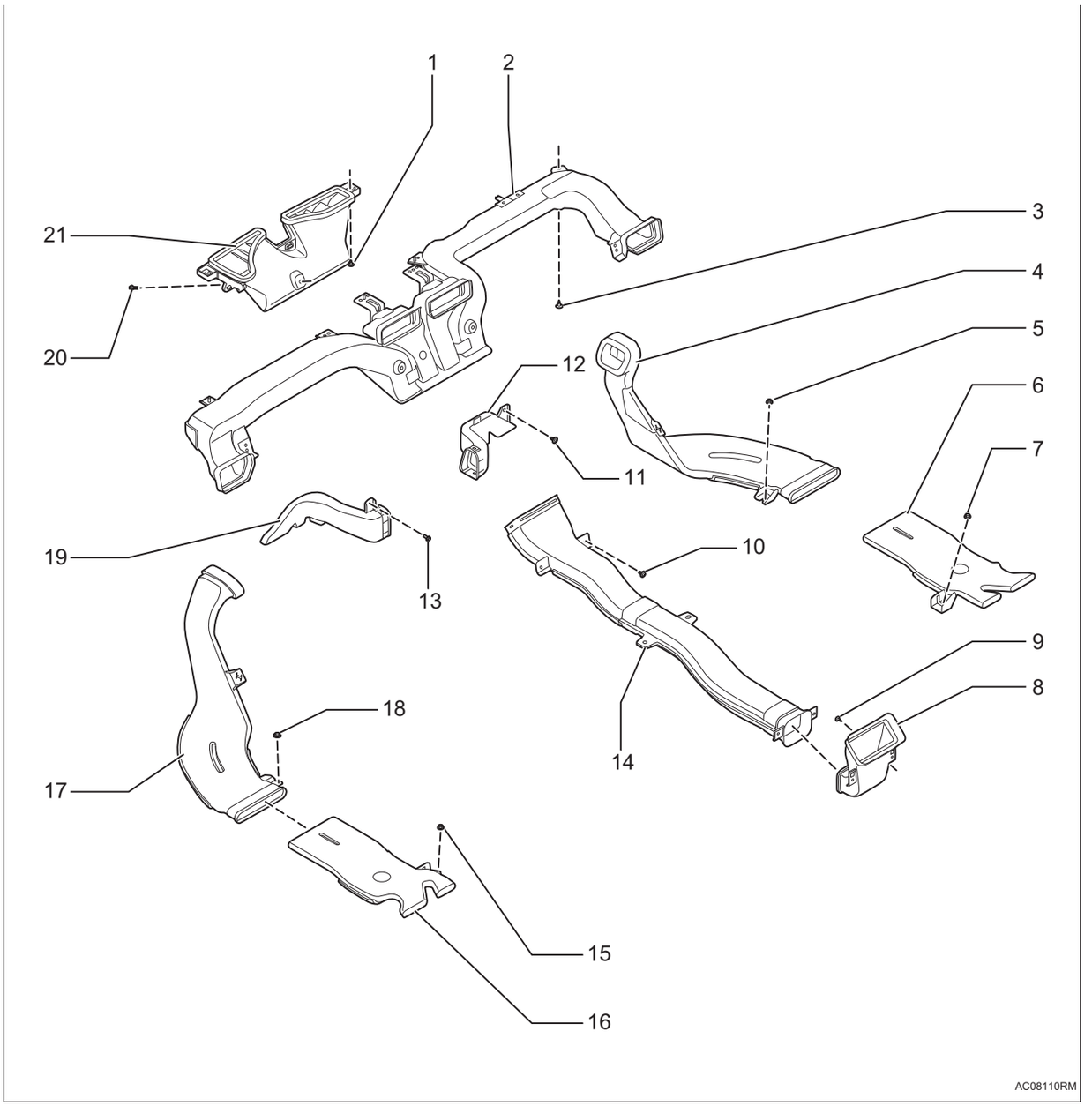
7. The installation procedure is the reverse of removal procedure.

Installation

1. The installation procedure is the reverse of removal procedure.

Front A/C air duct

Parts



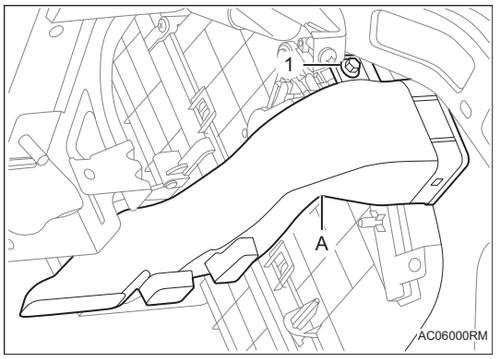
1. **Screw**
   - X2
2. **Instrument panel air duct assembly**
3. **Screw**
   - X6
4. **Right rear floor air outlet**
5. **Hexagon flange nut**
   - Torque: 6~8 N · m

6. **Right rear floor air outlet II**
7. **Hexagon flange nut**
   - Torque: 6~8 N · m
8. **Rear cold air duct rear section**
9. **Screw**
   - X2
10. **Screw**
    - X4
11. **Screw**
12. **Front right floor air outlet**
13. **Hexagon flange nut**
    - Torque: 6~8 N · m
14. **Rear cold air duct front section**
15. **Hexagon flange nut**
    - Torque: 6~8 N · m
16. **Left rear floor air outlet II**
17. **Left rear floor air outlet**
18. **Hexagon flange nut**
    - Torque: 6~8 N · m
19. **Front left floor air outlet**
20. **Round head screw**
21. **Defroster transition air duct assembly**

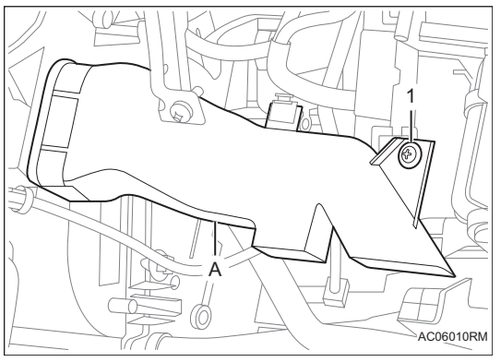
AC

Removal

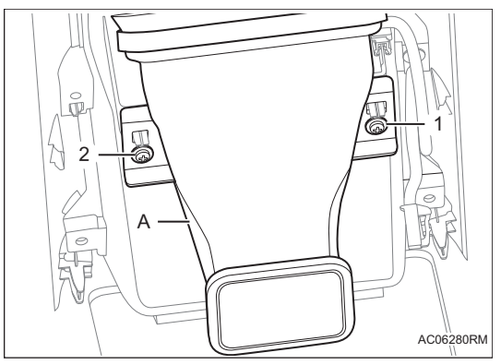
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove left lower guard plate assembly (See page IP-5)**
3. **Remove the front left floor air outlet assembly**
   (a) Remove the bolt -1- and the left floor air outlet assembly -A-.



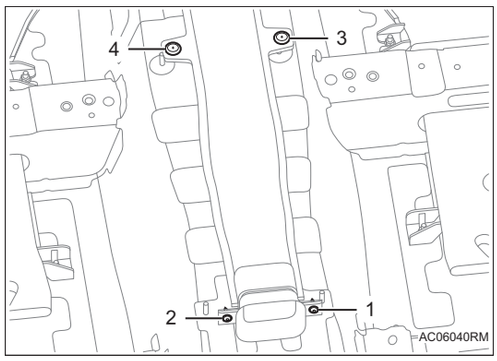
4. **Remove the glove box assembly (See page IP-5)**
5. **Remove the front right floor air outlet assembly**
   (a) Remove the screw -1-, and remove the right floor air outlet assembly -A-.



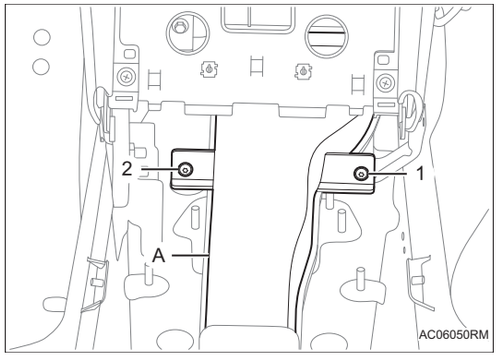
6. **Remove the rear end plate assembly (See page IP-17)**
7. **Remove rear cold air duct rear section**
   (a) Remove the screws -1-2-, and remove the rear section -A- of the rear cold air duct.



8. **Remove the console assembly (See page IP-17)**
9. **Remove rear cold air duct front section**



(a) Remove the fixing screws -1-4- of the rear cold air duct front section assembly -A-.



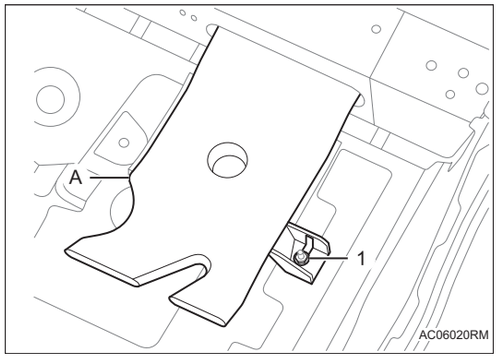
(b) Remove the screws -1-2-, and remove the front section -A- of the rear cold air duct.

10. Remove the carpet assembly (See page IR-26)

11. Remove the left rear floor air outlet II

Hint:

The removal sequence on the right side is the same as that on the left side.

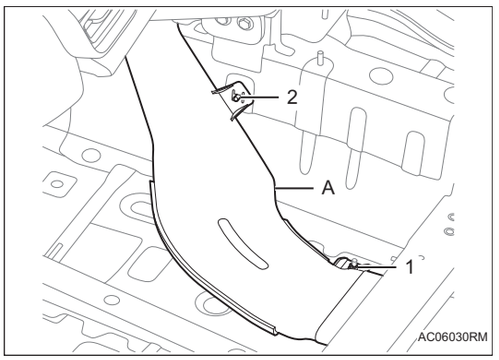


(a) Remove the nut -1-, and remove the left rear floor air outlet Ⅱ -A-.

12. Remove the left rear floor air outlet

Hint:

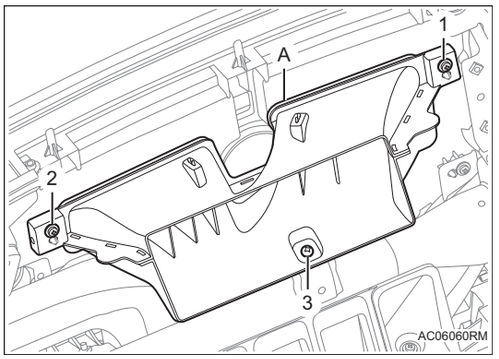
The removal sequence on the right side is the same as that on the left side.



(a) Remove the nuts -1-2-, and remove the left rear floor air outlet -A-.

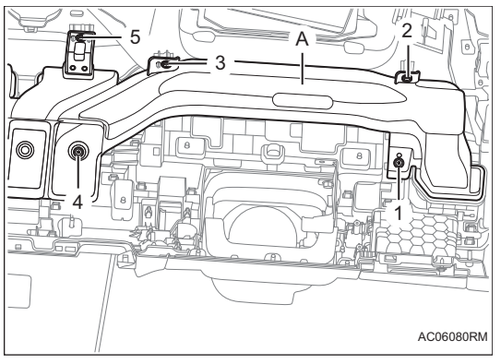
13. Remove the instrument panel assembly (See page IP-5)

14. Remove the defroster transition air duct assembly

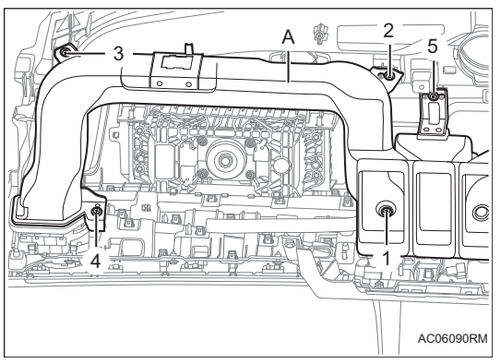


(a) Remove the screws -1-3- and remove defroster transition air duct assembly -A-.

15. Remove the instrument panel air duct assembly



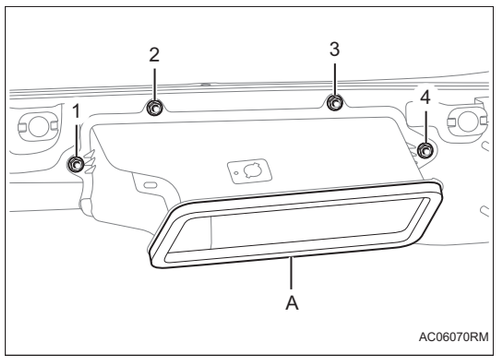
(a) Remove the left fixing screws -1-5- of the instrument panel air duct assembly -A-.



(b) Remove the right fixing screws -1-5- of the instrument panel air duct assembly -A-.

(c) Remove the instrument panel air duct assembly.

16. Remove the air inlet



(a) Remove the bolts -1-4- and remove the air inlet -A-.

Installation

1. The installation procedure is the reverse of removal procedure.

ADV

ADV AD-1

Precautions AD-1
Location of parts AD-2
System diagram AD-5
System description AD-5
ECU terminal AD-7
Symptom chart AD-8
DTC chart AD-9
C1A0017 ..... AD-10
C1A0016 ..... AD-10
C1A014B AD-14
U003788 ..... AD-15
U014687 ..... AD-15
U023287 ..... AD-15
U023787 ..... AD-15
U024387 ..... AD-15
U114687 ..... AD-15
U112187 ..... AD-15
U114087 ..... AD-15
U119987 ..... AD-15
U12F987 ..... AD-15
U110387 ..... AD-15
U110087 ..... AD-15
U113187 ..... AD-15
U124587 ..... AD-15
U115587 ..... AD-15
U120087 ..... AD-15
U120187 ..... AD-15
U120287 ..... AD-15
U110187 ..... AD-15
U115187 ..... AD-15
U041582 ..... AD-15
U041583 ..... AD-15
U041586 ..... AD-15
U042082 ..... AD-15
U042083 ..... AD-15
U042086 ..... AD-15
U054686 ..... AD-15
U040286 ..... AD-15

U007788 .....AD-18
U007888 .....AD-24
Advanced ADV assembly AD-30
Parts AD-30
Removal AD-31
Installation AD-31

ADV

Precautions

1. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

2. Removal and installation of battery terminal

(a) Before removal and repair of electrical components, disconnect the battery negative terminal to prevent the system from short circuit.

(b) Before disconnecting or reconnecting the battery cable terminal, first turn off the power (ignition) switch and lighting switch, and then completely loosen or tighten the battery cable terminal nut.

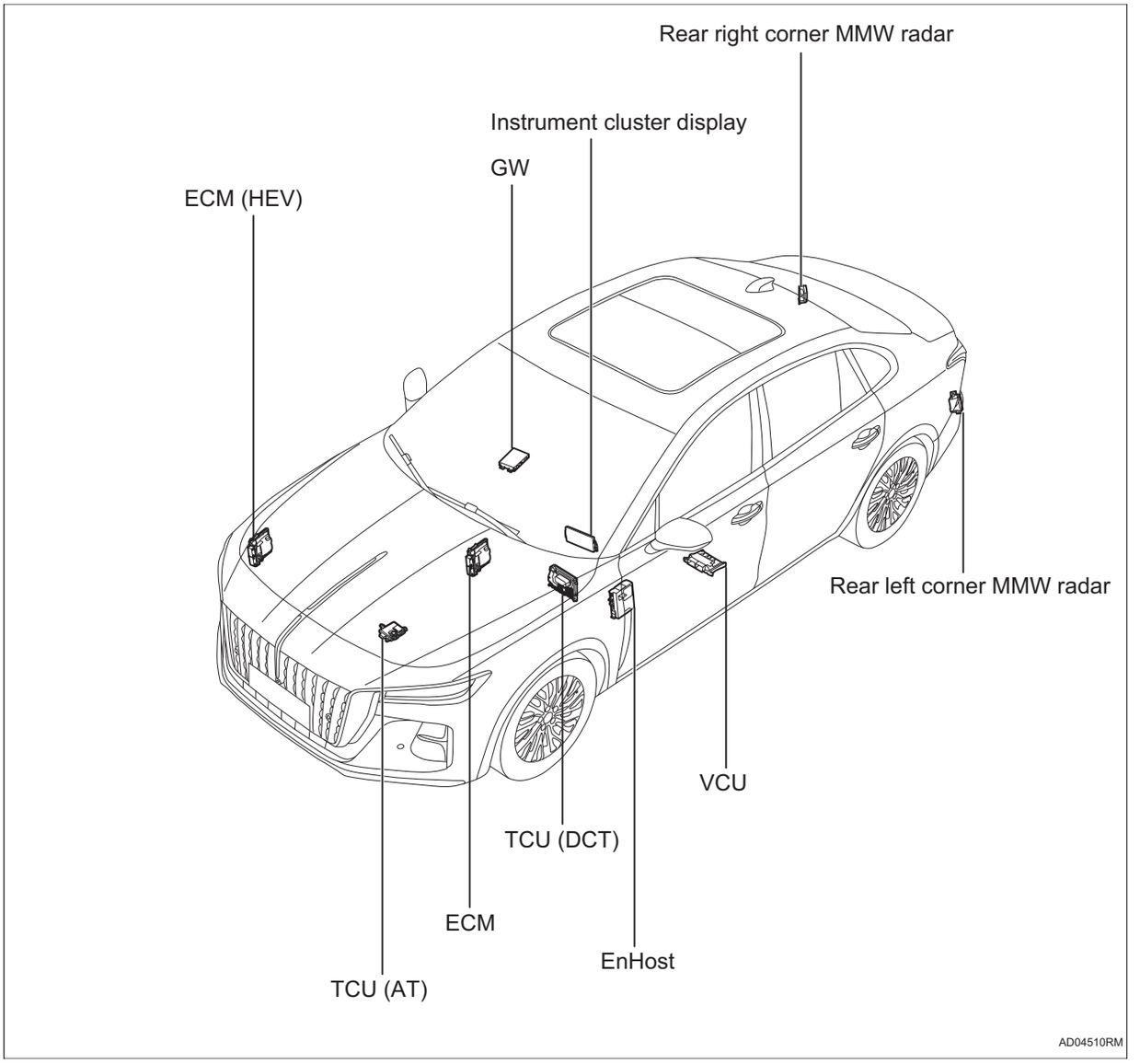
(c) When reconnecting after disconnecting the battery cable, some systems need to be initialized.

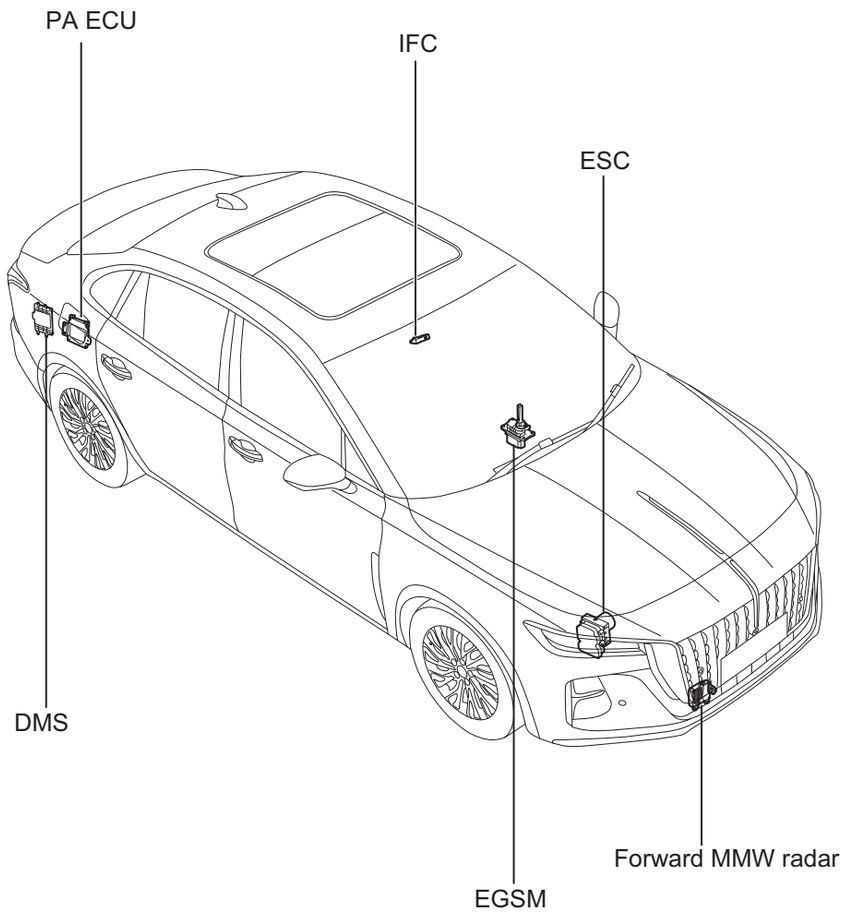
3. General repair instructions

(a) During the automatic parking process, the driver is still the first responsible person, and it is necessary to observe the surrounding conditions of the vehicle throughout the parking process.

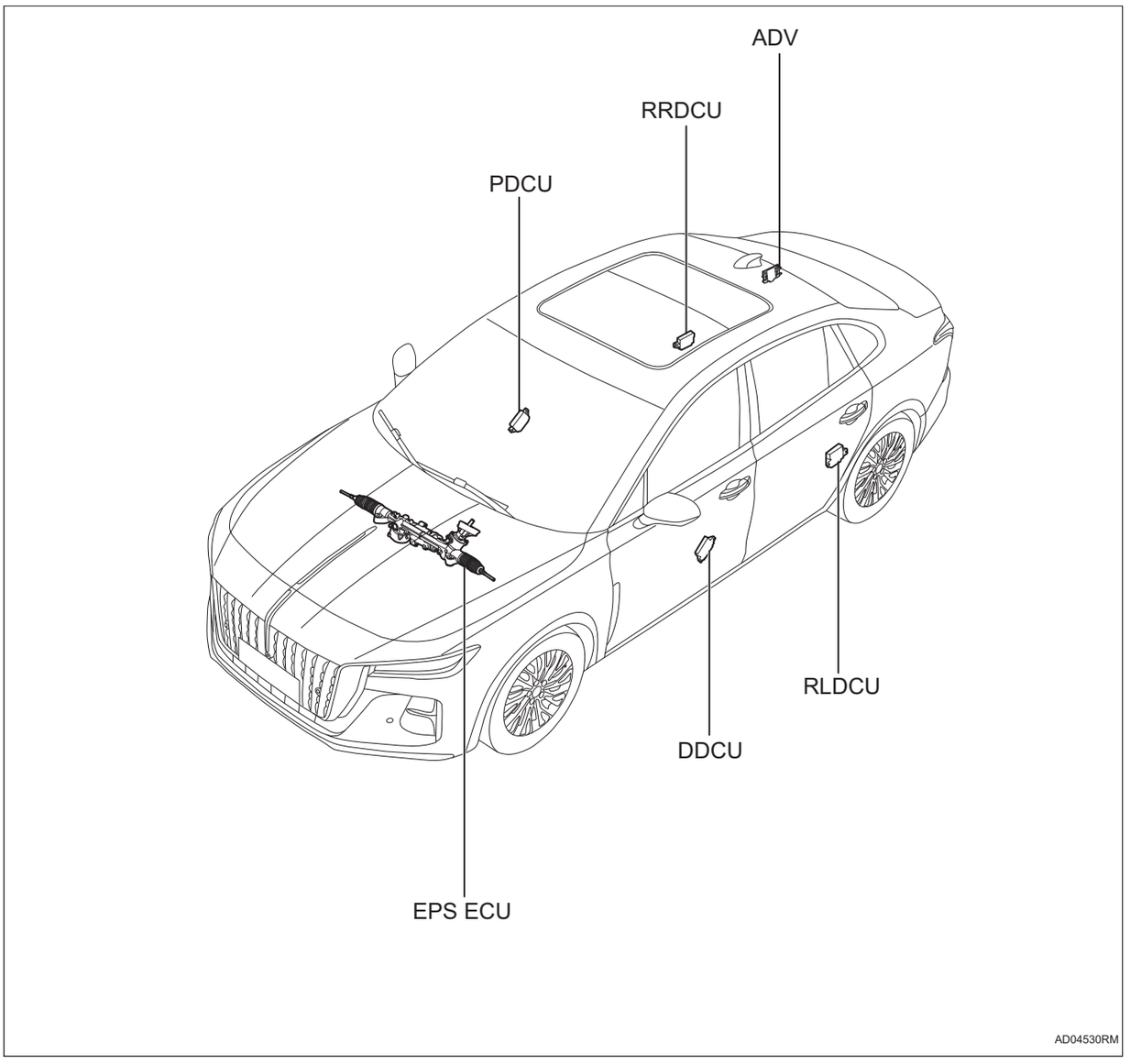
AD

Location of parts

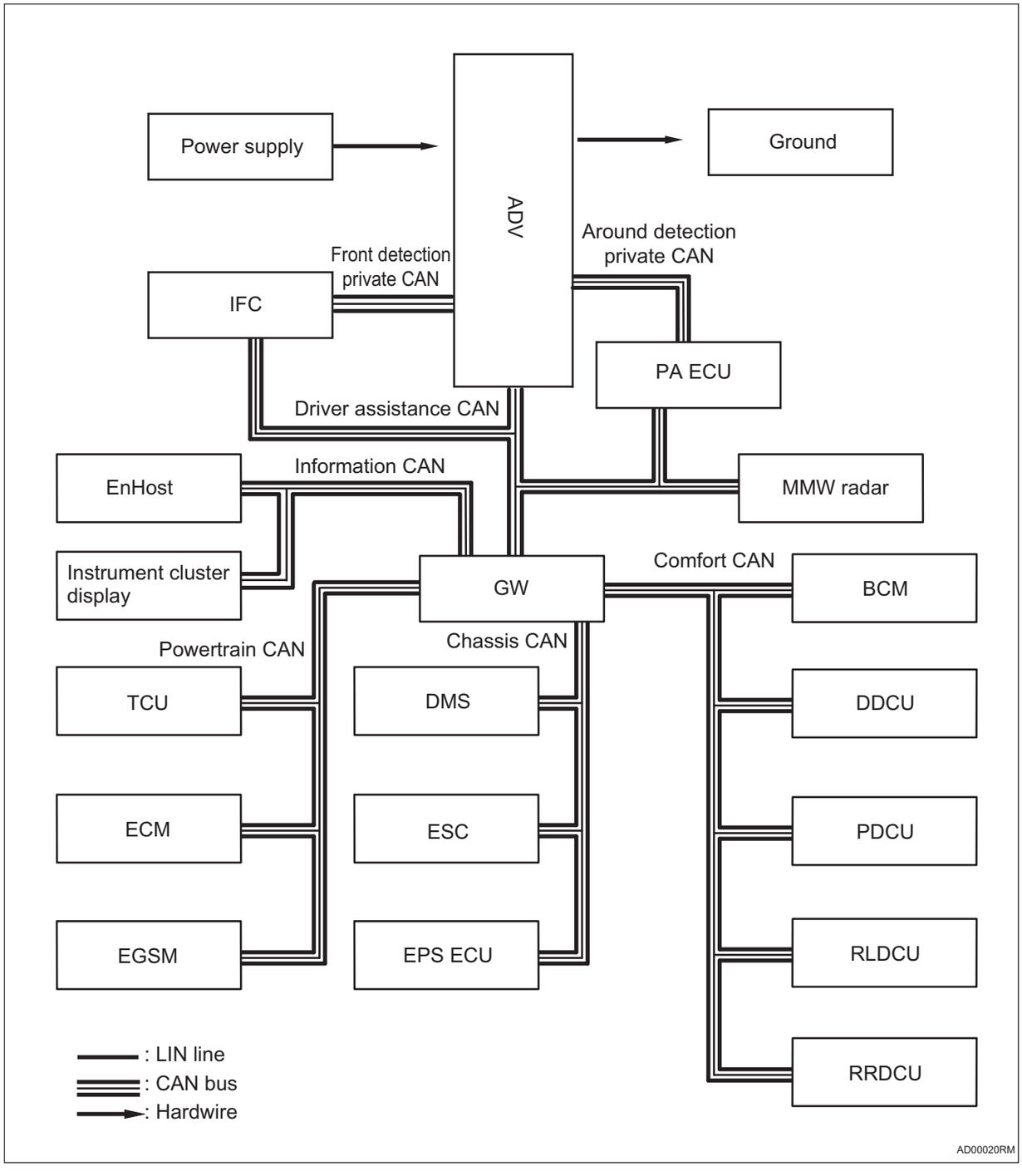




AD04520RM


ADV
RRDCU
PDCU
RLDCU
DDCU
EPS ECU
AD04530RM

System diagram



System description

1. Function brief description

(a) The APA has functions of automatic parking in and automatic parking out.

(b) The APA can identify the side, vertical and oblique parking, and automatically park the vehicle backwards, supporting the automatic parking out function in horizontal and vertical parking spaces.

2. Operating principle

(a) When the vehicle is in APA mode, the ADV sends a enable signal to the PA ECU through the CAN bus, and the system starts to work until the APA process ends.

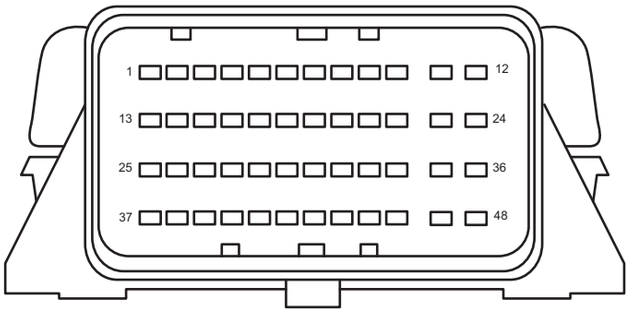
(b) When the vehicle is in the APA mode, the PA ECU needs to collect the real-time information of the sensor, calculate the vehicle position and size, the real-time distance information of obstacles, etc., and output it to the ADV through the CAN bus. The ADV conducts trajectory planning and calculation according to the information, and conducts horizontal and vertical control of the vehicle until the parking process is completed.

3. APA prompt

(a) The PA ECU sends obstacle distance information and classification alarm to the EnHost, and EnHost gives video and audio prompts.

(b) During the working process of the system, the PA ECU continuously monitors the normal functions of sensors and peripheral circuit. If any fault is found, it will be classified and saved into the memory and sent to the EnHost through the bus, and the EnHost will give an alarm.

ECU terminal



ADV

AD00010RM

ADV			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	—	25	—
2	—	26	—
3	—	27	—
4	CAN2 low (IFC)	28	CAN3 low (AVM)
5	CAN2 high (IFC)	29	CAN3 high (AVM)
6	Extended CAN5 low	30	—
7	—	31	—
8	—	32	—
9	—	33	—
10	—	34	—
11	Power GND	35	—
12	B+ (KL30)	36	Power GND
13	—	37	—
14	—	38	—
15	—	39	—
16	—	40	—
17	—	41	—
18	Extended CAN5 high	42	—
19	—	43	—
20	—	44	—
21	—	45	—
22	—	46	—
23	—	47	Ignition (KL15)
24	B+ (KL30)	48	Power GND

Symptom chart

Fault	Possible location
APA function failure	• Reversing radar • Camera • Related harness and connector • PA ECU • ADV • CAN line • T-BOX • GW • IFC • MMW radar • EGSM • EPS ECU control unit • HCU • SAS • EnHost • ESC

DTC chart

DTC	Description	Reference page
C1A0017	Battery input voltage high	(See page AD-10)
C1A0016	Battery input voltage low	(See page AD-10)
C1A014B	PCB overtemperature	(See page AD-14)
U007788	ADV-APA CAN bus off	(See page AD-18)
U007888	ADV-IFC CAN bus OFF	(See page AD-24)
U003788	Driver assistance CAN bus off	(See page AD-16)
U014687	GW node lost	(See page AD-16)
U023287	Left lane change assist control unit node lost	(See page AD-16)
U023787	IFC node lost	(See page AD-16)
U024387	AVM ECU node lost	(See page AD-16)
U114687	GW message lost	(See page AD-16)
U112187	ESP message lost	(See page AD-16)
U114087	BCM 1 message lost	(See page AD-16)
U119987	Driver door module message lost	(See page AD-16)
U12F987	DMS panel message lost	(See page AD-16)
U110387	EGSM message lost	(See page AD-16)
U110087	ECM message lost	(See page AD-16)
U113187	EPS ECU message lost	(See page AD-16)
U124587	EnHost message lost	(See page AD-16)
U115587	Instrument cluster control unit message lost	(See page AD-16)
U120087	Passenger door module message lost	(See page AD-16)
U120187	Rear left door module message lost	(See page AD-16)
U120287	Rear right door module message lost	(See page AD-16)
U110187	TCU message lost	(See page AD-16)
U115187	ACU message lost	(See page AD-16)
U041582	ESP message content error	(See page AD-16)
U041583	ESP message content error	(See page AD-16)
U041586	ESP message content error	(See page AD-16)
U042082	EPS ECU message content error	(See page AD-16)
U042083	EPS ECU message content error	(See page AD-16)
U042086	EPS ECU message content error	(See page AD-16)
U054686	IVI message content error	(See page AD-16)
U040286	TCU message content error	(See page AD-16)

DTC	C1A0017	Battery input voltage high
DTC	C1A0016	Battery input voltage low

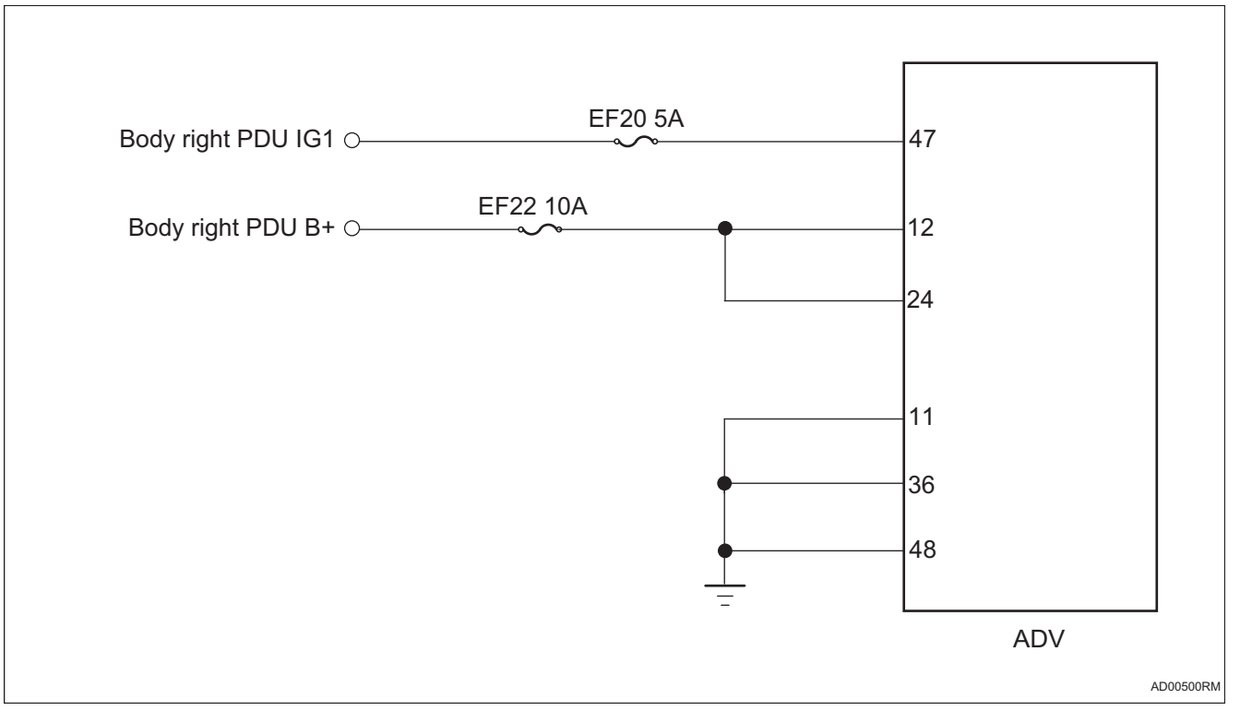
Description

When the ADV input voltage is too high or too low, ADV records the DTC.

AD

DTC	DTC detection conditions	Faulty location
C1A0017	(a) Battery input voltage high.	• ADV • Harness and connector • Battery/charging system
C1A0016	(a) Battery input voltage low.	• ADV • Harness and connector • Battery/charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery + - battery -	Always connected	About 11~14 V

NG	Overhaul the charging system

OK

2	**Check ADV fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the ADV fuse.

(d) Measure the resistance according to the values in the table below.

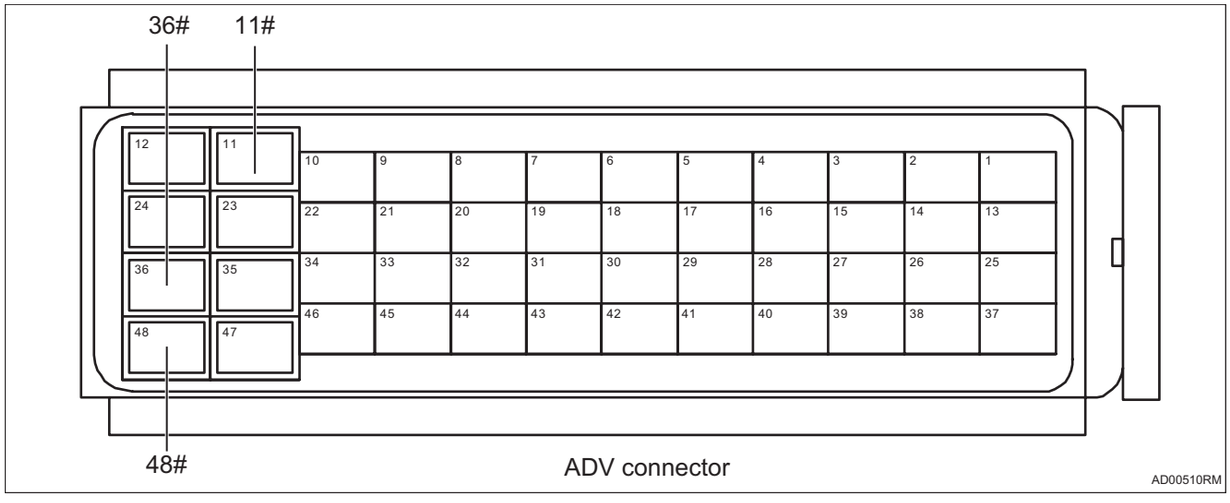
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG **Replace fuse**

OK

3	**Check ADV ground**



(a) Disconnect the ADV connector.

(b) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ADV connector 11# - body GND	Always connected	Less than 1Ω
ADV connector 36# - body GND	Always connected	Less than 1Ω

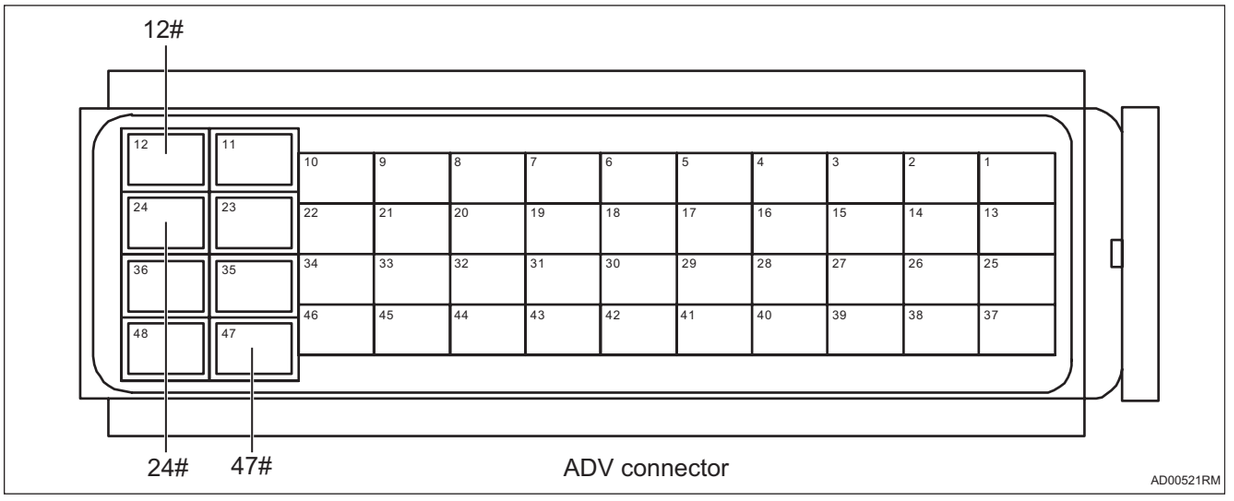
Detector connection	Detection conditions	Specified state
ADV connector 48# - body GND	Always connected	Less than 1Ω

NG → **Repair and replace harness or connector**

AD

OK

4	Check ADV power supply



(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ADV connector 47# - body GND	The ignition switch is set to "ON"	Battery voltage
ADV connector 12# - body GND	The ignition switch is set to "ON"	Battery voltage
ADV connector 24# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace harness or connector**

OK

5	Replace the ADV (See page AD-31)

DTC	C1A014B	PCB overtemperature

Description

When the PCB temperature is too high, the ADV records DTC.

DTC	DTC detection conditions	Faulty location
C1A014B	(a) PCB overtemperature.	• Ambient temperature • ADV

AD

Inspection procedure

1	Power off or cool down the ADV

(a) Reduce the ADV temperature to the normal operating temperature.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the ADV (See page AD-31)**

OK

2	End

DTC	U003788	Driver assistance CAN bus off
DTC	U014687	GW node lost
DTC	U023287	Left lane change assist control unit node lost
DTC	U023787	IFC node lost
DTC	U024387	AVM ECU node lost
DTC	U114687	GW message lost
DTC	U112187	ESP message lost
DTC	U114087	BCM 1 message lost
DTC	U119987	Driver door module message lost
DTC	U12F987	DMS panel message lost
DTC	U110387	EGSM message lost
DTC	U110087	ECM message lost
DTC	U113187	EPS ECU message lost
DTC	U124587	EnHost message lost
DTC	U115587	Instrument cluster control unit message lost
DTC	U120087	Passenger door module message lost
DTC	U120187	Rear left door module message lost
DTC	U120287	Rear right door module message lost
DTC	U110187	TCU message lost
DTC	U115187	ACU message lost
DTC	U041582	ESP message content error
DTC	U041583	ESP message content error
DTC	U041586	ESP message content error
DTC	U042082	EPS ECU message content error
DTC	U042083	EPS ECU message content error
DTC	U042086	EPS ECU message content error
DTC	U054686	IVI message content error
DTC	U040286	TCU message content error

AD

Description

When the communication between the ADV and other systems is abnormal or interrupted, the ADV records a DTC.

DTC	DTC detection conditions	Faulty location
U003788	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U023287	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U023787	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U024387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U112187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U119987	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U12F987	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U113187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U124587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U120087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U120187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U120287	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

DTC	DTC detection conditions	Faulty location
U115187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041582	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041583	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041586	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042082	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042083	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042086	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U054686	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U040286	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

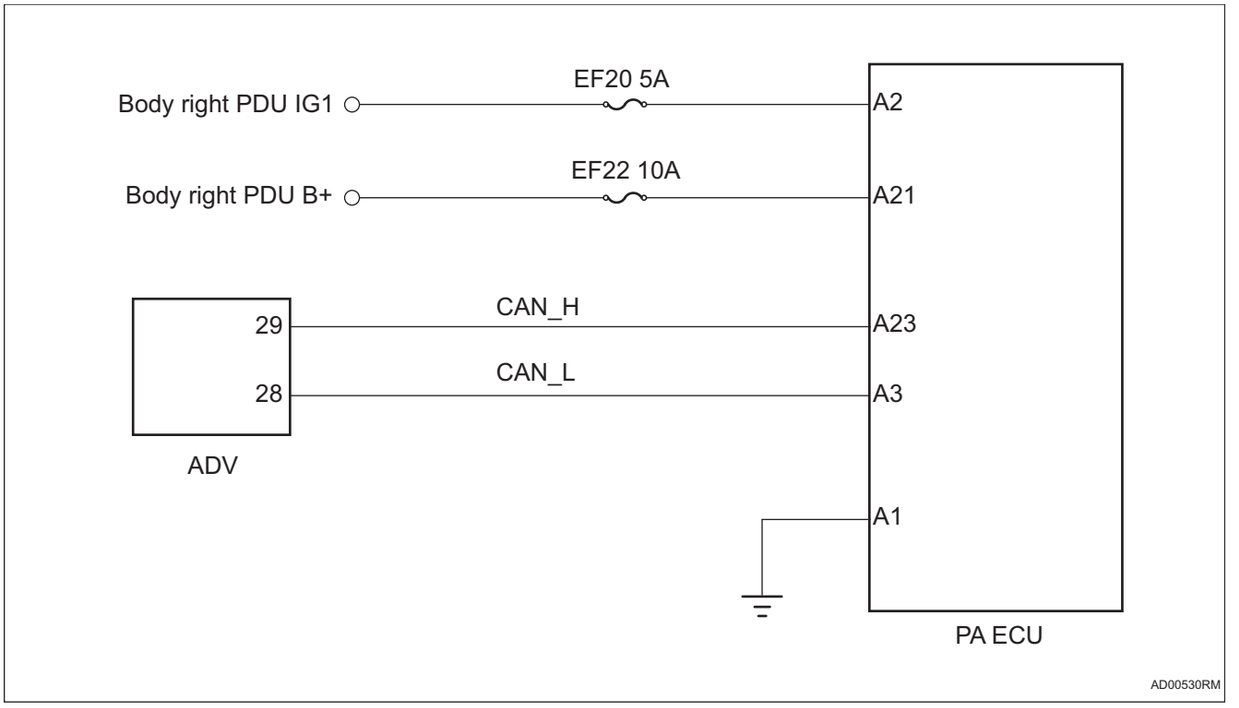
DTC	U007788	ADV-APA CAN bus off

Description

When the communication between the ADV and the PA ECU is abnormal or interrupted, the ADV records a DTC.

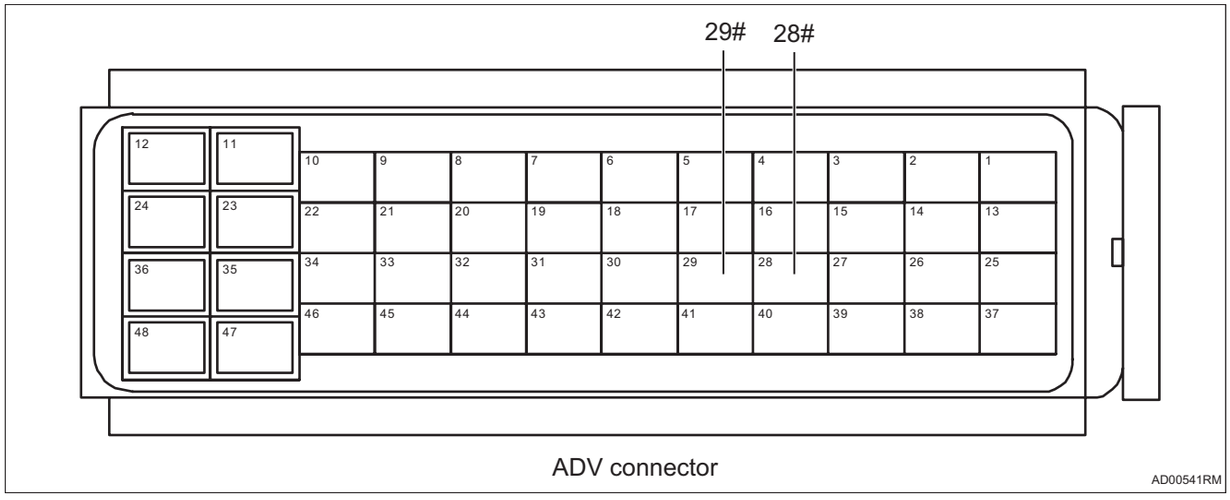
DTC	DTC detection conditions	Faulty location
U007788	(a) ADV-APA CAN bus off.	• ADV • Harness and connector • PA ECU

Circuit diagram



Inspection procedure

1	Check whether there is short circuit between the private CAN bus CAN-L and CAN-H



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ADV connector.

(d) Disconnect the PA ECU connector.

(e) Measure the resistance according to the values in the table below.

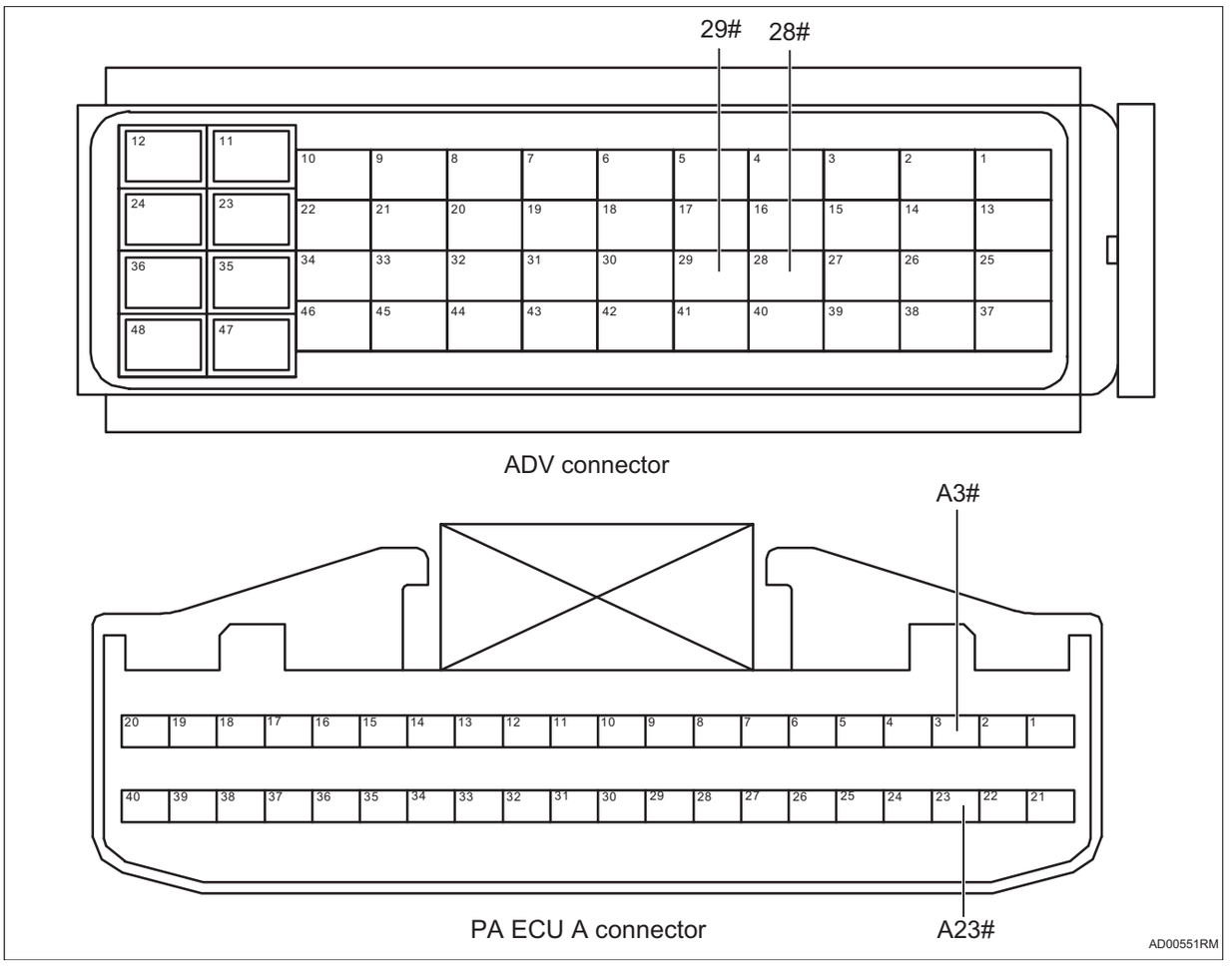
Standard value

Detector connection	Detection conditions	Specified state
ADV connector 29# -ADV connector 28#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

2	**Check whether private CAN bus circuit is open (PA ECU-ADV)**



(a) Measure the resistance according to the values in the table below.

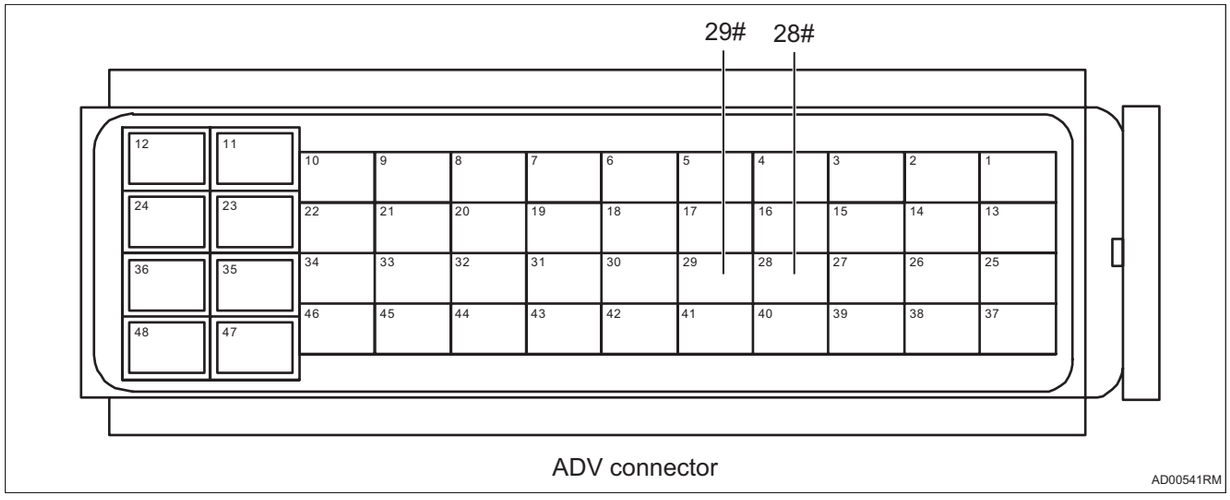
Standard value

Detector connection	Detection conditions	Specified state
ADV connector 29# -PA ECU connector A23#	Always connected	Less than 1Ω
ADV connector 28# -PA ECU connector A3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check private CAN bus for circuit shorted to ground (PA ECU-ADV)**



(a) Measure the resistance according to the values in the table below.

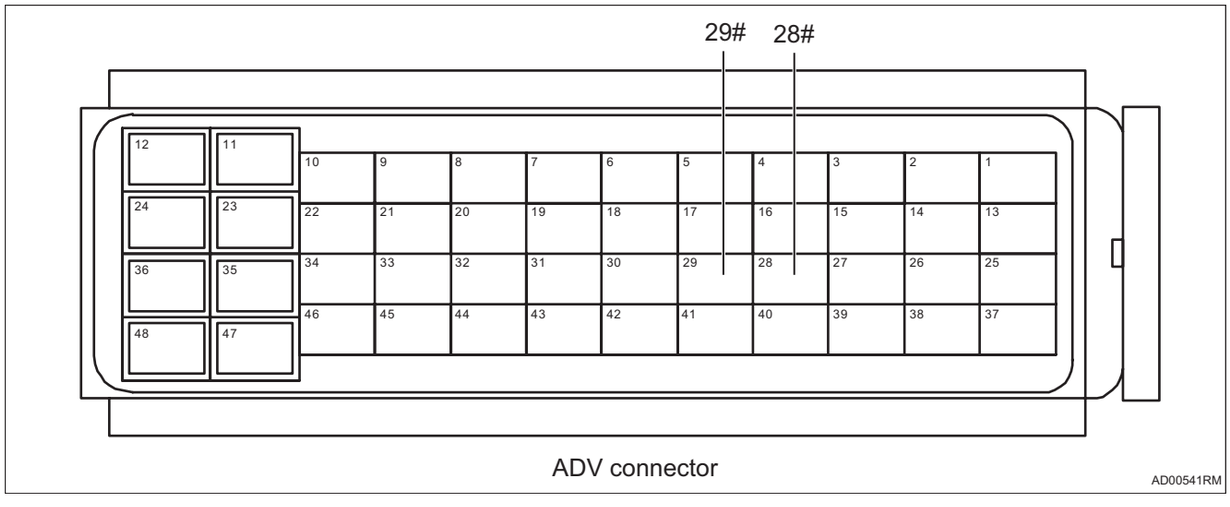
Standard value

Detector connection	Detection conditions	Specified state
ADV connector 28# - body GND	Always connected	10 KΩ or greater
ADV connector 29# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

4	Check private CAN bus for circuit shorted to power supply (PA ECU-ADV)



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

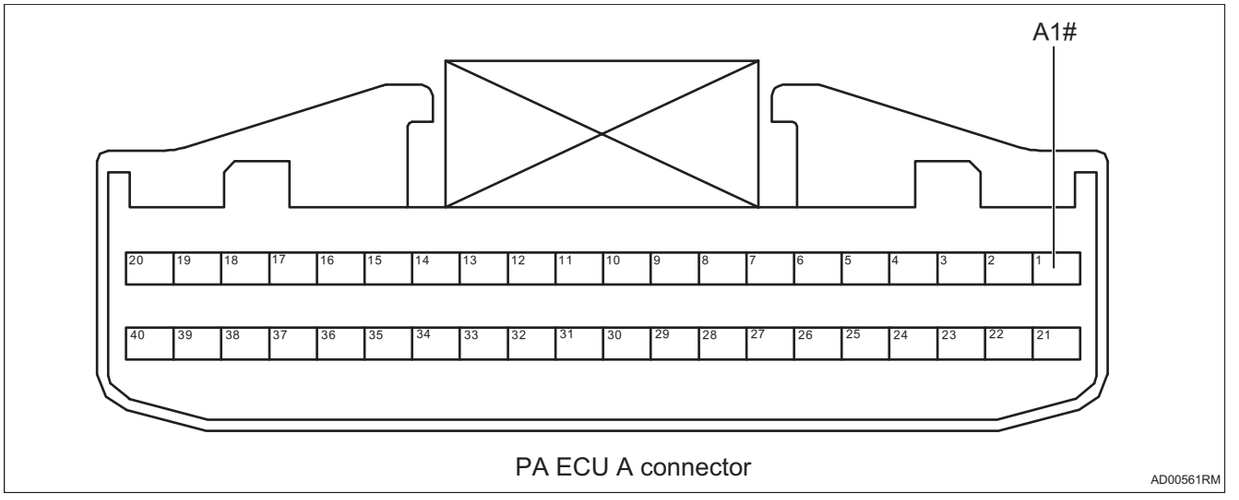
Detector connection	Detection conditions	Specified state
ADV connector 28# - body GND Set the ignition	switch to "ON"	Less than 1 V
ADV connector 29# - body GND Set the ignition	switch to "ON"	Less than 1 V

AD

NG → **Repair or replace the harness and connector**

OK

5	Check PA ECU ground



PA ECU A connector

(a) Measure the resistance according to the values in the table below.

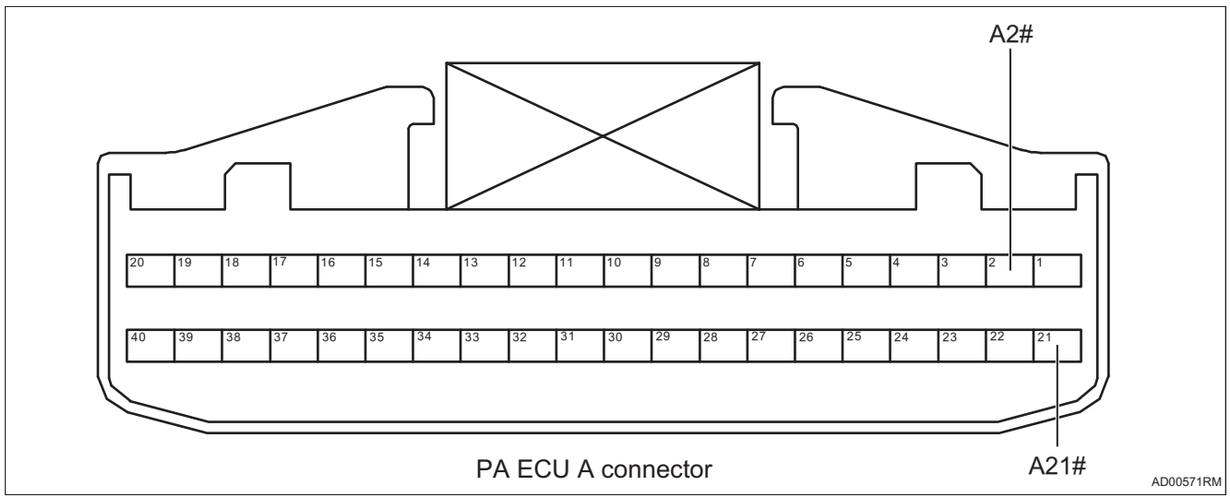
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A1# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

6	Check PA ECU power supply



(a) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A2# -body GND	Set the ignition switch to "ON"	Battery voltage
PA ECU connector A21# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

7	**Replace the PA ECU**

(a) Replace the PA ECU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace the ADV (See page AD-31)**

OK

8	**End**

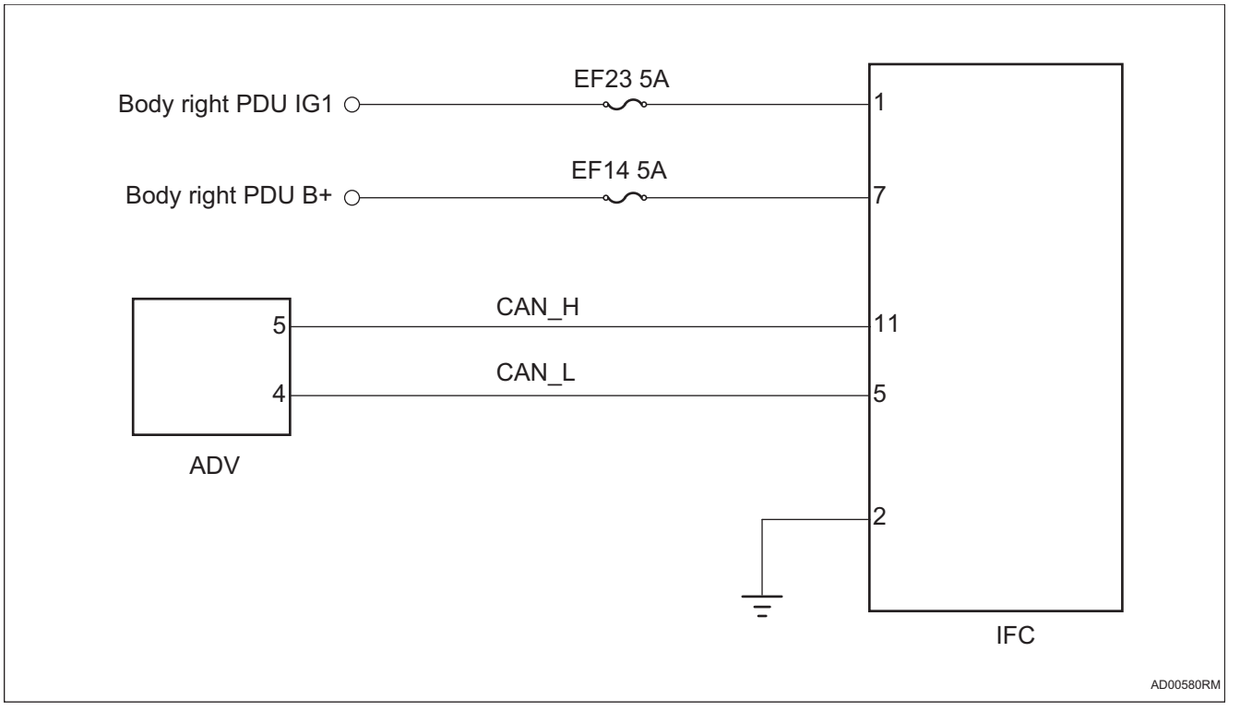
DTC	U007888	ADV-IFC CAN bus OFF

Description

When the communication between the ADV and the IFC is abnormal or interrupted, the ADV records a DTC.

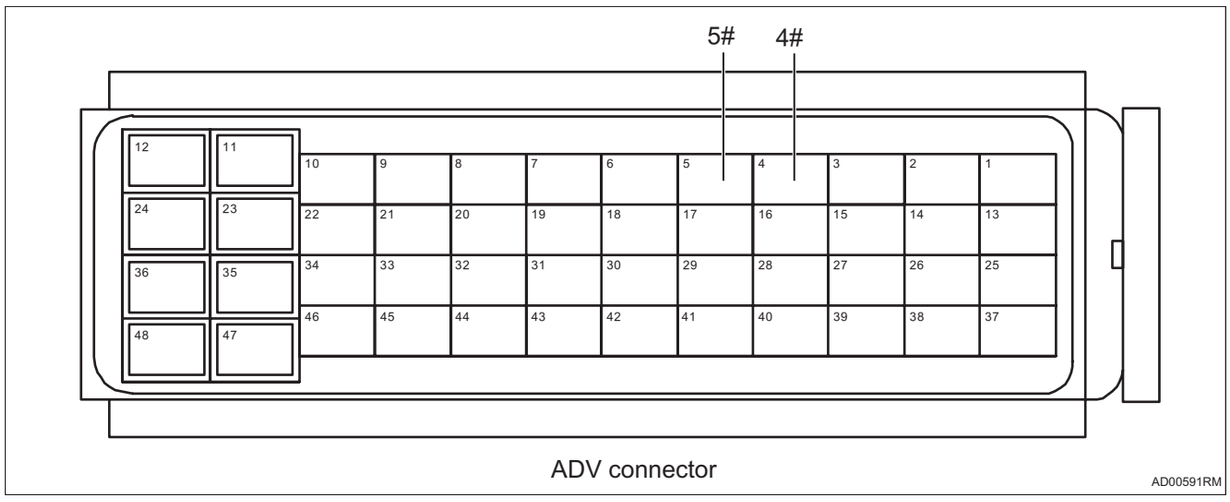
DTC	DTC detection conditions	Faulty location
U007888	(a) ADV-IFC CAN bus off.	• ADV • Harness and connector • IFC

Circuit diagram



Inspection procedure

1	**Check whether there is short circuit between the driver assistance private CAN bus CAN-L and CAN-H**



ADV connector

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the driver assistance private CAN bus.

(d) Disconnect the driver assistance private CAN terminal resistor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ADV connector 4# -ADV connector 5#	Always connected	10 KΩ or greater

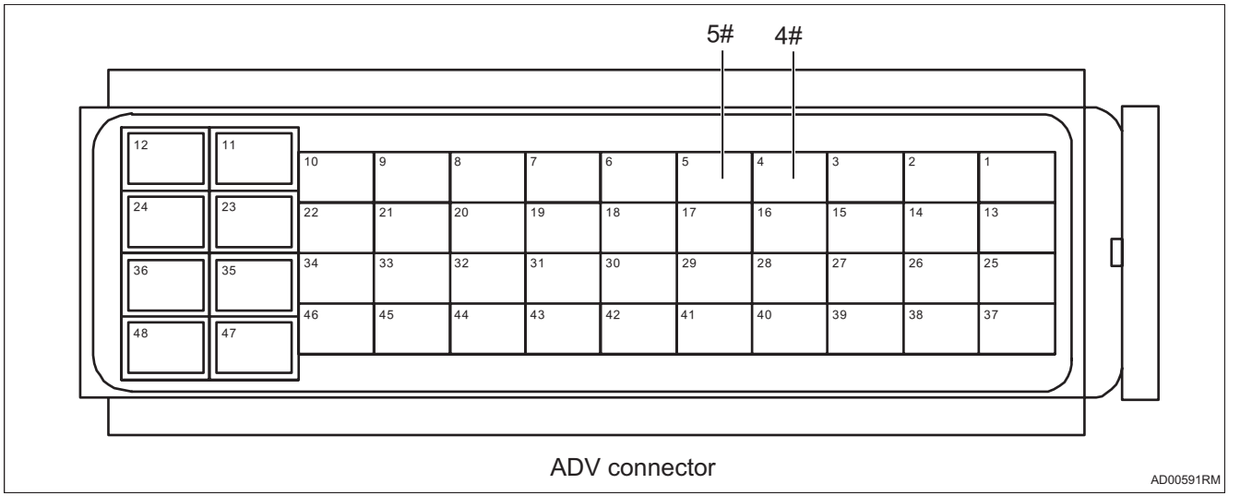
NG **Repair or replace the harness and connector**

OK

2	**Check whether driver assistance private CAN bus circuit is open (IFC-ADV)**

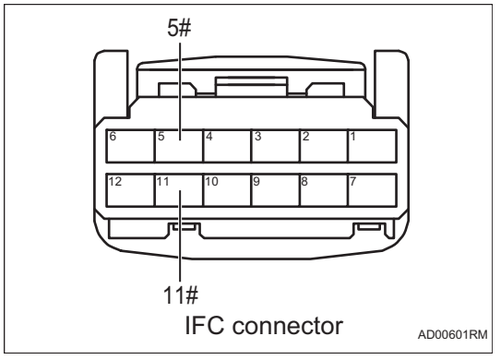
AD

AD



ADV connector

AD00591RM



IFC connector

AD00601RM

(a) Measure the resistance according to the values in the table below.

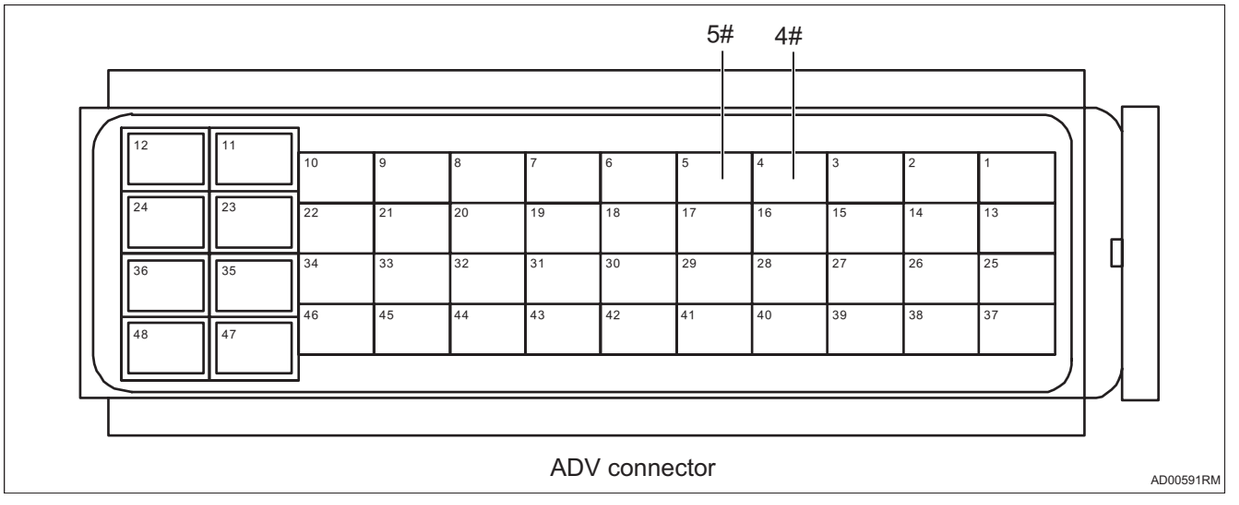
Standard value

Detector connection	Detection conditions	Specified state
ADV connector 4# - IFC connector 5#	Always connected	Less than 1Ω
ADV connector 5# - IFC connector 11#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	**Check whether driver assistance private CAN bus circuit is shorted to ground (IFC-ADV)**



ADV connector

AD00591RM

(a) Measure the resistance according to the values in the table below.

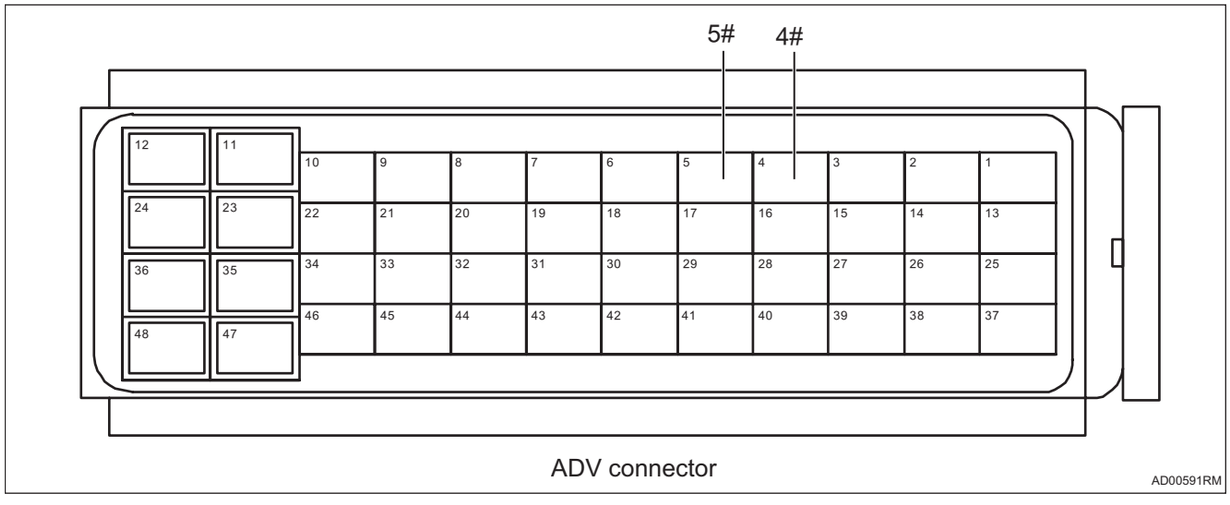
Standard value

Detector connection	Detection conditions	Specified state
ADV connector 4# - body GND	Always connected	10 KΩ or greater
ADV connector 5# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check whether driver assistance private CAN bus circuit is shorted to power supply (IFC-ADV)**



ADV connector

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

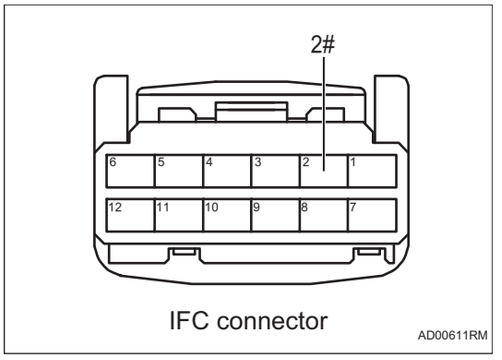
Detector connection	Detection conditions	Specified state
ADV connector 4# - body GND	Set the ignition switch to "ON"	Less than 1 V
ADV connector 5# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Check the IFC ground

AD



(a) Measure the resistance according to the values in the table below.

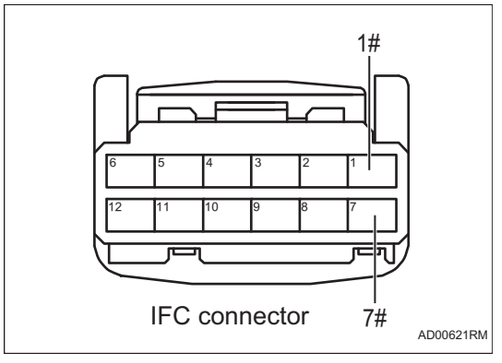
Standard value

Detector connection	Detection conditions	Specified state
IFC connector 2# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

6	Check the IFC power supply



(a) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
IFC connector 1# - body GND	Set the ignition switch to "ON"	Battery voltage
IFC connector 7# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

7	Check driver assistance private CAN terminal resistor

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Driver assistance private CAN terminal resistor 1# - driver assistance private CAN terminal resistor 2#	Always connected	About 120 Ω

NG → **Replace the driver assistance private CAN terminal resistor**

OK

8	**Replace the IFC (See page CC-35)**

(a) Replace the IFC.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

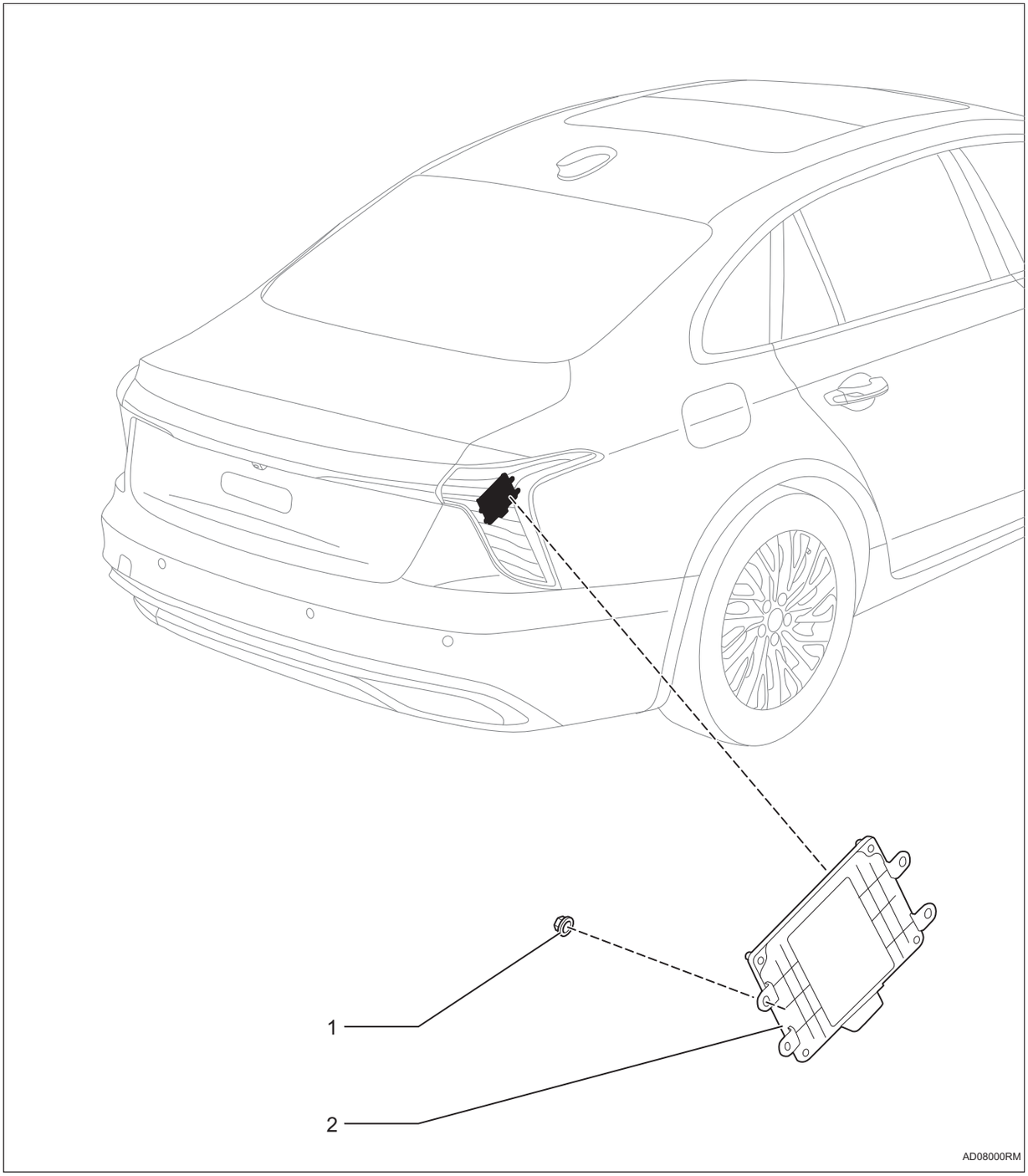
NG → **Replace the ADV (See page AD-31)**

OK

9	**End**

Advanced ADV assembly

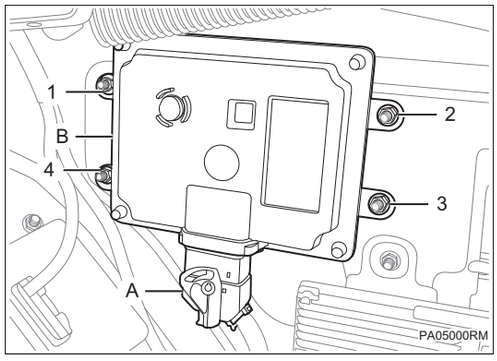
Parts



1. **Hexagon flange nut**
   - X4
   - Torque: 12 ~ 17 N · m
2. **Advanced ADV assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove trunk right covering (See page IR-33)**
3. **Remove the advanced ADV assembly**



(a) Disconnect the harness connector-A-.

(b) Remove nuts -1-4- and remove advanced ADV assembly -B-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

IFC

IFC CC-1
Precautions CC-1
Location of parts CC-3
System diagram CC-6
System description CC-6
Symptom chart CC-8
ECU terminal CC-9
DTC chart CC-9
B168016 .....CC-12
B168017 .....CC-12
B168104 .....CC-15
B168404 .....CC-15
B168254 .....CC-16
B168504 .....CC-17
B168604 .....CC-18
U003788 .....CC-19
U014687 .....CC-19
U02DC87 .....CC-19
U024387 .....CC-19
U023287 .....CC-19
U112187 .....CC-19
U115187 .....CC-19
U114087 .....CC-19
U119987 .....CC-19
U113887 .....CC-19
U110087 .....CC-19
U113187 .....CC-19
U124587 .....CC-19
U115587 .....CC-19
U120087 .....CC-19
U120187 .....CC-19
U120287 .....CC-19
U110187 .....CC-19
U129387 .....CC-19
U114687 .....CC-19
U041582 .....CC-19
U041583 .....CC-19
U041586 .....CC-19
U041585 .....CC-19

U045282 ..... CC-20
U045283 ..... CC-20
U054482 ..... CC-20
U054483 ..... CC-20
U040182 ..... CC-20
U040183 ..... CC-20
U040186 ..... CC-20
U042082 ..... CC-20
U042083 ..... CC-20
U042086 ..... CC-20
U053582 ..... CC-20
U053583 ..... CC-20
U053586 ..... CC-20
U054682 ..... CC-20
U054683 ..... CC-20
U040282 ..... CC-20
U040283 ..... CC-20
U042286 ..... CC-20
U059482 ..... CC-20
U059483 ..... CC-20
U059486 ..... CC-20
U112987 ..... CC-20
U043986 ..... CC-20
U053386 ..... CC-20
U042386 ..... CC-20
U007888 ..... CC-23
U008388 ..... CC-30
IFC CC-34
Parts CC-34
Removal CC-35
Installation CC-35

IFC

Precautions

1. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

2. Removal and installation of battery terminal

(a) Before removal and repair of electrical components, disconnect the battery negative terminal to prevent the system from short circuit.

(b) Before disconnecting or reconnecting the battery cable terminal, first turn off the power (ignition) switch and lighting switch, and then completely loosen or tighten the battery cable terminal nut.

(c) When reconnecting after disconnecting the battery cable, some systems need to be initialized.

3. General repair instructions

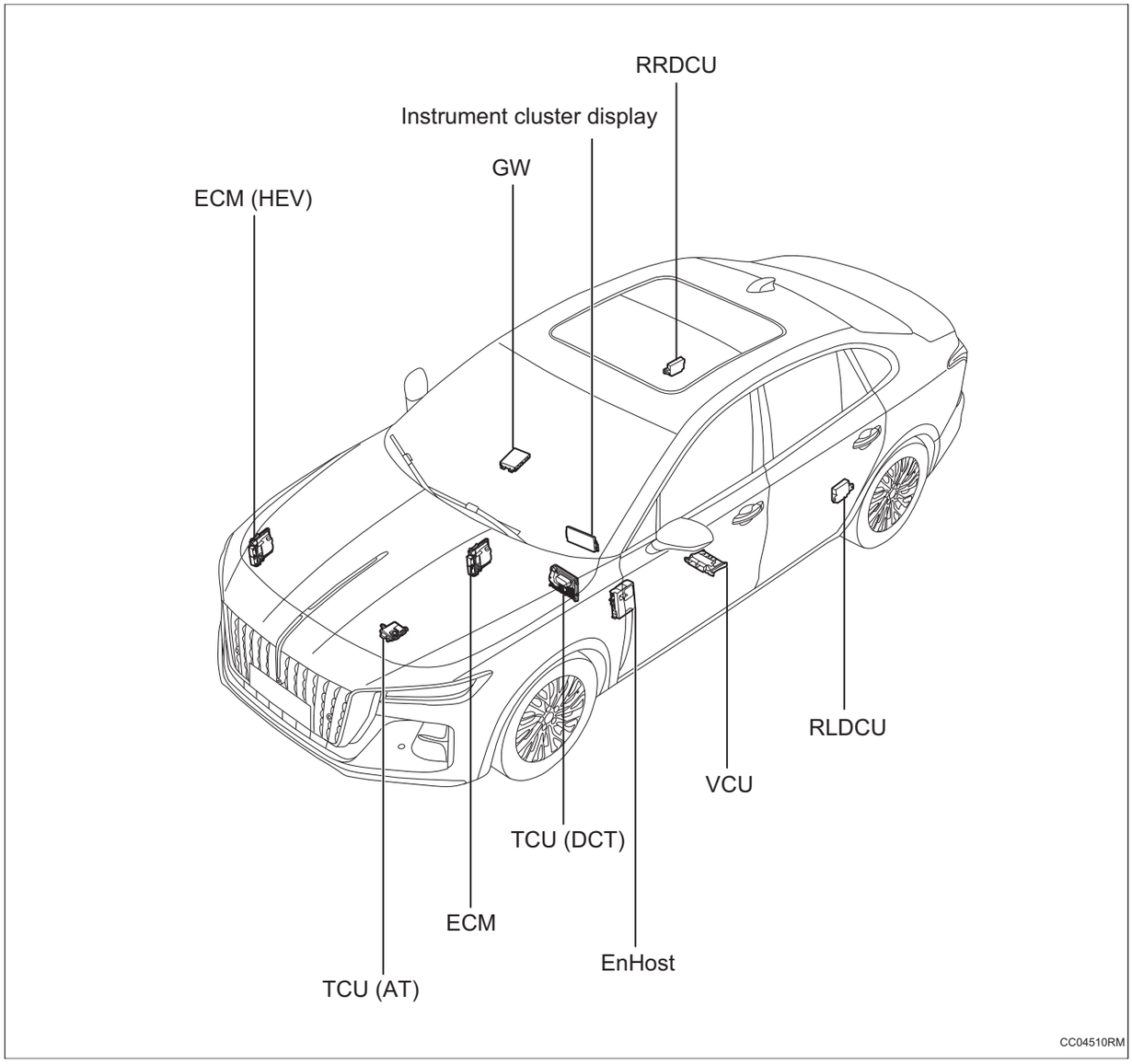
(a) When checking the IFC, the airbag system may be affected. Therefore, before carrying out maintenance work, be sure to carefully read and confirm the precautions for airbag.

(b) Weather conditions may affect the monitoring of the IFC, thus careful driving is required.

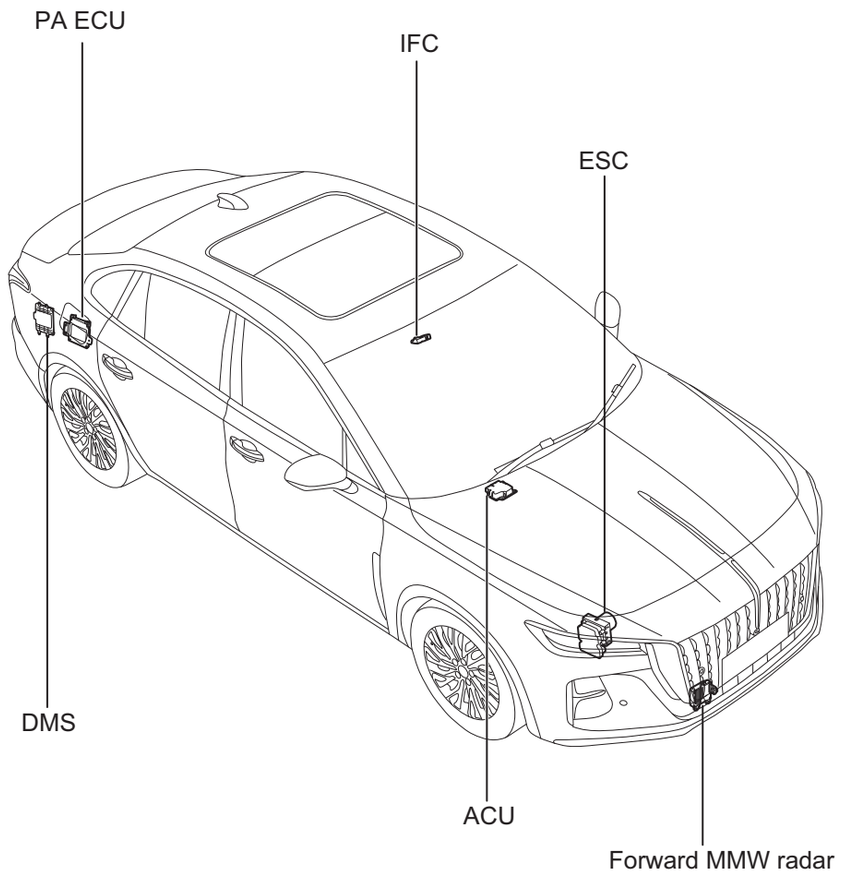
(c) The driver is the primary operator of a vehicle and his/her control on the vehicle takes precedence over the IFC. The driver shall take over the vehicle according to the actual conditions to ensure the driving safety of the vehicle.

4. **After replacing the IFC, use the HQ-VDS for calibration.**

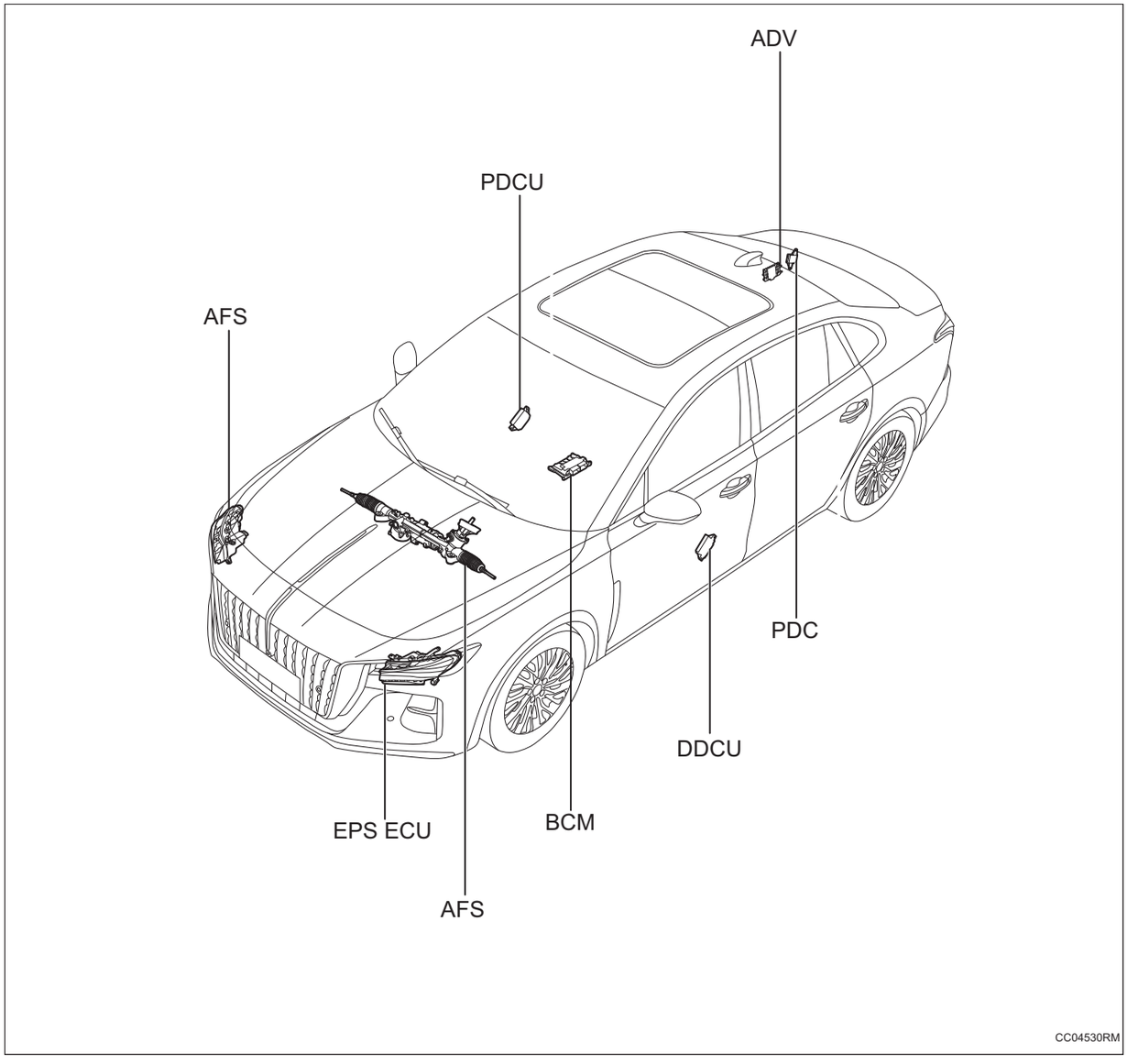
Location of parts



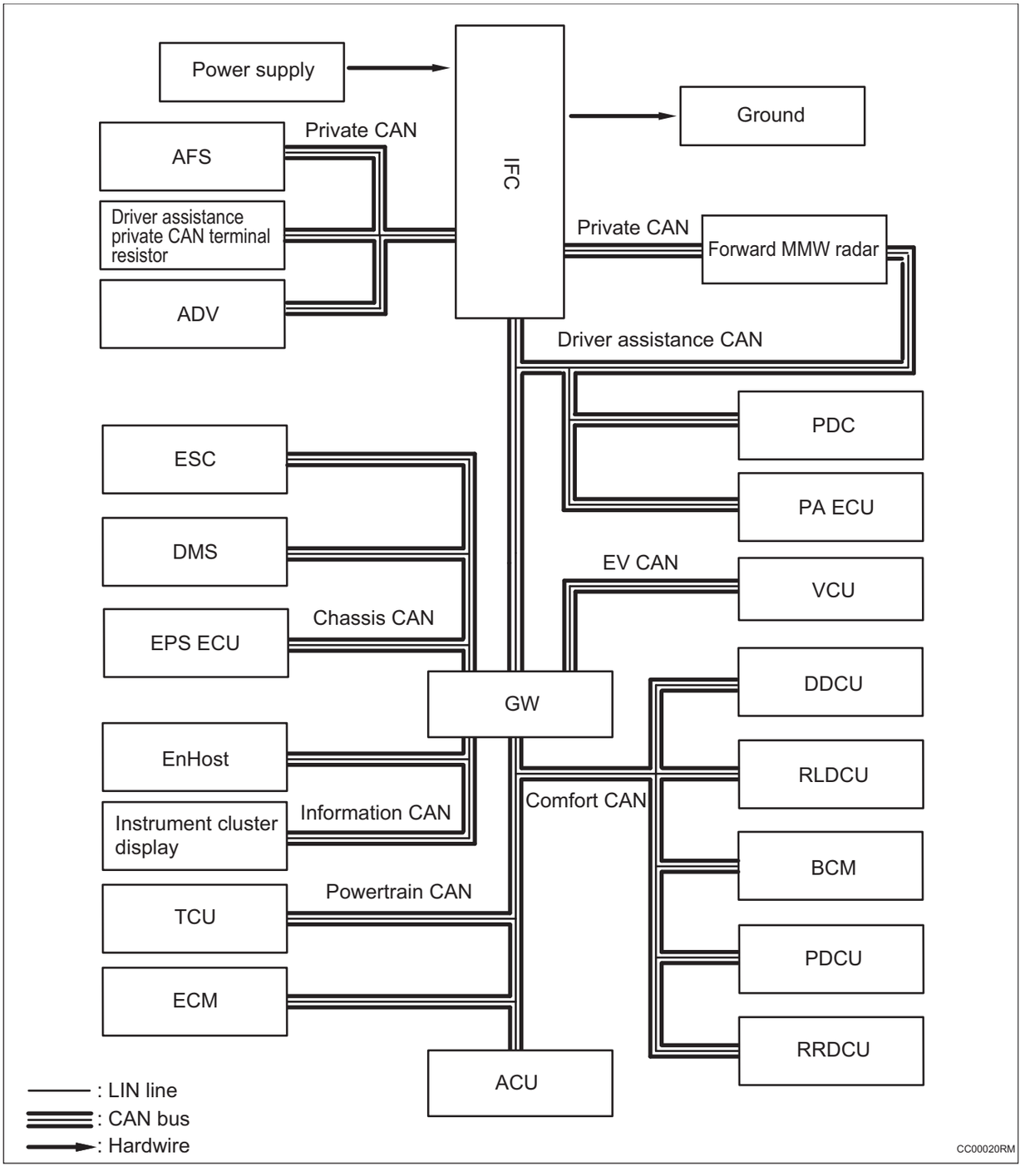
CC



CC04520RM


ADV
PDCU
AFS
PDC
DDCU
EPS ECU
BCM
AFS
CC04530RM

System diagram



System description

1. Function brief description

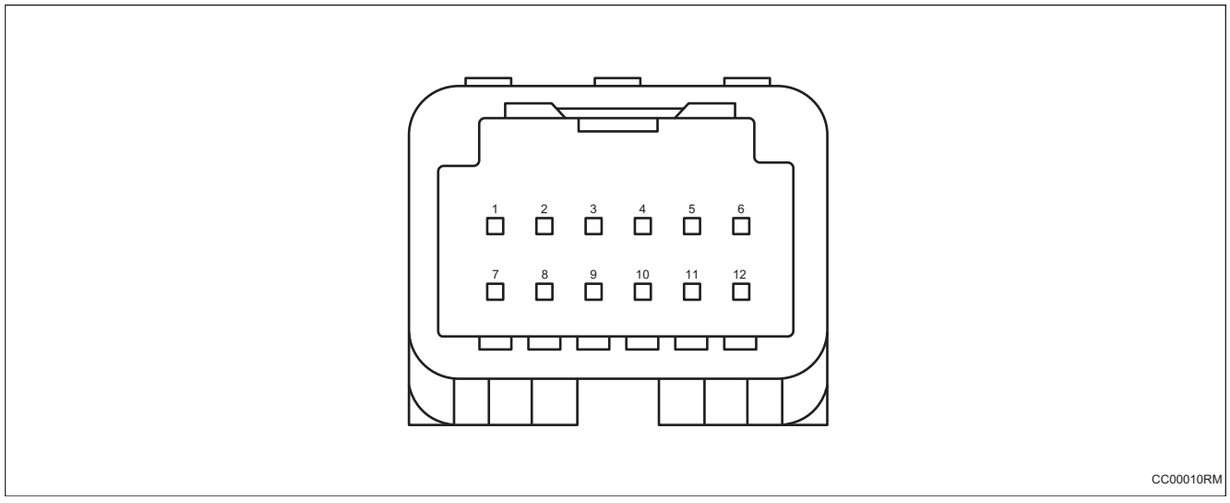
(a) The system includes active cruise, forward collision warning, advanced emergency braking for pedestrians/suburbs/urbans, lane departure warning, traffic sign recognition, driver status monitor, adaptive front-lighting system, advanced cruise and other functions.

Symptom chart

Fault	Possible location
LDW activation failure	• IFC • GW • EnHost display • EGSM • SAS • CAN bus
ACC inoperative	• ACC switch • IFC • ECM • ESP system • CAN bus
AEB inoperative	• IFC • ECM • ESP system • CAN bus
FCW inoperative	• IFC • GW • EnHost • Gear position signal • SAS • CAN bus

ECU terminal

IFC



IFC			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	IG1	7	B+
2	Ground	8	—
3	—	9	—
4	(MMW radar) Private CAN_L	10	(MMW radar) Private CAN_H
5	(ADV, ADB, etc.) Private CAN_L	11	(ADV, ADB, etc.) Private CAN_H
6	CAN_L	12	CAN_H

DTC chart

DTC	Description	Reference page
B168016	System voltage out of range (low voltage)	(See page CC-12)
B168017	System voltage out of range (high voltage)	(See page CC-12)
B168104	IFC internal circuit fault	(See page CC-15)
B168254	Camera not calibrated	(See page CC-16)
B168404	IFC fault	(See page CC-15)
B168504	IFC blocked	(See page CC-17)
B168604	IFC software mismatch	(See page CC-18)
U003788	Driver assistance/extension CAN bus off	(See page CC-21)
U008388	Front MMW radar-IFC CAN bus OFF	(See page CC-30)
U007888	ADV-IFC CAN bus OFF	(See page CC-23)
U014687	GW node lost	(See page CC-21)
U02DC87	Front APA control unit node lost	(See page CC-21)
U024387	APA node lost	(See page CC-21)
U023287	Left lane change assist control unit node lost	(See page CC-21)

DTC	Description	Reference page
U112187	ESP message lost	(See page CC-21)
U115187	ACU message lost	(See page CC-21)
U114087	BCM 1 message lost	(See page CC-21)
U119987	Driver door module message lost	(See page CC-21)
U113887	Driving mode selection control unit message lost	(See page CC-21)
U110087	ECM message lost	(See page CC-21)
U113187	EPS ECU message lost	(See page CC-21)
U124587	IVI message lost	(See page CC-21)
U115587	Instrument cluster control unit message lost	(See page CC-21)
U120087	Passenger door module message lost	(See page CC-21)
U120187	Rear left door module message lost	(See page CC-21)
U120287	Rear right door module message lost	(See page CC-21)
U110187	TCU message lost	(See page CC-21)
U129387	HCU message lost	(See page CC-21)
U114687	GW message lost	(See page CC-21)
U041582	ABS/ESP/ESP with APB message content error	(See page CC-21)
U041583	ABS/ESP/ESP with APB message content error	(See page CC-21)
U041586	ABS/ESP/ESP with APB message content error	(See page CC-21)
U041585	ABS/ESP/ESP with APB message content error	(See page CC-21)
U045282	ACU message content error	(See page CC-21)
U045283	ACU message content error	(See page CC-21)
U054482	APA/ADV message content error	(See page CC-21)
U054483	APA/ADV message content error	(See page CC-21)
U040182	ECM message content error	(See page CC-21)
U040183	ECM message content error	(See page CC-21)
U040186	ECM message content error	(See page CC-21)
U042082	EPS ECU message content error	(See page CC-21)
U042083	EPS ECU message content error	(See page CC-21)
U042086	EPS ECU message content error	(See page CC-21)
U053582	Forward millimeter wave radar control unit message content error	(See page CC-21)
U053583	Forward millimeter wave radar control unit message content error	(See page CC-21)
U053586	Forward millimeter wave radar control unit message content error	(See page CC-21)
U054682	EnHost/IVI message content error	(See page CC-21)
U054683	EnHost/IVI message content error	(See page CC-21)
U040282	TCU message content error	(See page CC-21)

DTC	Description	Reference page
U040283	TCU message content error	(See page CC-21)
U042286	BCM 1 message content error	(See page CC-21)
U059482	HCU message content error	(See page CC-21)
U059483	HCU message content error	(See page CC-21)
U059486	HCU message content error	(See page CC-21)
U112987	IBC message lost	(See page CC-21)
U043986	Driving mode selection control unit message content error	(See page CC-21)
U053386	Left lane change assist control unit message content error	(See page CC-21)
U042386	IPC message content error	(See page CC-21)

DTC	B168016	System voltage out of range (low voltage)
DTC	B168017	System voltage out of range (high voltage)

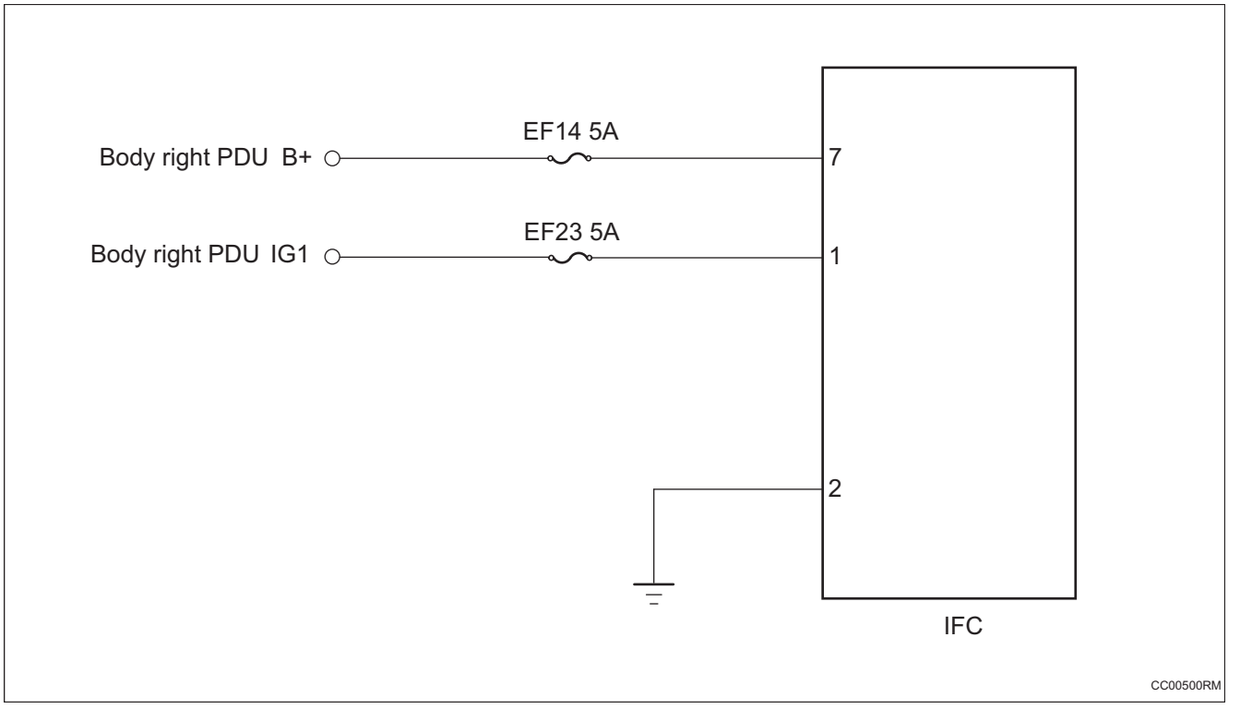
Description

When the IFC power supply voltage exceeds the normal operating range, the IFC records the DTC.

DTC	DTC detection conditions	Faulty location
B168016	(a) The power supply voltage is outside the normal range.	• IFC • Harness and connector • Charging system
B168017	(a) The power supply voltage is outside the normal range.	• IFC • Harness and connector • Fuse • Charging system

CC

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2	Check the IFC fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the IFC fuse.

(d) Measure the resistance according to the values in the table below.

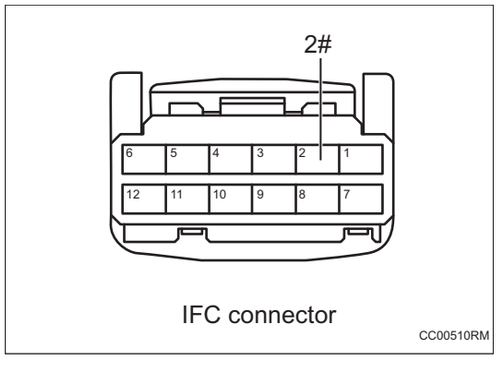
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3	Check the IFC ground



(a) Disconnect the IFC connector.

(b) Measure the resistance according to the values in the table below.

Standard value

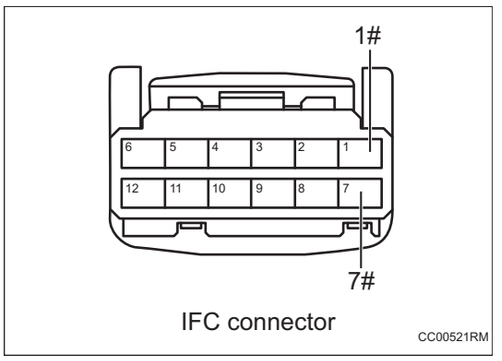
Detector connection	Detection conditions	Specified state
IFC connector 2# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	Check the IFC power supply

CC



IFC connector

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
IFC connector 7# - body GND	The ignition switch is set to "ON"	Battery voltage
IFC connector 1# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace the IFC (See page CC-35)**

DTC	B168104	IFC internal circuit fault
DTC	B168404	IFC fault

Description

When the internal circuit of the IFC fails, the IFC records a DTC.

DTC	DTC detection conditions	Faulty location
B168104	(a) Camera internal circuit abnormal.	• IFC
B168404	(a) Camera fault.	• IFC

Inspection procedure

1	Clear DTC

(a) Connect the HQ-VDS.

(b) Clear the DTC.

(c) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the IFC (See page CC-35)**

OK

2	End

DTC	B168254	Camera not calibrated

Description

When the IFC is not calibrated or the calibration operation is wrong, the IFC records a DTC.

DTC	DTC detection conditions	Faulty location
B168254	(a) Calibration abnormal.	• IFC

Inspection procedure

1	Clear DTC

(a) Connect the HQ-VDS.

(b) Clear the DTC.

(c) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Calibrate IFC**

OK

2	End

DTC	B168504	IFC blocked

Description

When the IFC is dirty or obscured, the IFC records a DTC.

DTC	DTC detection conditions	Faulty location
B168504	(a) The field of view of camera is blocked.	• IFC

Inspection procedure

1	Check the IFC

(a) Check whether the IFC is dirty.

(b) Check if the IFC is obscured.

NG → **Clean IFC or remove obstructions**

OK

2	Replace the IFC (See page CC-35)

DTC	B168604	IFC software mismatch

Description

When the IFC internal software fails, the IFC records a DTC.

DTC	DTC detection conditions	Faulty location
B168604	(a) Software fault.	• IFC

Inspection procedure

CC

1	Clear DTC

(a) Connect the HQ-VDS.

(b) Clear the DTC.

(c) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Update IFC software version**

OK

2	End

DTC	U003788	Driver assistance/extension CAN bus off
DTC	U014687	GW node lost
DTC	U02DC87	Front APA control unit node lost
DTC	U024387	APA node lost
DTC	U023287	Left lane change assist control unit node lost
DTC	U112187	ESP message lost
DTC	U115187	ACU message lost
DTC	U114087	BCM 1 message lost
DTC	U119987	Driver door module message lost
DTC	U113887	Driving mode selection control unit message lost
DTC	U110087	ECM message lost
DTC	U113187	EPS ECU message lost
DTC	U124587	IVI message lost
DTC	U115587	Instrument cluster control unit message lost
DTC	U120087	Passenger door module message lost
DTC	U120187	Rear left door module message lost
DTC	U120287	Rear right door module message lost
DTC	U110187	TCU message lost
DTC	U129387	HCU message lost
DTC	U114687	GW message lost
DTC	U041582	ABS/ESP/ESP with APB message content error
DTC	U041583	ABS/ESP/ESP with APB message content error
DTC	U041586	ABS/ESP/ESP with APB message content error
DTC	U041585	ABS/ESP/ESP with APB message content error

CC

DTC	U045282	ACU message content error
DTC	U045283	ACU message content error
DTC	U054482	APA/ADV message content error
DTC	U054483	APA/ADV message content error
DTC	U040182	ECM message content error
DTC	U040183	ECM message content error
DTC	U040186	ECM message content error
DTC	U042082	EPS ECU message content error
DTC	U042083	EPS ECU message content error
DTC	U042086	EPS ECU message content error
DTC	U053582	Forward millimeter wave radar control unit message content error
DTC	U053583	Forward millimeter wave radar control unit message content error
DTC	U053586	Forward millimeter wave radar control unit message content error
DTC	U054682	EnHost/IVI message content error
DTC	U054683	EnHost/IVI message content error
DTC	U040282	TCU message content error
DTC	U040283	TCU message content error
DTC	U042286	BCM 1 message content error
DTC	U059482	HCU message content error
DTC	U059483	HCU message content error
DTC	U059486	HCU message content error
DTC	U112987	IBC message lost
DTC	U043986	Driving mode selection control unit message content error
DTC	U053386	Left lane change assist control unit message content error
DTC	U042386	IPC message content error

Description

When the communication between the IFC and other systems is abnormal or interrupted, the IFC records a DTC.

DTC	DTC detection conditions	Faulty location
U003788	(a) Abnormal or interrupted communication.	
U014687	(a) Abnormal or interrupted communication.	
U02DC87	(a) Abnormal or interrupted communication.	
U024387	(a) Abnormal or interrupted communication.	
U023287	(a) Abnormal or interrupted communication.	
U112187	(a) Abnormal or interrupted communication.	
U115187	(a) Abnormal or interrupted communication.	
U114087	(a) Abnormal or interrupted communication.	
U119987	(a) Abnormal or interrupted communication.	
U113887	(a) Abnormal or interrupted communication.	
U110087	(a) Abnormal or interrupted communication.	
U113187	(a) Abnormal or interrupted communication.	
U124587	(a) Abnormal or interrupted communication.	
U115587	(a) Abnormal or interrupted communication.	
U120087	(a) Abnormal or interrupted communication.	
U120187	(a) Abnormal or interrupted communication.	
U120287	(a) Abnormal or interrupted communication.	
U110187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U129387	(a) Abnormal or interrupted communication.	
U114687	(a) Abnormal or interrupted communication.	
U041582	(a) Abnormal or interrupted communication.	
U041583	(a) Abnormal or interrupted communication.	
U041586	(a) Abnormal or interrupted communication.	
U041585	(a) Abnormal or interrupted communication.	
U045282	(a) Abnormal or interrupted communication.	
U045283	(a) Abnormal or interrupted communication.	
U054482	(a) Abnormal or interrupted communication.	
U054483	(a) Abnormal or interrupted communication.	
U040182	(a) Abnormal or interrupted communication.	
U040183	(a) Abnormal or interrupted communication.	
U040186	(a) Abnormal or interrupted communication.	
U042082	(a) Abnormal or interrupted communication.	
U042083	(a) Abnormal or interrupted communication.	
U042086	(a) Abnormal or interrupted communication.	
U053582	(a) Abnormal or interrupted communication.	
U053583	(a) Abnormal or interrupted communication.	

DTC	DTC detection conditions	Faulty location
U053586	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U054682	(a) Abnormal or interrupted communication.	
U054683	(a) Abnormal or interrupted communication.	
U040282	(a) Abnormal or interrupted communication.	
U040283	(a) Abnormal or interrupted communication.	
U042286	(a) Abnormal or interrupted communication.	
U059482	(a) Abnormal or interrupted communication.	
U059483	(a) Abnormal or interrupted communication.	
U059486	(a) Abnormal or interrupted communication.	
U112987	(a) Abnormal or interrupted communication.	
U043986	(a) Abnormal or interrupted communication.	
U053386	(a) Abnormal or interrupted communication.	
U042386	(a) Abnormal or interrupted communication.	

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

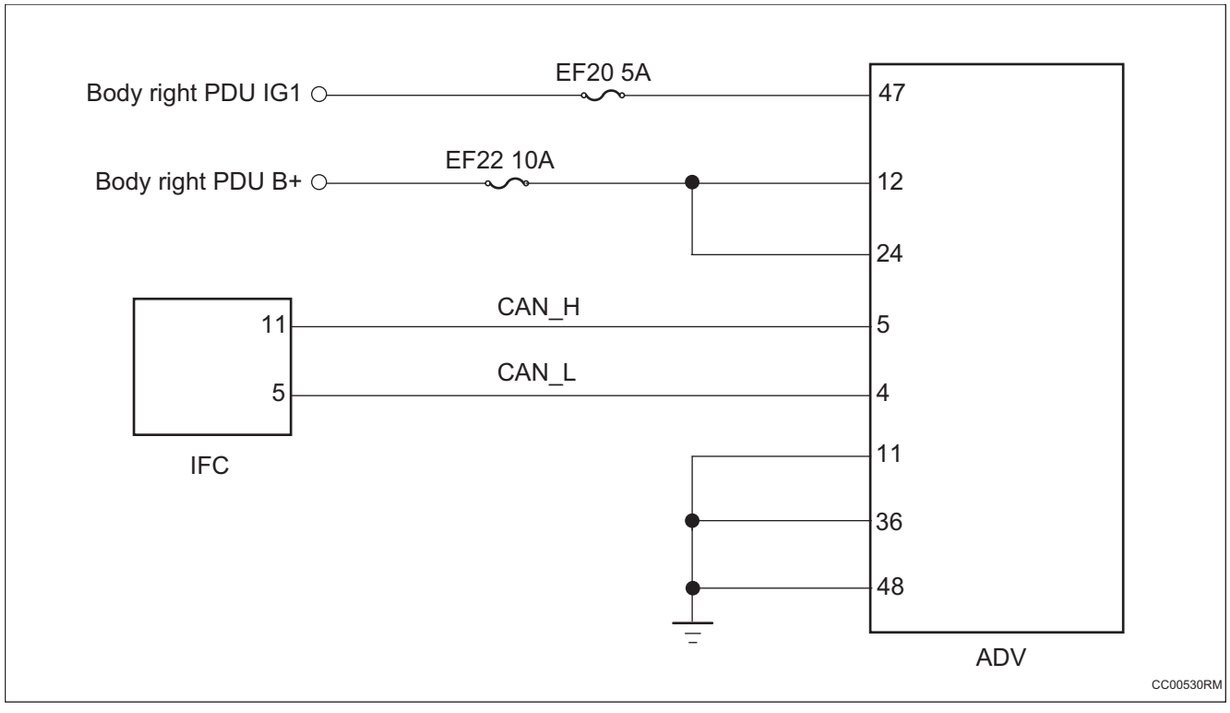
DTC	U007888	ADV-IFC CAN bus OFF

Description

When the communication between the IFC and the ADV is abnormal or interrupted, the IFC records a DTC.

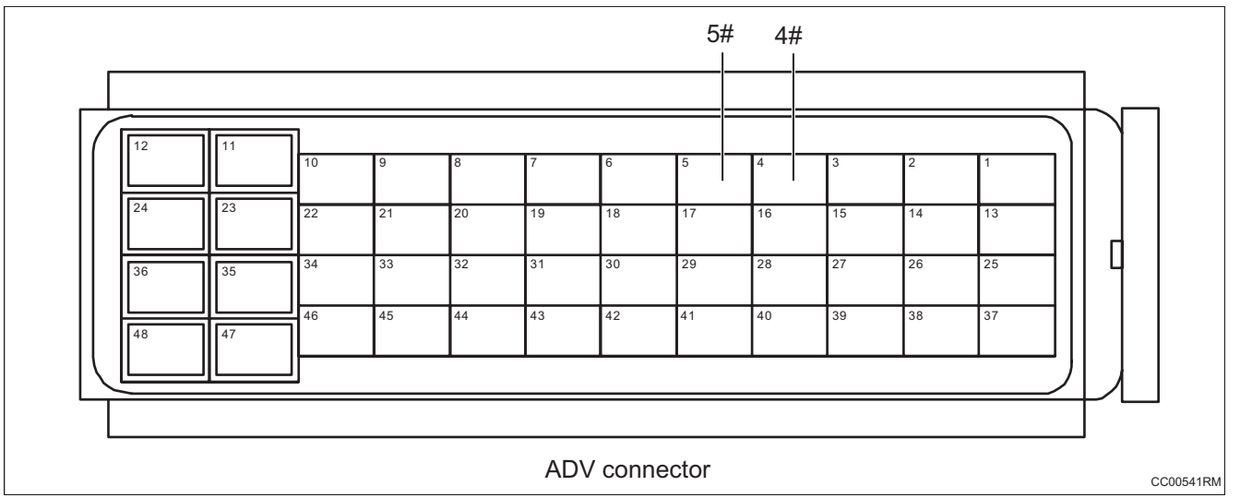
DTC	DTC detection conditions	Faulty location
U007888	(a) ADV-IFC CAN bus off.	• ADV • Harness and connector • IFC

Circuit diagram



Inspection procedure

1	**Check whether there is short circuit between the driver assistance private CAN bus CAN-L and CAN-H**



ADV connector

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the driver assistance private CAN bus.

(d) Disconnect the driver assistance private CAN terminal resistor connector.

(e) Measure the resistance according to the values in the table below.

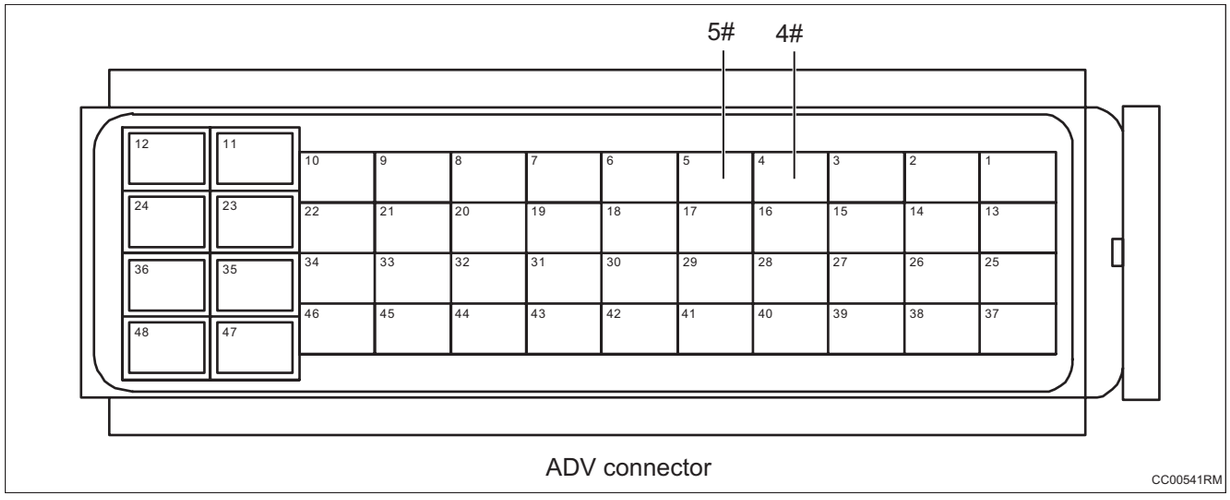
Standard value

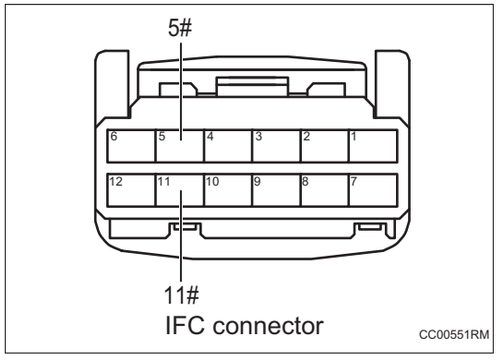
Detector connection	Detection conditions	Specified state
ADV connector 4# -ADV connector 5#	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

2	**Check whether driver assistance private CAN bus circuit is open (IFC-ADV)**





(a) Measure the resistance according to the values in the table below.

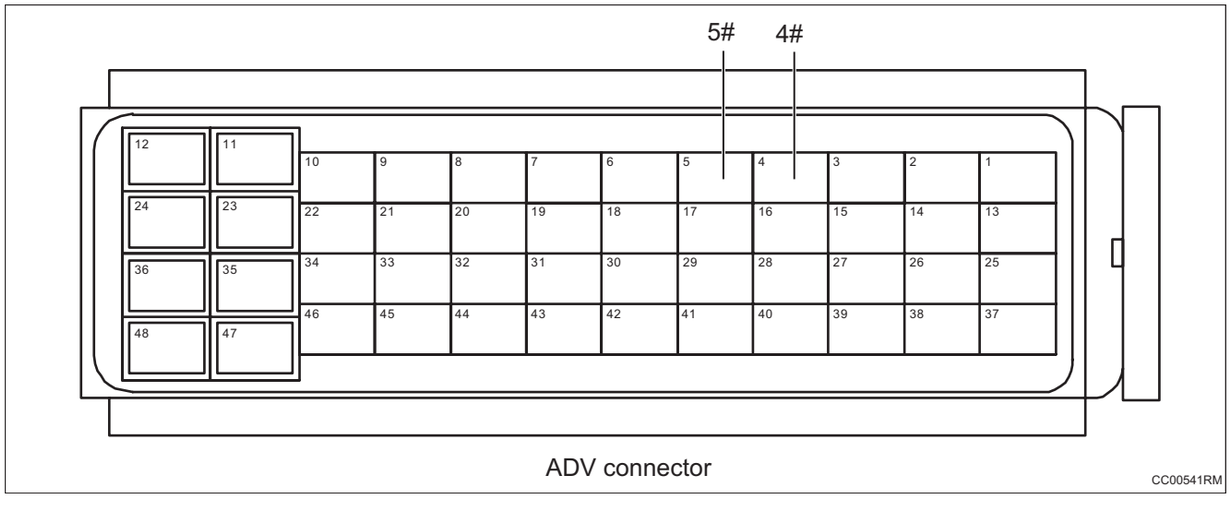
Standard value

Detector connection	Detection conditions	Specified state
ADV connector 4# - IFC connector 5#	Always connected	Less than 1Ω
ADV connector 5# - IFC connector 11#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check whether driver assistance private CAN bus circuit is shorted to ground (IFC-ADV)**



(a) Measure the resistance according to the values in the table below.

Standard value

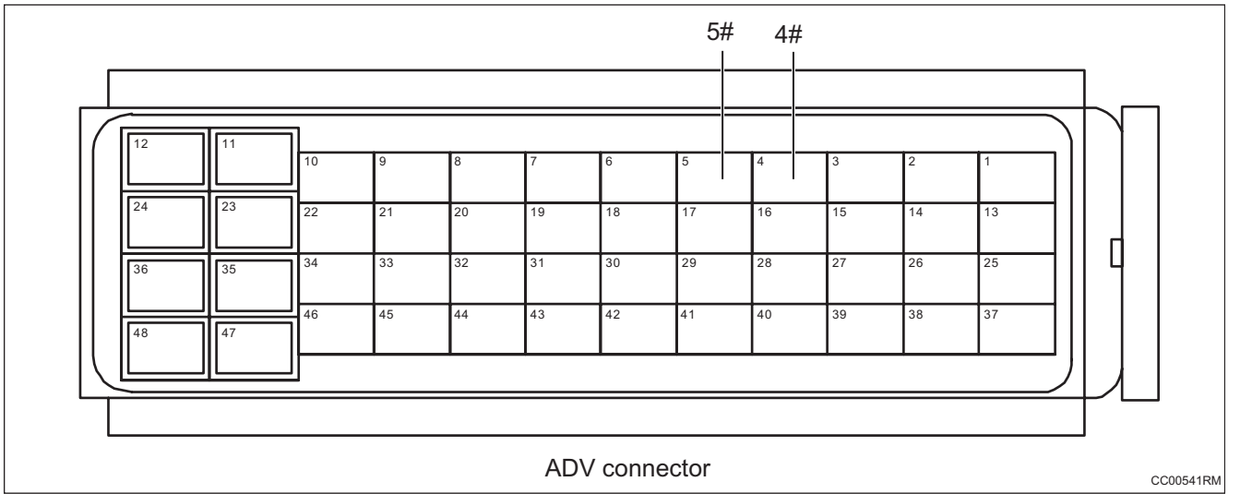
Detector connection	Detection conditions	Specified state
ADV connector 4# - body GND	Always connected	10 KΩ or greater
ADV connector 5# - body GND	Always connected	10 KΩ or greater

CC

NG **Repair or replace the harness and connector**

OK

4	**Check whether driver assistance private CAN bus circuit is shorted to power supply (IFC-ADV)**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

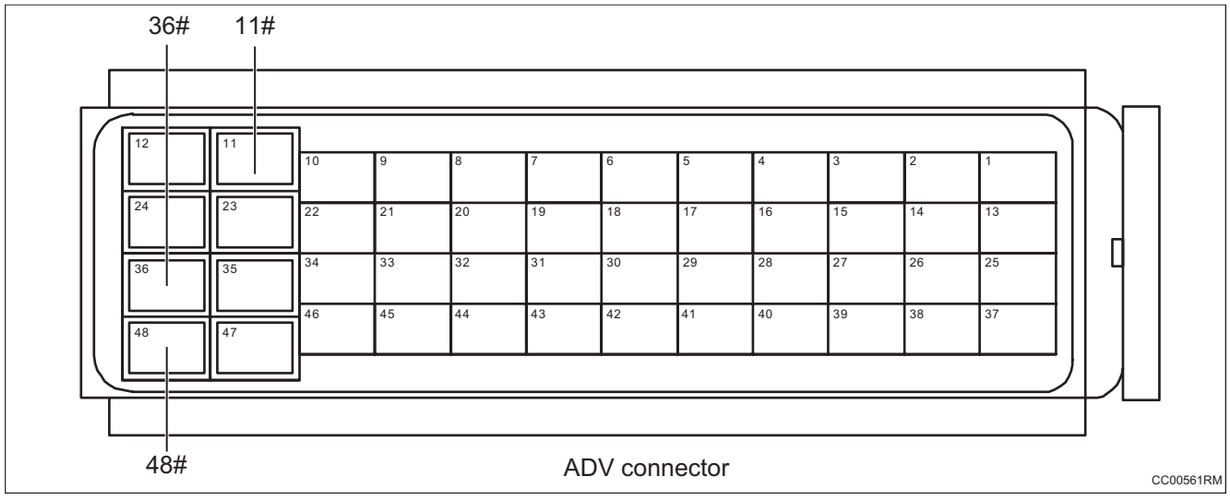
Standard value

Detector connection	Detection conditions	Specified state
ADV connector 4# - body GND	Set the ignition switch to "ON"	Less than 1 V
ADV connector 5# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Check ADV ground



(a) Measure the resistance according to the values in the table below.

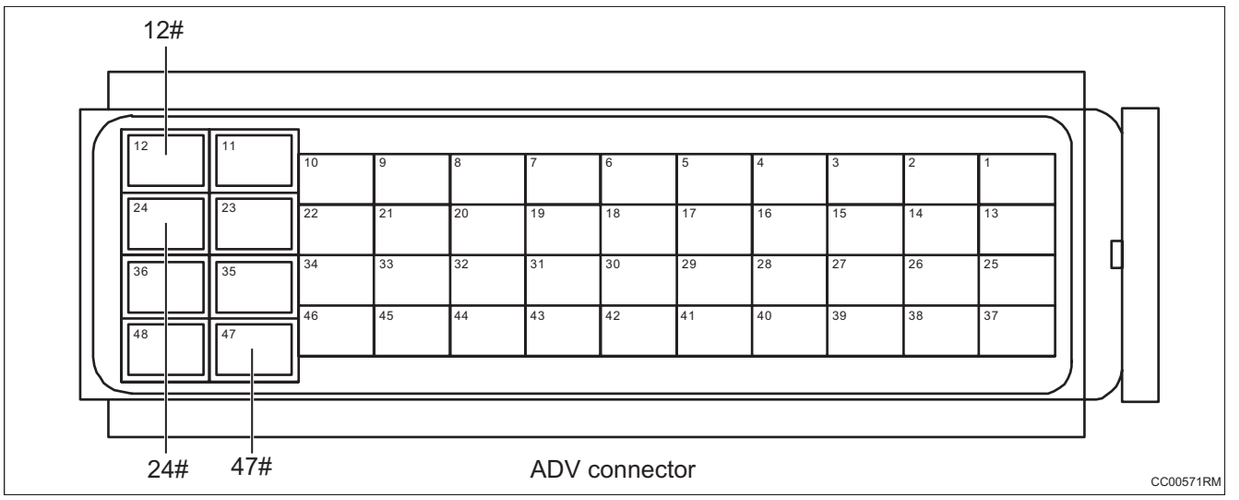
Standard value

Detector connection	Detection conditions	Specified state
ADV connector 11# - body GND	Always connected	Less than 1Ω
ADV connector 36# - body GND	Always connected	Less than 1Ω
ADV connector 48# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

6	Check ADV power supply



CC

(a) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ADV connector 12# - body GND	Set the ignition switch to "ON"	Battery voltage
ADV connector 24# - body GND	Set the ignition switch to "ON"	Battery voltage
ADV connector 47# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

7	Check driver assistance private CAN terminal resistor

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Driver assistance private CAN terminal resistor 1# - driver assistance private CAN terminal resistor 2#	Always connected	About 120 Ω

NG → **Replace the driver assistance private CAN terminal resistor**

OK

8	**Replace the ADV (See page AD-31)**

(a) Replace the ADV.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace the IFC (See page CC-35)**

OK

9	**End**

DTC	U008388	Front MMW radar-IFC CAN bus OFF

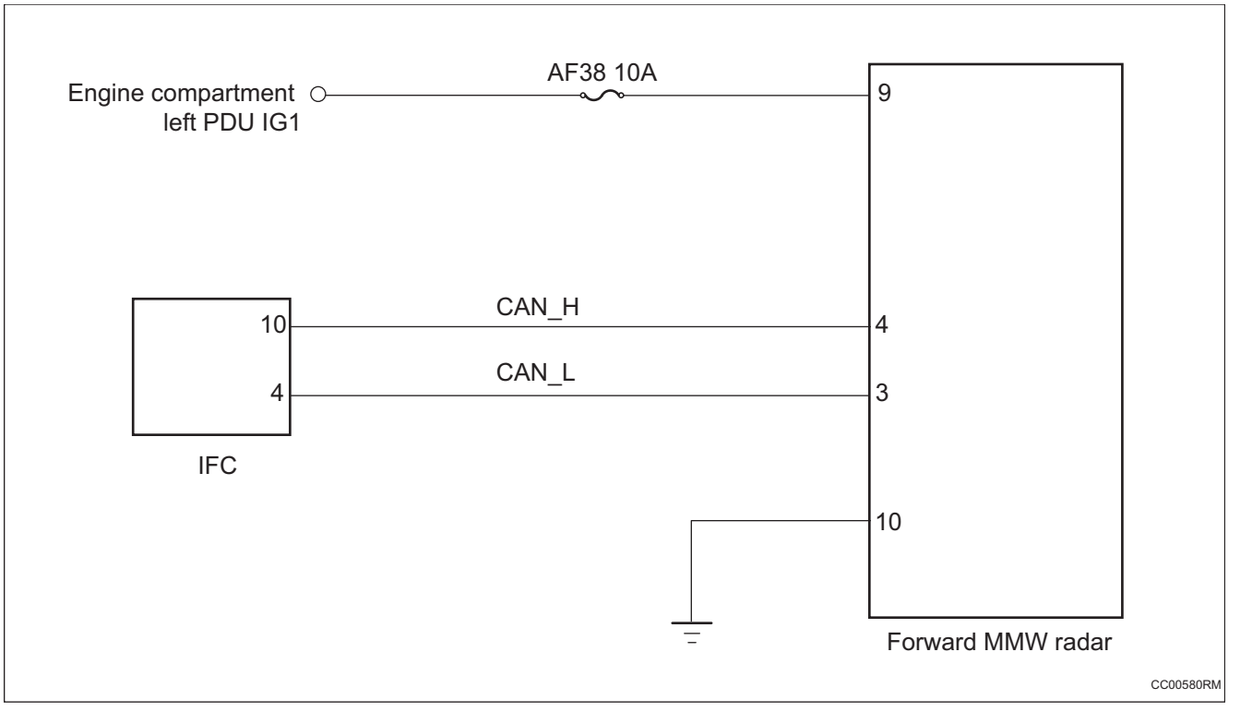
Description

When the communication between the IFC and the forward MMW radar is abnormal or interrupted, the IFC records a DTC.

DTC	DTC detection conditions	Faulty location
U008388	(a) Front MMW radar-IFC CAN bus OFF	• Forward MMW radar • Harness and connector • IFC

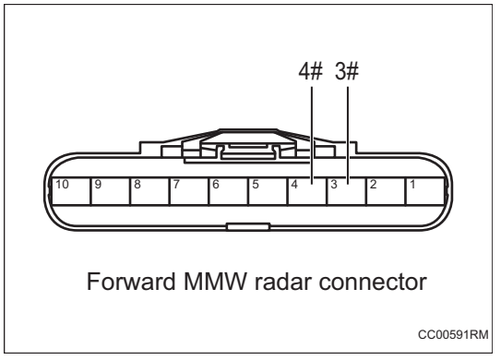
CC

Circuit diagram



Inspection procedure

1	Check whether there is short circuit between the private CAN bus CAN-L and CAN-H



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the forward MMW radar connector.

(d) IFC connector.

(e) Measure the resistance according to the values in the table below.

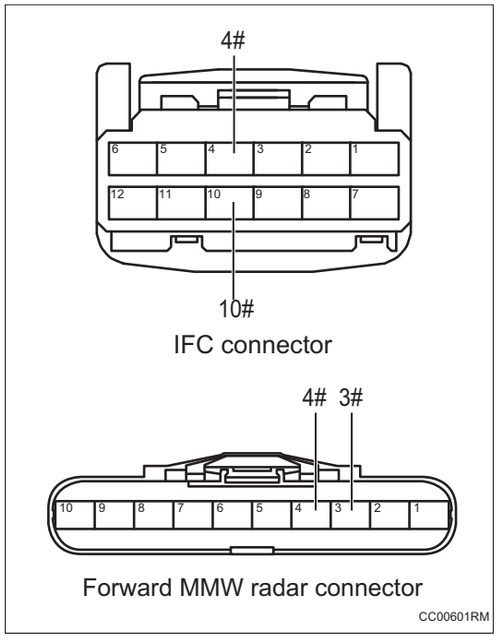
Standard value

Detector connection	Detection conditions	Specified state
Forward MMW radar connector 3# - forward MMW radar connector 4#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

2	**Check whether driver assistance private CAN bus circuit is open (IFC-forward MMW radar)**



(a) Measure the resistance according to the values in the table below.

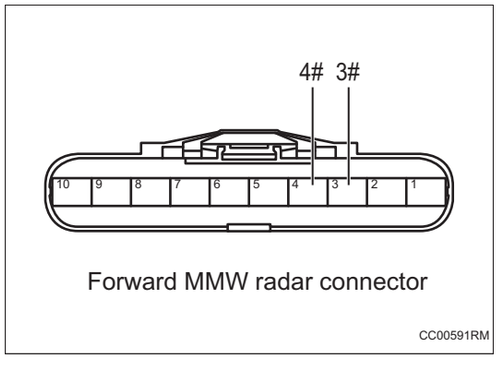
Standard value

Detector connection	Detection conditions	Specified state
Forward MMW radar connector 4# -IFC connector 10#	Always connected	Less than 1Ω
Forward MMW radar connector 3# -IFC connector 4#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check whether driver assistance private CAN bus circuit is shorted to ground (IFC-forward MMW radar)**



(a) Measure the resistance according to the values in the table below.

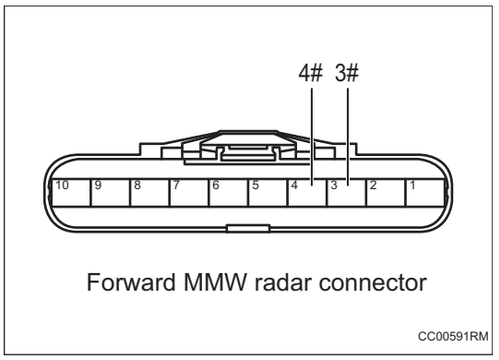
Standard value

Detector connection	Detection conditions	Specified state
Forward MMW radar connector 4# -body GND	Always connected	10 KΩ or greater
Forward MMW radar connector 3# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check whether driver assistance private CAN bus circuit is shorted to power supply (IFC-forward MMW radar)



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

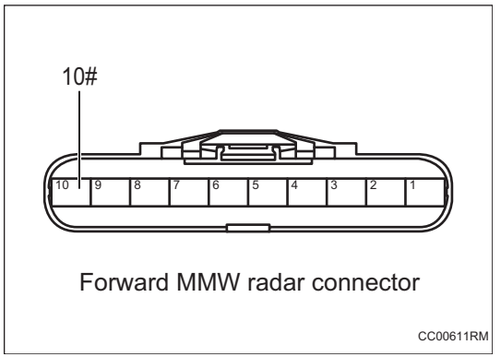
Standard value

Detector connection	Detection conditions	Specified state
Forward MMW radar connector 4# -body GND	Set the ignition switch to "ON"	Less than 1 V
Forward MMW radar connector 3# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Check forward MMW radar ground



(a) Measure the resistance according to the values in the table below.

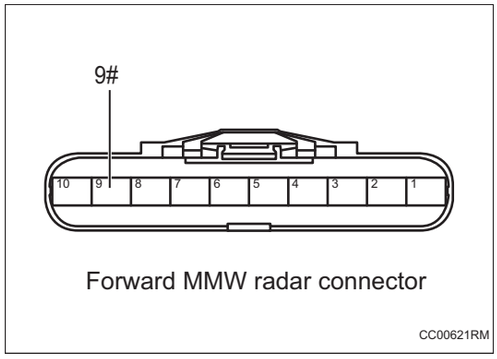
Standard value

Detector connection	Detection conditions	Specified state
Forward MMW radar connector 10# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

6	Check forward MMW radar power supply



Forward MMW radar connector

(a) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Forward MMW radar connector 9# -body GND	Set the ignition switch to "ON"	Battery voltage

CC

NG → **Repair or replace the harness and connector**

OK

7	**Replace forward MMW radar (See page RA-22)**

(a) Replace the forward MMW radar.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

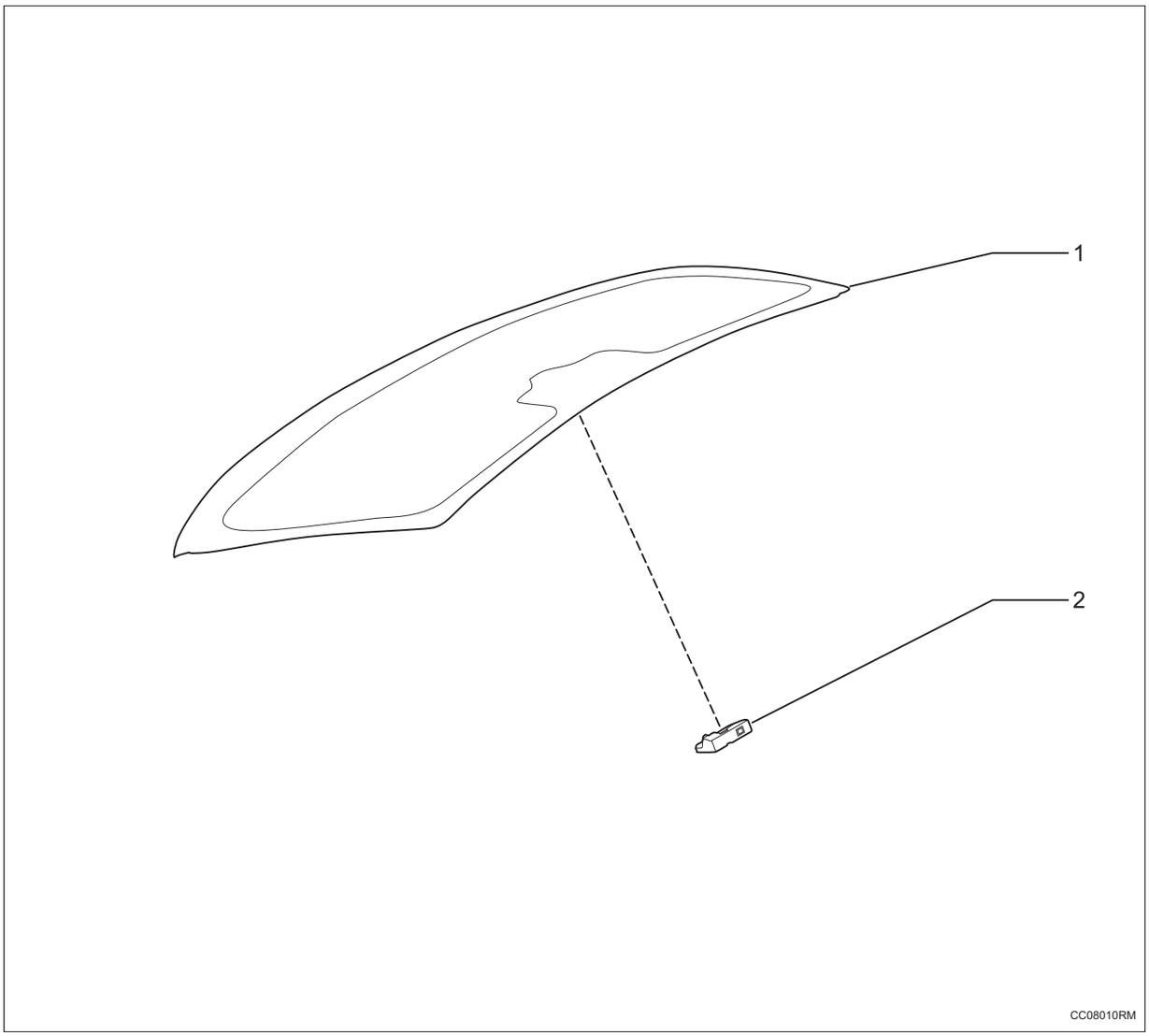
NG → **Replace the IFC (See page CC-35)**

OK

8	**End**

IFC

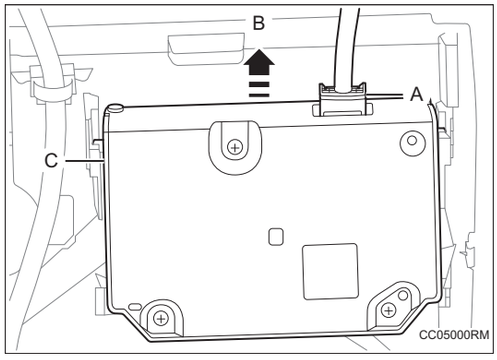
Parts



1. **Front windshield assembly**
2. **IFC assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove interior rearview mirror trim cover II (See page IM-2)**
3. **Remove interior rearview mirror trim cover I (See page IM-2)**
4. **Remove IFC**



(a) Disconnect the harness connector-A-.

(b) Push IFC-C- in the direction of -arrow B- .

Installation

1. **The installation procedure is the reverse of removal procedure.**

DCDC control system

DCDC control unit DC-1
Precautions DC-1
Location of parts DC-4
System diagram DC-7
System description DC-7
ECU terminal DC-8
DTC chart DC-8
P1E0017 .....DC-10
P1E0117 .....DC-10
P1E0216 .....DC-10
P1E0316 .....DC-10
P1E0517 .....DC-12
P1E0617 .....DC-12
P1E0716 .....DC-12
P1E0816 .....DC-12
P1E1517 .....DC-12
P1E1617 .....DC-12
P1E0919 .....DC-16
P1E0A19 .....DC-16
P1E0E4B DC-18
P1E0F4B DC-20
P1E1316 .....DC-21
P1E1417 .....DC-22
U005588 .....DC-23
U029387 .....DC-23
U014687 .....DC-23
U114687 .....DC-23
U112187 .....DC-23
U115587 .....DC-23
U114087 .....DC-23
U059482 .....DC-23
U044782 .....DC-23
U059483 .....DC-23
U044783 .....DC-23
U044784 .....DC-23
U059484 .....DC-23
P1E2017 .....DC-25
P1E2016 .....DC-25
P1E1716 .....DC-25

P1E1813 ..... DC-29
P1E1916 ..... DC-30
P1E1A19 ..... DC-31
DCDC assembly DC-32
Parts DC-32
Removal DC-33
Installation DC-34

DCDC control unit

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Notice:

Before repairing the high voltage systems or adjacent high voltage system components, be sure to read the Instructions and Precautions for Maintenance carefully!

2. ENGINE START/STOP button (ignition switch) representation:

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

3. Removal and installation of battery terminal

(a) Before removal and repair of electrical components, disconnect the battery negative (-) terminal to prevent the system from short circuit.

(b) Before disconnecting or reconnecting the battery cable terminal, first turn off the power (ignition) switch and lighting switch, and then completely loosen or tighten the battery cable terminal nut.

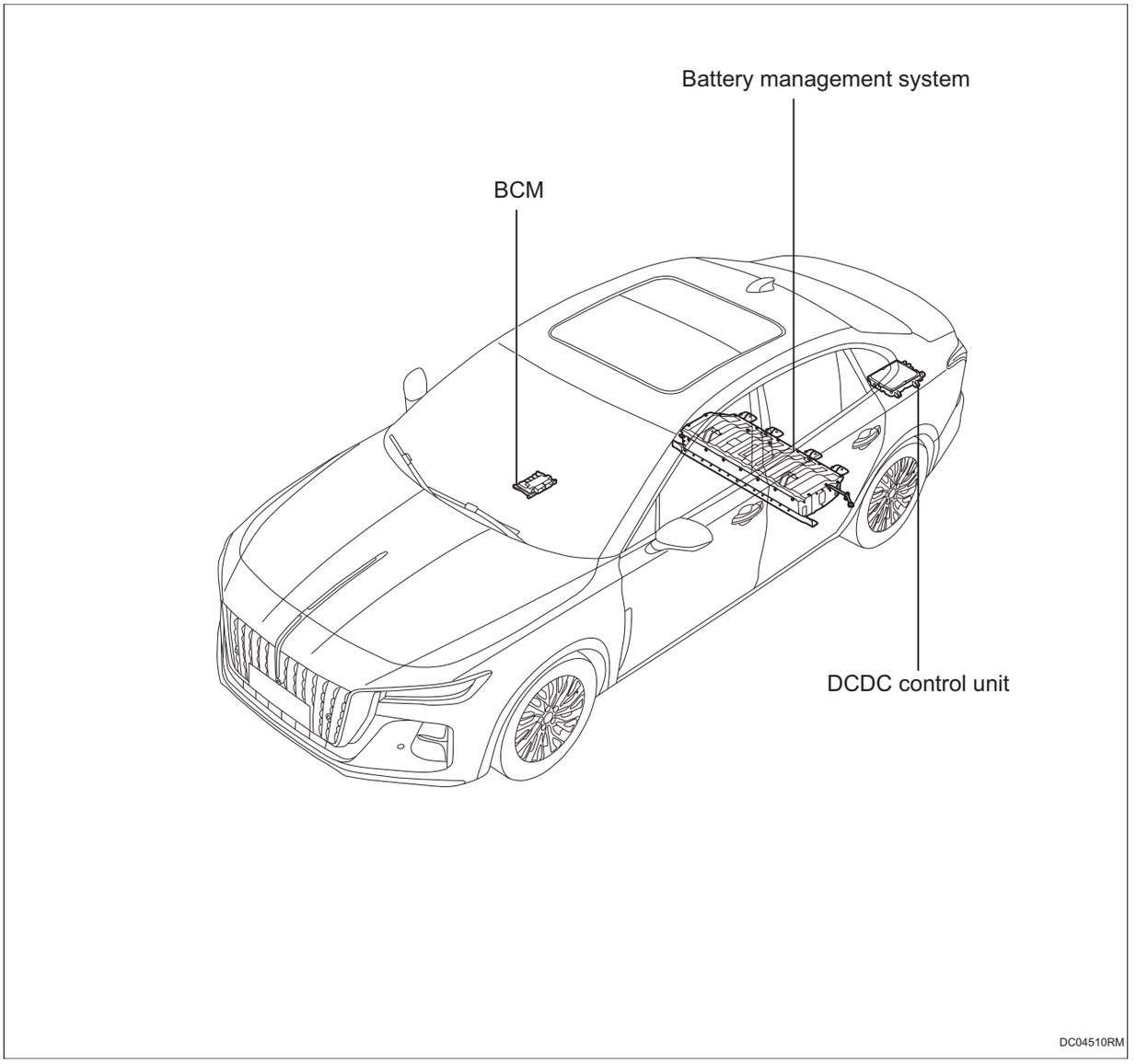
(c) When reconnecting after disconnecting the battery cable, some systems need to be initialized.

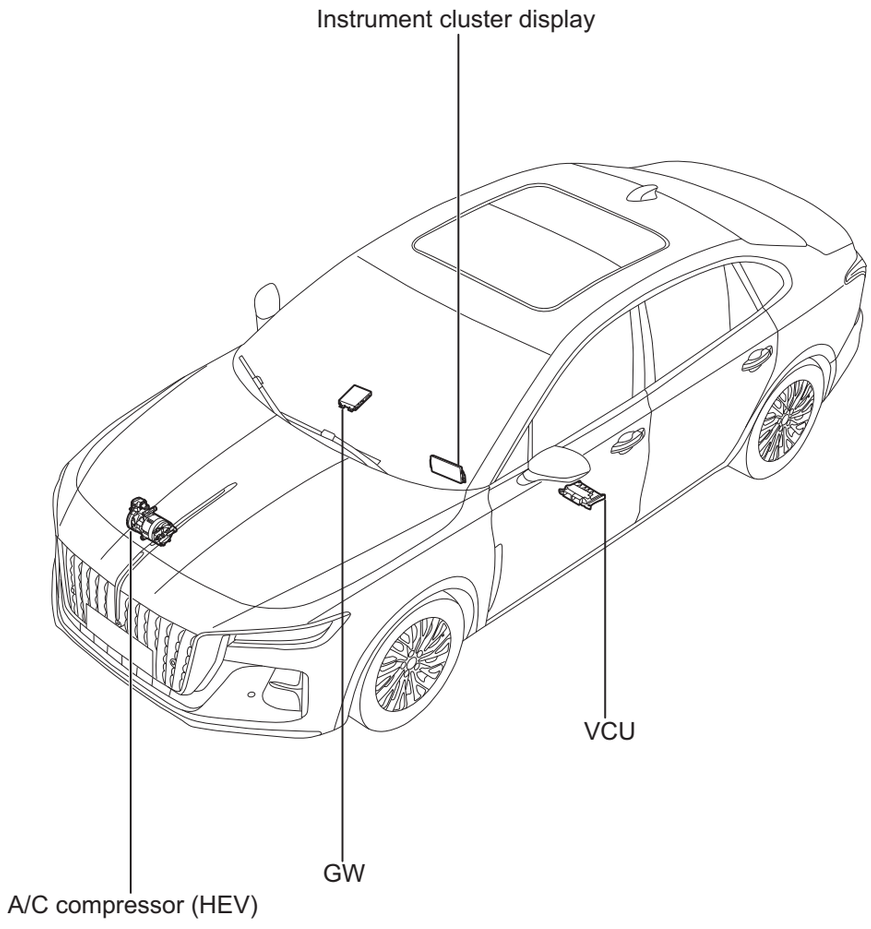
4. DCDC impedance check

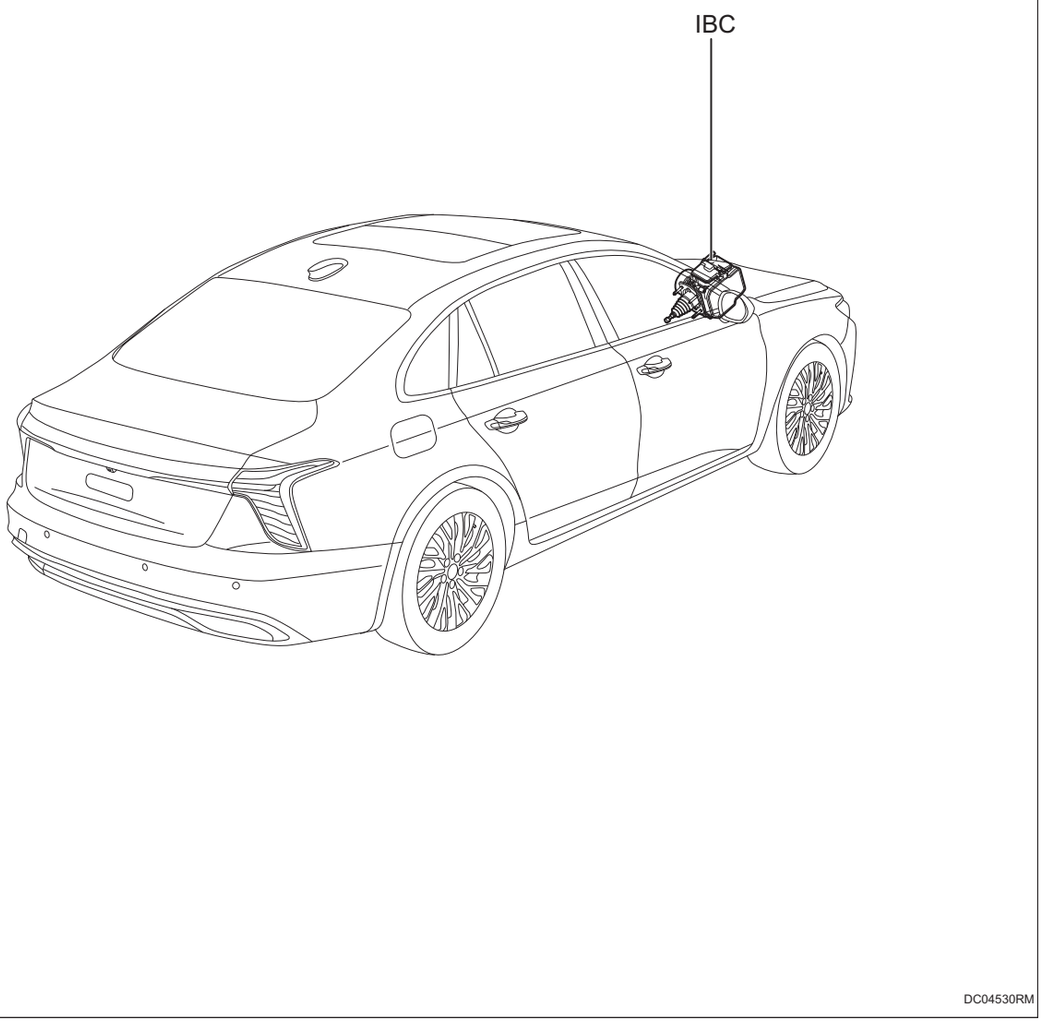
Port impedance	Function	Normal impedance (voltage) range
Power terminal	Low-voltage side B +	1. Switch the multimeter to diode mode; 2. Connect the black probe to B + on the low-voltage side and the red probe to the housing, and confirm whether the multimeter shows no value. If not, the output synchronous rectifier tube and safety switch may be damaged. 3. Power supply output state TBD
	HV-	1. Switch the multimeter to diode mode 2. The red probe is connected to HV-, and the black probe is connected to HV+; 3. Confirm whether the displayed voltage drop is within the range of 0.5 V-2.6 V; If that is the case, jump to step 5 4. The display voltage is lower than 0.2 V, and the primary side MOS tube may be short circuited. If not, go to step 5 5. Switch the position of the probe and confirm whether the multimeter does not display numerical value; (If not, the primary side MOS may have been damaged; DCDC needs to be replaced;) 6. The primary side input is normal.
	HV+	

Port impedance	Function	Normal impedance (voltage) range
Low voltage signal terminal	KL30	1. KL 30 is externally supplied with 12 V +, and the shell is connected with 12 V-; 2. Observe whether the power supply current is greater than 0.1 mA and less than 0.3 A; (If not, the auxiliary power supply is abnormal, and the DCDC needs to be replaced;) 3. The auxiliary power supply is normal.
	Interlock1	1. Insert the HV +/HV- connector terminal; 2. Switch the multimeter to resistance mode; 3. Contact the probe of multimeter with Interlock1 and Interlock2 respectively to confirm whether the multimeter display value is less than 5 ohms; (If not, high voltage interlock circuit is open, and the DCDC needs to be replaced;) 4. Disconnect the HV +/ HV- connector terminal; 5. Confirm whether the multimeter displays no value, (if not, the high-voltage interlock circuit is abnormal internally, and the DCDC needs to be replaced;) 6. There is no abnormality in the high voltage interlock detection circuit.
	Interlock2	
	CAN-H	1. Switch the multimeter to resistance mode 2. Connect the probe of multimete to CAN-H and CAN-L respectively, and confirm whether the multimeter value is in the range of 1000 ohm-3000 ohm. (If not, the CAN communication chip is abnormal, and DCDC needs to be replaced;)
	CAN-L	

Location of parts

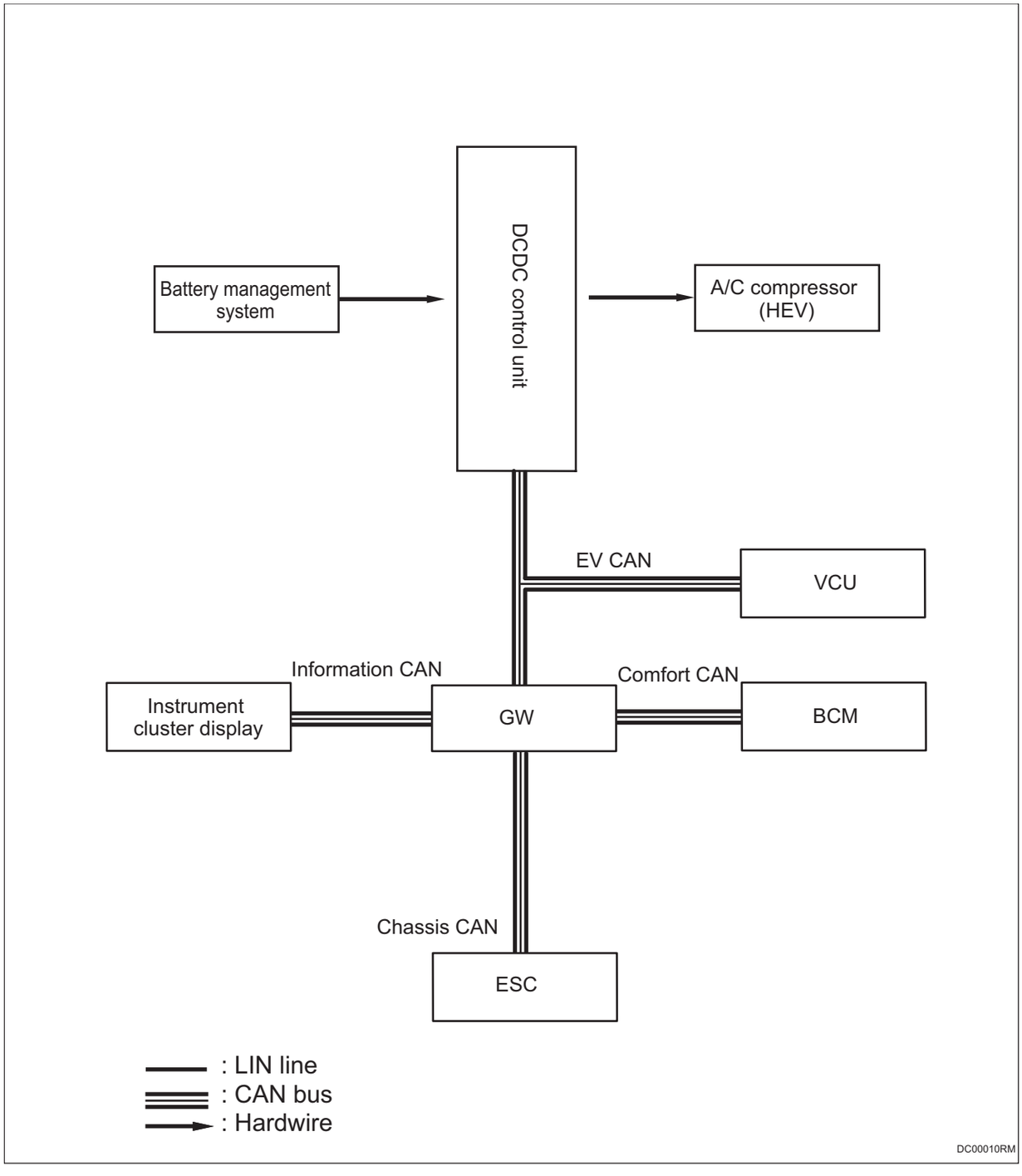



Instrument cluster display
VCU
GW
A/C compressor (HEV)
DC04520RM



DC04530RM

System diagram



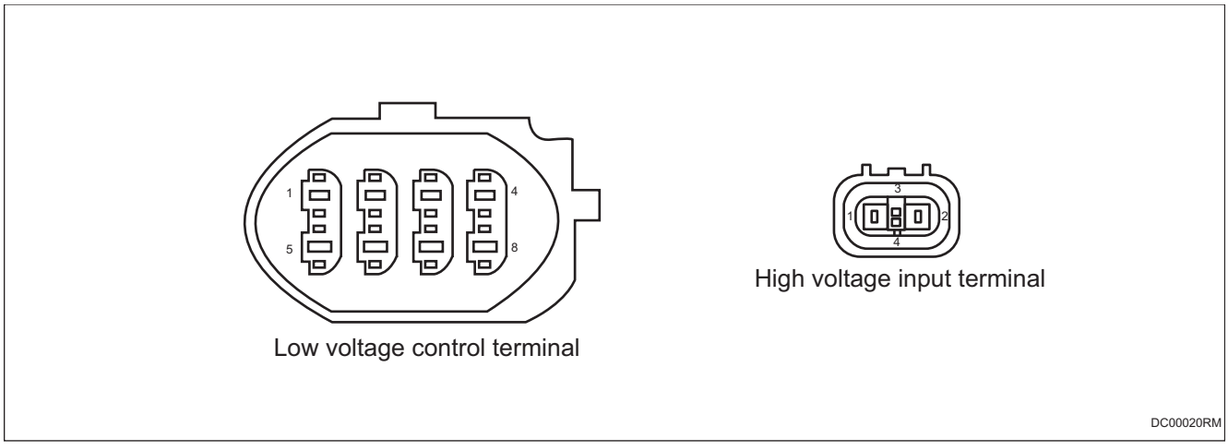
System description

1. Function overview

(a) DCDC voltage conversion function: realize the conversion of voltage between different voltage platforms.

(b) The DCDC has a diagnostic function.

ECU terminal



DC

DCDC control unit (high voltage input terminal)			
Pin No.	**Definition**	**Pin No.**	**Definition**
1	HVDC + (high voltage direct current +)	3	High voltage interlocking interface positive
2	HVDC - (high voltage direct current -)	4	High voltage interlocking interface negative

DCDC control unit (low voltage control terminal)			
Pin No.	**Definition**	**Pin No.**	**Definition**
1	—	5	—
2	—	6	CAN_L
3	CAN_H	7	Interlock_2
4	Interlock_1	8	KL30

DTC chart

DTC	Description	Reference page
P1E0017	High-voltage side overvoltage 1	(See page DC-10)
P1E0117	High-voltage side overvoltage 2	(See page DC-10)
P1E0216	High-voltage side undervoltage 1	(See page DC-10)
P1E0316	High-voltage side undervoltage 2	(See page DC-10)
P1E0517	Low-voltage side overvoltage 1	(See page DC-12)
P1E0617	Low-voltage side rapid overvoltage 2	(See page DC-12)
P1E0716	Low-voltage side battery undervoltage 1	(See page DC-12)
P1E0816	Low-voltage side battery undervoltage 2	(See page DC-12)
P1E0919	Low-voltage side forward overcurrent	(See page DC-16)
P1E0A19	Low-voltage side reverse overcurrent	(See page DC-16)
P1E0E4B	Coolant overtemperature	(See page DC-18)
P1E0F4B	Mos pipe over-temperature	(See page DC-20)
P1E1316	Hardware fault	(See page DC-21)

DTC	Description	Reference page
P1E1417	Clamp capacitor overvoltage	(See page DC-21)
P1E1517	Low-voltage side rapid undervoltage	(See page DC-12)
P1E1617	Low-voltage side battery overvoltage	(See page DC-12)
U005588	Hybrid CAN bus off	(See page DC-23)
U029387	HCU node lost	(See page DC-23)
U014687	GW node lost	(See page DC-23)
U114687	GW message lost	(See page DC-23)
U112187	ESP message lost	(See page DC-23)
U115587	Instrument cluster control unit message lost	(See page DC-23)
U114087	BCM 1 message lost	(See page DC-23)
U059482	HCU_1_6 Livecounter error	(See page DC-23)
U044782	EEM_2 Livecounter error	(See page DC-23)
U059483	HCU_1_6 Checksum error	(See page DC-23)
U044783	EEM_2 Checksum error	(See page DC-23)
U044784	EEM_2 DLC error	(See page DC-23)
U059484	HCU_1_6 DLC error	(See page DC-23)
P1E1716	Battery undervoltage in Precharge mode	(See page DC-25)
P1E1813	High voltage line open circuit	(See page DC-29)
P1E1916	High voltage undervoltage in Precharge mode	(See page DC-30)
P1E1A19	High-voltage side overcurrent	(See page DC-31)
P1E2017	KL30 overvoltage	(See page DC-25)
P1E2016	KL30 undervoltage	(See page DC-25)

DTC	P1E0017	High-voltage side overvoltage 1
DTC	P1E0117	High-voltage side overvoltage 2
DTC	P1E0216	High-voltage side undervoltage 1
DTC	P1E0316	High-voltage side undervoltage 2

Description

When the high voltage is detected outside the normal range, the DCDC control unit records the DTC.

DC

DTC	DTC detection conditions	Faulty location
P1E0017	(a) high-voltage side overvoltage.	• DCDC control unit • Low-voltage harness and connector
P1E0117	(a) high-voltage side overvoltage.	• DCDC control unit • Low-voltage harness and connector
P1E0216	(a) High-voltage side undervoltage.	• DCDC control unit • Low-voltage harness and connector
P1E0316	(a) High-voltage side undervoltage.	• DCDC control unit • Low-voltage harness and connector

Inspection procedure

1	Read DTC

(a) Keep the vehicle stationary, and stop charging.

(b) Connect the HQ-VDS.

(c) Set the ignition switch to "ON".

(d) Read the DTC.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → End

NG

2	Check other high voltage systems for this DTC

(a) Read the DTC of other high voltage systems.

Results	Go to
This DTC exists	Abnormal
This DTC does not exist	Normal

NG

Clear the DTC, restart the vehicle and see if the fault is eliminated (if not, replace DCDC control unit) (See page DC-33)

OK

3	**Repair or replace the low-voltage harness and connector**

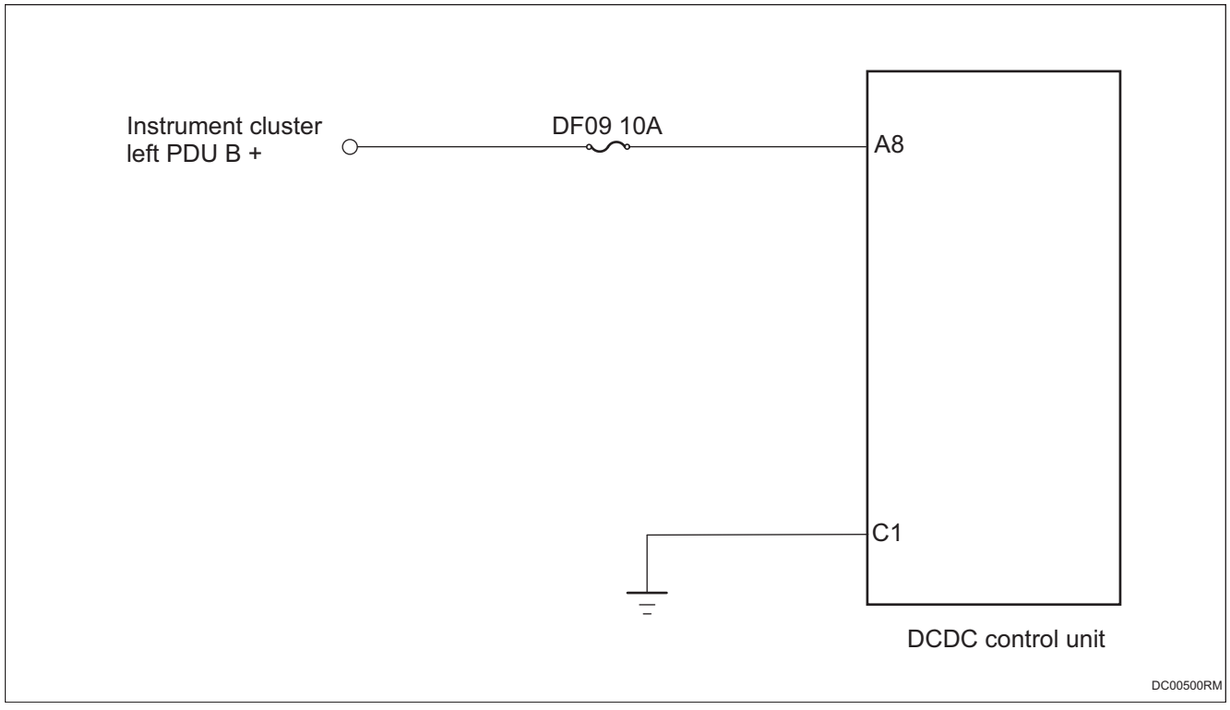
DTC	**P1E0517**	**Low-voltage side overvoltage 1**
DTC	**P1E0617**	**Low-voltage side rapid overvoltage 2**
DTC	**P1E0716**	**Low-voltage side battery undervoltage 1**
DTC	**P1E0816**	**Low-voltage side battery undervoltage 2**
DTC	**P1E1517**	**Low-voltage side rapid undervoltage**
DTC	**P1E1617**	**Low-voltage side battery overvoltage**

Description

When the DCDC low voltage is abnormal, the DCDC records DTC.

DTC	DTC detection conditions	Faulty location
P1E0517	(a) low-voltage side overvoltage.	• DCDC control unit • Fuse • Harness and connector • Charging system
P1E0617	(a) Low-voltage side rapid overvoltage.	• DCDC control unit • Harness and connector • Fuse • Charging system
P1E0716	(a) Low-voltage side battery undervoltage.	• DCDC control unit • Fuse • Harness and connector • Charging system
P1E0816	(a) Low-voltage side battery undervoltage.	• DCDC control unit • Harness and connector • Fuse • Charging system
P1E1517	(a) Low-voltage side rapid undervoltage.	• DCDC control unit • Fuse • Harness and connector • Charging system
P1E1617	(a) Low-voltage side battery overvoltage.	• DCDC control unit • Harness and connector • Fuse • Charging system

Circuit diagram



Inspection procedure

1	**Read DTC**

(a) Keep the vehicle stationary, and stop charging.

(b) Connect the HQ-VDS.

(c) Set the ignition switch to "ON".

(d) Read the DTC.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → **End**

NG

2	**Check low-voltage battery voltage**

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	Battery voltage

NG → **Overhaul the charging system**

OK

3	**Check DCDC control unit low-voltage power supply fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the DCDC control unit fuse.

(d) Measure the resistance according to the values in the table below.

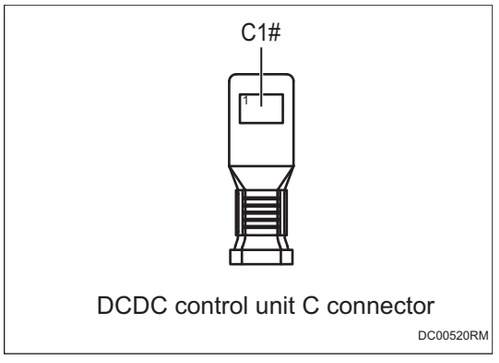
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

4	**Check DCDC control unit ground**



DCDC control unit C connector
DC00520RM

(a) Disconnect the DCDC control unit connector.

(b) Measure the resistance according to the values in the table below.

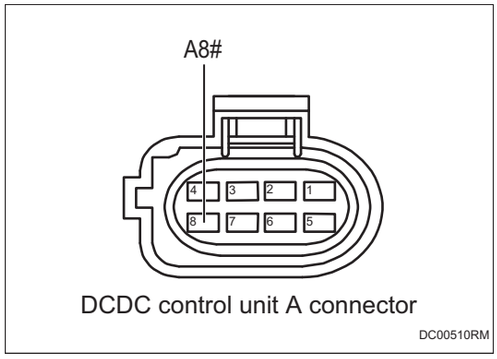
Standard value

Detector connection	Detection conditions	Specified state
DCDC control unit connector C1# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

5	**Check DCDC control unit low-voltage power supply**



DCDC control unit A connector

DC00510RM

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DCDC control unit connector A8# - body GND	The ignition switch is set to "ON"	Battery voltage

DC

NG → **Repair or replace the harness and connector**

OK

6	**Clear DTC**

(a) Clear the DTC.

(b) Restart the vehicle.

(c) Check DTC again

Criteria:

No DTC is output.

NG → **Replace the DCDC control unit (See page DC-33)**

OK

7	**End**

DTC	P1E0919	Low-voltage side forward overcurrent
DTC	P1E0A19	Low-voltage side reverse overcurrent

Description

When DCDC low voltage overcurrent occurs, the DCDC control unit records the DTC.

DTC	DTC detection conditions	Faulty location
P1E0919	(a) low-voltage side forward overcurrent.	• DCDC control unit • Fuse • Harness and connector • Charging system
P1E0A19	(a) low-voltage side reverse overcurrent.	• DCDC control unit • Harness and connector • Fuse • Charging system

Inspection procedure

1	**Read DTC**

(a) Keep the vehicle stationary, and stop charging.

(b) Connect the HQ-VDS.

(c) Set the ignition switch to "ON".

(d) Read the DTC.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → **End**

NG

2	**Check DCDC low voltage side power cable**

(a) Check whether DCDC low voltage side power cable is correctly connected.

(b) Check the DCDC low side power cable for short circuit or open circuit.

NG → **Repair according to the fault**

OK

3	**Clear DTC**

(a) Clear the DTC and restart the vehicle.

(b) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

NG → **Replace the DCDC control unit (See page DC-33)**

OK

4	**End**

DTC	P1E0E4B	Coolant overtemperature

Description

When the temperature of the cooling system is too high, the DCDC control unit records the DTC.

DTC	DTC detection conditions	Faulty location
P1E0E4B	(a) Coolant temperature> 85°C.	• DCDC control unit • Cooling system

Inspection procedure

1	Read DTC

(a) Keep the vehicle stationary, and stop charging.

(b) Connect the HQ-VDS.

(c) Set the ignition switch to "ON".

(d) Read the DTC.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → **End**

NG

2	Check cooling system

(a) Check whether the vehicle coolant pump flow rate and actual coolant temperature are abnormal.

(b) Check if the coolant level is normal.

(c) Check whether the coolant pipeline is blocked or leaking.

(d) Check whether the heat dissipation system is normal.

NG → **Repair according to the fault**

OK

3	Clear DTC

(a) Clear the DTC and restart the vehicle.

(b) Read DTC again.

Results	Go to
There is a DTC	Abnormal

Results	Go to
No DTC	Normal

NG → **Replace the DCDC control unit (See page DC-33)**

OK

4	**End**

DTC	P1E0F4B	Mos pipe over-temperature

Description

When the MOS tube temperature is too high, the DCDC records DTC.

DTC	DTC detection conditions	Faulty location
P1E0F4B	(a) MOS pipe temperature> 130 ℃ .	• DCDC control unit

Inspection procedure

DC

1	Clear DTC

(a) Keep the vehicle stationary, and stop charging.

(b) Clear the DTC and restart the vehicle.

(c) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

NG → **Replace the DCDC control unit (See page DC-33)**

OK

2	End

DTC	P1E1316	Hardware fault

Description

When the DCDC detects a failure of its own hardware, the DCDC records DTC.

DTC	DTC detection conditions	Faulty location
P1E1316	(a) Hardware fault.	• DCDC control unit

Inspection procedure

1	Clear DTC

(a) Keep the vehicle stationary, and stop charging.

(b) Clear the DTC and restart the vehicle.

(c) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

NG → **Replace the DCDC control unit (See page DC-33)**

OK

2	End

DTC	P1E1417	Clamp capacitor overvoltage

Description

When the DCDC detects clamp capacitor overvoltage, the DCDC control unit records DTC.

DTC	DTC detection conditions	Faulty location
P1E1417	(a) Clamp capacitor overvoltage> 73 V.	• DCDC control unit

Inspection procedure

DC

1	Clear DTC

(a) Keep the vehicle stationary, and stop charging.

(b) Clear the DTC and restart the vehicle.

(c) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

NG → **Replace the DCDC control unit (See page DC-33)**

OK

2	End

DTC	**U005588**	**Hybrid CAN bus off**
DTC	**U029387**	**HCU node lost**
DTC	**U014687**	**GW node lost**
DTC	**U114687**	**GW message lost**
DTC	**U112187**	**ESP message lost**
DTC	**U115587**	**Instrument cluster control unit message lost**
DTC	**U114087**	**BCM 1 message lost**
DTC	**U059482**	**HCU_1_6 Livecounter error**
DTC	**U044782**	**EEM_2 Livecounter error**
DTC	**U059483**	**HCU_1_6 Checksum error**
DTC	**U044783**	**EEM_2 Checksum error**
DTC	**U044784**	**EEM_2 DLC error**
DTC	**U059484**	**HCU_1_6 DLC error**

Description

When the communication between the DCDC control unit and other systems is abnormal or interrupted, the DCDC control unit records the DTC.

DTC	DTC detection conditions	Faulty location
U005588	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U029387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U112187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059482	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U044782	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

DTC	DTC detection conditions	Faulty location
U059483	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U044783	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U044784	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059484	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

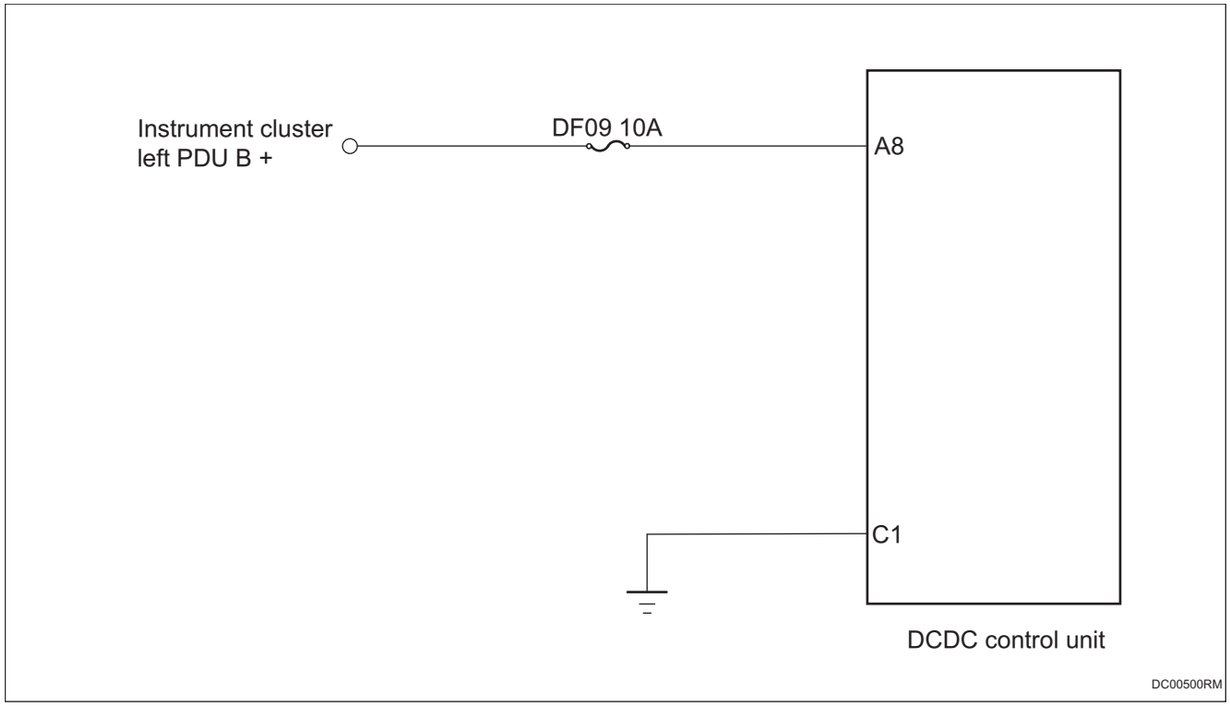
DTC	**P1E2017**	**KL30 overvoltage**
DTC	**P1E2016**	**KL30 undervoltage**
DTC	**P1E1716**	**Battery undervoltage in Precharge mode**

Description

When the DCDC low voltage is abnormal, the DCDC records DTC.

DTC	DTC detection conditions	Faulty location
P1E2017	(a) Low-voltage battery overvoltage.	• DCDC control unit • Fuse • Harness and connector • Charging system
P1E2016	(a) Low-voltage battery undervoltage.	• DCDC control unit • Harness and connector • Fuse • Charging system
P1E1716	(a) Battery undervoltage in Precharge mode.	• DCDC control unit • Fuse • Harness and connector • Charging system

Circuit diagram



Inspection procedure

1	**Read DTC**

(a) Keep the vehicle stationary, and stop charging.

(b) Connect the HQ-VDS.

(c) Set the ignition switch to "ON".

(d) Read the DTC.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → **End**

NG

2	Check low-voltage battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	Battery voltage

NG → **Overhaul the charging system**

OK

3	Check DCDC control unit low-voltage power supply fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the DCDC control unit fuse.

(d) Measure the resistance according to the values in the table below.

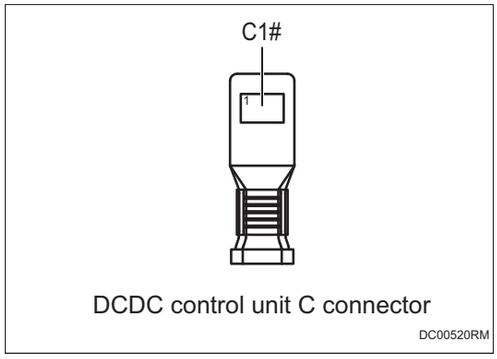
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

4	Check DCDC control unit ground



DCDC control unit C connector
DC00520RM

(a) Disconnect the DCDC control unit connector.

(b) Measure the resistance according to the values in the table below.

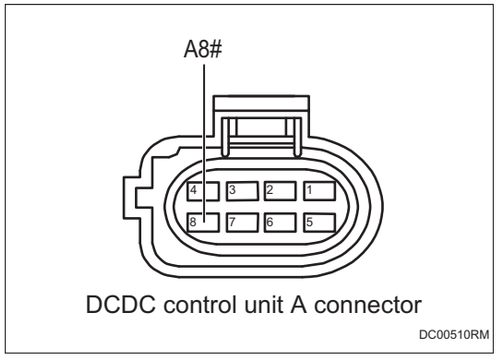
Standard value

Detector connection	Detection conditions	Specified state
DCDC control unit connector C1# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

5 Check DCDC control unit low-voltage power supply



DCDC control unit A connector
DC00510RM

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DCDC control unit connector A8# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

6 Clear DTC

(a) Clear the DTC.

(b) Restart the vehicle.

(c) Check DTC again

Criteria:

No DTC is output.

NG → **Replace the DCDC control unit (See page DC-33)**

OK

7	**End**

DTC	P1E1813	High voltage line open circuit

Description

The DCDC control unit records DTC when a high voltage line open circuit is detected.

DTC	DTC detection conditions	Faulty location
P1E1813	(a) High voltage line open circuit	• DCDC control unit • High voltage system

Inspection procedure

1	Check high voltage system

(a) Check whether the high-voltage harness is connected tightly.

(b) Check the high-voltage harness for short circuit or open circuit.

(c) Check whether the high-voltage battery, fuse and other high voltage components are normal.

NG → **Repair the high voltage system**

OK

2	Replace the DCDC control unit (See page DC-33)

DTC	P1E1916	High voltage undervoltage in Precharge mode

Description

When high voltage undervoltage occurs in Precharge mode, the DCDC control unit records the DTC.

DTC	DTC detection conditions	Faulty location
P1E1916	(a) High voltage undervoltage in Precharge mode.	• DCDC control unit • High voltage system

Inspection procedure

1	Check high voltage system

(a) Check whether the high-voltage harness is connected tightly.

(b) Check the high-voltage harness for short circuit or open circuit.

(c) Check whether the high-voltage battery, fuse and other high voltage components are normal.

NG → **Repair the high voltage system**

OK

2	Clear DTC

(a) Clear the DTC

(b) Restart the vehicle.

(c) Connect the HQ-VDS.

(d) Set the ignition switch to "ON".

(e) Read the DTC.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

NG → **Replace the DCDC control unit (See page DC-33)**

OK

3	End

DTC	P1E1A19	High-voltage side overcurrent

Description

In case of high-voltage side overcurrent, the DCDC records DTC.

DTC	DTC detection conditions	Faulty location
P1E1A19	(a) high-voltage side overcurrent.	• DCDC control unit • High-voltage load out of limit

Inspection procedure

1	Check the high-voltage side load

(a) Check whether the high-voltage side load is out of limit.

NG → **Repair according to the fault**

OK

2	Clear DTC

(a) Clear the DTC and restart the vehicle.

(b) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

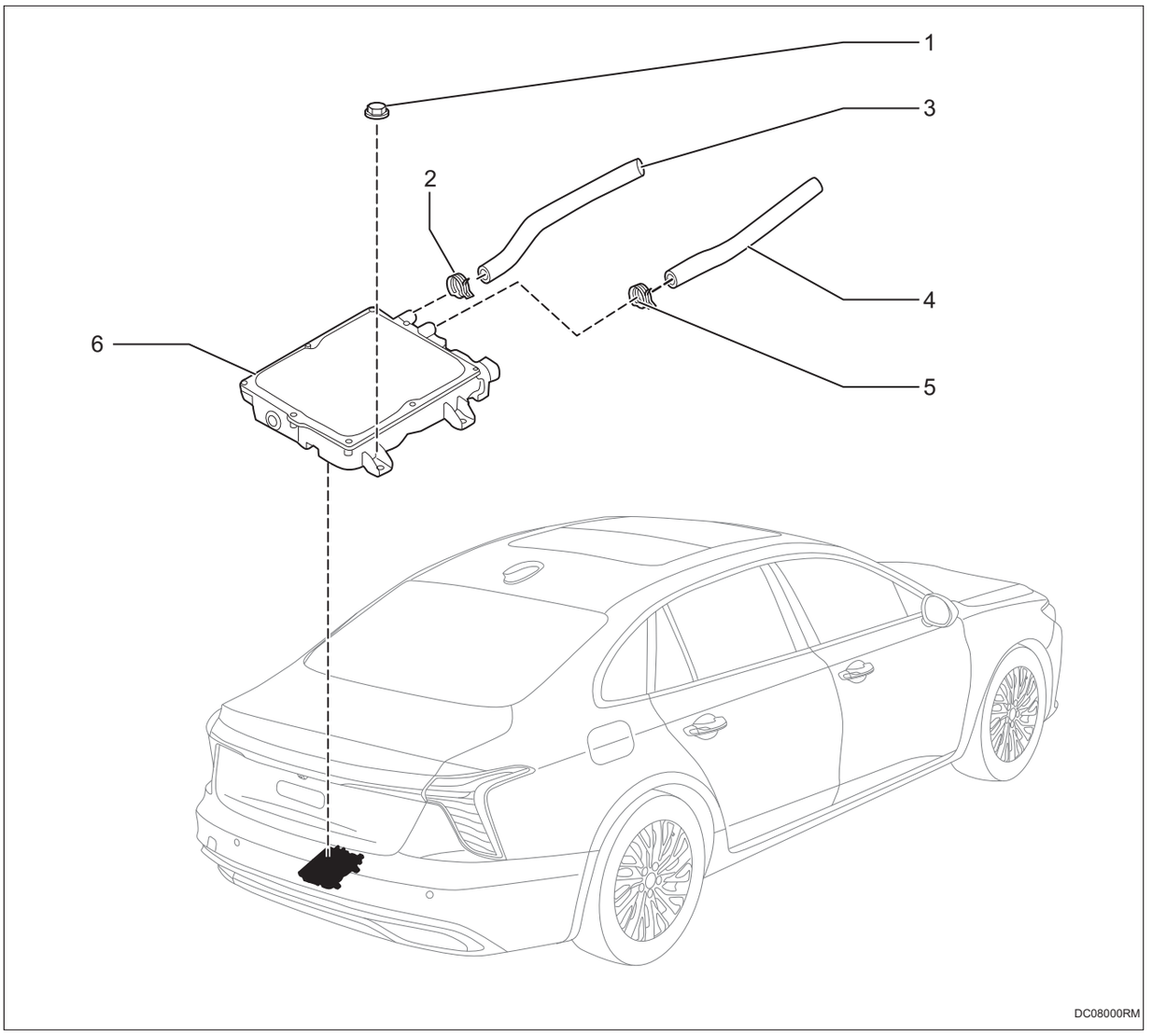
NG → **Replace the DCDC control unit (See page DC-33)**

OK

3	End

DCDC assembly

Parts



1. **Hexagon flange nut**
   - X4
   - Torque: 8 ~ 12 N·m
2. **Water pipe clamp**
3. **Water outlet hose**
4. **Water inlet hose**
5. **Water pipe clamp**
6. **DCDC assembly**

Removal

1. **After the vehicle is stationary, set the ignition switch to OFF (STOP).**
2. **Disconnect the battery negative terminal (See page CH-20)**

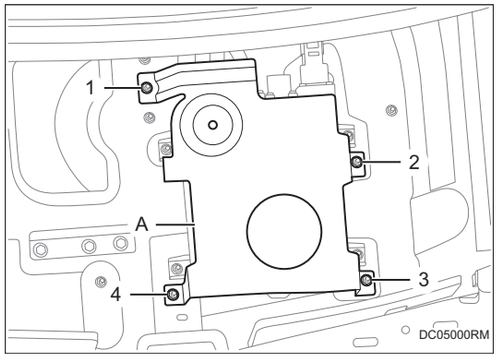
   Notice:

   Disconnect the battery negative terminal after waiting for 5s.
3. **Detach service switch (See page CH-1)**

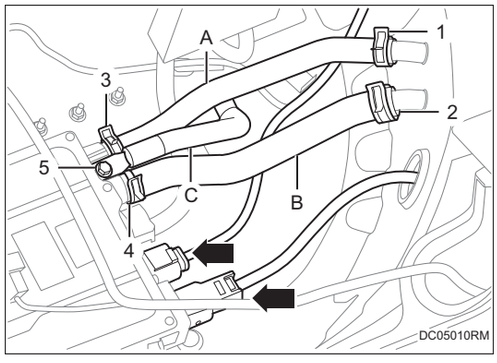
   Notice:

   Detach the service switch and wait 5 min for the high voltage components to be discharged before proceeding.

   Wear insulating gloves.
4. **Drain coolant of electric drive system (See page CO-1)**
5. **Remove DCDC assembly**



(a) Remove nut -1-4- and remove the woofer bracket-A-.



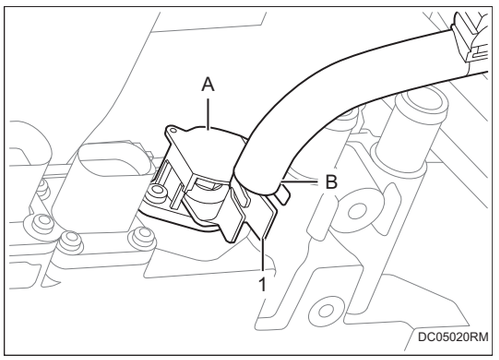
(b) Disconnect the harness connector as arrowed.

Notice:

After disconnection, wrap the connector port with high-voltage insulating tape to prevent electric leakage.

(c) Remove the bolt -5- and disconnect the ground wire -C-.

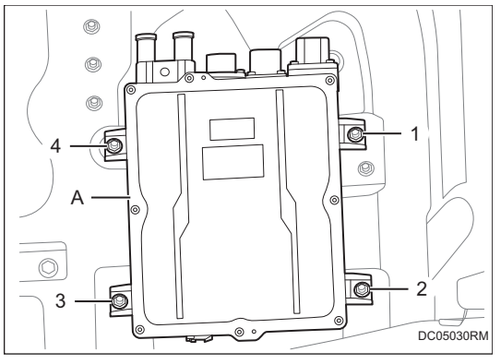
(d) Detach the water pipe clamp -1-4-, and remove the water outlet and water inlet hoses -A-B- of DCDC assembly.



(e) Open the protective cover -A-.

(f) Remove the bolt -1- and disconnect the DCDC assembly positive harness -B-

(g) Remove the nut -1-4-, and remove the DCDC assembly-A-.



Installation

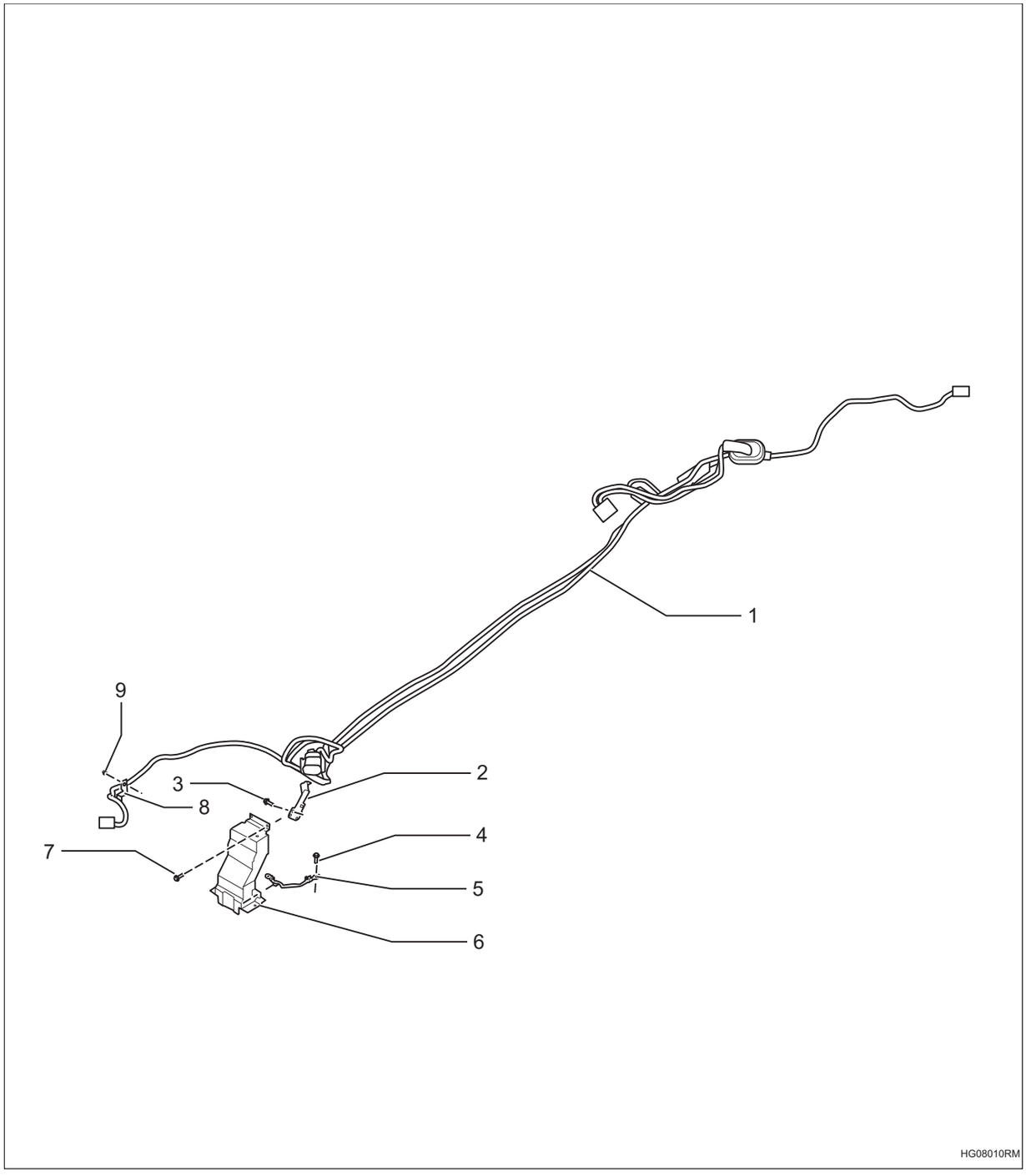
1. **The installation procedure is the reverse of removal procedure.**

High-voltage harness

DC bus high-voltage harness assembly HG-1
Parts HG-1
Removal HG-3
Installation HG-5

DC bus high-voltage harness assembly

Parts



1. **DC bus high-voltage harness assembly**
2. **DC bus high-voltage harness bracket assembly**
3. **Hexagon flange bolt**

- X2
- Torque: 8 ~ 10 N·m

4. **Hexagon flange bolt**
   - Torque: 8 ~ 10 N·m
5. **Motor equipotential balance line assembly**
6. **Motor high-voltage harness bracket assembly**
7. **Hexagon flange bolt**
   - X4
   - Torque: 8 ~ 10 N·m
8. **DC bus high-voltage harness bracket I**
9. **Hexagon flange nut**
   - Torque: 8 ~ 10 N·m

Removal

1. **After the vehicle is stationary, set the ignition switch to OFF (STOP).**
2. **Disconnect the battery negative terminal (See page CH-20)**

   Notice:

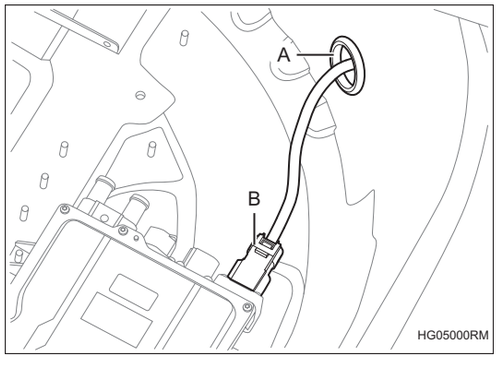
   Disconnect the battery negative terminal after waiting for 5s.
3. **Detach service switch (See page CH-1)**

   Notice:

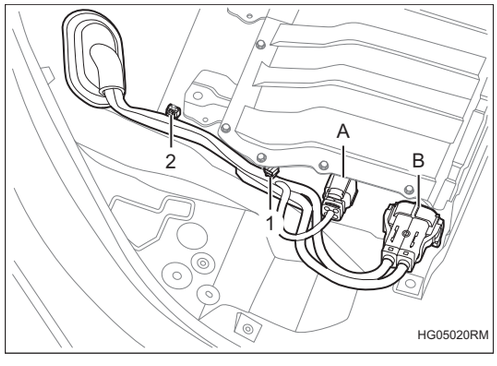
   Detach the service switch and wait 5 min for the high voltage components to be discharged before proceeding.

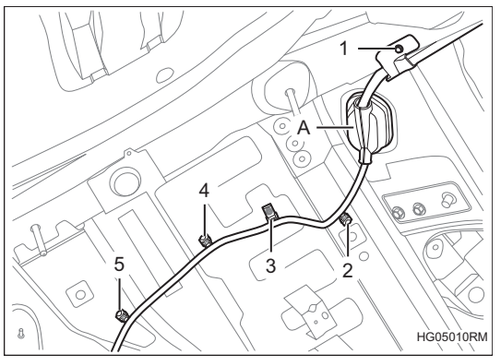
   Wear insulating gloves.
4. **Remove engine bottom guard plate (See page ET-34)**
5. **Remove floor right bottom guard plate I (See page ET-34)**
6. **Remove the trunk front carpet assembly.**
7. **Remove rear seat cushion assembly (See page SE-98)**
8. **Remove DC bus high-voltage harness assembly**

   (a) Disconnect the DCDC high-voltage harness connector-B-, and detach the DC bus high-voltage harness assembly protection device-A-.



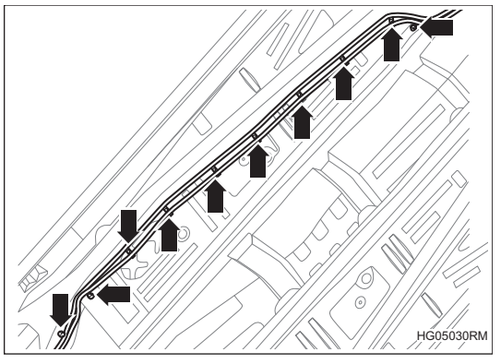
   (b) Disconnect the traction battery high-voltage harness connector-A-B-, and the harness retaining clip -1-2-.



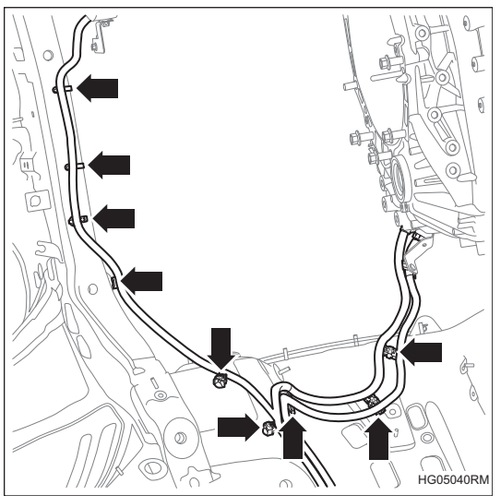


(c) Remove bolt -1- and nut -3-.

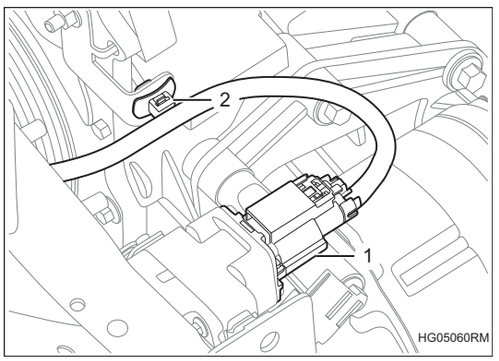
(d) Detach the harness fixing clips -2- and -4-5-, and detach the harness protector -A-.



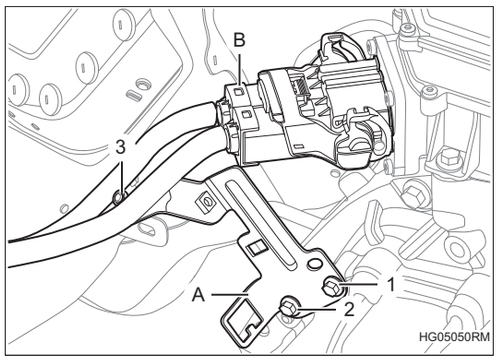
(e) Detach the underbody harness fixing clip -arrow-.



(f) Detach the front body harness fixing clip -arrow-.



(g) Disconnect the compressor high-voltage harness connector -1-, and detach the harness retaining clip -2-.



(h) Detach the DC bus high-voltage harness assembly connector -B-.

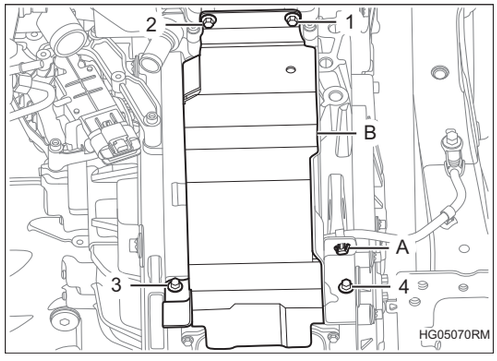
(i) Remove bolts -1-2- and detach harness fixing clip -3-.

(j) Remove the DC bus high-voltage harness assembly -B- and the bracket -A-.

Notice:

Carefully remove the DC bus high-voltage harness assembly from the body.

9. Remove motor high-voltage harness bracket assembly



(a) Remove the bolts -1-4- and detach the ground wire retaining clip -A-.

(b) Remove the motor high-voltage harness bracket assembly-B-.

Installation

1. The installation procedure is the reverse of removal procedure.

DMS

DMS DM-1
Precautions DM-1
Location of parts DM-2
System diagram DM-6
System description DM-6
Symptom chart DM-8
ECU terminal DM-9
DTC chart DM-10
C180832 ..... DM-12
C180629 ..... DM-12
C180729 ..... DM-12
C180932 ..... DM-13
C180A32 ..... DM-14
C180B32 ..... DM-15
C180C32 ..... DM-16
C181017 ..... DM-17
C181016 ..... DM-17
U006488 ..... DM-20
U014687 ..... DM-20
U012187 ..... DM-20
U013187 ..... DM-20
U110087 ..... DM-20
U129387 ..... DM-20
U110187 ..... DM-20
U124387 ..... DM-20
U118187 ..... DM-20
U116487 ..... DM-20
U115587 ..... DM-20
U124587 ..... DM-20
U123587 ..... DM-20
U114687 ..... DM-20
U040182 ..... DM-20
U040183 ..... DM-20
U040186 ..... DM-20
U059482 ..... DM-20
U059483 ..... DM-20
U059486 ..... DM-20
U040282 ..... DM-20
U040283 ..... DM-20

U040286 ..... DM-20
U048286 ..... DM-20
U041582 ..... DM-20
U041583 ..... DM-20
U041586 ..... DM-20
U042082 ..... DM-20
U042083 ..... DM-21
U042086 ..... DM-21
U043382 ..... DM-21
U043383 ..... DM-21
DMS DM-23
Parts DM-23
Removal DM-24
Installation DM-24

DMS

Precautions

1. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

2. Removal and installation of battery terminal

(a) Before removal and repair of electrical components, disconnect the battery negative (-) terminal to prevent the system from short circuit.

(b) Before disconnecting or reconnecting the battery cable, first turn off the ignition and lighting switch, and then completely loosen or tighten the battery cable terminal nut.

(c) When reconnecting after disconnecting the battery cable, some systems need to be initialized.

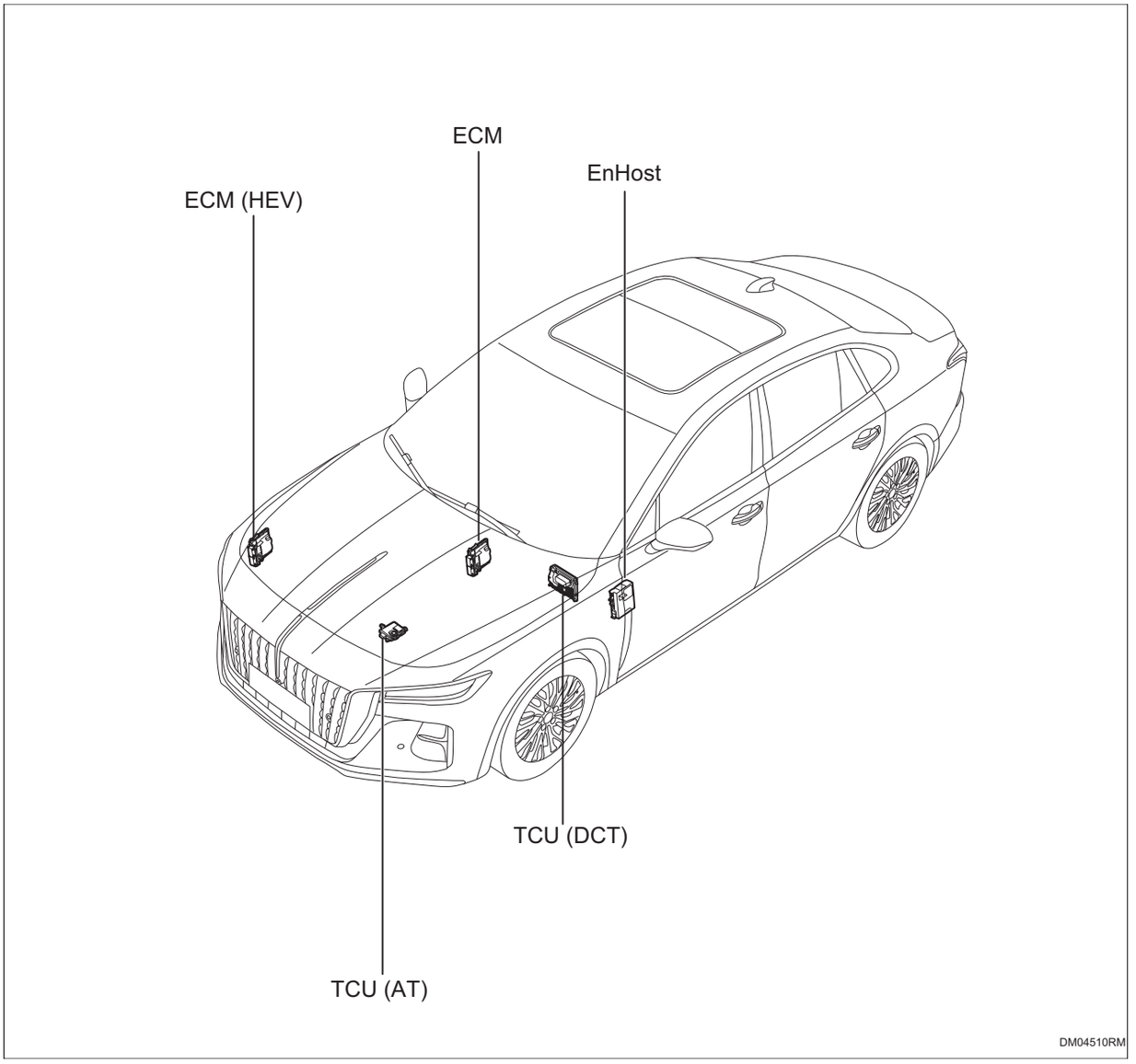
3. General repair instructions

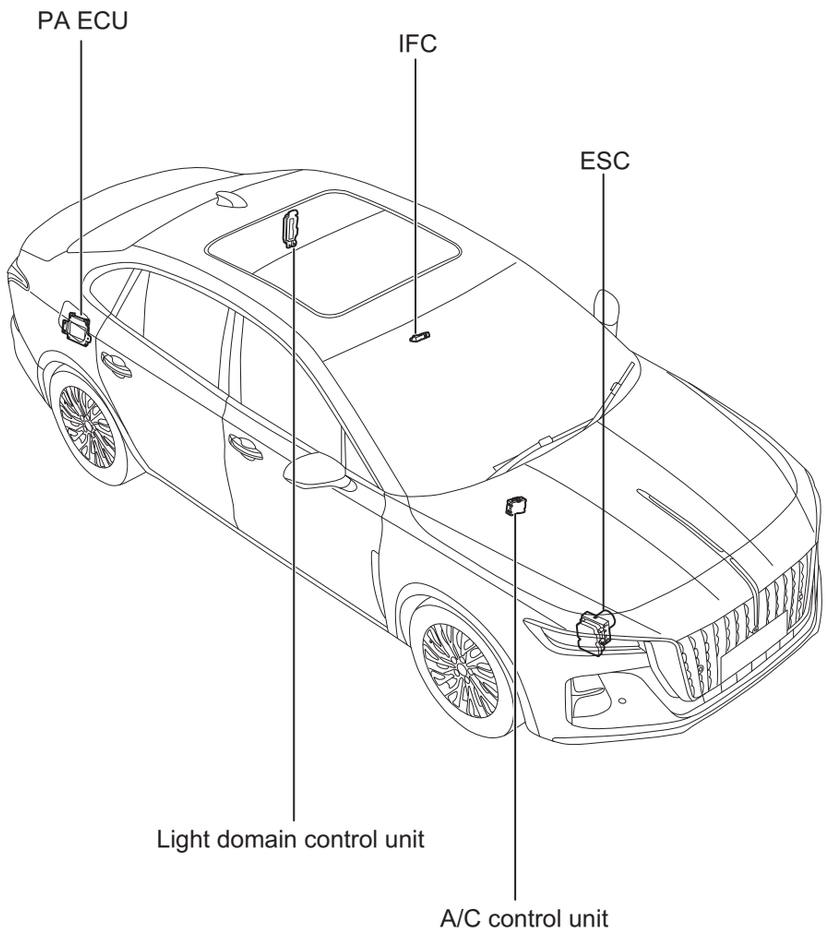
(a) During maintenance, take and place electronic component (ECU, sensor, etc.) carefully to avoid injuries caused by impact and static electricity.

(b) Establish awareness of environmental protection and effectively dispose of wastes generated during maintenance.

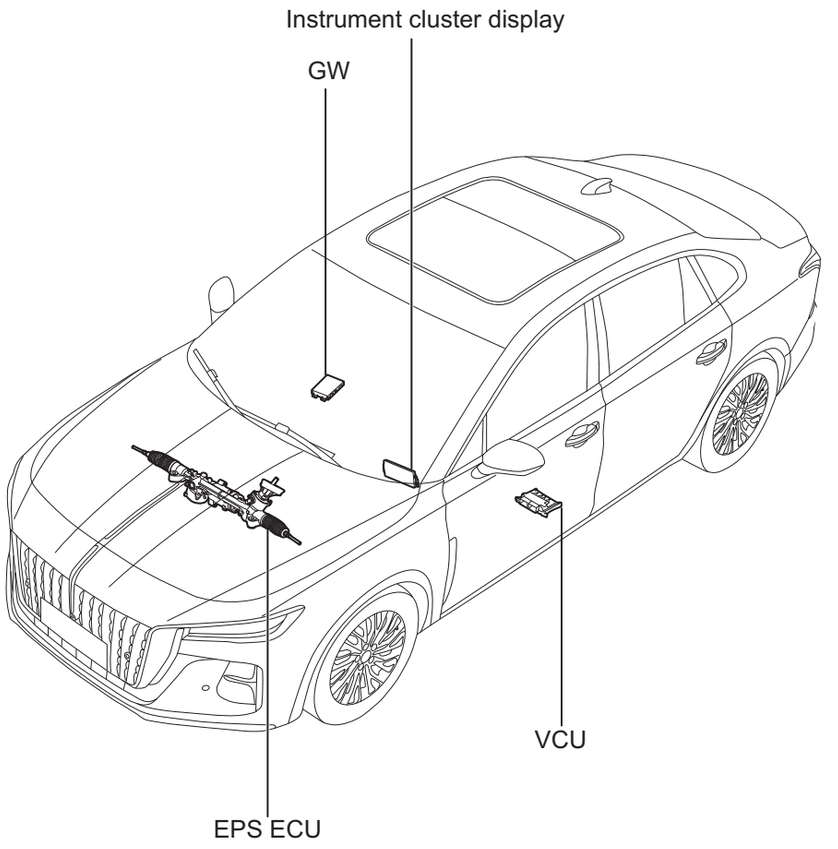
(c) It is not recommended to use the method of piercing the wire skin to detect the electrical signals input and output of the part, so as to avoid harness short circuit.

Location of parts

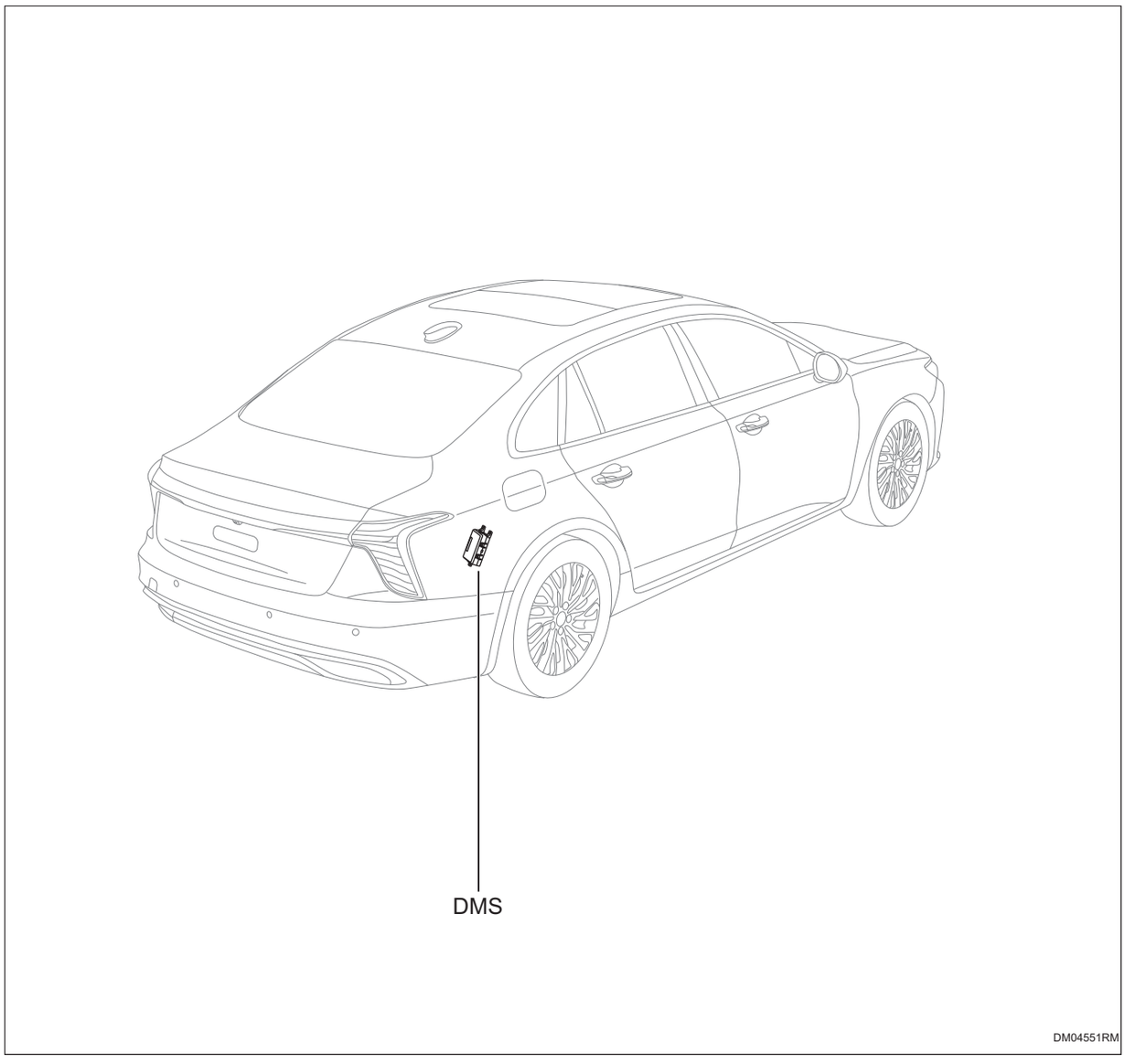




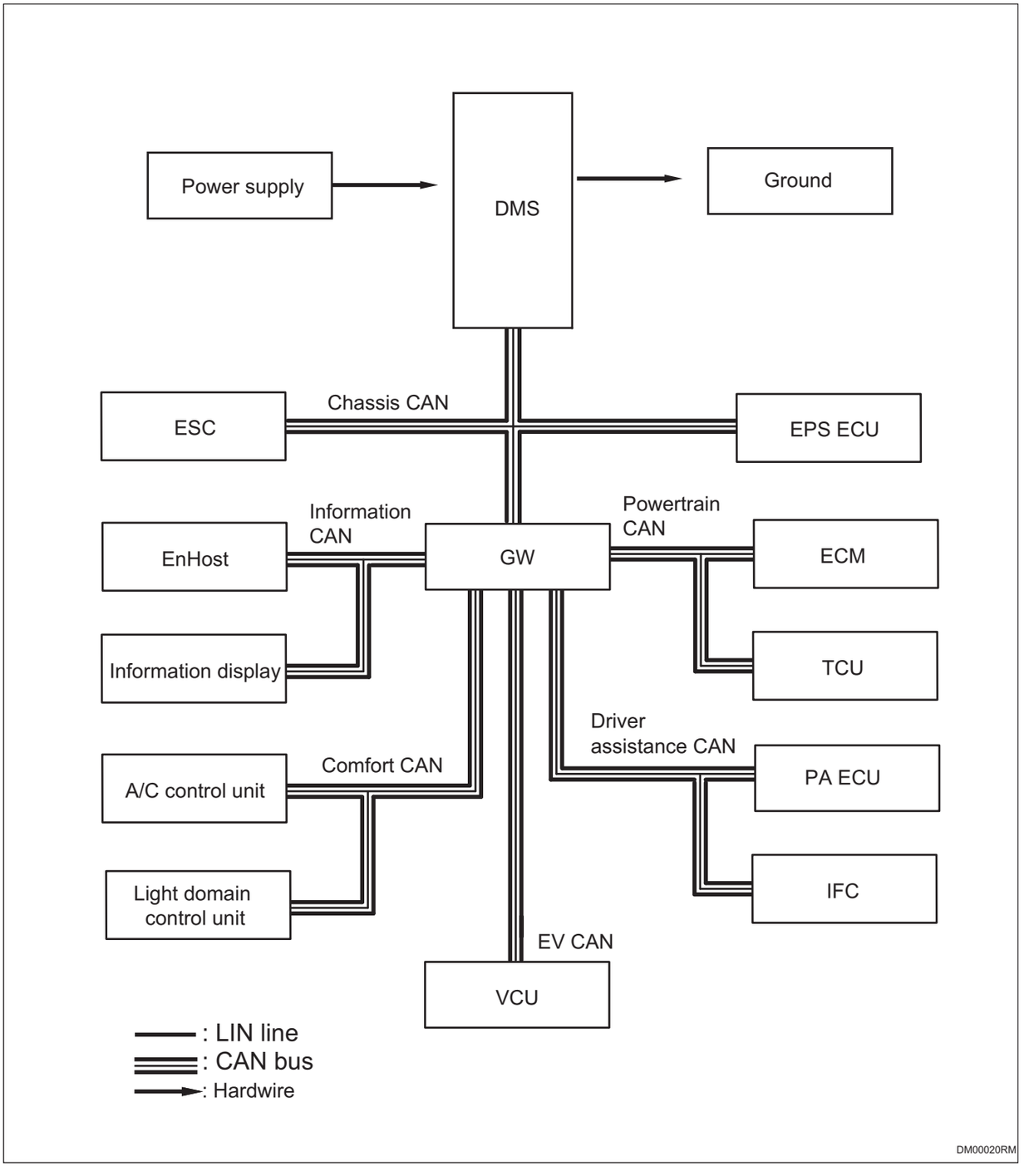
DM04520RM



DM04540RM


DMS
DM04551RM

System diagram



System description

1. DMS function overview

(a) The DMS can provide different vehicle modes, and vehicles have unique driving performance in different modes to meet driving needs.

(b) Switching of driving mode: by turning the DMS button, four driving modes of customization, sport, comfort and economy can be switched cyclically; Four driving modes of customization, sport, comfort and economy can be selected in the vehicle settings of the IVI.

2. Driving mode

(a) Economy mode: In the economic mode, the vehicle has good economy and is suitable for running on common urban pavements.

(b) Comfort mode: In the comfort mode, the vehicle can provide good comfort and is suitable for running on common urban pavements.

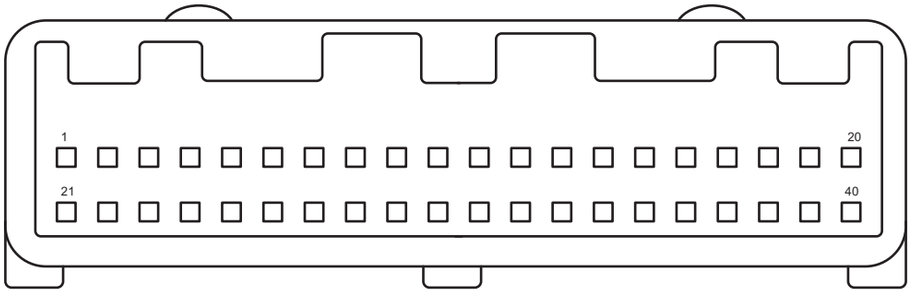
(c) Sport mode: In the sport mode, the vehicle is highly dynamic and suitable for running on highways or common urban pavements.

(d) Custom mode: In order to meet the personalized driving needs, in addition to the above driving modes, the driver can also select a custom mode.

Symptom chart

Fault	Possible location
Abnormal system operation	• Related harness and connector • DMS • CAN communication

ECU terminal



DM00010RM

DMS	
Pin No.	**DEFINITIONS**
1	Ground
2	Ground
3	—
4	CAN_H
5	Calibration CAN_H
6	—
7	—
8	—
9	—
10	—
11	—
12	—
13	—
14	—
15	—
16	—
17	—
18	—
19	—
20	–
21	B+
22	B+
23	IG1
24	—
25	CAN_L

DMS	
Pin No.	**DEFINITIONS**
26	Calibration CAN_L
27	—
28	—
29	—
30	—
31	—
32	—
33	—
34	—
35	—
36	—
37	—
38	—
39	—
40	—

DTC chart

DTC	Description	Reference page
C180A32	Incorrect transmission response to DMS command	(See page DM-14)
C180B32	ESC response DMS command error	(See page DM-15)
C180C32	EPS response DMS command error	(See page DM-16)
C180832	HCU response DMS command error	(See page DM-12)
C180629	HCU custom coasting mode response error	(See page DM-12)
C180729	HCU custom acceleration mode response error	(See page DM-12)
C180932	Incorrect engine response to DMS command	(See page DM-13)
C181017	DMS control unit power supply overvoltage	(See page DM-17)
C181016	DMS control unit power supply undervoltage	(See page DM-17)
U006488	Chassis CAN bus off	(See page DM-21)
U014687	GW node lost	(See page DM-21)
U012187	ESC node lost	(See page DM-21)
U013187	EPS ECU node lost	(See page DM-21)
U110087	ECM message lost	(See page DM-21)
U129387	HCU message lost	(See page DM-21)
U110187	TCU message lost	(See page DM-21)
U124387	APA message/ADV message lost	(See page DM-21)
U118187	Light domain control unit message lost	(See page DM-21)

DTC	Description	Reference page
U116487	A/C control unit message lost	(See page DM-21)
U115587	Instrument cluster control unit message lost	(See page DM-21)
U124587	EnHost/IVI message lost	(See page DM-21)
U123587	IFC message lost	(See page DM-21)
U114687	GW message lost	(See page DM-21)
U040182	ECM message content error	(See page DM-21)
U040183	ECM message content error	(See page DM-21)
U040186	ECM message content error	(See page DM-21)
U059482	HCU message content error	(See page DM-21)
U059483	HCU message content error	(See page DM-21)
U059486	HCU message content error	(See page DM-21)
U040282	TCU message content error	(See page DM-21)
U040283	TCU message content error	(See page DM-21)
U040286	TCU message content error	(See page DM-21)
U048286	Light domain control unit message content error	(See page DM-21)
U041582	ESC/IBC message content error	(See page DM-21)
U041583	ESC/IBC message content error	(See page DM-21)
U041586	ESC/IBC message content error	(See page DM-21)
U042082	EPS ECU message content error	(See page DM-21)
U042083	EPS ECU message content error	(See page DM-21)
U042086	EPS ECU message content error	(See page DM-21)
U043382	IFC message content error	(See page DM-21)
U043383	IFC message content error	(See page DM-21)

DTC	C180832	HCU response DMS command error
DTC	C180629	HCU custom coasting mode response error
DTC	C180729	HCU custom acceleration mode response error

Description

When the HCU responds to the DMS command error, the DMS records the DTC.

DTC	DTC detection conditions	Faulty location
C180832	(a) Incorrect HCU response to DMS command.	• DMS • HCU
C180629	(a) HCU custom coasting mode response error.	• DMS • HCU
C180729	(a) HCU custom acceleration mode response error.	• DMS • HCU

Inspection procedure

1	**Replace HCU (See page HC-127)**

(a) Replace the HCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **DMS (See page DM-24)**

OK

2	**End**

DTC	C180932	Incorrect engine response to DMS command

Description

When error occurs in ECM response to DMS command, the DMS records the DTC.

DTC	DTC detection conditions	Faulty location
C180932	(a) ECM response DMS command error.	• DMS • ECM

Inspection procedure

1	Replace the ECM (See page ES-451)

(a) Replace the ECM.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **DMS (See page DM-24)**

OK

2	End

DTC	C180A32	Incorrect transmission response to DMS command

Description

When error occurs in TCU response to DMS command, the DMS records the DTC.

DTC	DTC detection conditions	Faulty location
C180A32	(a) Incorrect TCU response to DMS command.	• DMS • TCU

Inspection procedure

1	Replace the TCU (See page AX-225)

(a) Replace the TCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **DMS (See page DM-24)**

OK

2	End

DTC	C180B32	ESC response DMS command error

Description

When error occurs in ESC response to DMS command, the DMS records the DTC.

DTC	DTC detection conditions	Faulty location
C180B32	(a) ESC response DMS command error.	• DMS • ESC

Inspection procedure

1	**Replace the ESC (See page BC-89)**

(a) Replace the ESC.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **DMS (See page DM-24)**

OK

2	**End**

DM

DTC	C180C32	EPS response DMS command error

Description

When error occurs in EPS ECU response to DMS command, the DMS records the DTC.

DTC	DTC detection conditions	Faulty location
C180C32	(a) Incorrect EPS response to DMS command.	• DMS • EPS ECU

Inspection procedure

1	**Replace the EPS ECU (See page PS-27)**

(a) Replace the EPS ECU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **DMS (See page DM-24)**

OK

2	**End**

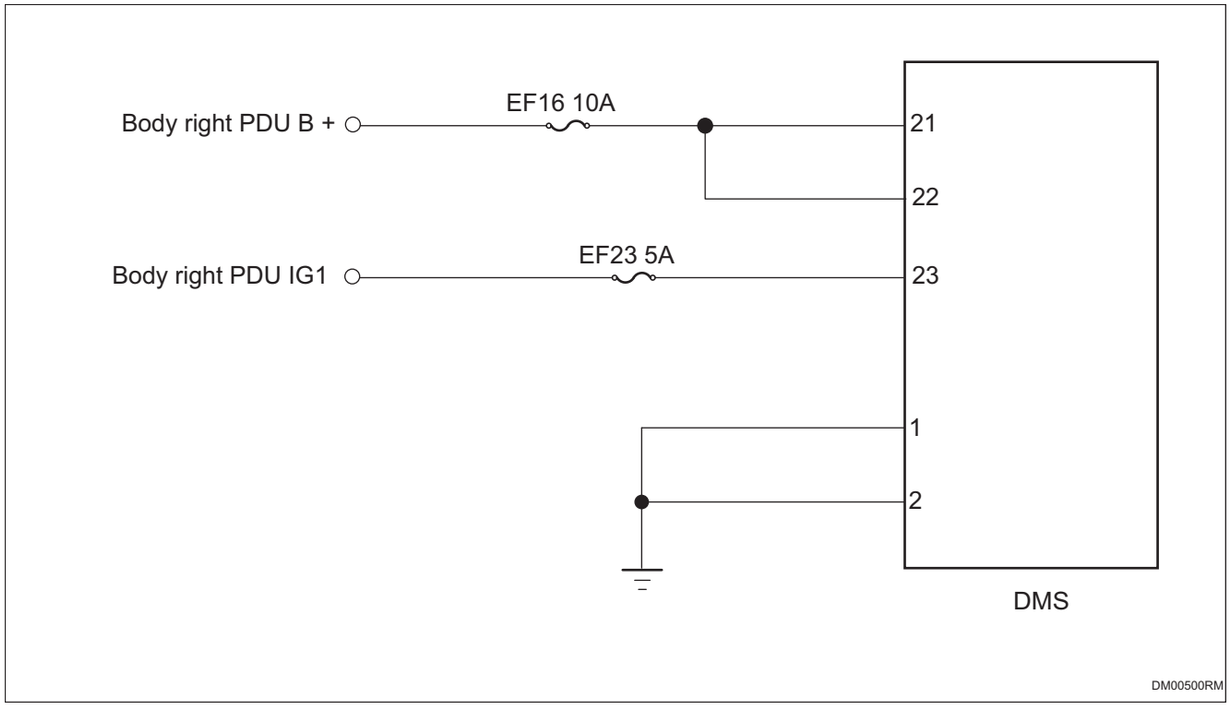
DTC	C181017	DMS control unit power supply overvoltage
DTC	C181016	DMS control unit power supply undervoltage

Description

When the DMS power supply voltage exceeds the normal range, the DMS records the DTC.

DTC	DTC detection conditions	Faulty location
C181017	(a) Control unit power supply overvoltage.	• DMS • Harness and connector • Battery/charging system
C181016	(a) Control unit power supply undervoltage.	• DMS • Harness and connector • Battery/charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery + - battery -	Always connected	About 11~14 V

NG	Overhaul the charging system

OK

2	Check DMS fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the DMS fuse.

(d) Measure the resistance according to the values in the table below.

Standard value

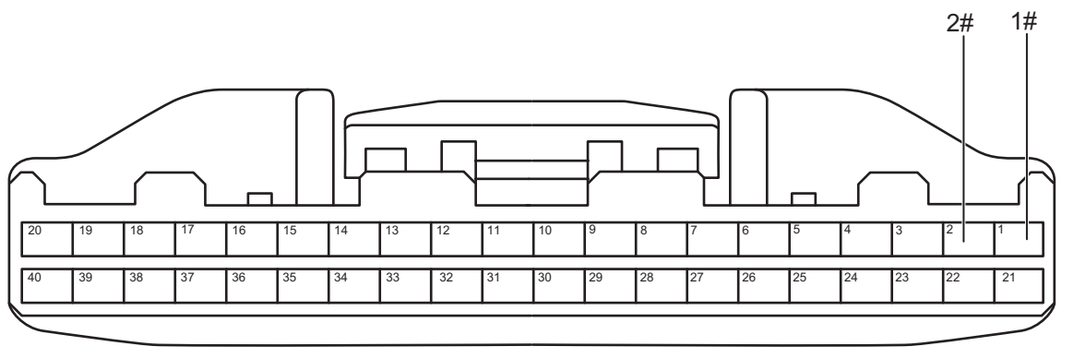
Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

DM

NG → **Replace fuse**

OK

3	Check DMS ground



DMS connector

DM00510RM

(a) Disconnect the DMS connector.

(b) Measure the resistance according to the values in the table below.

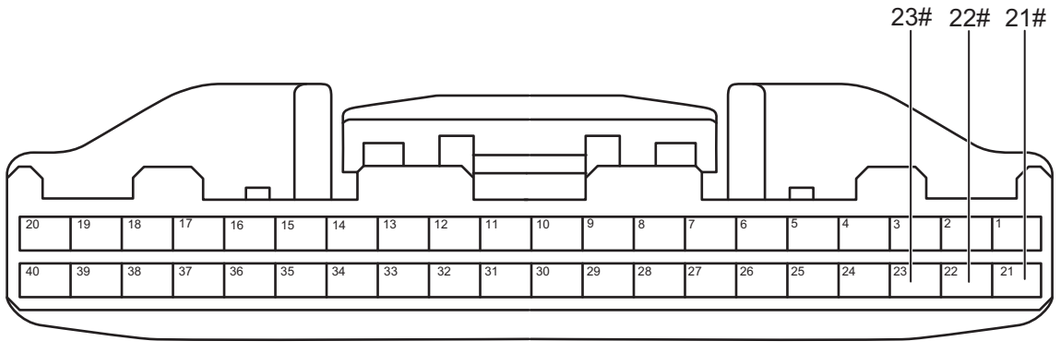
Standard value

Detector connection	Detection conditions	Specified state
DMS connector 1# -body GND	Always connected	Less than 1Ω
DMS connector 2# -body GND	Always connected	Less than 1Ω

NG → **Repair and replace harness or connector**

OK

4	**Check DMS power supply**



DMS connector

DM00521RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DMS connector 21# -body GND	The ignition switch is set to "ON"	Battery voltage
DMS connector 22# -body GND	The ignition switch is set to "ON"	Battery voltage
DMS connector 23# -body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace harness or connector**

OK

5	**Replace DMS (See page DM-24)**

DM

DTC	U006488	Chassis CAN bus off
DTC	U014687	GW node lost
DTC	U012187	ESC node lost
DTC	U013187	EPS ECU node lost
DTC	U110087	ECM message lost
DTC	U129387	HCU message lost
DTC	U110187	TCU message lost
DTC	U124387	APA message/ADV message lost
DTC	U118187	Light domain control unit message lost
DTC	U116487	A/C control unit message lost
DTC	U115587	Instrument cluster control unit message lost
DTC	U124587	EnHost/IVI message lost
DTC	U123587	IFC message lost
DTC	U114687	GW message lost
DTC	U040182	ECM message content error
DTC	U040183	ECM message content error
DTC	U040186	ECM message content error
DTC	U059482	HCU message content error
DTC	U059483	HCU message content error
DTC	U059486	HCU message content error
DTC	U040282	TCU message content error
DTC	U040283	TCU message content error
DTC	U040286	TCU message content error
DTC	U048286	Light domain control unit message content error
DTC	U041582	ESC/IBC message content error
DTC	U041583	ESC/IBC message content error
DTC	U041586	ESC/IBC message content error
DTC	U042082	EPS ECU message content error

DTC	**U042083**	**EPS ECU message content error**
DTC	**U042086**	**EPS ECU message content error**
DTC	**U043382**	**IFC message content error**
DTC	**U043383**	**IFC message content error**

Description

When the communication between the DMS and other systems is abnormal or interrupted, the DMS will record the DTC.

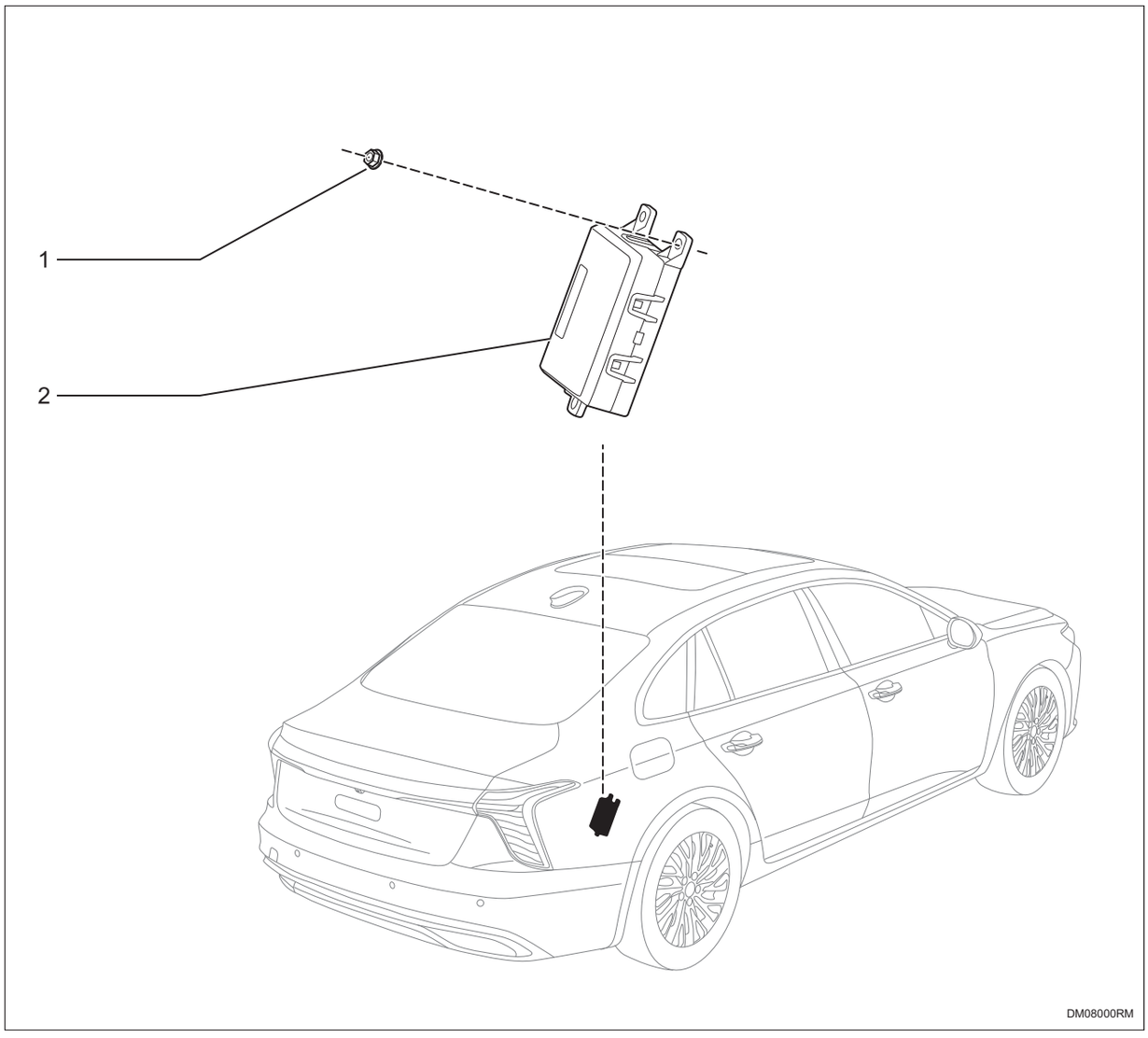
DTC	DTC detection conditions	Faulty location
U006488	(a) Abnormal or interrupted communication.	• Relevant system control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	
U012187	(a) Abnormal or interrupted communication.	
U013187	(a) Abnormal or interrupted communication.	
U110087	(a) Abnormal or interrupted communication.	
U129387	(a) Abnormal or interrupted communication.	
U110187	(a) Abnormal or interrupted communication.	
U124387	(a) Abnormal or interrupted communication.	
U118187	(a) Abnormal or interrupted communication.	
U116487	(a) Abnormal or interrupted communication.	
U115587	(a) Abnormal or interrupted communication.	
U124587	(a) Abnormal or interrupted communication.	
U123587	(a) Abnormal or interrupted communication.	
U114687	(a) Abnormal or interrupted communication.	
U040182	(a) Abnormal or interrupted communication.	
U040183	(a) Abnormal or interrupted communication.	
U040186	(a) Abnormal or interrupted communication.	
U059482	(a) Abnormal or interrupted communication.	
U059483	(a) Abnormal or interrupted communication.	
U059486	(a) Abnormal or interrupted communication.	
U040282	(a) Abnormal or interrupted communication.	
U040283	(a) Abnormal or interrupted communication.	
U040286	(a) Abnormal or interrupted communication.	
U048286	(a) Abnormal or interrupted communication.	
U041582	(a) Abnormal or interrupted communication.	
U041583	(a) Abnormal or interrupted communication.	
U041586	(a) Abnormal or interrupted communication.	
U042082	(a) Abnormal or interrupted communication.	
U042083	(a) Abnormal or interrupted communication.	
U042086	(a) Abnormal or interrupted communication.	
U043382	(a) Abnormal or interrupted communication.	
U043383	(a) Abnormal or interrupted communication.	

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

DMS

Parts



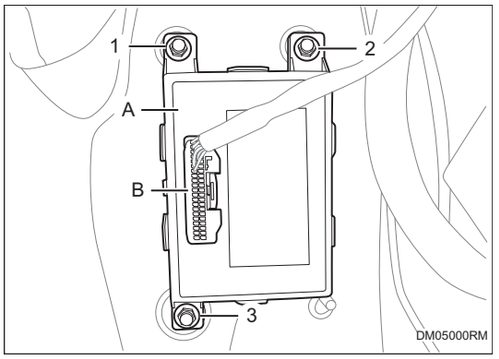
1. Hexagon flange nut

- X3
- Torque: 4 ~ 5 N·m

2. DMS

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove trunk right covering (See page IR-33)**
3. **Remove driving mode control**



(a) Disconnect the harness connector-B-.

(b) Remove the nuts -1-3-, and remove the DMS -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

HCU

VCU HC-1
Precautions HC-1
Location of parts HC-2
System diagram HC-7
System description HC-8
Symptom chart HC-9
Data recorder HC-10
Active test HC-11
ECU terminal HC-12
DTC chart HC-14
P057101 .....HC-23
P063300 .....HC-28
P068712 .....HC-34
P068611 .....HC-34
P068513 .....HC-34
P069212 .....HC-39
P069111 .....HC-39
P048001 .....HC-39
P1B0604 .....HC-39
P1B0698 .....HC-39
P1B0671 .....HC-39
P1B061C HC-39
P0A0312 .....HC-44
P0A0211 .....HC-44
P0A0712 .....HC-49
P0A0611 .....HC-49
P0A0513 .....HC-49
P1B0806 .....HC-49
P1B0871 .....HC-49
P1B0816 .....HC-49
P1B0817 .....HC-49
P1B0898 .....HC-49
P0A8DA2 .....HC-54
P0A8EA3 .....HC-54
P1B201C HC-54
P1B211C HC-54
P1B221C HC-54
P1B231C HC-54
P1B241C HC-54

P1B251C HC-54
P0BFD00 ..... HC-54
P1B261C HC-54
P0C79A3 ..... HC-54
P0A7800 ..... HC-54
P1B2700 ..... HC-54
P0A5F19 ..... HC-54
P0A6219 ..... HC-54
P1B2841 ..... HC-54
P0A3C98 ..... HC-54
P0A2F98 ..... HC-54
P0A3F01 ..... HC-55
P1B2C47 ..... HC-55
P1B2D44 ..... HC-55
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P0A7100 ..... HC-55
P0A7419 ..... HC-55
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P1B057F HC-66
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P0563A3 ..... HC-70
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P1B0E2B HC-76
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P300211 ..... HC-76
P300113 ..... HC-76
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P1B1417 .....HC-84
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P212711 .....HC-84
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P1B3108 .....HC-93
P0DE700 .....HC-93
P0DE600 .....HC-93
P1B3217 .....HC-93
P058E00 .....HC-93
P0C6E00 .....HC-93
P0B2400 .....HC-93
P0B2800 .....HC-93
P0CA700 .....HC-93
P0CA600 .....HC-93
P0A7D00 .....HC-93
P057F00 .....HC-93
P1B3300 .....HC-93
P0AC501 .....HC-93
P0B1300 .....HC-93
P1B3700 .....HC-93
P1B380A HC-93
P058C00 .....HC-93
P0DAC01 .....HC-93
P1B3A0A HC-93
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P1B3D0A HC-93
P1B3E0A HC-94
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P1CA000 .....HC-117
P1CA100 .....HC-117
P1CA200 .....HC-117
P1CA300 .....HC-117
P1CA400 .....HC-117
P1CA500 .....HC-117
P1CA600 .....HC-117
P1B2C00 .....HC-125
VCU HC-126
Parts HC-126
Removal HC-127
Installation HC-127

VCU

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Warning:

Before repairing the high voltage system or adjacent high voltage system components, be sure to carefully read the "Instructions and precautions for maintenance work" in the introduction carefully!

2. ENGINE START/STOP button (ignition switch) representation:

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

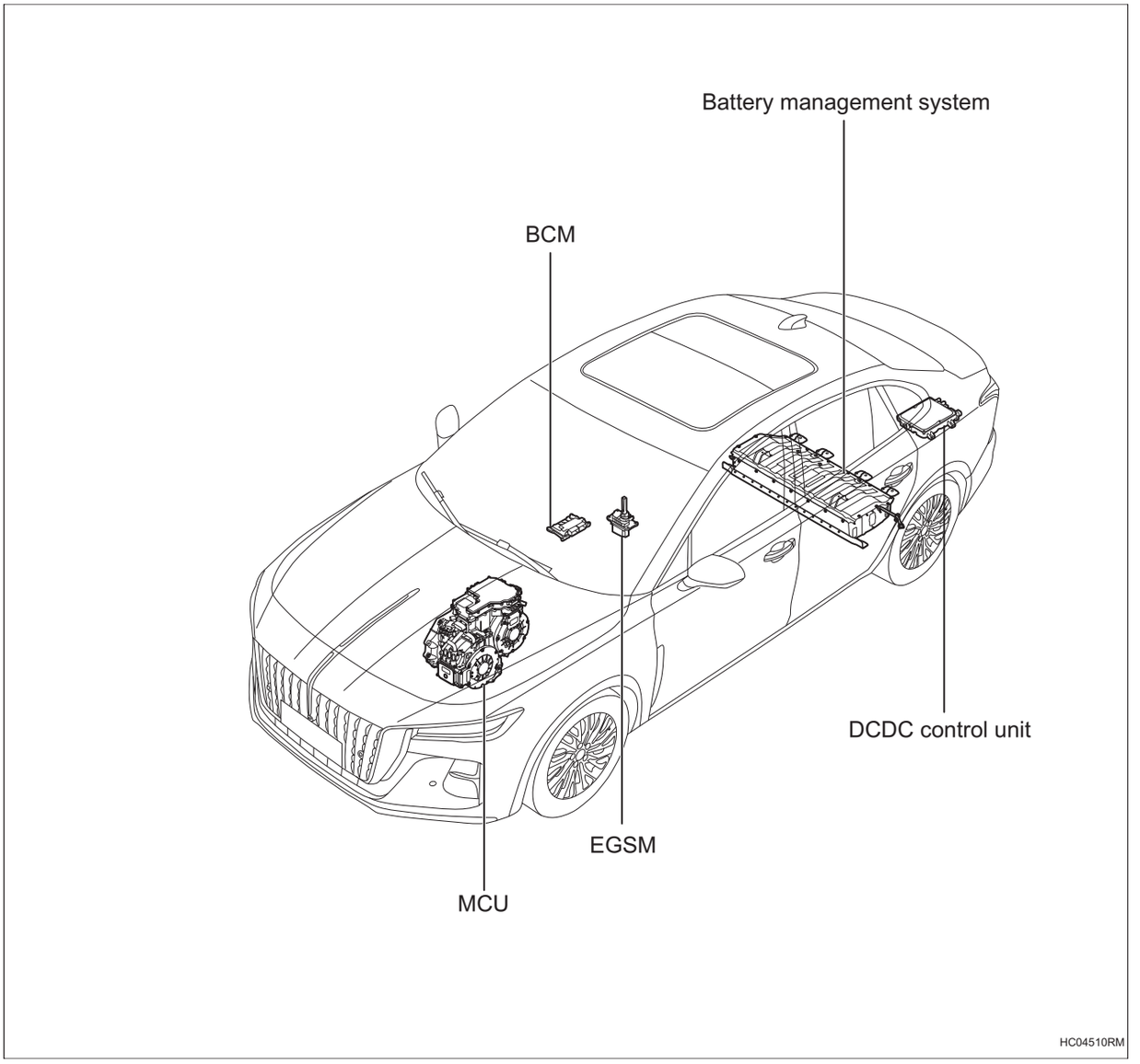
3. Removal and installation of battery terminal

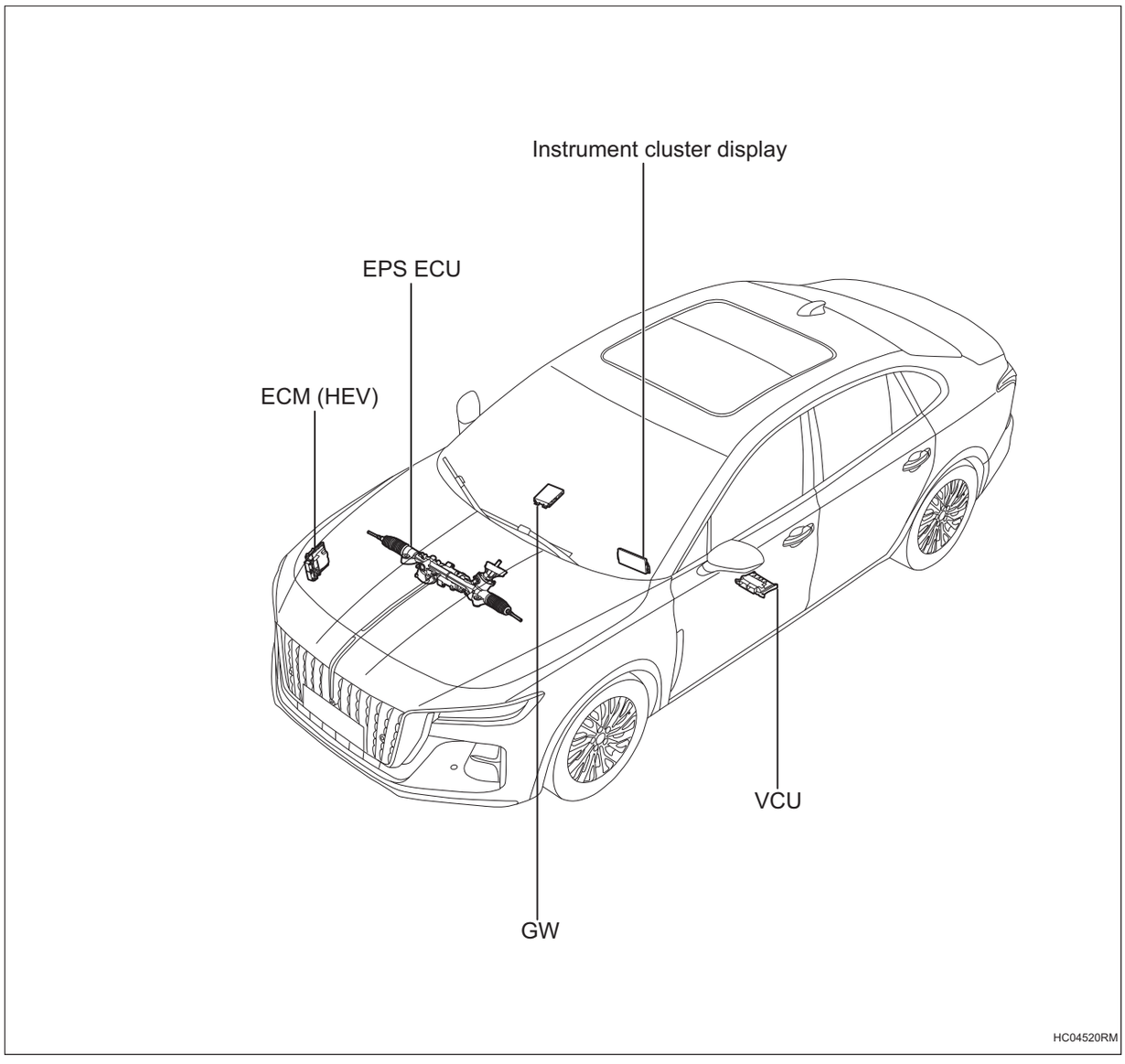
(a) Before removal and repair of electrical components, disconnect the battery negative terminal to prevent the system from short circuit.

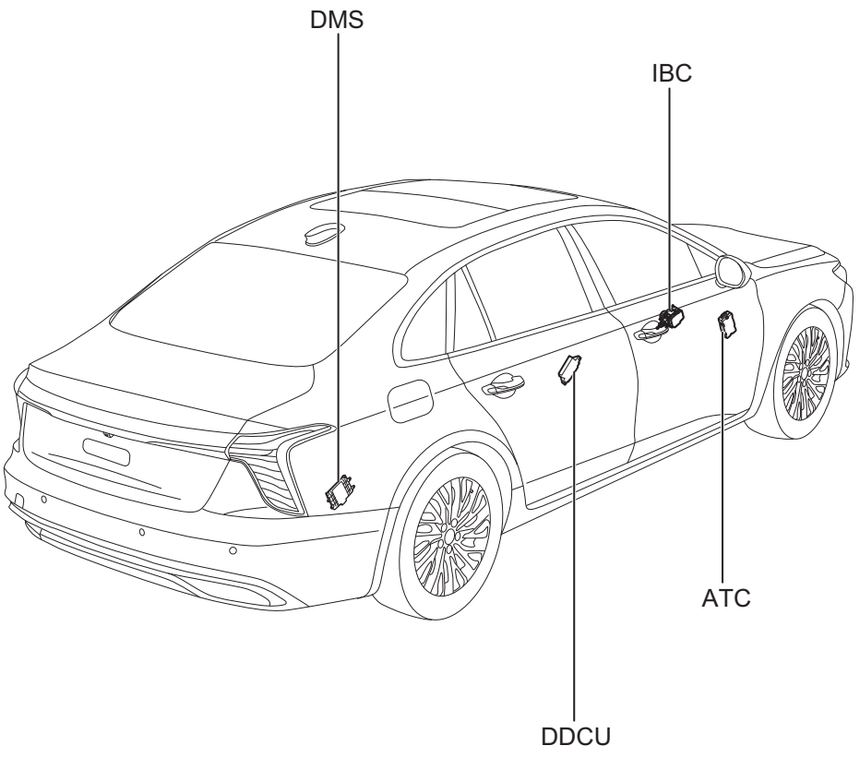
(b) Before disconnecting or reconnecting the battery cable terminal, first turn off the power (ignition) switch and lighting switch, and then completely loosen or tighten the battery cable terminal nut.

(c) When reconnecting after disconnecting the battery cable, some systems need to be initialized.

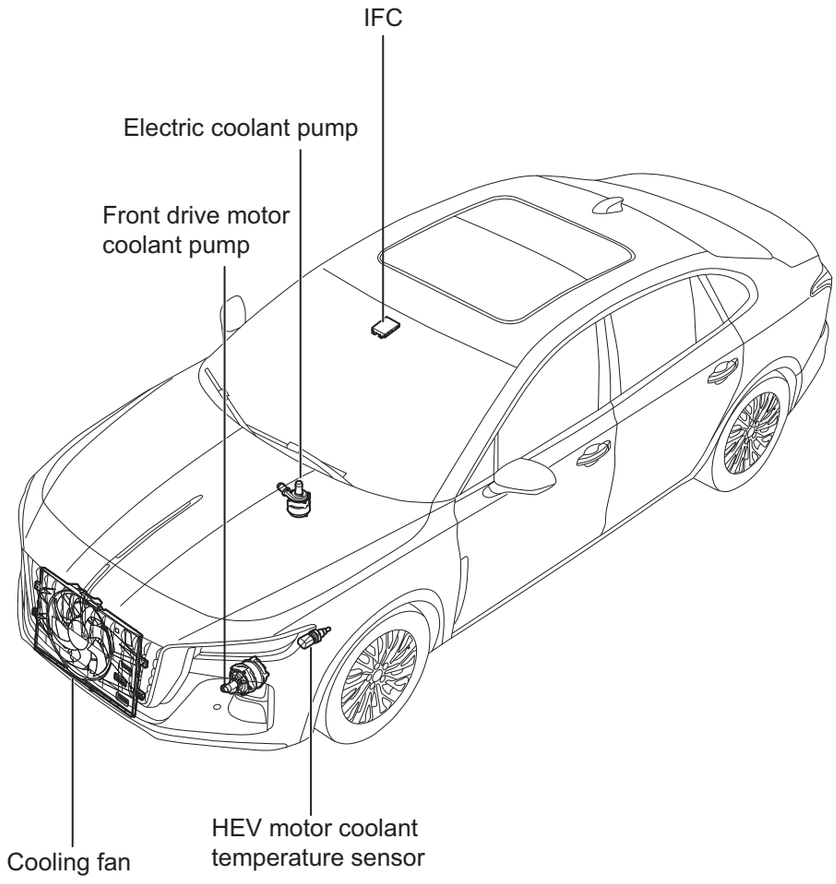
Location of parts



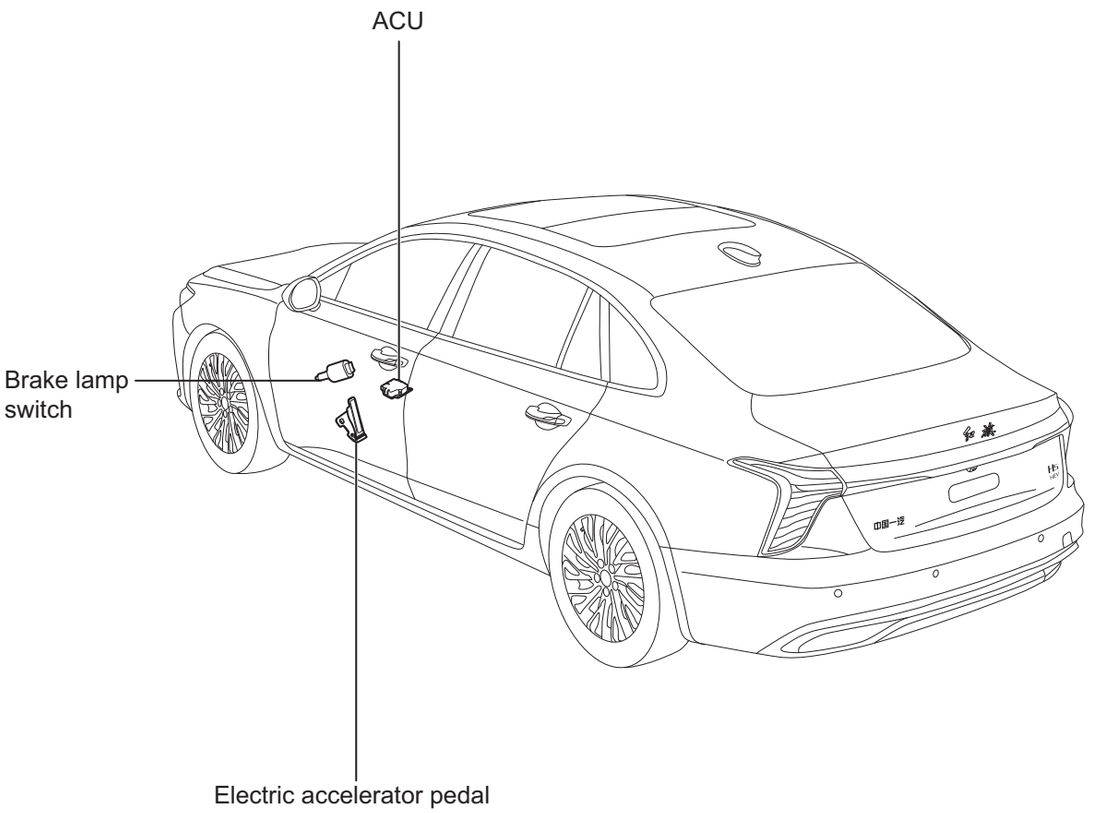

Instrument cluster display
EPS ECU
ECM (HEV)
VCU
GW
HC04520RM



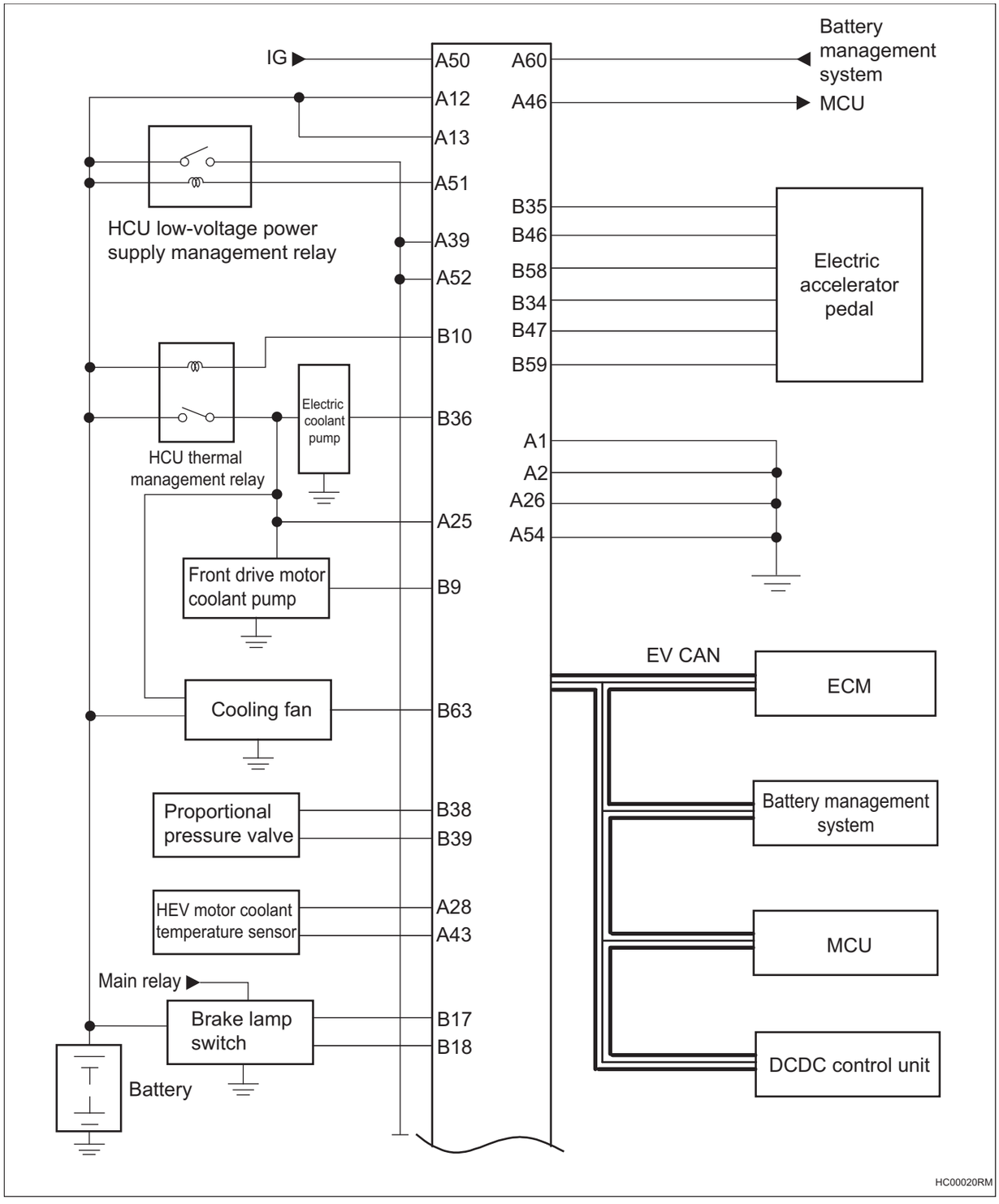
HC04530RM


IFC
Electric coolant pump
Front drive motor
coolant pump
Cooling fan
HEV motor coolant
temperature sensor

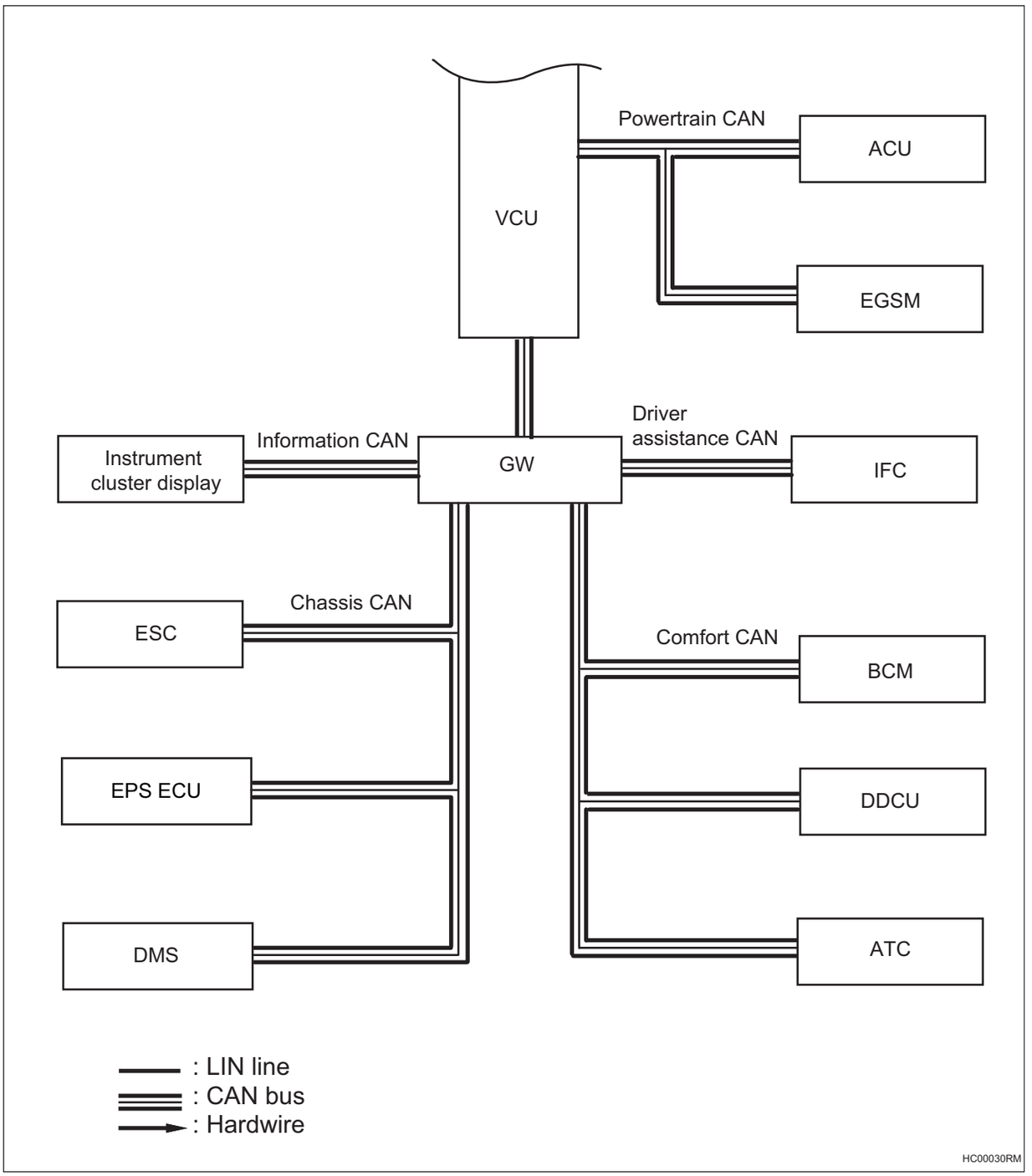
HC04540RM


ACU
Brake lamp switch
Electric accelerator pedal
HC04550RM

System diagram



HC



System description

1. **Function brief description: HCU is the core of the electric vehicle, and its main function is to control the powertrain and cooling system, and coordinate the control of each assembly to ensure good driving performance.**

Symptom chart

Fault	Possible location
Abnormal high voltage system	• Battery • Related harness and connector • High-voltage harness • Service switch • High voltage battery • Power motor • Inverter • High voltage component (interlock switch) • EGSM • CAN line • GW • HCU

Data recorder

1. Data recorder

Hint:

Using the HQ-VDS reading data recorder, the values or status of switch, sensor, actuator and other items can be read without removing any parts. This detection method can be used to find intermittent failure or signals. Reading the data recorder information can save diagnostic time when troubleshooting.

Item	Description of items	Detection conditions	Reference value	Fault check part
Accelerator pedal 1 signal voltage	Accelerator pedal 1 channel power supply voltage display range	IG ON	0.5V-4.6V	Accelerator pedal 1 position sensor and its circuit
Accelerator pedal 2 signal voltage	Accelerator pedal 2 channel power supply voltage display range	IG ON	0.5V-4.6V	Accelerator pedal 2 position sensor and its circuit
Main brake switch status	Main brake switch status	IG ON	0/1, consistent with auxiliary brake switch state	Brake pedal
Auxiliary brake switch status	Auxiliary brake switch status	IG ON	0/1, consistent with main brake switch status	Brake pedal
Interlock switch output voltage	Interlock switch output voltage, voltage range	IG ON	2.3V-2.7V	Interlock loop open circuit or interlock switch open
Interlock switch input voltage	Interlock switch input voltage, voltage range	IG ON	2.3V-2.7V	Interlock loop open circuit or interlock switch open
Coolant temperature sensor signal voltage	Coolant temperature sensor signal voltage and voltage range	IG ON	0.2V-4.9V	Coolant temperature sensor and its circuit

Active test

1. Active test

Hint:

Use the HQ-VDS to carry out active test. The relay, actuator and other items can be operated without removing any parts. This inspection can shorten the diagnosis time, find the intermittent fault between parts and wiring as early as possible, and thus eliminate the fault.

(a) Connect the HQ-VDS.

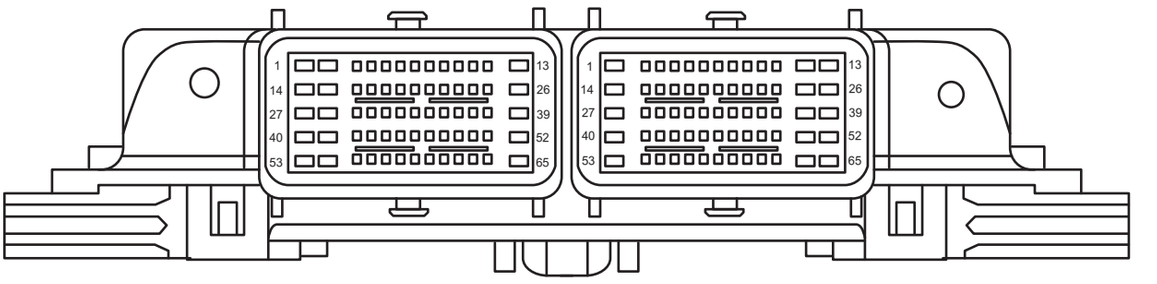
(b) Set the ignition switch to ON position.

(c) Start HQ-VDS.

(d) Refer to the table below for active testing.

Item	Description of items	Detection conditions	Test content	Reference value	Fault check part
Coolant pump 1 control	Motor coolant pump	IG On	Controllable coolant pump 1 output (0-100%)	Coolant pump speed proportional to PWM	Motor coolant pump and its drive circuit
Coolant pump 2 control	Heater coolant pump	IG On	Controllable coolant pump 2 output (0-100%)	Coolant pump speed proportional to PWM	Heater coolant pump and its drive circuit
Cooling fan control	Cooling fan	IG On	Controllable cooling fan output (0-100%)	Fan speed proportional to PWM	Cooling fan and its drive circuit
Thermal management relay control	Control thermal management relay	IG On	Control not recommended	Control not recommended	Control not recommended
Proportional pressure valve control	Clutch proportional pressure valve	IG On	Control not recommended	Control not recommended	Control not recommended
Clear EEPROM	Clear the E2P content (control not recommended)	—	Control not recommended	Control not recommended	Control not recommended
HVPUD high voltage power-off command	Control vehicle high voltage power-off	Vehicle Ready	Command vehicle high voltage power-off	Instrument cluster Ready indicator lamp goes out	Notify the professional for maintenance

ECU terminal



HC00010RM

HCU A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Ground	34	—
2	Ground	35	—
3	—	36	—
4	CAN1_H (hybrid CAN)	37	—
5	CAN1_L (hybrid CAN)	38	—
6	—	39	Main relay rear power supply
7	CAN2_L (powertrain CAN)	40	—
8	CAN2_H (powertrain CAN)	41	—
9	—	42	—
10	—	43	Motor coolant temperature sensor ground
11	—	44	—
12	B+	45	—
13	B+	46	INTERLOCK_OUT
14	—	47	—
15	—	48	—
16	—	49	—
17	—	50	Ignition lock ON
18	—	51	Low-voltage power supply management relay control
19	—	52	Main relay rear power supply
20	—	53	—
21	—	54	Ground
22	CAN3-L (calibration CAN)	55	—
23	CAN3-H (calibration CAN)	56	—

HCU A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
24	—	57	—
25	Thermal management relay rear voltage signal	58	—
26	Ground	59	—
27	—	60	INTERLOCK_IN
28	Motor coolant temperature sensor signal	61	—
29	—	62	—
30	—	63	—
31	—	64	—
32	—	65	—
33	—	—	—

HCU B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	—	34	Accelerator pedal sensor power supply 2
2	—	35	Accelerator pedal sensor power supply 1
3	—	36	Electric coolant pump
4	—	37	—
5	—	38	Proportional pressure valve control terminal
6	—	39	Proportional pressure valve signal terminal
7	—	40	—
8	—	41	—
9	Front drive motor coolant pump	42	—
10	Thermal management relay control	43	—
11	—	44	—
12	—	45	—
13	—	46	Accelerator pedal sensor signal 1
14	—	47	Accelerator pedal sensor signal 2
15	—	48	—
16	—	49	—
17	Brake lamp switch CC	50	—
18	Brake lamp switch OUT	51	—
19	—	52	—
20	—	53	—
21	—	54	—
22	—	55	—

HCU B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
23	—	56	—
24	—	57	—
25	—	58	Accelerator pedal sensor GND 1
26	—	59	Accelerator pedal sensor GND 2
27	—	60	—
28	—	61	—
29	—	62	—
30	—	63	Cooling fan control
31	—	64	—
32	—	65	—
33	—	—	—

DTC chart

DTC	Description	Reference page
P1B1217	Accelerator pedal 1 sensor power supply voltage above upper limit	(See page HC-84)
P1B1216	Accelerator pedal 1 sensor power supply voltage below lower limit	(See page HC-84)
P212312	Accelerator pedal 1 sensor voltage above upper limit	(See page HC-84)
P212211	Accelerator pedal 1 sensor voltage below lower limit	(See page HC-84)
P1B1417	Accelerator pedal 2 sensor power supply voltage above upper limit	(See page HC-84)
P1B1416	Accelerator pedal 2 sensor power supply voltage below lower limit	(See page HC-84)
P212812	Accelerator pedal 2 sensor voltage above upper limit	(See page HC-84)
P212711	Accelerator pedal 2 sensor voltage below lower limit	(See page HC-84)
P213800	Accelerator pedal discrepancy error	(See page HC-99)
P063300	IMMO authentication failure	(See page HC-28)
P1B2B00	Pre-charge timeout	(See page HC-91)
P1B0000	Engine start failure	(See page HC-58)
P1B0100	Functional safety level 1 fault	(See page HC-64)
P1B0200	Functional safety level 2 fault	(See page HC-64)
P1B0300	Functional safety level 3 fault	(See page HC-64)
P057101	Brake pedal discrepancy error	(See page HC-23)
P1B1100	High voltage interlock failure	(See page HC-81)
P0A0312	Motor system coolant temperature sensor voltage above upper limit	(See page HC-44)

DTC	Description	Reference page
P0A0211	Motor system coolant temperature sensor voltage below lower limit	(See page HC-44)
P273912	Proportional pressure valve number or frequency output pin circuit shorted to power supply	(See page HC-109)
P273811	Proportional pressure valve number or / and frequency output pin circuit shorted to ground	(See page HC-109)
P273613	Proportional pressure valve number or frequency output pin circuit open	(See page HC-109)
P1B057E	Clutch engagement failure	(See page HC-66)
P1B0575	Clutch torque transmission abnormity	(See page HC-66)
P1B057F	Clutch release failure	(See page HC-66)
P1B0C16	VCU power supply undervoltage	(See page HC-70)
P0562A2	VCU power supply voltage low	(See page HC-70)
P0563A3	VCU power supply voltage high	(See page HC-70)
P1B0C1B	VCU power supply overvoltage	(See page HC-70)
P068712	Low voltage management relay output pin circuit shorted to power supply	(See page HC-34)
P068611	Low voltage management relay output pin circuit shorted to ground	(See page HC-34)
P068513	Low voltage management relay output pin circuit open	(See page HC-34)
P1B0E00	Thermal management relay power supply low	(See page HC-76)
P1B0E2B	Thermal management relay adhesion	(See page HC-76)
P300312	Thermal management relay output pin circuit shorted to power supply	(See page HC-76)
P300211	Thermal management relay output pin circuit shorted to ground	(See page HC-76)
P300113	Thermal management relay output pin circuit open	(See page HC-76)
P069212	Cooling fan output pin circuit shorted to power supply	(See page HC-39)
P069111	Cooling fan output pin circuit shorted to ground	(See page HC-39)
P048001	Cooling fan output pin circuit open	(See page HC-39)
P1B0604	Cooling fan internal failure	(See page HC-39)
P1B0698	Cooling fan overtemperature	(See page HC-39)
P1B0671	Cooling fan stalling	(See page HC-39)
P1B061C	Cooling fan voltage failure	(See page HC-39)
P0A0712	Motor coolant pump output pin circuit shorted to power supply	(See page HC-49)
P0A0611	Motor coolant pump output pin circuit shorted to ground	(See page HC-49)
P0A0513	Motor coolant pump output pin circuit open	(See page HC-49)
P1B0806	Motor coolant pump underspeed operation	(See page HC-49)

DTC	Description	Reference page
P1B0871	Motor coolant pump overcurrent/stalling	(See page HC-49)
P1B0816	Motor coolant pump undervoltage	(See page HC-49)
P1B0817	Motor coolant pump overvoltage	(See page HC-49)
P1B0898	Motor coolant pump overtemperature	(See page HC-49)
P261D12	Heater coolant pump output pin circuit shorted to power supply	(See page HC-104)
P261C11	Heater coolant pump output pin circuit shorted to ground	(See page HC-104)
P261A13	Heater coolant pump output pin circuit open	(See page HC-104)
P1B0907	Heater coolant pump dry rotation	(See page HC-104)
P1B0906	Heater coolant pump underspeed operation	(See page HC-104)
P1B0971	Heater coolant pump overcurrent/stalling	(See page HC-104)
P1B0916	Heater coolant pump undervoltage	(See page HC-104)
P1B0917	Heater coolant pump overvoltage	(See page HC-104)
P1B0998	Heater coolant pump overtemperature	(See page HC-104)
U000188	Powertrain CAN bus off	(See page HC-117)
U014687	Powertrain CAN GW node lost	(See page HC-117)
U005588	Hybrid CAN bus off	(See page HC-117)
U014787	Hybrid CAN GW node lost	(See page HC-117)
U010087	ECM node lost	(See page HC-117)
U040183	ECM message Checksum error	(See page HC-117)
U040182	ECM message Livecounter error	(See page HC-117)
U029A87	BMS node lost	(See page HC-117)
U059B83	BMS message checksum error	(See page HC-117)
U059B82	BMS message livecounter error	(See page HC-117)
U011087	MCU 1 node lost	(See page HC-117)
U041183	MCU 1 message Checksum error	(See page HC-117)
U041182	MCU 1 message Livecounter error	(See page HC-117)
U029887	DCDC node lost	(See page HC-117)
U059983	DCDC message Checksum error	(See page HC-117)
U059982	DCDC message Livecounter error	(See page HC-117)
U010387	EGSM node lost	(See page HC-117)
U040483	EGSM message Checksum error	(See page HC-117)
U040482	EGSM message Livecounter error	(See page HC-117)
U015187	ACU node lost	(See page HC-117)
U045283	ACU Checksum error	(See page HC-117)
U045282	ACU message Livecounter error	(See page HC-117)
U114687	GW message lost	(See page HC-117)
U123587	IFC message lost	(See page HC-117)
U043383	IFC message checksum error	(See page HC-117)

DTC	Description	Reference page
U043382	IFC message Livecounter error	(See page HC-117)
U112987	IBC message lost	(See page HC-117)
U041883	IBC message Checksum error	(See page HC-117)
U041882	IBC message Livecounter error	(See page HC-117)
U113187	EPS ECU message lost	(See page HC-117)
U042083	EPS ECU message Checksum error	(See page HC-117)
U042082	EPS ECU message Livecounter error	(See page HC-117)
U113887	DMS message lost	(See page HC-117)
U043983	DMS message Checksum error	(See page HC-117)
U043982	DMS message Livecounter error	(See page HC-117)
U116487	A/C control unit message lost	(See page HC-117)
U042483	A/C control unit message Checksum error	(See page HC-117)
U042482	A/C control unit message Livecounter error	(See page HC-117)
U114087	BCM message lost	(See page HC-117)
U119987	Driver door module message lost	(See page HC-117)
U115587	Instrument cluster control unit message lost	(See page HC-117)
P1C7000	EMS _1 message Checksum error	(See page HC-117)
P1C7100	EMS _1 message Livecounter error	(See page HC-117)
P1C7200	EMS _1 message timeout	(See page HC-117)
P1C7300	EMS _2 message Checksum error	(See page HC-117)
P1C7400	EMS _2 message Livecounter error	(See page HC-117)
P1C7500	EMS _2 message timeout	(See page HC-117)
P1C7600	EMS _3 message Checksum error	(See page HC-117)
P1C7700	EMS _3 message Livecounter error	(See page HC-117)
P1C7800	EMS _3 message timeout	(See page HC-117)
P1C7900	EMS _5 message timeout	(See page HC-117)
P1C7A00	EMS _6 message timeout	(See page HC-117)
P1C7B00	EMS _11 message Checksum error	(See page HC-117)
P1C7C00	EMS _11 message Livecounter error	(See page HC-117)
P1C7D00	EMS _11 message timeout	(See page HC-117)
P1B7B00	BMS_1 message Checksum error	(See page HC-117)
P1B8100	BMS_1 message Livecounter error	(See page HC-117)
P1C8000	BMS_1 message timeout	(See page HC-117)
P1B7C00	BMS_2 message Checksum error	(See page HC-117)
P1B8200	BMS_2 message Livecounter error	(See page HC-117)
P1C8100	BMS_2 message timeout	(See page HC-117)
P1B7D00	BMS_3_1 message Checksum error	(See page HC-117)
P1B8300	BMS_3_1 message Livecounter error	(See page HC-117)
P1C8200	BMS_3_1 message timeout	(See page HC-117)

DTC	Description	Reference page
P1B7E00	BMS_3_2 message Checksum error	(See page HC-117)
P1B8400	BMS_3_2 message Livecounter error	(See page HC-117)
P1C8300	BMS_3_2 message timeout	(See page HC-117)
P1C8400	BMS_5_1 message timeout	(See page HC-117)
P1C8500	BMS_5_2 message timeout	(See page HC-117)
P1B7F00	BMS_6 message Checksum error	(See page HC-117)
P1B8500	BMS_6 message Livecounter error	(See page HC-117)
P1C8600	BMS_6 message timeout	(See page HC-117)
P1B8000	BMS_7 message Checksum error	(See page HC-117)
P1B8600	BMS_7 message Livecounter error	(See page HC-117)
P1C8700	BMS_7 message timeout	(See page HC-117)
P1C8800	IMCU_1 message timeout	(See page HC-117)
P1C8900	GM_1 message Checksum error	(See page HC-117)
P1C8A00	GM_1 message Livecounter error	(See page HC-117)
P1C8B00	GM_1 message timeout	(See page HC-117)
P1C8C00	GM_2 message Checksum error	(See page HC-117)
P1C8D00	GM_2 message Livecounter error	(See page HC-117)
P1C8E00	GM_2 message timeout	(See page HC-117)
P1C8F00	GM_3 message timeout	(See page HC-117)
P1B8700	MCU1_1 message Checksum error	(See page HC-117)
P1B8900	MCU1_1 message Livecounter error	(See page HC-117)
P1C9000	MCU1_1 message timeout	(See page HC-117)
P1B8800	MCU1_2 message Checksum error	(See page HC-117)
P1B8A00	MCU1_2 message Livecounter error	(See page HC-117)
P1C9100	MCU1_2 message timeout	(See page HC-117)
P1C9200	MCU1_3 message timeout	(See page HC-117)
P1B8F00	ABS_1 message Checksum error	(See page HC-117)
P1B9800	ABS_1 message Livecounter error	(See page HC-117)
P1BA100	ABS_1 message timeout	(See page HC-117)
P1B9000	ABS_2 message Checksum error	(See page HC-117)
P1B9900	ABS_2 message Livecounter error	(See page HC-117)
P1BA200	ABS_2 message timeout	(See page HC-117)
P1B9100	ESC_1_FW message Checksum error	(See page HC-117)
P1B9A00	ESC_1_FW message Livecounter error	(See page HC-117)
P1BA300	ESC_1_FW message timeout	(See page HC-117)
P1B9300	ESC_2 message Checksum error	(See page HC-117)
P1B9C00	ESC_2 message Livecounter error	(See page HC-117)
P1BA500	ESC_2 message timeout	(See page HC-117)
P1B9400	ESC_3 message Checksum error	(See page HC-117)

DTC	Description	Reference page
P1B9D00	ESC_3 message Livecounter error	(See page HC-117)
P1BA600	ESC_3 message timeout	(See page HC-117)
P1B9700	ESC_6 message Checksum error	(See page HC-117)
P1BA000	ESC_6 message Livecounter error	(See page HC-117)
P1BA900	ESC_6 message timeout	(See page HC-117)
P1C9600	IBC_1 message Checksum error	(See page HC-117)
P1C9700	IBC_1 message Livecounter error	(See page HC-117)
P1C9800	IBC_1 message timeout	(See page HC-117)
P1BC200	IFC_1 message Checksum error	(See page HC-117)
P1BC300	IFC_1 message Livecounter error	(See page HC-117)
P1C9900	IFC_1 message timeout	(See page HC-117)
P1BC400	IFC_7 message Checksum error	(See page HC-117)
P1BC500	IFC_7 message Livecounter error	(See page HC-117)
P1BC600	IFC_7 message timeout	(See page HC-117)
P1BC800	CSC_1 message timeout	(See page HC-117)
P1C9A00	ESC_2: AvailableSt_MSR signal implausible	(See page HC-117)
P1C9B00	ESC_1_FW: TorqueReductionFast_TCS signal invalid	(See page HC-117)
P1C9C00	ESC_1_FW: TorqueIncrease_MSR signal invalid	(See page HC-117)
P1C9F00	ESC_6: RegenerationTorqueRequest signal invalid	(See page HC-117)
P1CA000	IFC_1: TorqueRequest _ACC signal invalid	(See page HC-117)
P1CA100	EMS _1: Engine torque ActualNetTorq signal invalid	(See page HC-117)
P1CA200	GM_1: GM_ActGMTorque signal invalid	(See page HC-117)
P1CA300	EMS_3:EngineSpeed signal and GM_1:GM_Speed signal invalid	(See page HC-117)
P1CA400	MCU1_Speed signal and ABS vehicle speed signal invalid	(See page HC-117)
P1CA500	BMS_7: BMS_BatteryPackSOC signal invalid	(See page HC-117)
P1CA600	MCU1_1(MCU1_Speed) message and ABS vehicle speed (ABS_1) communication failure	(See page HC-117)
P0A8DA2	Electric drive system 12 V undervoltage flag bit	(See page HC-55)
P0A8EA3	M electric drive system 12 V overvoltage flag bit	(See page HC-55)
P1B201C	Drive motor drive board digital 5 V power supply abnormal	(See page HC-55)
P1B211C	Abnormal electric drive system position sensor power supply voltage	(See page HC-55)
P1B221C	Alternator driver board digital 5 V power supply abnormal	(See page HC-55)

DTC	Description	Reference page
P1B231C	Abnormal electric drive system current sensor 5 V power supply	(See page HC-55)
P1B241C	Abnormal electric drive system driver board analog 5 V voltage	(See page HC-55)
P1B251C	Abnormal electric drive system temperature sensor voltage	(See page HC-55)
P0BFD00	Drive motor phase current zero error flag	(See page HC-55)
P1B261C	Electric drive system bus voltage undervoltage flag bit	(See page HC-55)
P0C79A3	Electric drive system bus overvoltage flag bit	(See page HC-55)
P0A7800	Drive motor IGBT Fault flag	(See page HC-55)
P1B2700	Drive motor IGBT Ready fault identification	(See page HC-55)
P0A5F19	Drive motor output software overcurrent flag bit	(See page HC-55)
P0A6219	Drive motor output hardware overcurrent flag bit	(See page HC-55)
P1B2841	Drive motor three-phase current and checksum error status flag	(See page HC-55)
P0A3C98	Drive motor IGBT overtemperature flag bit	(See page HC-55)
P0A2F98	Drive motor overtemperature flag bit	(See page HC-55)
P0A3F01	Drive motor position sensor signal acquisition abnormity	(See page HC-55)
P1B2C47	Electric drive system watchdog monitoring abnormality	(See page HC-55)
P1B2D44	Electric drive system diagnostic memory data error (EEPROM)	(See page HC-55)
P0C1900	Drive motor torque monitoring abnormity	(See page HC-55)
P0DFA00	Alternator phase current zero error flag	(See page HC-55)
P0A7A00	Alternator IGBT Fault flag	(See page HC-55)
P1B2E00	Alternator IGBT Ready fault identification	(See page HC-55)
P0A7100	Alternator output software overcurrent flag bit	(See page HC-55)
P0A7419	Alternator output hardware overcurrent flag bit	(See page HC-55)
P1B2F41	Alternator three-phase current and checksum error status flag	(See page HC-55)
P0A3E98	Alternator IGBT overtemperature flag bit	(See page HC-55)
P0A3B98	Alternator overtemperature flag bit	(See page HC-55)
P0A4B01	Alternator position sensor signal acquisition abnormity	(See page HC-55)
P0E7100	Alternator torque monitoring abnormity	(See page HC-55)
P1B3008	MCU identifies BMS control unit node abnormality	(See page HC-95)
P1B3108	MCU identifies VCU node abnormality	(See page HC-95)
P0DE700	Traction battery cell overvoltage	(See page HC-95)
P0DE600	Traction battery cell undervoltage	(See page HC-95)

DTC	Description	Reference page
P1B3217	Traction battery cell OCV voltage out of limit	(See page HC-95)
P058E00	Traction battery module overtemperature	(See page HC-95)
P0C6E00	Critical excessive traction battery temperature difference	(See page HC-95)
P0B2400	Total traction battery overvoltage	(See page HC-95)
P0B2800	Total traction battery undervoltage	(See page HC-95)
P0CA700	Traction battery discharge current failure	(See page HC-95)
P0CA600	Traction battery feedback current failure	(See page HC-95)
P0A7D00	Traction battery SOC undervoltage	(See page HC-95)
P057F00	Traction battery cell SOC deviation alarm	(See page HC-95)
P1B3300	Thermal runaway	(See page HC-95)
P0AC501	Traction battery current sensor failure	(See page HC-95)
P0B1300	Traction battery current sensor message receiving error	(See page HC-95)
P1B3700	Traction battery high voltage sampling failure	(See page HC-95)
P1B380A	Traction battery cell voltage sampling line open	(See page HC-95)
P058C00	Traction battery module temperature sampling circuit failure	(See page HC-95)
P0DAC01	Traction battery equalization circuit short	(See page HC-95)
P1B3A0A	Daisy chain open circuit	(See page HC-95)
P1B3B05	Traction battery AFE initialization addressing failure	(See page HC-95)
P1B3D0A	Traction battery AFE communication lost	(See page HC-95)
P1B3E0A	Traction battery AFE communication message CRC error	(See page HC-95)
P1B3F0A	Traction battery AFE communication message Rolling counter error	(See page HC-95)
P0DB801	Traction battery equalization open circuit	(See page HC-95)
P0DB001	Traction battery diagnostic equalization switch disconnection	(See page HC-95)
P1B4017	Traction battery AFE communication module power supply overvoltage	(See page HC-95)
P1B410A	Traction battery AFE communication module power supply circuit shorted to ground/ undervoltage	(See page HC-95)
P1B420A	Traction battery AFE internal ADC module power supply overvoltage	(See page HC-95)
P1B430A	Traction battery AFE internal ADC module power supply shorted to ground/undervoltage	(See page HC-95)
P1B440A	Traction battery AFE chip power supply overvoltage	(See page HC-95)
P1B450A	Traction battery AFE chip power supply undervoltage	(See page HC-95)
P1B460A	Traction battery AFEADC function failure	(See page HC-95)

DTC	Description	Reference page
P0A9B01	Traction battery AFE overtemperature alarm	(See page HC-95)
P0A9C1C	Traction battery AFE overtemperature	(See page HC-95)
P1B470A	AFE diagnosis timeout	(See page HC-95)
P0AC61C	Traction battery SBC overtemperature alarm	(See page HC-95)
P0C3301	Traction battery SBC overtemperature	(See page HC-95)
P1B4800	Traction battery E2P error	(See page HC-95)
P0ACB1C	Traction battery MCU overtemperature alarm	(See page HC-95)
P0C7C01	Traction battery MCU overtemperature	(See page HC-95)
P0AD913	Traction battery main positive coil failure	(See page HC-95)
P0ADD13	Traction battery main negative coil failure	(See page HC-95)
P0AE413	Traction battery pre-charge coil failure	(See page HC-95)
P0AA001	Traction battery main positive or pre-charge contact adhesion	(See page HC-95)
P0AA301	Traction battery main negative contact adhesion	(See page HC-95)
P0D0701	Traction battery main positive or pre-charge contact circuit open	(See page HC-95)
P0D0E01	Traction battery main negative contact circuit open	(See page HC-95)
P1B4904	Battery assembly connection failure (blown fuse or disconnection of copper bar between modules)	(See page HC-95)
P0AA600	Battery insulation failure	(See page HC-95)
P1B4A08	CAN fault	(See page HC-95)
P0A8113	Traction battery fan failure	(See page HC-95)
P1B2C00	Engine shutdown disenable	(See page HC-125)

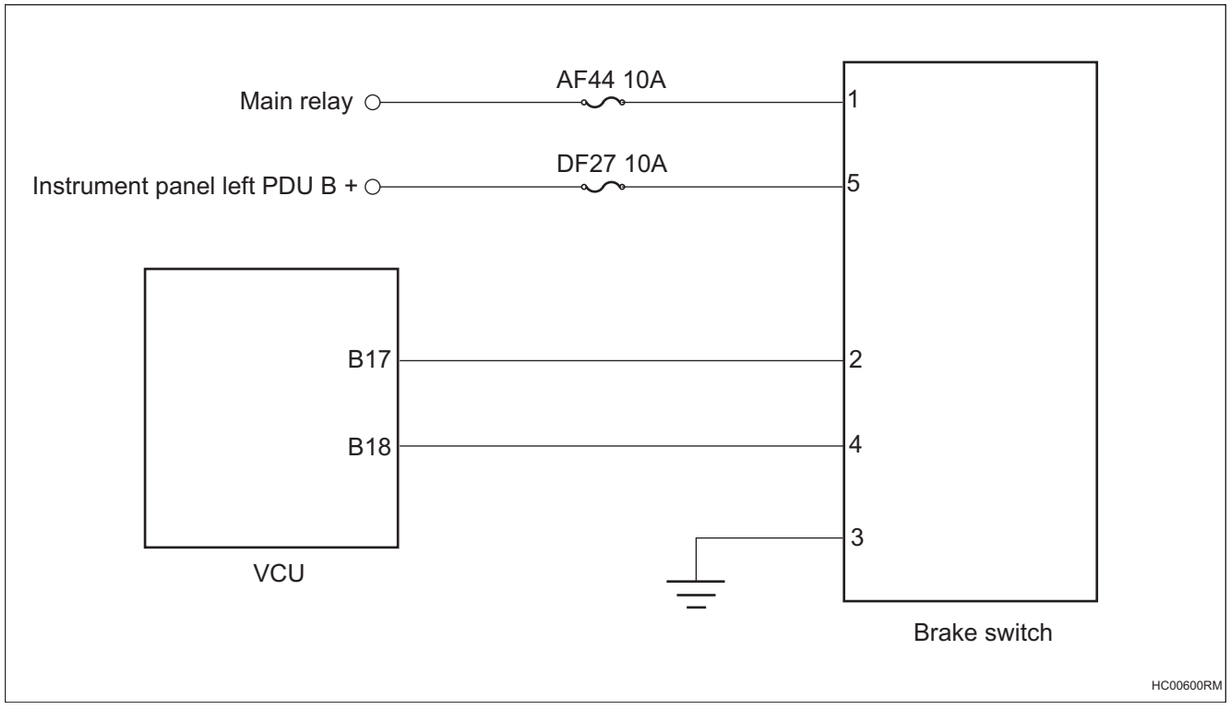
DTC	P057101	Brake pedal discrepancy error

Description

When a brake pedal discrepancy error is detected, the HCU records DTC.

DTC	DTC detection conditions	Faulty location
P057101	(a) Brake switch discrepancy error.	• Brake switch • Fuse • Harness and connector • HCU

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

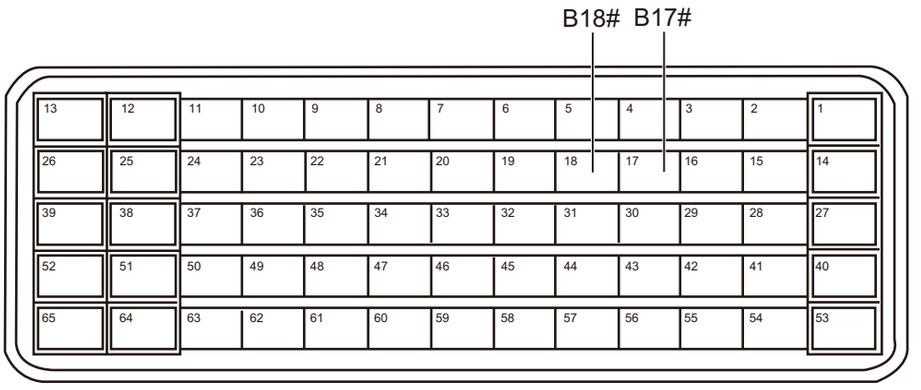
Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

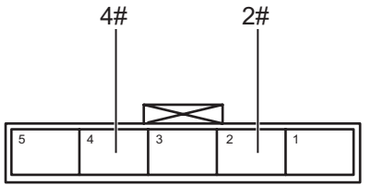
OK

2 **Check brake switch harness and connector for open circuit**



HCU B connector

HC00611RM



Brake switch connector

HC00620RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the brake switch connector.

(d) Disconnect the HCU connector.

(e) Measure the resistance according to the values in the table below.

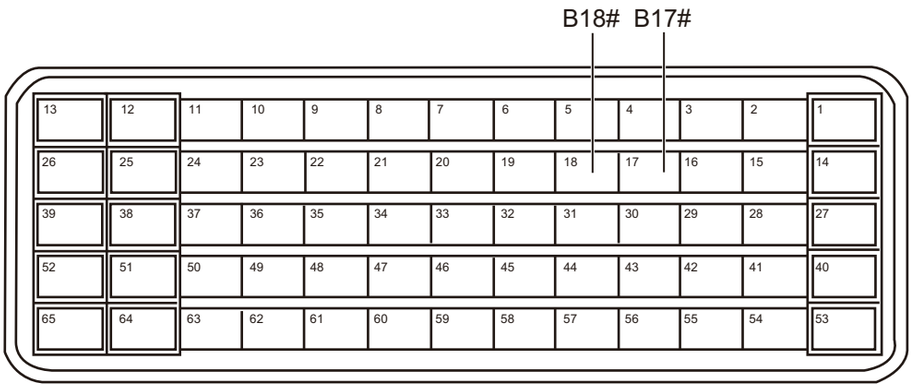
Standard value

Detector connection	Detection conditions	Specified state
HCU connector B17# - brake switch connector 2#	Always connected	Less than 1Ω
HCU connector B18# - brake switch connector 4#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3 **Check brake switch harness and connector for circuit shorted to ground**



HCU B connector

HC00611RM

(a) Measure the resistance according to the values in the table below.

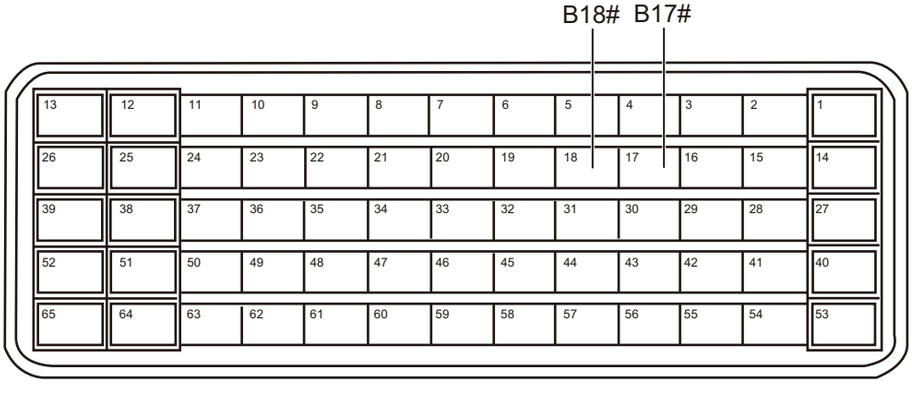
Standard value

Detector connection	Detection conditions	Specified state
HCU connector B17# - body GND	Always connected	10 KΩ or greater
HCU connector B18# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check brake switch harness and connector for circuit shorted to power supply**



HCU B connector

HC00611RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

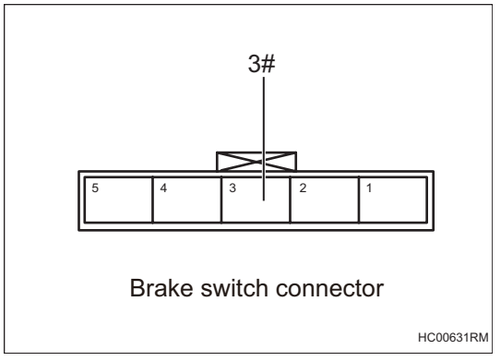
Standard value

Detector connection	Detection conditions	Specified state
HCU connector B17# - body GND	Set the ignition switch to "ON"	Less than 1 V
HCU connector B18# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5 Check brake switch ground



(a) Measure the resistance according to the values in the table below.

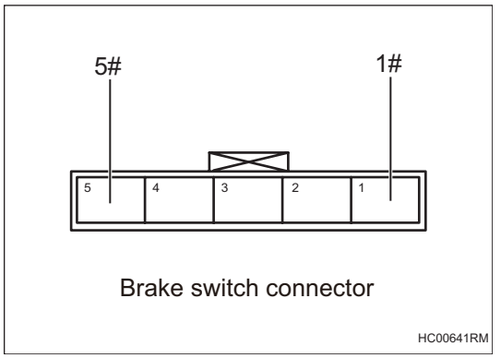
Standard value

Detector connection	Detection conditions	Specified state
Brake switch connector 3# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

6 Check brake switch power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Brake switch connector 1# - body GND	Set the ignition switch to "ON"	Battery voltage

Detector connection	Detection conditions	Specified state
Brake switch connector 5# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

7	Check brake switch

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions (pedal travel)	Specified state
Brake switch 4# -brake switch 3#	Brake pedal not depressed	10 KΩ or greater
Brake switch 2# -brake switch 3#	Brake pedal not depressed	Less than 1Ω
Brake switch 4# -brake switch 3#	Brake pedal pressed	Less than 1Ω
Brake switch 2# -brake switch 3#	Brake pedal pressed	10 KΩ or greater

NG → **Replace brake switch (See page BR-3)**

OK

8	Replace HCU (See page HC-126)

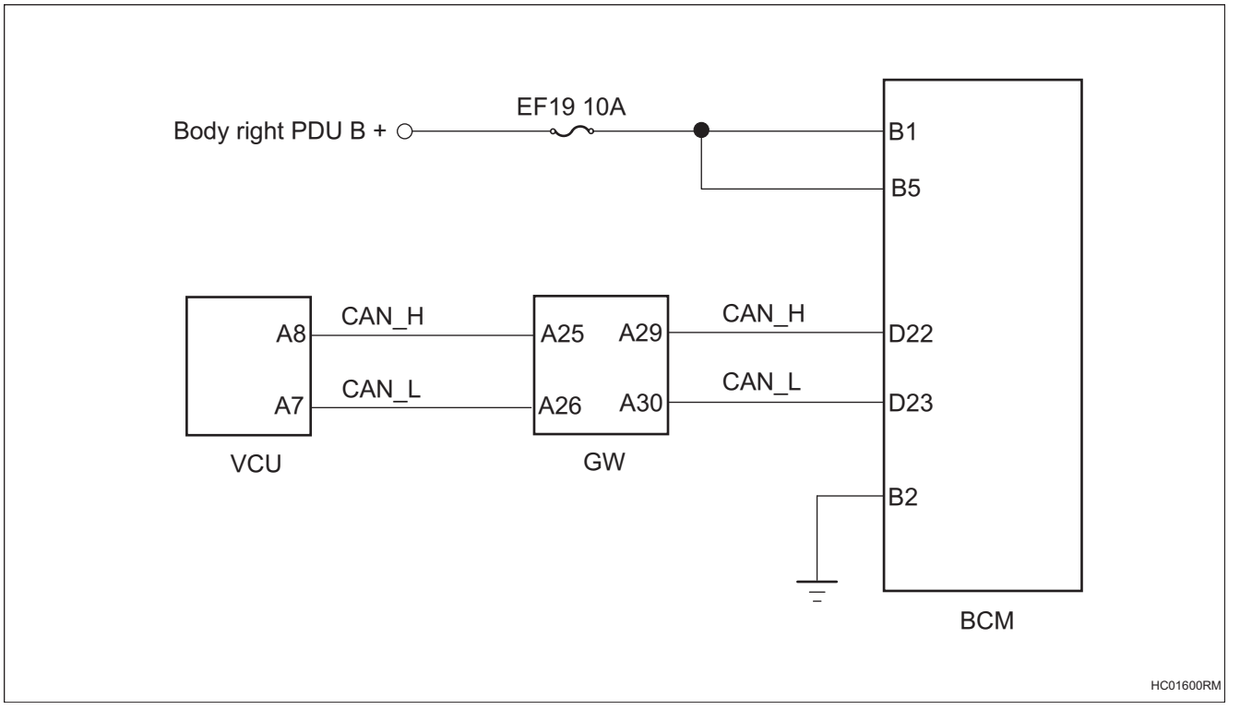
DTC	P063300	IMMO authentication failure

Description

When no response to IMMO authentication request is detected, the HCU records the DTC.

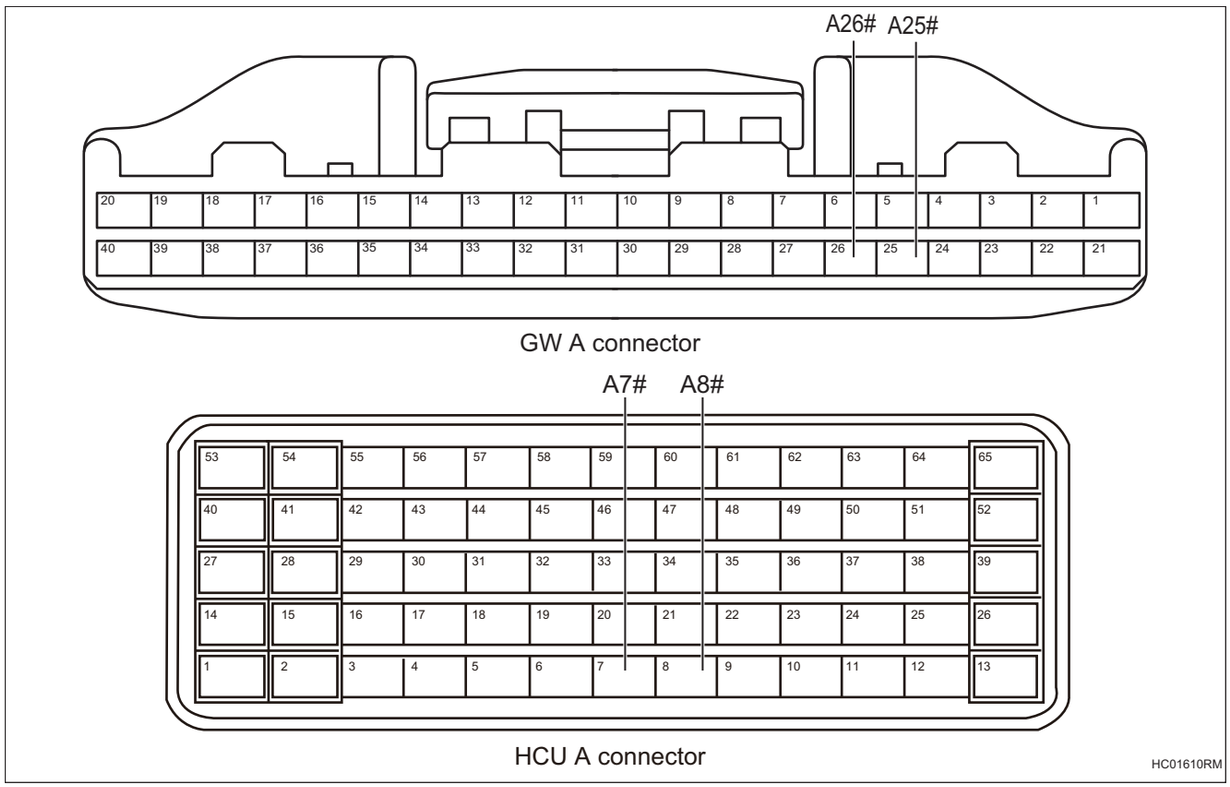
DTC	DTC detection conditions	Faulty location
P063300	(a) No response to IMMO authentication request.	• BCM • Harness and connector • GW • HCU

Circuit diagram



Inspection procedure

1	Check powertrain CAN bus for open circuit (GW-HCU)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the power-train CAN bus.

(d) Measure the resistance according to the values in the table below.

Standard value

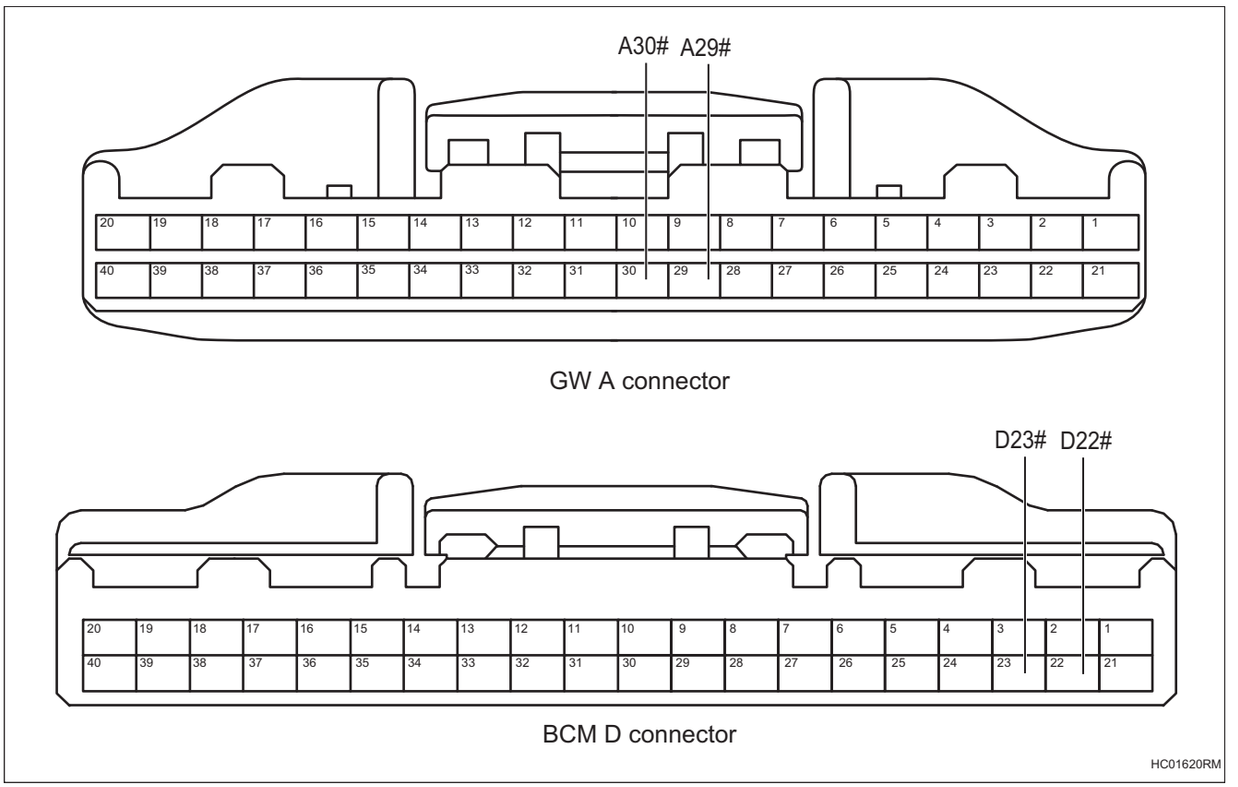
Detector connection	Detection conditions	Specified state
HCU connector A8# -GW connector A25#	Always connected	Less than 1Ω
HCU connector A7# -GW connector A26#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check comfort CAN bus for open circuit (GW-BCM)**

HC



HC

(a) Disconnect all control unit connectors on the comfort CAN bus.

(b) Measure the resistance according to the values in the table below.

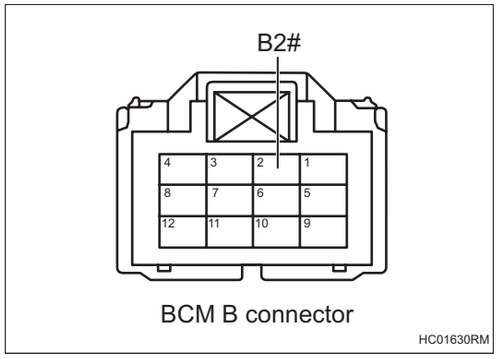
Standard value

Detector connection	Detection conditions	Specified state
GW connector A29# - BCM connector D22#	Always connected	Less than 1Ω
GW connector A30# - BCM connector D23#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	**Check BCM ground**



(a) Measure the resistance according to the values in the table below.

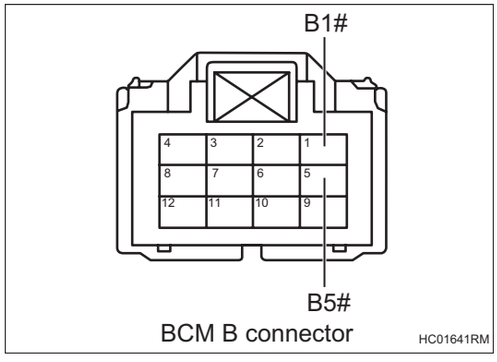
Standard value

Detector connection	Detection conditions	Specified state
BCM connector B2# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	Check BCM power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

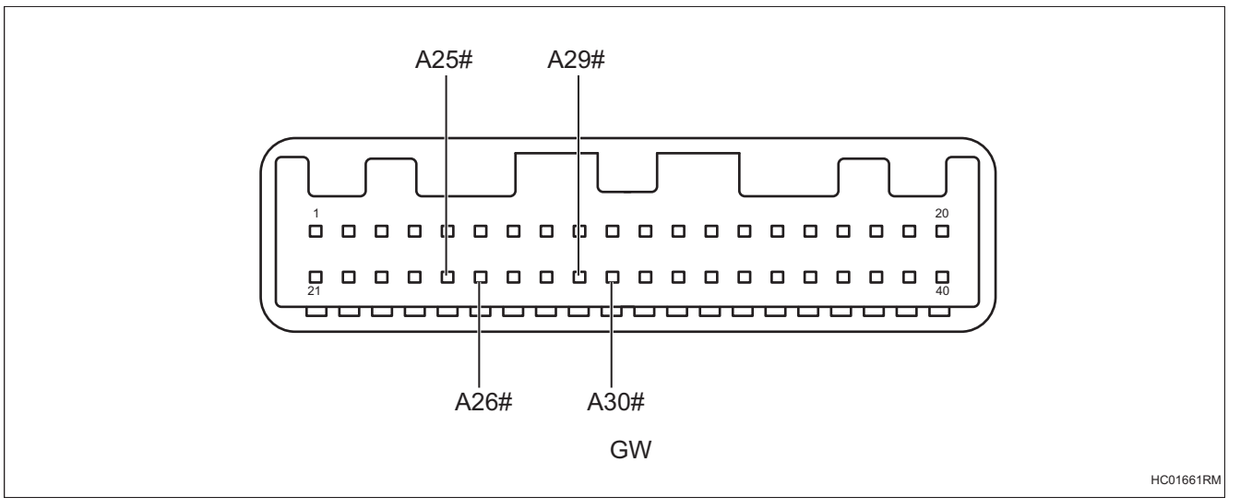
Standard value

Detector connection	Detection conditions	Specified state
BCM connector B1# -body GND	The ignition switch is set to "ON"	Battery voltage
BCM connector B5# -body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	Check GW terminal resistor



HC

(a) Measure the resistance according to the values in the table below.

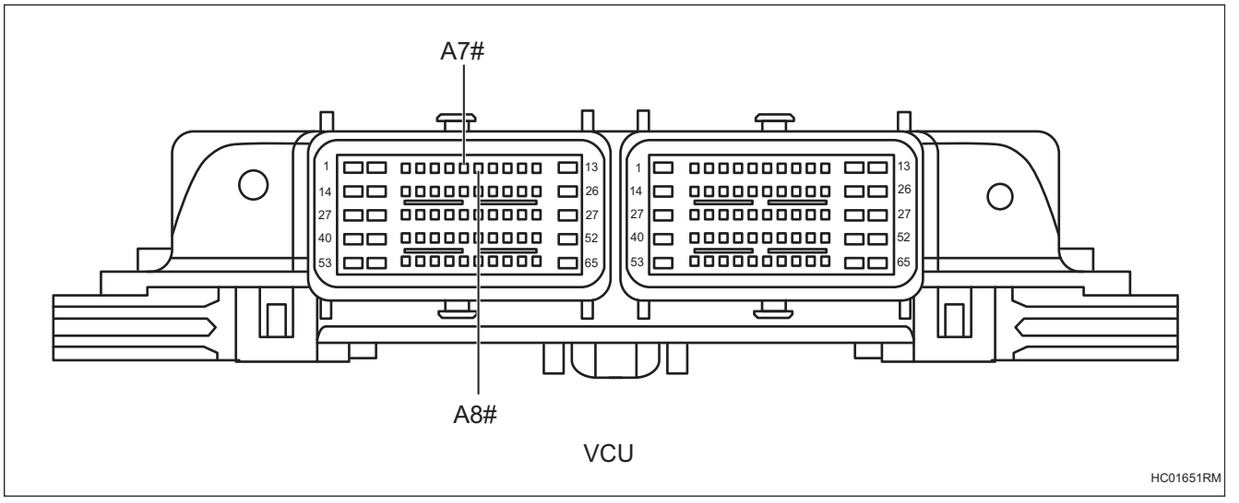
Standard value

Detector connection	Detection conditions	Specified state
GW A29#- GW A30#	Always connected	About 120 Ω
GW A25#- GW A26#	Always connected	About 120 Ω

NG → **Replace GW (See page CA-256)**

OK

6	Check HCU terminal resistor



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
HCU A7#- HCU A8#	Always connected	About 120 Ω

NG → **Replace HCU (See page HC-126)**

OK

7	**Replace the BCM (See page BM-114)**

DTC	P068712	Low voltage management relay output pin circuit shorted to power supply
DTC	P068611	Low voltage management relay output pin circuit shorted to ground
DTC	P068513	Low voltage management relay output pin circuit open

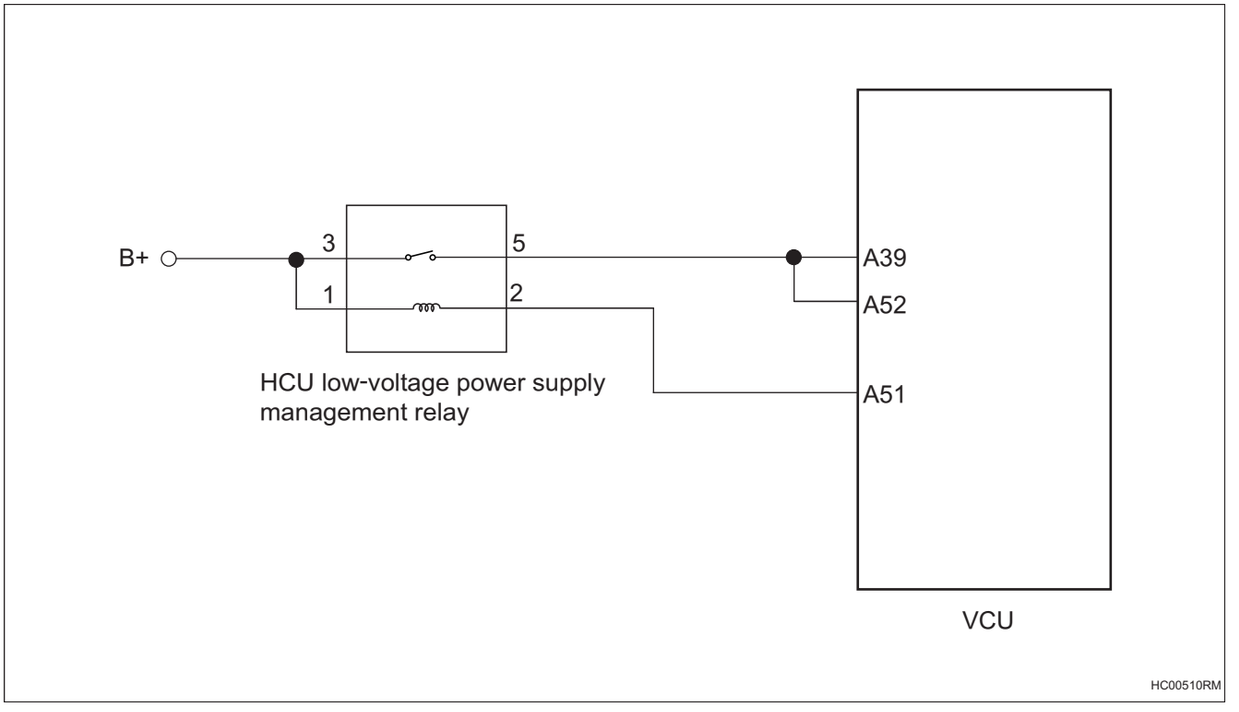
Description

When a short circuit or an open circuit occurs in the HCU low-voltage power supply management relay output pin, HCU shall record the DTC.

DTC	DTC detection conditions	Faulty location
P068712	(a) HCU low-voltage power supply management relay output pin circuit shorted to power supply.	• HCU low-voltage power supply management relay • Harness and connector • VCU
P068611	(a) HCU low voltage power supply management relay output pin circuit shorted to ground.	• HCU low-voltage power supply management relay • Harness and connector • VCU
P068513	(a) HCU low voltage power supply management relay output pin circuit open.	• HCU low-voltage power supply management relay • Harness and connector • VCU

HC

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

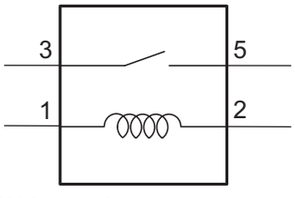
Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

HC

NG → **Check connector fit and clean connector**

OK

2	Check HCU low-voltage power supply management relay



HCU low-voltage power supply management relay

HC00520RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the HCU low-voltage power supply management relay.

(d) Measure the resistance according to the values in the table below.

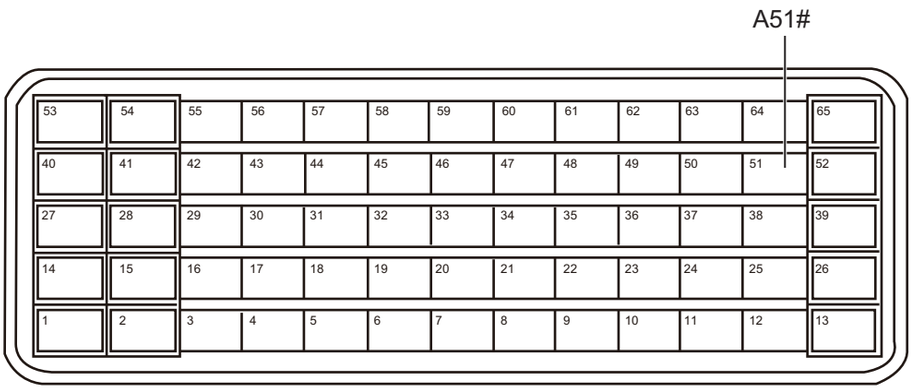
Standard value

Detector connection	Detection conditions	Specified state
HCU low-voltage power supply management relay 3# - HCU low-voltage power supply management relay 5#	Apply battery voltage between terminals 1# and 2#	Less than 1Ω
HCU low-voltage power supply management relay 3# - HCU low-voltage power supply management relay 5#	No battery voltage is applied between terminals 1# and 2#	10 KΩ or greater

NG → **Replace HCU low-voltage power management relay**

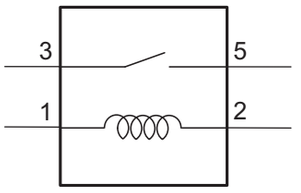
OK

3	Check HCU low-voltage power supply management relay harness and connector for open circuit



HCU A connector

HC00561RM



HCU low-voltage power supply management relay connector

HC00531RM

(a) Measure the resistance according to the values in the table below.

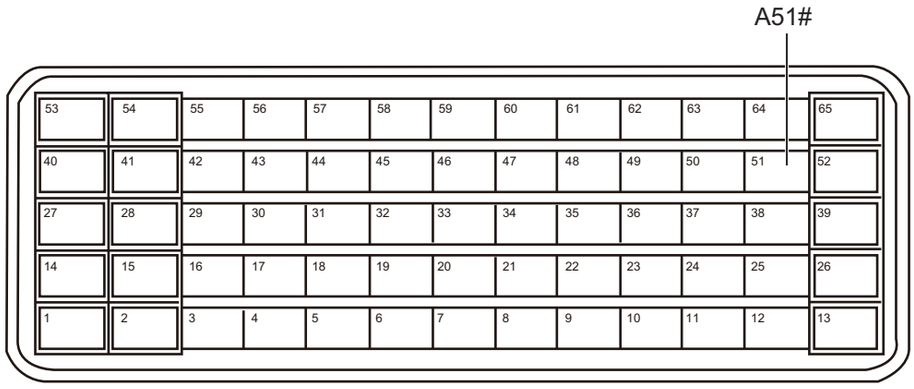
Standard value

Detector connection	Detection conditions	Specified state
HCU connector A51# - HCU low voltage power supply management relay connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	Check HCU low-voltage power supply management relay harness and connector for circuit shorted to ground



HCU A connector

HC00561RM

(a) Measure the resistance according to the values in the table below.

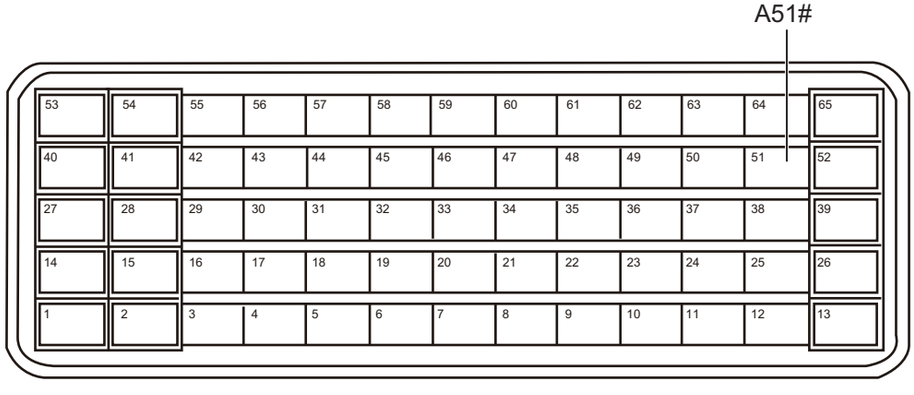
Standard value

Detector connection	Detection conditions	Specified state
HCU connector A51# - body GND	Always connected	10KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	**Check HCU low-voltage power supply management relay harness and connector for circuit shorted to power supply**



HCU A connector

HC00561RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
HCU connector A51# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Replace HCU (See page HC-126)**

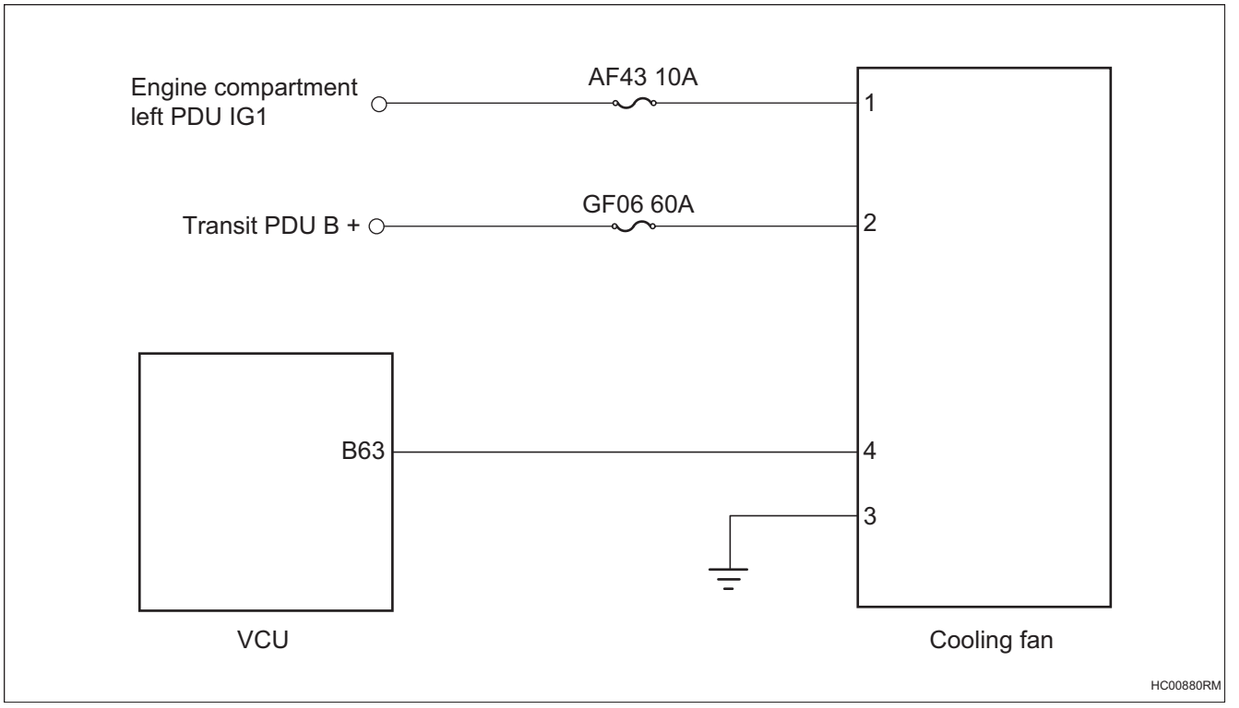
DTC	P069212	Cooling fan output pin circuit shorted to power supply
DTC	P069111	Cooling fan output pin circuit shorted to ground
DTC	P048001	Cooling fan output pin circuit open
DTC	P1B0604	Cooling fan internal failure
DTC	P1B0698	Cooling fan overtemperature
DTC	P1B0671	Cooling fan stalling
DTC	P1B061C	Cooling fan voltage failure

Description

When a low-speed cooling fan output pin fault or a body fault is detected, the HCU records the DTC.

DTC	DTC detection conditions	Faulty location
P069212	(a) Cooling fan output pin circuit shorted to power supply.	• VCU • Harness and connector • Cooling fan
P069111	(a) Cooling fan output pin circuit shorted to ground.	• VCU • Harness and connector • Cooling fan
P048001	(a) Cooling fan output pin circuit open.	• VCU • Harness and connector • Cooling fan
P1B0604	(a) Cooling fan internal failure.	• VCU • Harness and connector • Cooling fan
P1B0698	(a) Cooling fan overtemperature.	• VCU • Harness and connector • Cooling fan
P1B0671	(a) Cooling fan stalling.	• VCU • Harness and connector • Cooling fan
P1B061C	(a) Cooling fan voltage failure.	• VCU • Harness and connector • Cooling fan

Circuit diagram



HC

Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

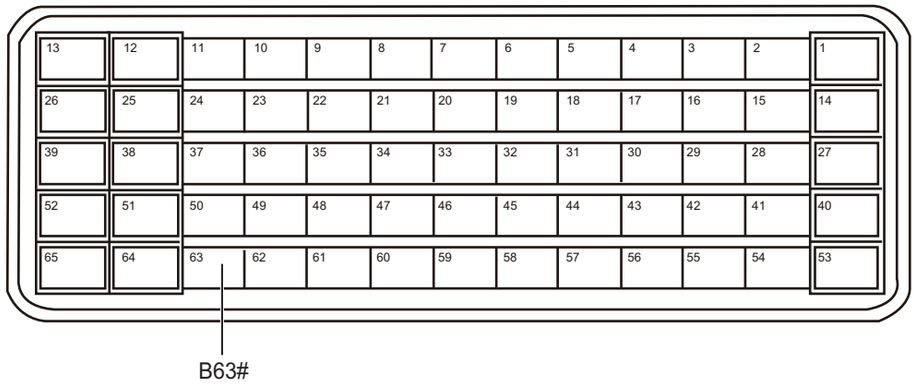
Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

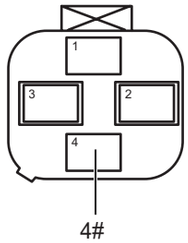
OK

2	Check cooling fan harness and connector for open circuit



HCU B connector

HC00891RM



Cooling fan connector

HC00900RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the cooling fan connector.

(d) Disconnect the HCU connector.

(e) Measure the resistance according to the values in the table below.

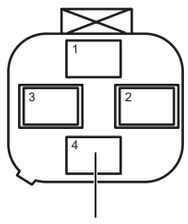
Standard value

Detector connection	Detection conditions	Specified state
Cooling fan connector 4# -HCU connector B63#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	Check whether cooling fan harness and connector circuit is shorted to ground



Cooling fan connector

HC00900RM

(a) Measure the resistance according to the values in the table below.

Standard value

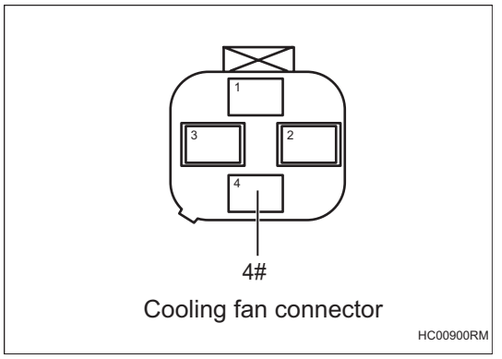
Detector connection	Detection conditions	Specified state
Cooling fan connector 4# -body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

HC

OK

4	Check whether cooling fan harness and connector circuit is shorted to power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

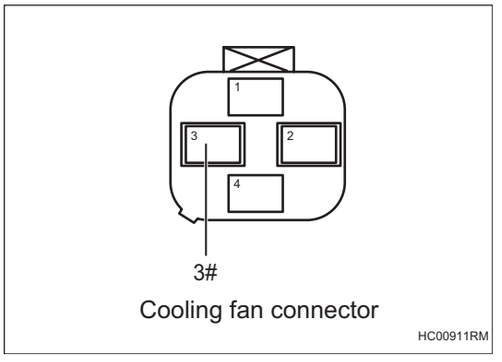
Detector connection	Detection conditions	Specified state
Cooling fan connector 4# -body GND	The ignition switch is set to "ON"	Less than 1 V

HC

NG → **Repair or replace the harness and connector**

OK

5	Check cooling fan ground



(a) Measure the resistance according to the values in the table below.

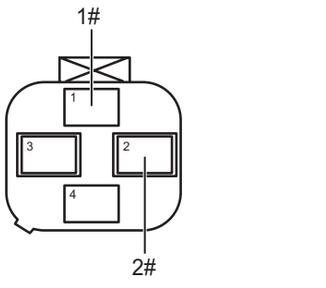
Standard value

Detector connection	Detection conditions	Specified state
Cooling fan connector 3# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

6	Check cooling fan power supply



Cooling fan connector
HC00921RM

(a) Set the ignition switch to "OFF".
(b) Disconnect the battery negative terminal.
(c) Connect the HCU connector.
(d) Connect the battery negative terminal.
(e) Set the ignition switch to "ON".
(f) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Cooling fan connector 1# -body GND	The ignition switch is set to "ON"	Battery voltage
Cooling fan connector 2# -body GND	The ignition switch is set to "ON"	Battery voltage

HC

NG → **Repair or replace harness and connector, fuse and relay**

OK

7	**Replace the cooling fan (See page CO-15)**

(a) Replace the cooling fan.
(b) Connect the HQ-VDS.
(c) Clear the DTC.
(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace HCU (See page HC-126)**

OK

8	**End**

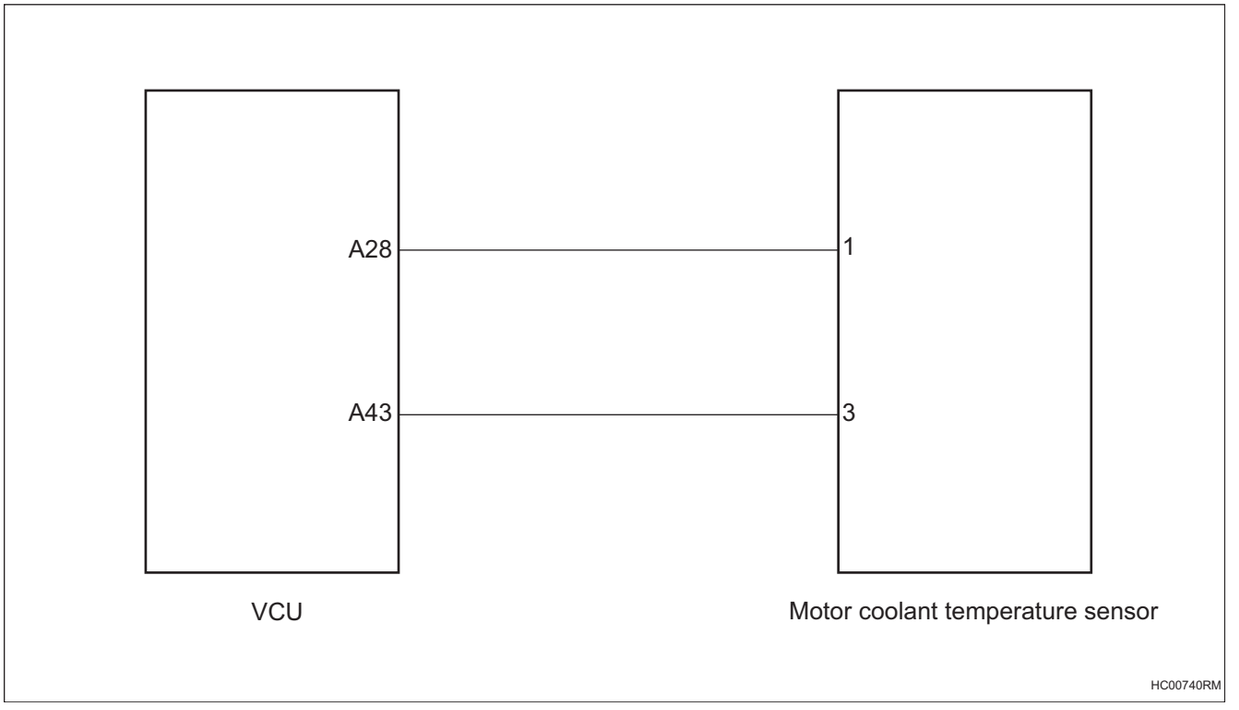
DTC	P0A0312	Motor system coolant temperature sensor voltage above upper limit
DTC	P0A0211	Motor system coolant temperature sensor voltage below lower limit

Description

When it is detected that the motor coolant temperature sensor signal is not within the specified range, the HCU will record the DTC.

DTC	DTC detection conditions	Faulty location
P0A0312	(a) Motor coolant temperature sensor voltage above upper limit.	• Motor coolant temperature sensor • Harness and connector • HCU
P0A0211	(a) Motor coolant temperature sensor voltage below lower limit.	• Motor coolant temperature sensor • Harness and connector • HCU

Circuit diagram



Inspection procedure

1	Check coolant

(a) Check whether the coolant level is normal.

(b) Check whether the coolant has deteriorated.

NG	Repair according to the fault

OK

2	**Check coolant temperature**

(a) Connect the HQ-VDS.

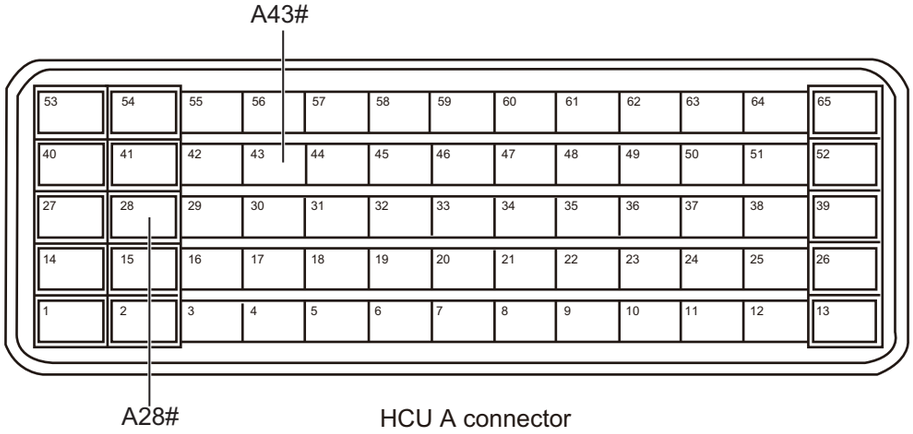
(b) Set the ignition switch to "ON".

(c) Read and check whether the measured coolant temperature is within a reasonable range.

NG **Repair according to the fault**

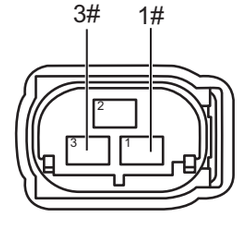
OK

3	**Check motor coolant temperature sensor harness and connector for open circuit**



HCU A connector

HC00731RM



Motor coolant temperature sensor connector

HC00720RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the motor coolant temperature sensor connector.

(d) Disconnect the HCU connector.

(e) Measure the resistance according to the values in the table below.

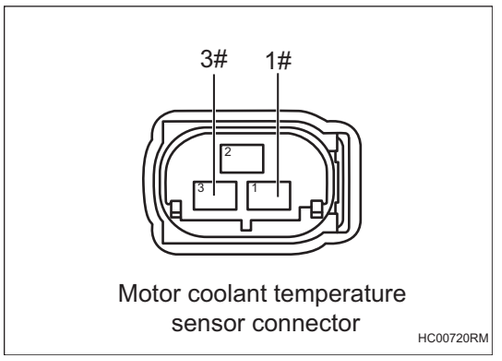
Standard value

Detector connection	Detection conditions	Specified state
Motor coolant temperature sensor connector 1# -HCU connector A28#	Always connected	Less than 1Ω
Motor coolant temperature sensor connector 3# -HCU connector A43#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	Check motor coolant temperature sensor harness and connector for circuit shorted to ground



Motor coolant temperature sensor connector
HC00720RM

(a) Measure the resistance according to the values in the table below.

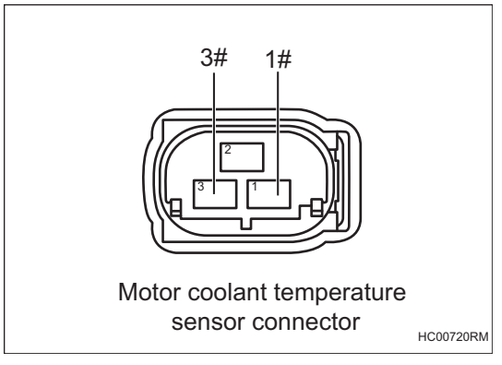
Standard value

Detector connection	Detection conditions	Specified state
Motor coolant temperature sensor connector 1# - body GND	Always connected	10 KΩ or greater
Motor coolant temperature sensor connector 3# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	Check motor coolant temperature sensor harness and connector for circuit shorted to each other



Motor coolant temperature sensor connector
HC00720RM

(a) Measure the resistance according to the values in the table below.

Standard value

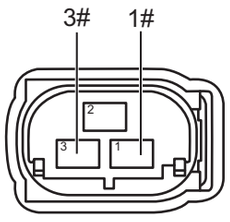
Detector connection	Detection conditions	Specified state
Motor coolant temperature sensor connector 1# -motor coolant temperature sensor connector 3#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

6	Check motor coolant temperature sensor harness and connector for circuit shorted to power supply

HC



Motor coolant temperature sensor connector

HC00720RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

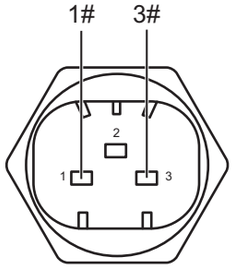
Detector connection	Detection conditions	Specified state
Motor coolant temperature sensor connector 1# - body GND	The ignition switch is set to "ON"	Less than 1 V
Motor coolant temperature sensor connector 3# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG **Repair or replace the harness and connector**

HC

OK

7 Check the motor coolant temperature sensor



Motor coolant temperature sensor

HC00710RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Motor coolant temperature sensor 1# -motor coolant temperature sensor 3#	－ 40 ℃	41.7200 ~ 51.4756KΩ
Motor coolant temperature sensor 1# -motor coolant temperature sensor 3#	－ 20 ℃	13.7511 ~ 16.4402KΩ
Motor coolant temperature sensor 1# -motor coolant temperature sensor 3#	0 ℃	5.2566 ~ 6.1153KΩ
Motor coolant temperature sensor 1# -motor coolant temperature sensor 3#	20 ℃	2.2631 ~ 2.5705KΩ
Motor coolant temperature sensor 1# -motor coolant temperature sensor 3#	40 ℃	1.0734 ~ 1.1936KΩ
Motor coolant temperature sensor 1# -motor coolant temperature sensor 3#	60 ℃	0.5516 ~ 0.6019KΩ
Motor coolant temperature sensor 1# -motor coolant temperature sensor 3#	80 ℃	0.3031 ~ 0.3251KΩ
Motor coolant temperature sensor 1# -motor coolant temperature sensor 3#	100 ℃	0.1777 ~ 0.1868KΩ
Motor coolant temperature sensor 1# -motor coolant temperature sensor 3#	120 ℃	0.1088 ~ 0.1144KΩ

NG **Replace the motor coolant temperature sensor (See page CO-5)**

OK

8	Replace HCU (See page HC-126)

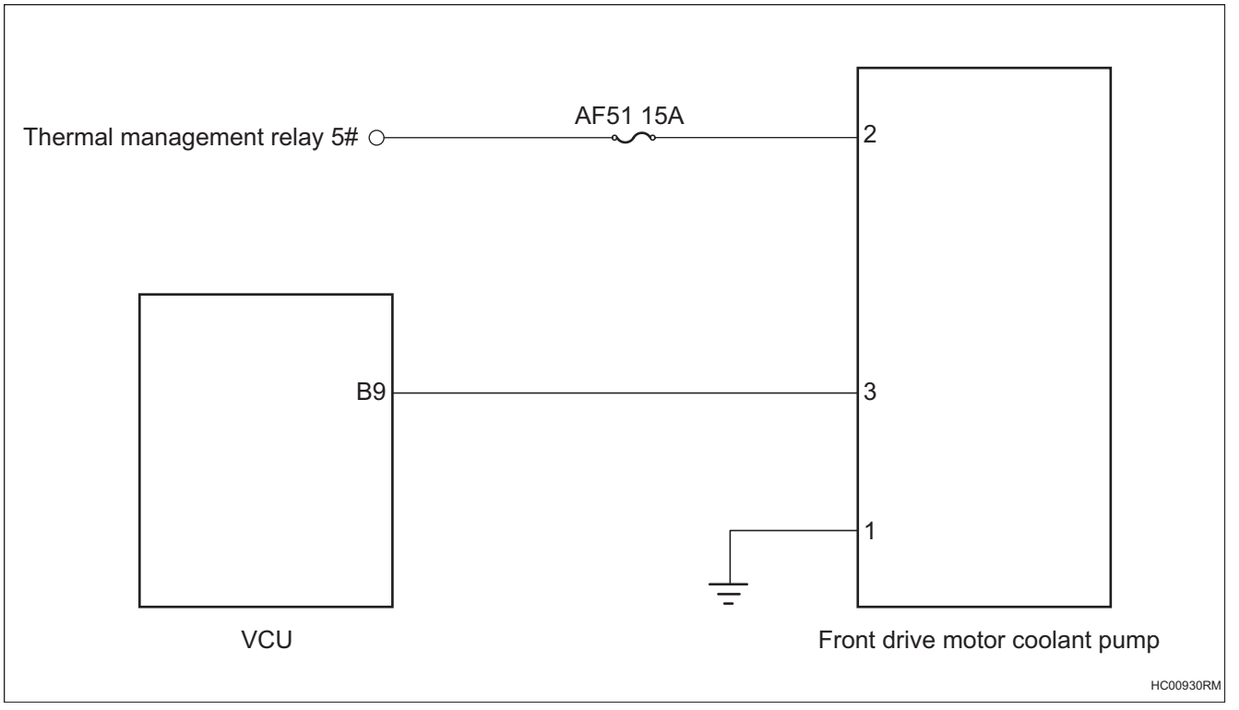
DTC	P0A0712	Motor coolant pump output pin circuit shorted to power supply
DTC	P0A0611	Motor coolant pump output pin circuit shorted to ground
DTC	P0A0513	Motor coolant pump output pin circuit open
DTC	P1B0806	Motor coolant pump underspeed operation
DTC	P1B0871	Motor coolant pump overcurrent/stalling
DTC	P1B0816	Motor coolant pump undervoltage
DTC	P1B0817	Motor coolant pump overvoltage
DTC	P1B0898	Motor coolant pump overtemperature

Description

When the front drive motor coolant pump output pin fault or the body fault is detected, the HCU records the DTC.

DTC	DTC detection conditions	Faulty location
P0A0712	(a) Motor coolant pump output pin circuit shorted to power supply.	• VCU • Harness and connector • Front drive motor coolant pump
P0A0611	(a) Motor coolant pump output pin circuit shorted to ground.	• VCU • Harness and connector • Front drive motor coolant pump
P0A0513	(a) Motor coolant pump output pin circuit open.	• VCU • Harness and connector • Front drive motor coolant pump
P1B0806	(a) Motor coolant pump underspeed operation.	• VCU • Harness and connector • Front drive motor coolant pump
P1B0871	(a) Motor coolant pump overcurrent/stalling.	• VCU • Harness and connector • Front drive motor coolant pump
P1B0816	(a) Motor coolant pump undervoltage.	• VCU • Harness and connector • Front drive motor coolant pump
P1B0817	(a) Motor coolant pump overvoltage.	• VCU • Harness and connector • Front drive motor coolant pump
P1B0898	(a) Motor coolant pump overtemperature.	• VCU • Harness and connector • Front drive motor coolant pump

Circuit diagram



Inspection procedure

1	**Confirm and clear the DTC**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

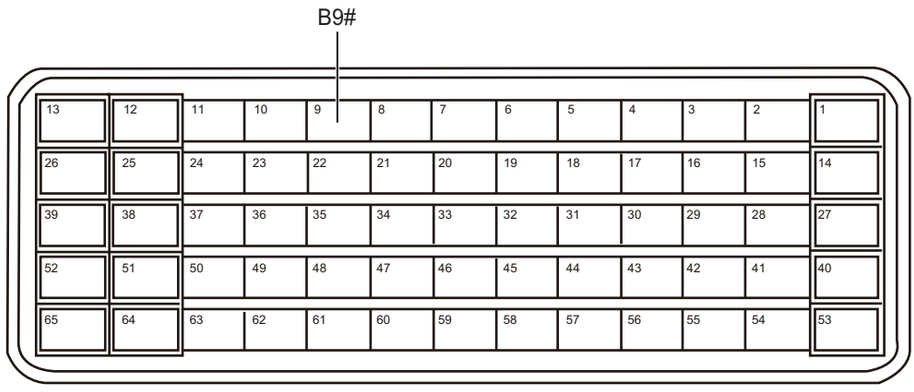
Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

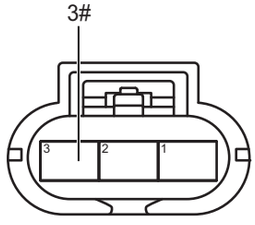
OK

2	**Check front drive motor coolant pump harness and connector for open circuit**



HCU B connector

HC00941RM



Front drive motor coolant pump connector

HC00950RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the front drive motor coolant pump connector.

(d) Disconnect the HCU connector.

(e) Measure the resistance according to the values in the table below.

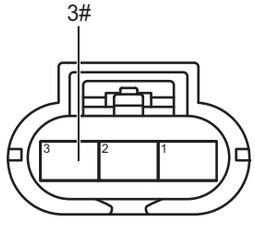
Standard value

Detector connection	Detection conditions	Specified state
Front drive motor coolant pump connector 3# -HCU connector B9#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	**Check front drive motor coolant pump harness and connector for circuit shorted to ground**



Front drive motor coolant pump connector

HC00950RM

(a) Measure the resistance according to the values in the table below.

Standard value

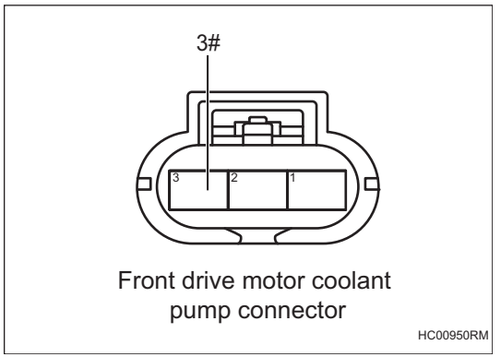
Detector connection	Detection conditions	Specified state
Front drive motor coolant pump connector 3# - body GND	Always connected	10 KΩ or greater

HC

NG → **Repair or replace the harness and connector**

OK

4	**Check front drive motor coolant pump harness and connector for circuit shorted to power supply**



Front drive motor coolant pump connector
HC00950RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

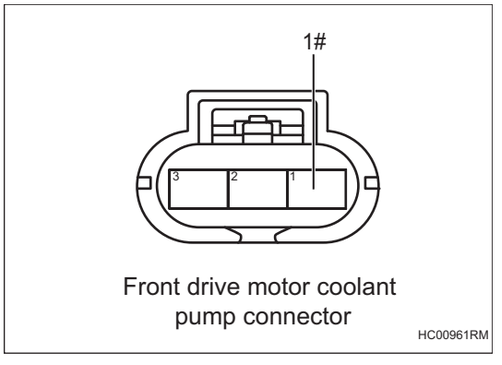
Standard value

Detector connection	Detection conditions	Specified state
Front drive motor coolant pump connector 3# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Check the front drive motor coolant pump ground**



Front drive motor coolant pump connector
HC00961RM

(a) Measure the resistance according to the values in the table below.

Standard value

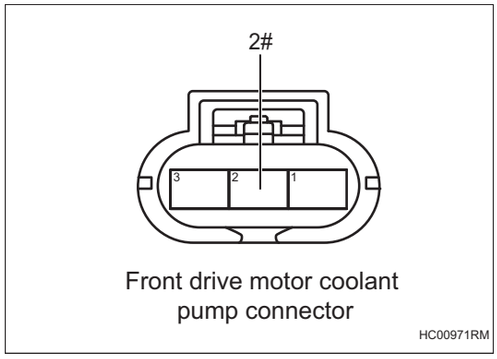
Detector connection	Detection conditions	Specified state
Front drive motor coolant pump connector 1# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

6	**Check the front drive motor coolant pump power supply**

HC



Front drive motor coolant pump connector

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Connect the HCU connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Front drive motor coolant pump connector 2# - body GND	The ignition switch is set to "ON"	Battery voltage

HC

NG → **Repair or replace harness and connector, fuse and relay**

OK

7	**Replace the front drive motor coolant pump (See page CO-14)**

(a) Replace the front drive motor coolant pump.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace HCU (See page HC-126)**

OK

8	**End**

DTC	P0A8DA2	Electric drive system 12 V undervoltage flag bit
DTC	P0A8EA3	M electric drive system 12 V overvoltage flag bit
DTC	P1B201C	Drive motor drive board digital 5 V power supply abnormal
DTC	P1B211C	Abnormal electric drive system position sensor power supply voltage
DTC	P1B221C	Alternator driver board digital 5 V power supply abnormal
DTC	P1B231C	Abnormal electric drive system current sensor 5 V power supply
DTC	P1B241C	Abnormal electric drive system driver board analog 5 V voltage
DTC	P1B251C	Abnormal electric drive system temperature sensor voltage
DTC	P0BFD00	Drive motor phase current zero error flag
DTC	P1B261C	Electric drive system bus voltage undervoltage flag bit
DTC	P0C79A3	Electric drive system bus overvoltage flag bit
DTC	P0A7800	Drive motor IGBT Fault flag
DTC	P1B2700	Drive motor IGBT Ready fault identification
DTC	P0A5F19	Drive motor output software overcurrent flag bit
DTC	P0A6219	Drive motor output hardware overcurrent flag bit
DTC	P1B2841	Drive motor three-phase current and checksum error status flag
DTC	P0A3C98	Drive motor IGBT overtemperature flag bit
DTC	P0A2F98	Drive motor overtemperature flag bit

DTC	P0A3F01	Drive motor position sensor signal acquisition abnormity
DTC	P1B2C47	Electric drive system watchdog monitoring abnormality
DTC	P1B2D44	Electric drive system diagnostic memory data error (EEPROM)
DTC	P0C1900	Drive motor torque monitoring abnormity
DTC	P0DFA00	Alternator phase current zero error flag
DTC	P0A7A00	Alternator IGBT Fault flag
DTC	P1B2E00	Alternator IGBT Ready fault identification
DTC	P0A7100	Alternator output software overcurrent flag bit
DTC	P0A7419	Alternator output hardware overcurrent flag bit
DTC	P1B2F41	Alternator three-phase current and checksum error status flag
DTC	P0A3E98	Alternator IGBT overtemperature flag bit
DTC	P0A3B98	Alternator overtemperature flag bit
DTC	P0A4B01	Alternator position sensor signal acquisition abnormity
DTC	P0E7100	Alternator torque monitoring abnormity

Description

When the HCU detects a motor system OBD related fault, the HCU records DTC.

DTC	DTC detection conditions	Faulty location
P0A8DA2	(a) Electric drive system 12 V undervoltage flag bit	• MCU • Harness and connector
P0A8EA3	(a) M electric drive system 12 V overvoltage flag	• MCU • Harness and connector
P1B201C	(a) Drive motor driver board digital 5 V power supply abnormal	• MCU • Harness and connector
P1B211C	(a) Abnormal electric drive system position sensor power supply voltage	• MCU • Harness and connector
P1B221C	(a) Alternator driver board digital 5 V power supply abnormal	• MCU • Harness and connector

DTC	DTC detection conditions	Faulty location
P1B231C	(a) Abnormal electric drive system 5 V power supply current sensor	• MCU • Harness and connector
P1B241C	(a) Electric drive system driver board analog 5 V voltage abnormal	• MCU • Harness and connector
P1B251C	(a) Abnormal electric drive system temperature sensor voltage	• MCU • Harness and connector
P0BFD00	(a) Drive motor phase current zero error flag	• MCU • Harness and connector
P1B261C	(a) Electric drive system bus undervoltage flag bit	• MCU • Harness and connector
P0C79A3	(a) Electric drive system bus overvoltage flag bit	• MCU • Harness and connector
P0A7800	(a) Drive motor IGBT Fault flag	• MCU • Harness and connector
P1B2700	(a) Drive motor IGBT Ready fault identification	• MCU • Harness and connector
P0A5F19	(a) Drive motor output software overcurrent flag bit	• MCU • Harness and connector
P0A6219	(a) Drive motor output hardware overcurrent flag bit	• MCU • Harness and connector
P1B2841	(a) Drive motor three-phase current and checksum error status flag	• MCU • Harness and connector
P0A3C98	(a) Drive motor IGBT overtemperature flag bit	• MCU • Harness and connector
P0A2F98	(a) Drive motor overtemperature flag bit	• MCU • Harness and connector
P0A3F01	(a) Drive motor position sensor signal acquisition abnormity	• MCU • Harness and connector
P1B2C47	(a) Abnormality of the watchdog monitoring of the electric drive system	• MCU • Harness and connector
P1B2D44	(a) Electric drive system diagnostic memory data error (EEPROM)	• MCU • Harness and connector
P0C1900	(a) Drive motor torque monitoring abnormity	• MCU • Harness and connector
P0DFA00	(a) Alternator phase current zero error flag	• MCU • Harness and connector
P0A7A00	(a) Alternator IGBT Fault flag bit	• MCU • Harness and connector
P1B2E00	(a) Alternator IGBT Ready fault identification	• MCU • Harness and connector
P0A7100	(a) Alternator output software overcurrent flag bit	• MCU • Harness and connector

DTC	DTC detection conditions	Faulty location
P0A7419	(a) Alternator output hardware overcurrent flag bit	• MCU • Harness and connector
P1B2F41	(a) Alternator three-phase current and checksum error status flag	• MCU • Harness and connector
P0A3E98	(a) Alternator IGBT overtemperature flag bit	• MCU • Harness and connector
P0A3B98	(a) Alternator overtemperature flag bit	• MCU • Harness and connector
P0A4B01	(a) Alternator position sensor signal acquisition abnormity	• MCU • Harness and connector
P0E7100	(a) Alternator torque monitoring abnormity	• MCU • Harness and connector

Inspection procedure

1	Check MCU harness and connector

(a) Check whether the MCU harness and connector are connected tightly.

(b) Check whether the MCU harness and connector are short-circuited or open-circuited.

(c) Check whether the motor system high-voltage harness and connector are connected tightly.

(d) Check whether the motor system high-voltage harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

2	Replace the MCU (See page MC-70)

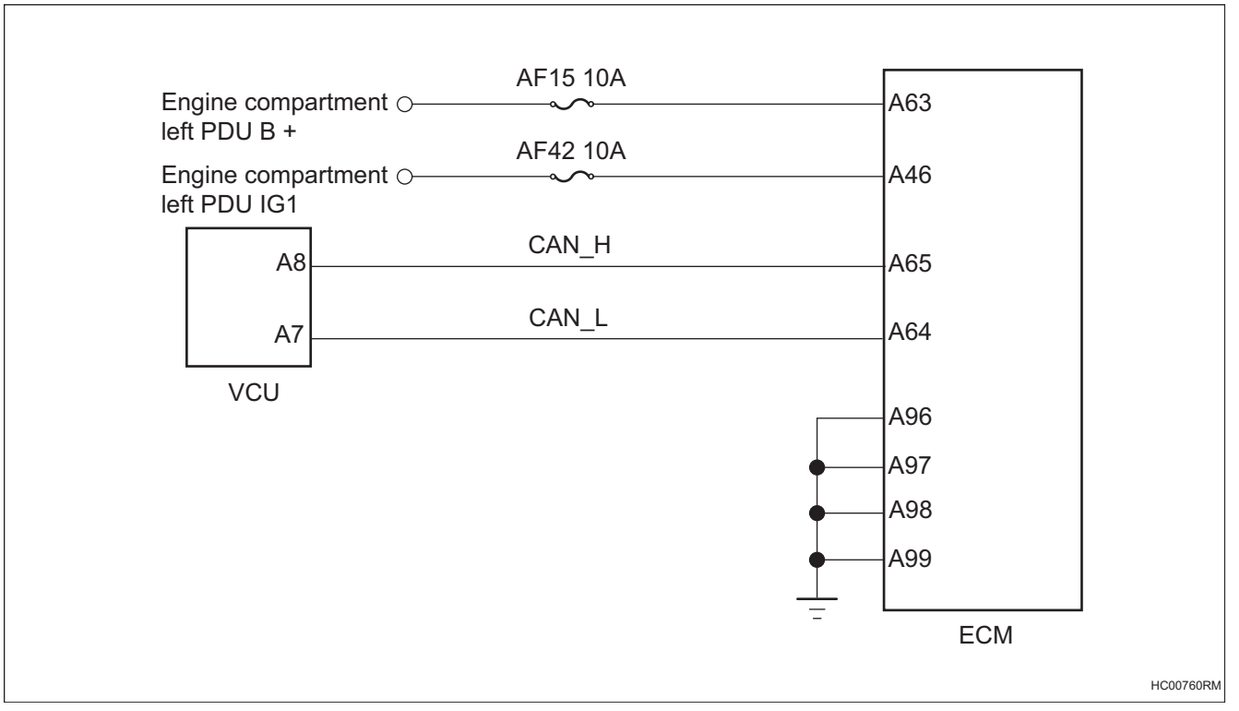
DTC	P1B0000	Engine start failure

Description

When a engine start failure is detected, the HCU records DTC.

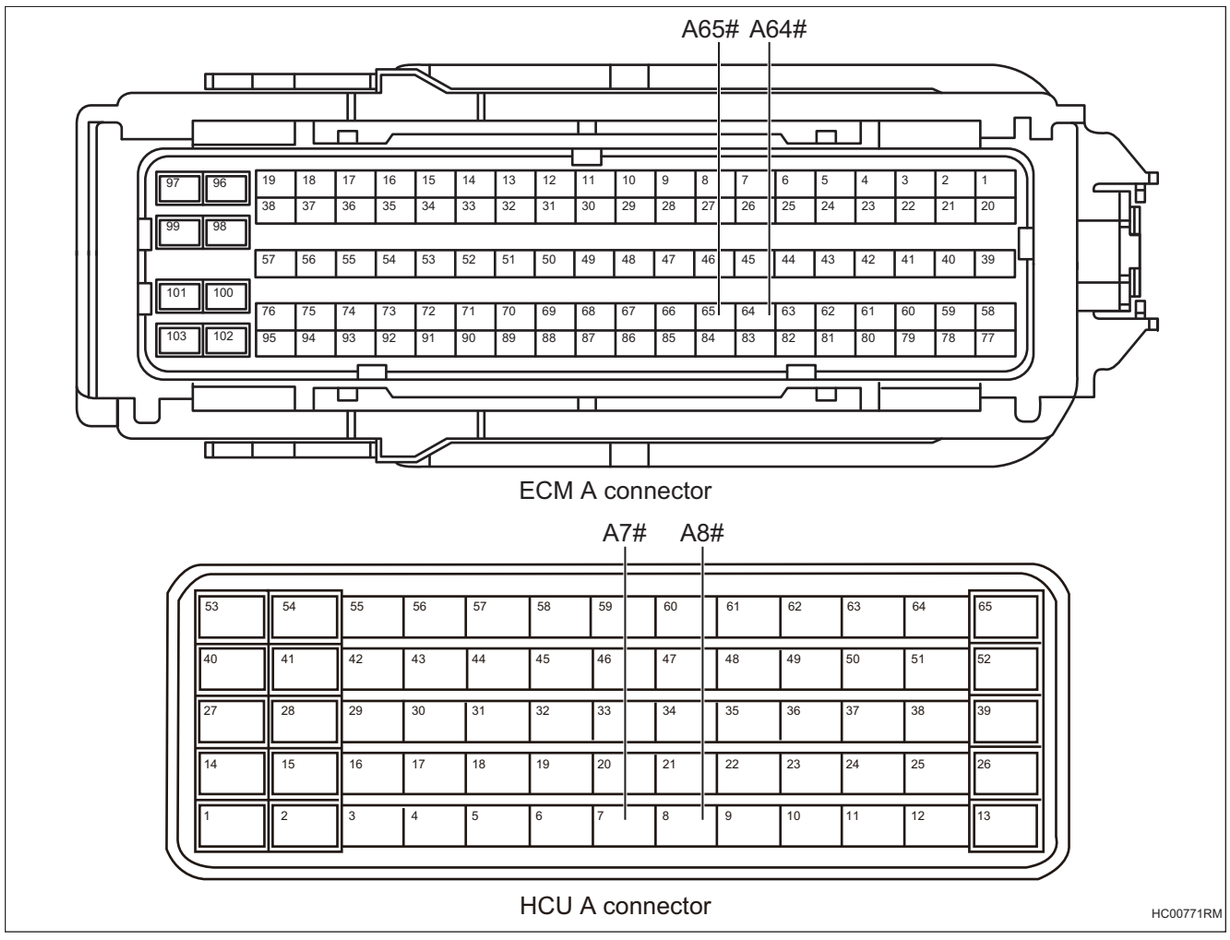
DTC	DTC detection conditions	Faulty location
P1B0000	(a) Engine start failure.	• ECM • Harness and connector • GW • HCU

Circuit diagram



Inspection procedure

1	Check powertrain CAN bus for open circuit (ECM-HCU)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the power-train CAN bus.

(d) Measure the resistance according to the values in the table below.

Standard value

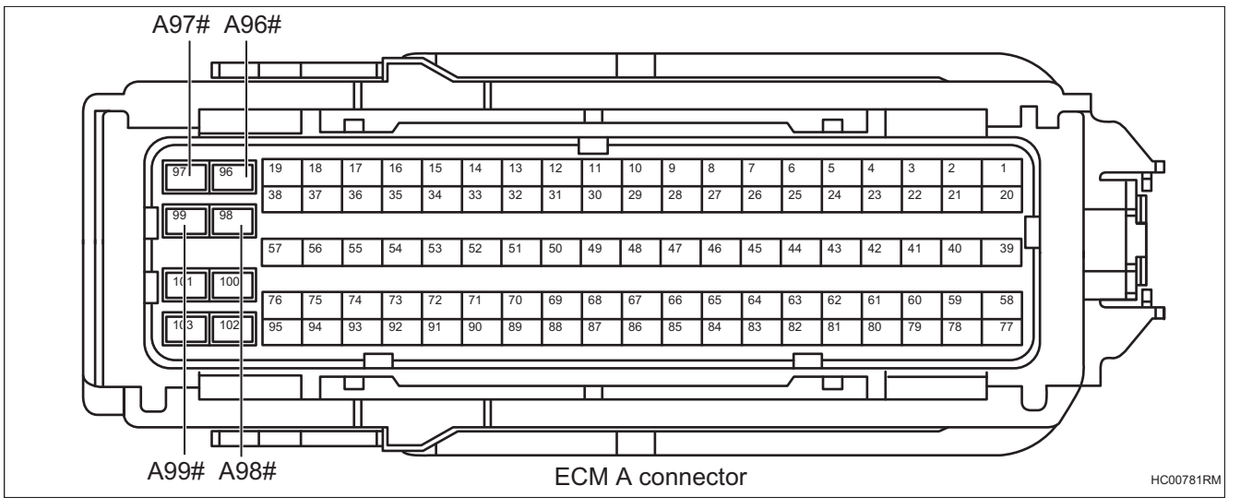
Detector connection	Detection conditions	Specified state
HCU connector A8# - ECM connector A65#	Always connected	Less than 1Ω
HCU connector A7# - ECM connector A64#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check ECM ground**

HC



HC

(a) Measure the resistance according to the values in the table below.

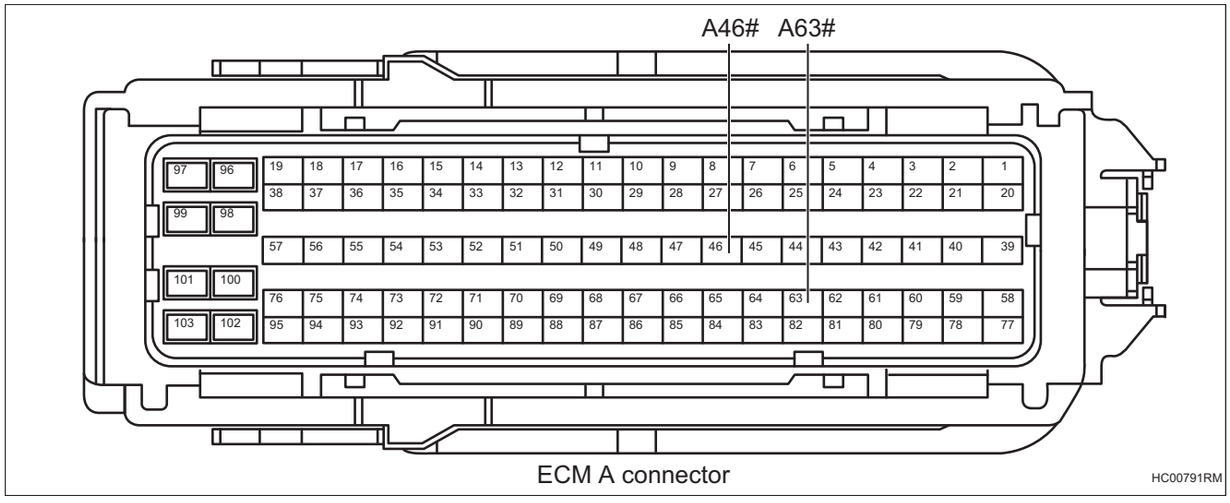
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A96# -body GND	Always connected	Less than 1Ω
ECM connector A97# - body GND	Always connected	Less than 1Ω
ECM connector A98# - body GND	Always connected	Less than 1Ω
ECM connector A99# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check ECM power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

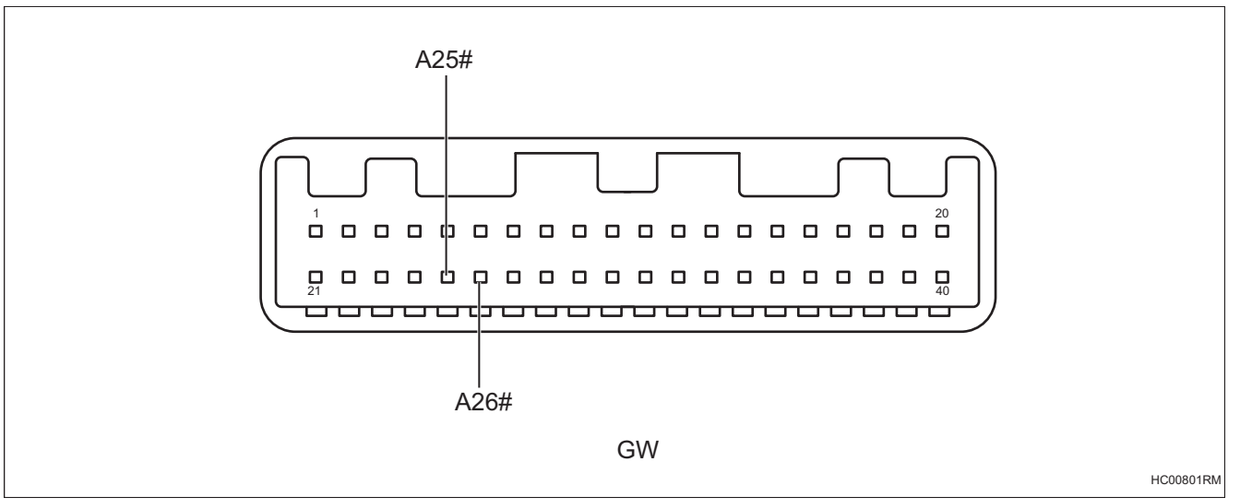
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A63# - body GND	The ignition switch is set to "ON"	Battery voltage
ECM connector A46# - body GND	The ignition switch is set to "ON"	Battery voltage

NG **Repair or replace the harness and connector**

OK

4	**Check GW terminal resistor**



HC

(a) Measure the resistance according to the values in the table below.

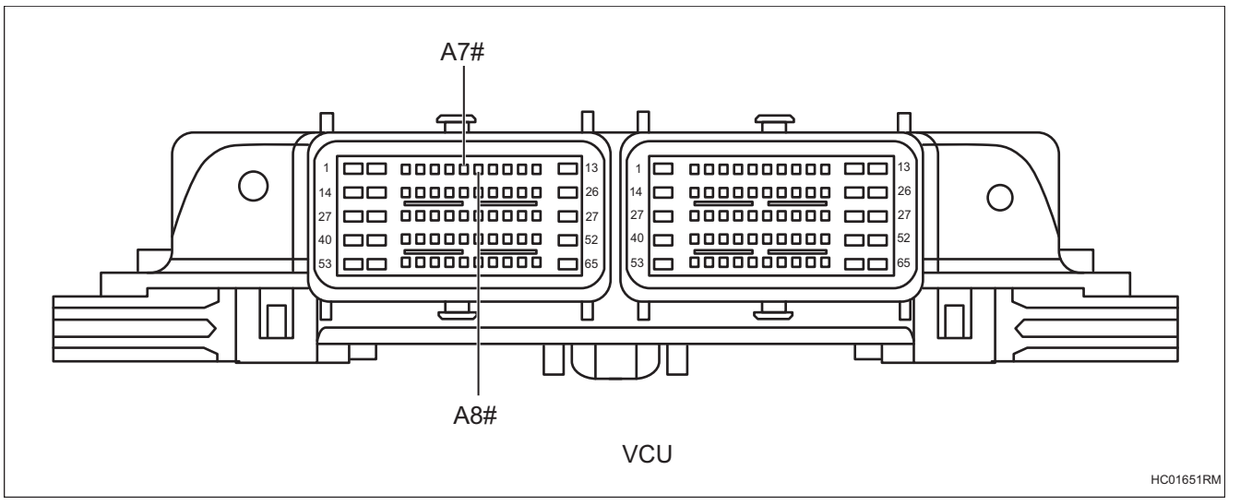
Standard value

Detector connection	Detection conditions	Specified state
GW A25#- GW A26#	Always connected	About 120 Ω

NG → **Replace GW (See page CA-256)**

OK

5	Check HCU terminal resistor



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
HCU A7#- HCU A8#	Always connected	About 120 Ω

NG → **Replace HCU (See page HC-126)**

OK

6	**Replace ECM (See page ES-54)**

DTC	P1B0100	Functional safety level 1 fault
DTC	P1B0200	Functional safety level 2 fault
DTC	P1B0300	Functional safety level 3 fault

Description

When a functional safety level fault is detected, the HCU records DTC.

DTC	DTC detection conditions	Faulty location
P1B0100	(a) Functional safety level 1 fault.	• ECM • Motor control unit • Battery management system • Harness and connector • VCU
P1B0200	(a) Functional safety level 2 fault.	• ECM • Motor control unit • Battery management system • Harness and connector • VCU
P1B0300	(a) Functional safety level 3 fault.	• ECM • Motor control unit • Battery management system • Harness and connector • VCU

Inspection procedure

1	Check the ECM harness and connector

(a) Check whether the ECM harness and connector are connected tightly.

(b) Check whether the ECM harness and connector are short-circuited or open-circuited.

(c) Check the system for DTC.

(d) Check whether the ECM is damaged.

NG → **Repair according to the fault**

OK

2	Check MCU harness and connector

(a) Check whether the MCU harness and connector are connected tightly.

(b) Check whether the MCU harness and connector are short-circuited or open-circuited.

(c) Check whether the high-voltage harness and connector are connected tightly.

(d) Check whether the high-voltage harness and connector are short-circuited or open-circuited.

(e) Check the system for DTC.

(f) Check whether the MCU is damaged.

NG → **Repair according to the fault**

OK

3	Check BMU harness and connector

(a) Check whether the BMU harness and connector are connected tightly.

(b) Check whether the BMU harness and connector are short-circuited or open-circuited.

(c) Check whether the high-voltage harness and connector are connected tightly.

(d) Check whether the high-voltage harness and connector are short-circuited or open-circuited.

(e) Check the system for DTC.

(f) Check whether the BMU is damaged.

NG → **Repair according to the fault**

OK

4	Check HCU harness and connector

(a) Check whether the HCU harness and connector are connected tightly.

(b) Check whether the HCU harness and connector are short-circuited or open-circuited.

(c) Check the system for DTC.

NG → **Repair according to the fault**

OK

5	Replace HCU (See page HC-126)

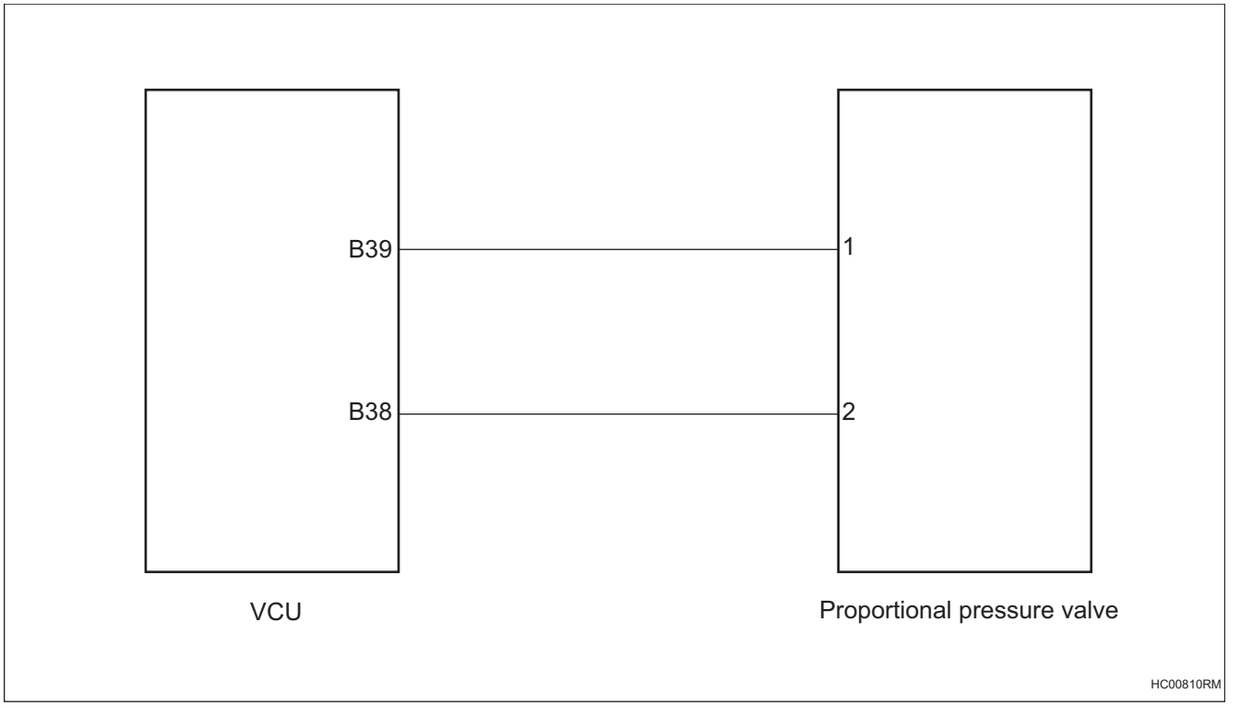
DTC	P1B057E	Clutch engagement failure
DTC	P1B0575	Clutch torque transmission abnormity
DTC	P1B057F	Clutch release failure

Description

When a clutch fault is detected, the HCU records DTC.

DTC	DTC detection conditions	Faulty location
P1B057E	(a) Clutch engagement failure.	• Clutch • Proportional pressure valve • Harness and connector • VCU
P1B0575	(a) Clutch torque transmission abnormity.	• Clutch • Proportional pressure valve • Harness and connector • VCU
P1B057F	(a) Clutch release failure.	• Clutch • Proportional pressure valve • Harness and connector • VCU

Circuit diagram



Inspection procedure

1	Check clutch

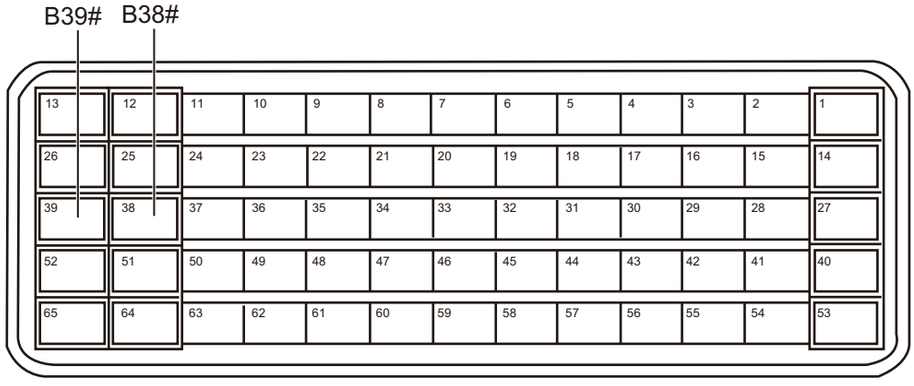
(a) Check whether the clutch is installed correctly.

(b) Check whether the clutch is damaged.

NG **Repair or replace the clutch**

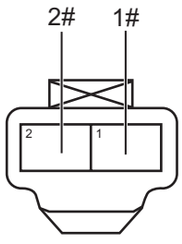
OK

2	**Check proportional pressure valve harness and connector for open circuit**



HCU B connector

HC00821RM



Proportional pressure valve connector

HC00830RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the proportional pressure valve connector.

(d) Disconnect the HCU connector.

(e) Measure the resistance according to the values in the table below.

Standard value

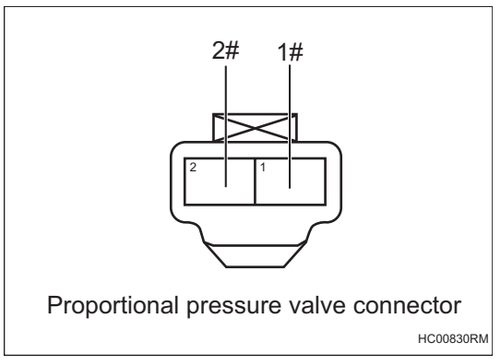
Detector connection	Detection conditions	Specified state
Proportional pressure valve connector 1# - HCU connector B39#	Always connected	Less than 1Ω
Proportional pressure valve connector 2# - HCU connector B38#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	**Check proportional pressure valve harness andconnector for circuit shorted to ground**

HC



Proportional pressure valve connector
HC00830RM

(a) Measure the resistance according to the values in the table below.

Standard value

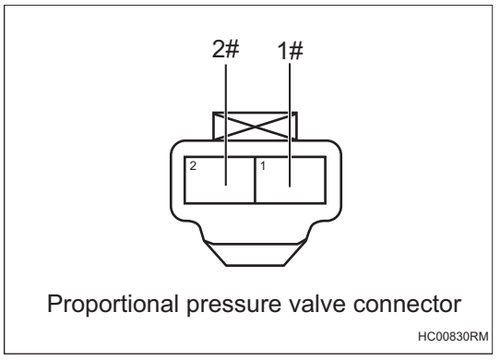
Detector connection	Detection conditions	Specified state
Proportional pressure valve connector 1# - body GND	Always connected	10 KΩ or greater
Proportional pressure valve connector 2# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

HC

OK

4 Check proportional pressure valve harness and connector for circuit shorted to each other



Proportional pressure valve connector
HC00830RM

(a) Measure the resistance according to the values in the table below.

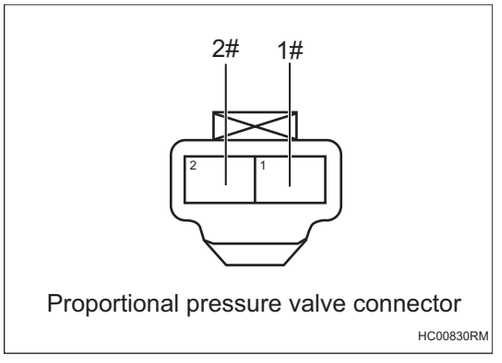
Standard value

Detector connection	Detection conditions	Specified state
Proportional pressure valve connector 1# - proportional pressure valve connector 2#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5 Check proportional pressure valve harness and connector for circuit shorted to power supply



Proportional pressure valve connector
HC00830RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Proportional pressure valve connector 1# - body GND	The ignition switch is set to "ON"	Less than 1 V

Detector connection	Detection conditions	Specified state
Proportional pressure valve connector 2# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Replace proportional pressure valve (See page MC-70)**

(a) Replace the proportional pressure valve.

(b) Connect the HQ-VDS .

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace HCU (See page HC-126)**

OK

7	**End**

DTC	P1B0C16	VCU power supply undervoltage
DTC	P0562A2	VCU power supply voltage low
DTC	P0563A3	VCU power supply voltage high
DTC	P1B0C1B	VCU power supply overvoltage

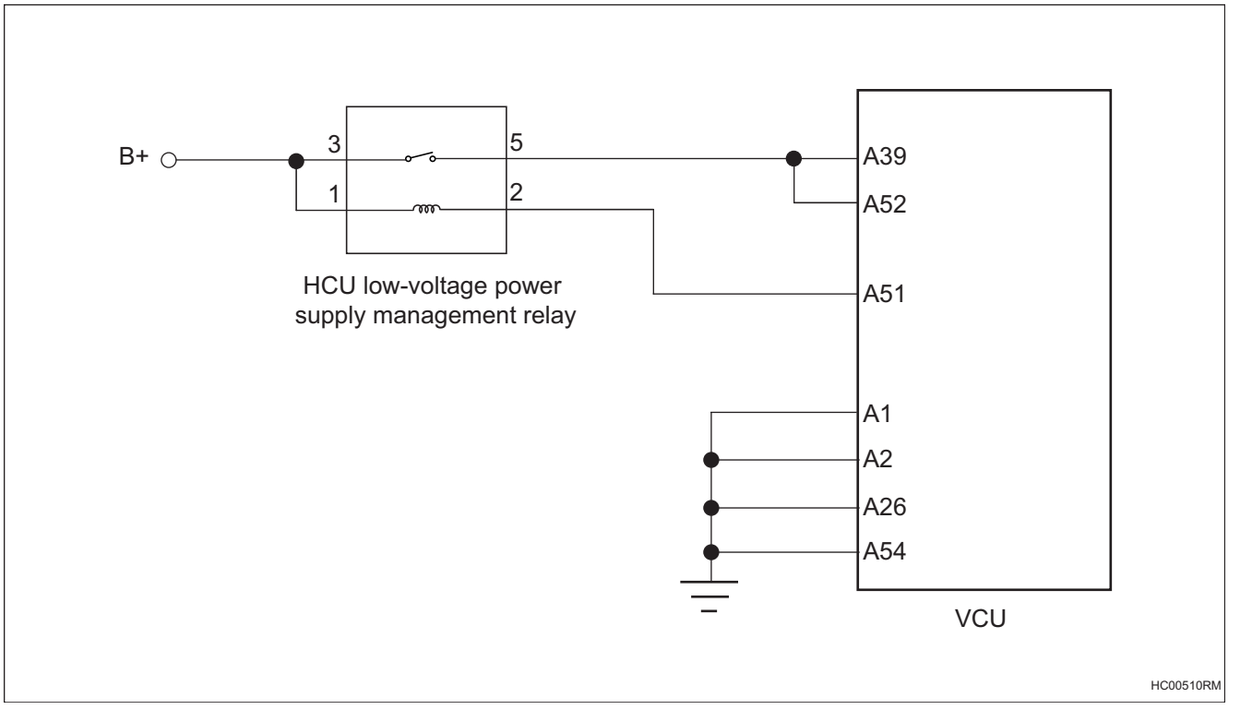
Description

When the HCU power supply voltage exceeds the normal range, the HCU records tbe DTC.

DTC	DTC detection conditions	Faulty location
P1B0C16	(a) The power supply voltage is detected too low.	• Low voltage charging system • Harness and connector • VCU
P0562A2	(a) Low power supply voltage is detected.	• Low voltage charging system • Harness and connector • VCU
P0563A3	(a) High power supply voltage is detected.	• Low voltage charging system • Harness and connector • VCU
P1B0C1B	(a) The power supply voltage is detected too high.	• Low voltage charging system • Harness and connector • HCU

HC

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

HC

NG → **Check connector fit and clean connector**

OK

2	Check low-voltage battery voltage

(a) Start the vehicle and measure the low-voltage battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Low-voltage battery + - low-voltage battery -	Always connected	About 11 ~ 14V

NG → **Overhaul the low voltage charging system**

OK

3	Check HCU low-voltage power supply management relay fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the HCU low-voltage power supply management relay fuse.

(d) Measure the resistance according to the values in the table below.

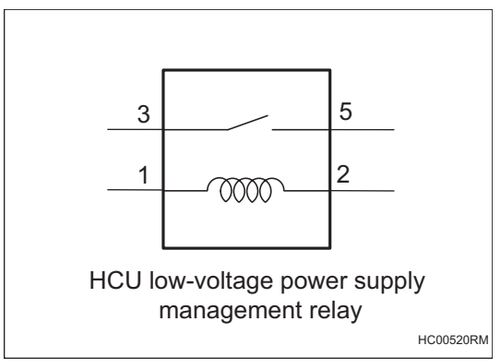
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

4 Check HCU low-voltage power supply management relay



HCU low-voltage power supply management relay

HC00520RM

(a) Measure the resistance according to the values in the table below.

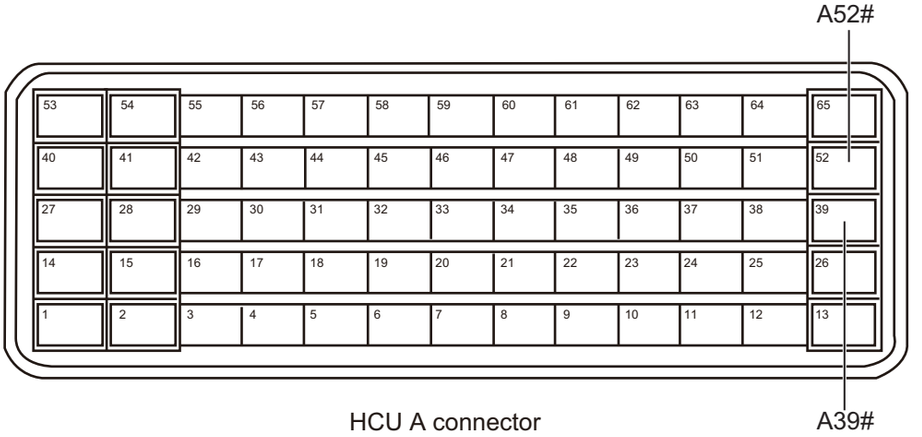
Standard value

Detector connection	Detection conditions	Specified state
HCU low-voltage power supply management relay 3# - HCU low-voltage power supply management relay 5#	Apply battery voltage between terminals 1# and 2#	Less than 1Ω
HCU low-voltage power supply management relay 3# - HCU low-voltage power supply management relay 5#	No battery voltage is applied between terminals 1# and 2#	10 KΩ or greater

NG → **Replace HCU low-voltage power management relay**

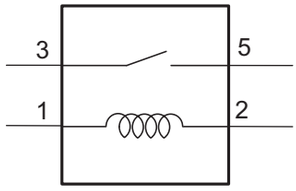
OK

5 Check HCU low-voltage power supply management relay harness and connector for open circuit



HCU A connector

HC00540RM



HCU low-voltage power supply management relay connector

HC00531RM

(a) Measure the resistance according to the values in the table below.

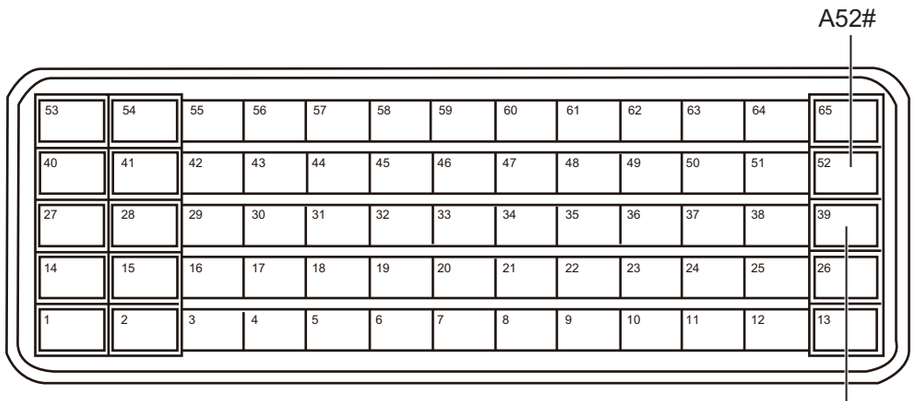
Standard value

Detector connection	Detection conditions	Specified state
HCU connector A52# - HCU low voltage power supply management relay connector 5#	Always connected	Less than 1Ω
HCU connector A39# - HCU low voltage power supply management relay connector 5#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

6 **Check HCU low-voltage power supply management relay harness and connector for circuit shorted to ground**



HCU A connector

HC00540RM

(a) Measure the resistance according to the values in the table below.

Standard value

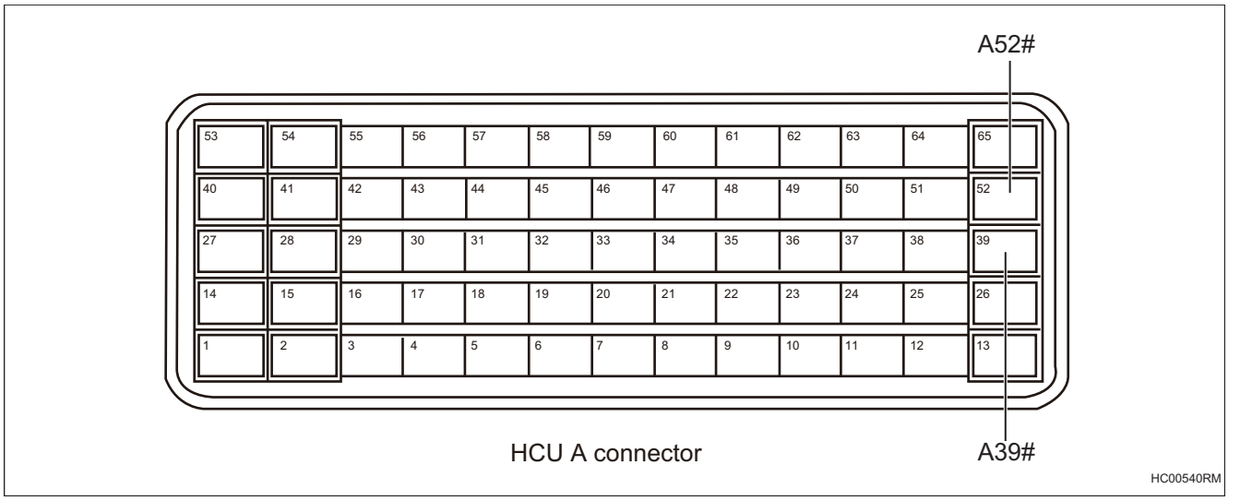
Detector connection	Detection conditions	Specified state
HCU connector A52# - body GND	Always connected	10 KΩ or greater
HCU connector A39# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

HC

OK

7	Check HCU low-voltage power supply management relay harness and connector for circuit shorted to power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

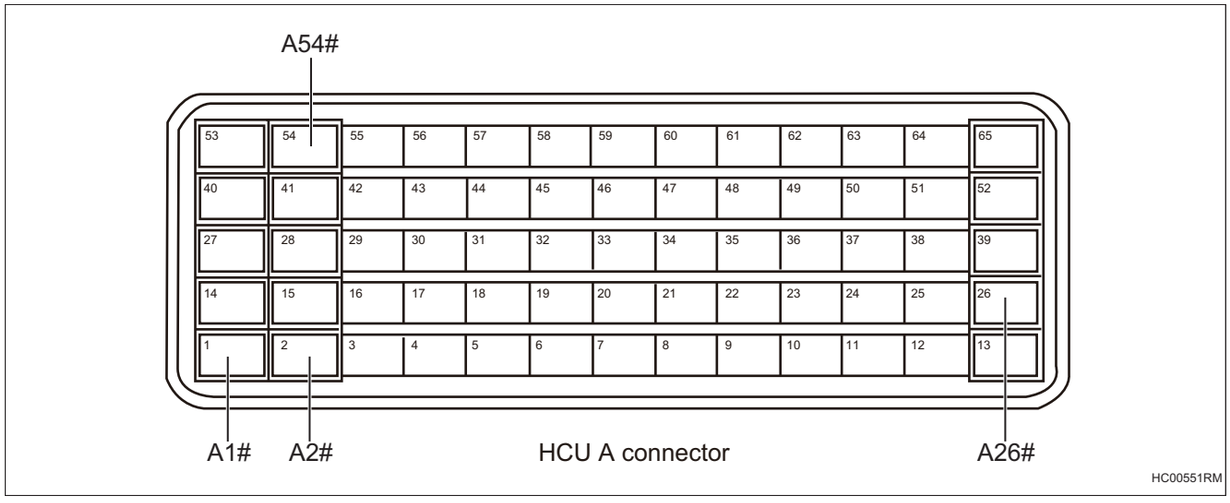
Standard value

Detector connection	Detection conditions	Specified state
HCU connector A52# - body GND	The ignition switch is set to "ON"	Less than 1 V
HCU connector A39# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

8	Check HCU ground



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
HCU connector A1# - body GND	Always connected	Less than 1Ω
HCU connector A2# - body GND	Always connected	Less than 1Ω
HCU connector A26# - body GND	Always connected	Less than 1Ω
HCU connector A54# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

9	**Replace HCU (See page HC-126)**

HC

DTC	P1B0E00	Thermal management relay power supply low
DTC	P1B0E2B	Thermal management relay adhesion
DTC	P300312	Thermal management relay output pin circuit shorted to power supply
DTC	P300211	Thermal management relay output pin circuit shorted to ground
DTC	P300113	Thermal management relay output pin circuit open

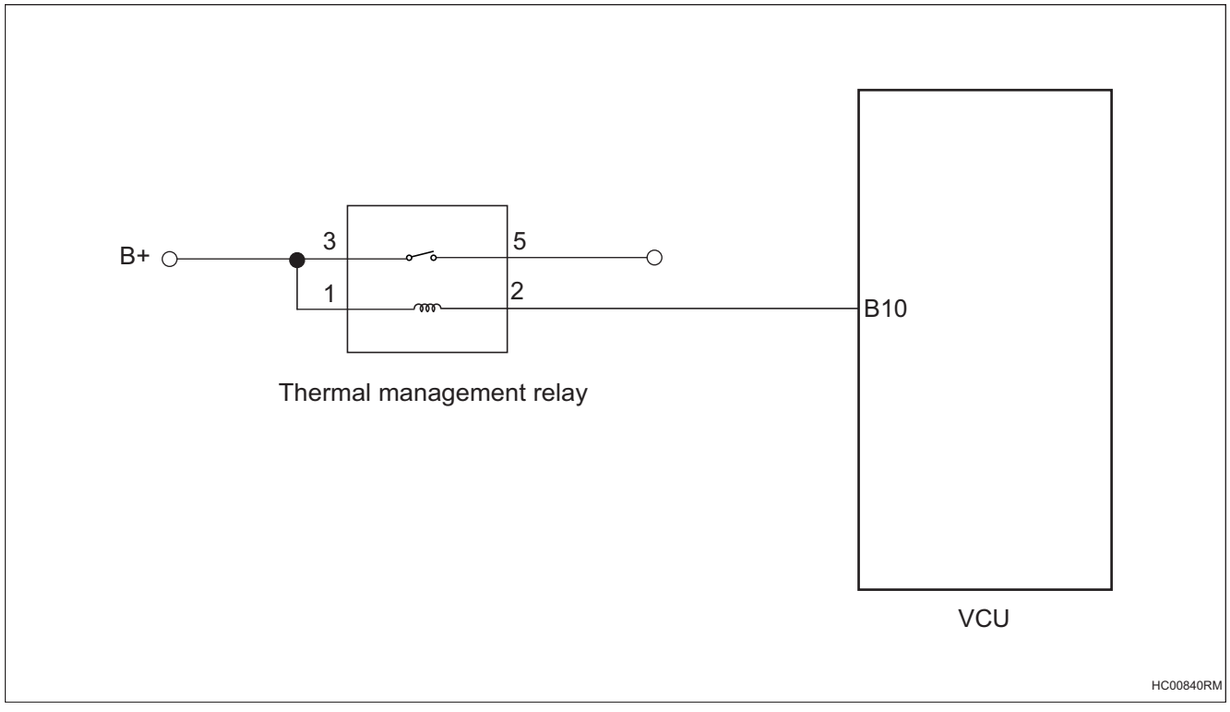
Description

HC

When a short circuit or an open circuit occurs in the thermal management relay output pin, and when a fault occurs inside the relay, HCU shall record the DTC.

DTC	DTC detection conditions	Faulty location
P1B0E00	(a) Thermal management relay power supply low	• Thermal management relay • Harness and connector • VCU
P1B0E2B	(a) Thermal management relay adhesion.	• Thermal management relay • Harness and connector • VCU
P300312	(a) Thermal management relay output pin circuit shorted to power supply.	• Thermal management relay • Harness and connector • VCU
P300211	(a) Thermal management relay output pin circuit shorted to ground.	• Thermal management relay • Harness and connector • VCU
P300113	(a) Thermal management relay output pin circuit open.	• Thermal management relay • Harness and connector • VCU

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

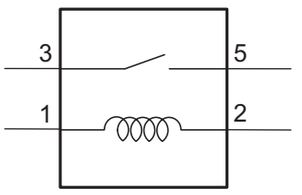
Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

2	Check the thermal management relay



Thermal management relay

HC00851RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the thermal management relay.

(d) Measure the resistance according to the values in the table below.

Standard value

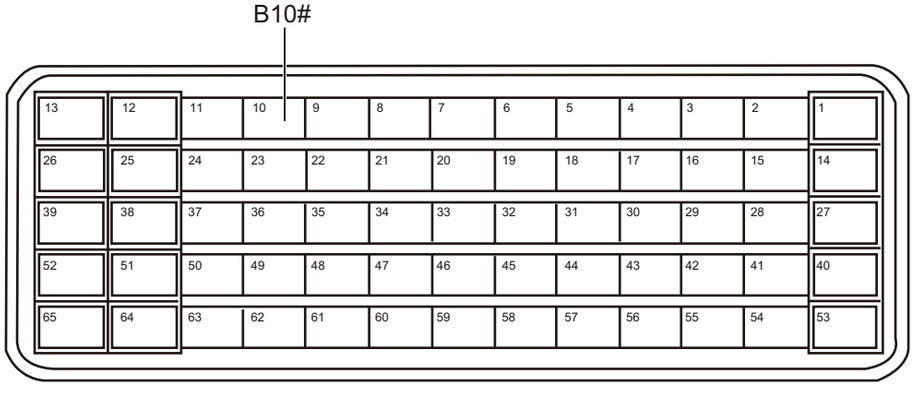
Detector connection	Detection conditions	Specified state
Thermal management relay 3# -thermal management relay 5#	Apply battery voltage between terminals 1# and 2#	Less than 1Ω
Thermal management relay 3# -thermal management relay 5#	No battery voltage is applied between terminals 1# and 2#	10 KΩ or greater

HC

NG **Replace the thermal management relay**

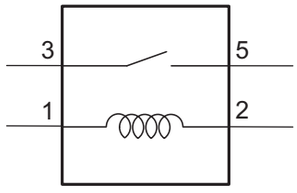
OK

3	Check thermal management relay harness and connector for open circuit



HCU B connector

HC00871RM



Thermal management relay connector

HC00861RM

(a) Measure the resistance according to the values in the table below.

Standard value

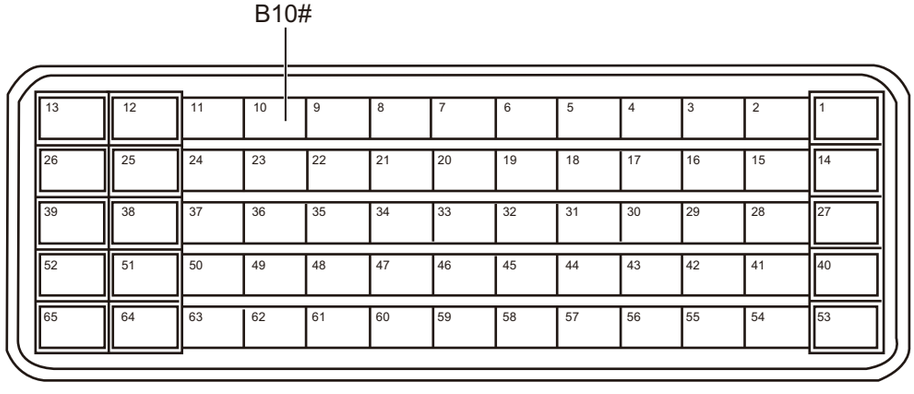
Detector connection	Detection conditions	Specified state
HCU connector B10# - thermal management relay connector 2#	Always connected	Less than 1Ω
Thermal management relay connector 1# - B+	Always connected	Less than 1Ω
Thermal management relay connector 3# - B+	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

HC

OK

4	**Check thermal management relay harness and connector for circuit shorted to ground**



HCU B connector

HC00871RM

(a) Measure the resistance according to the values in the table below.

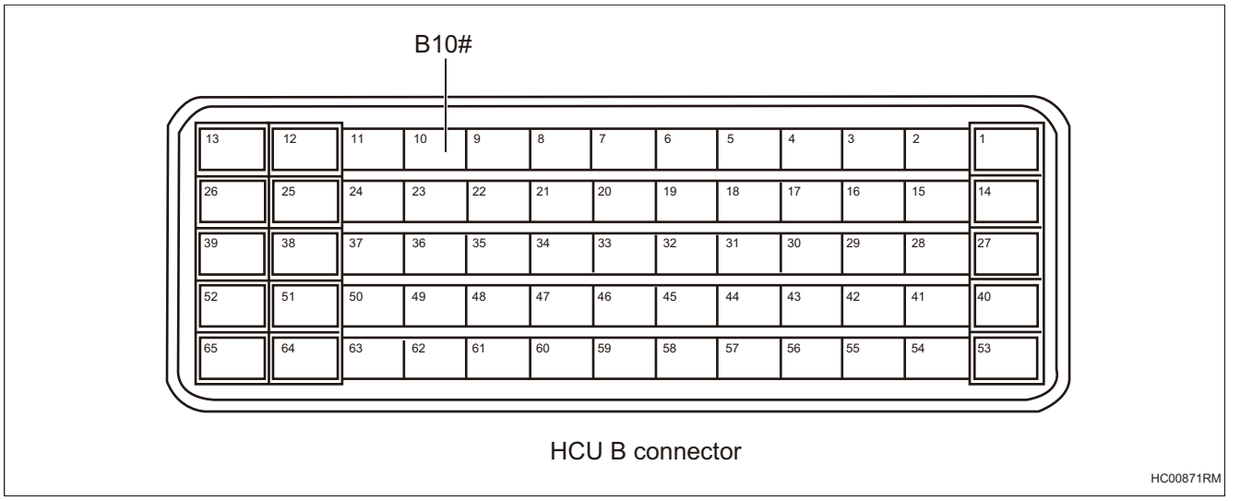
Standard value

Detector connection	Detection conditions	Specified state
HCU connector B10# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	Check thermal management relay harness and connector for circuit shorted to power supply



HCU B connector

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
HCU connector B10# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	Replace HCU (See page HC-126)

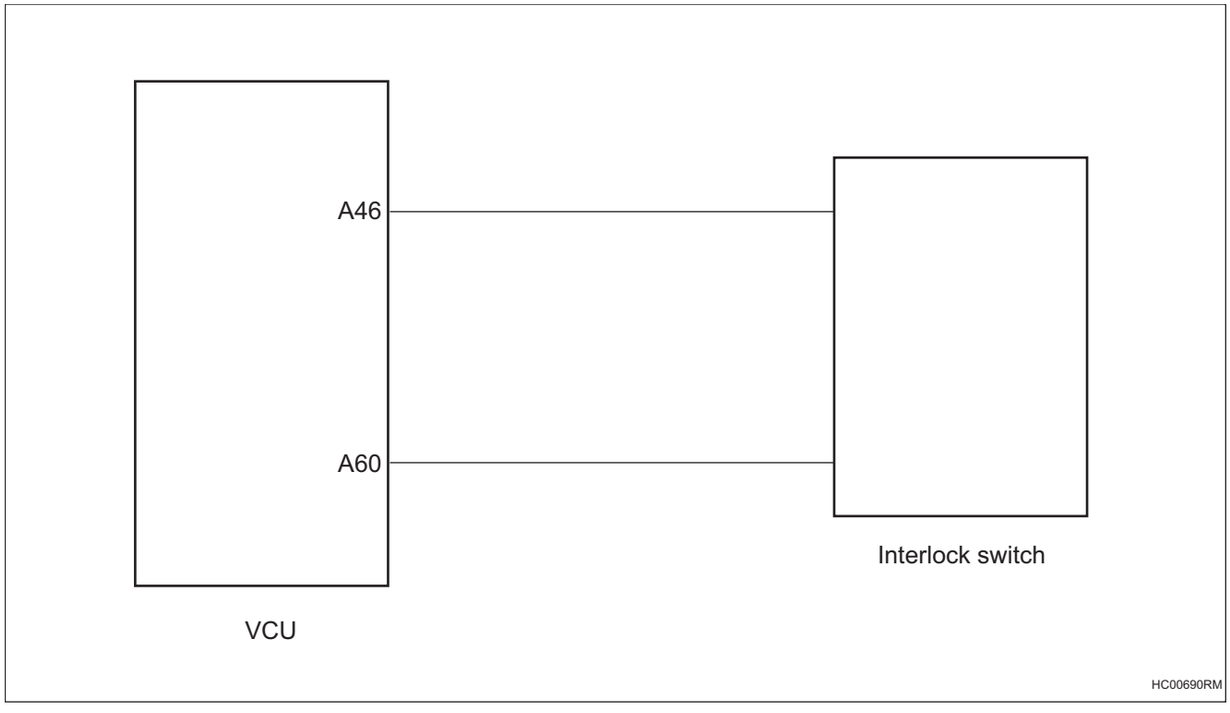
DTC	P1B1100	High voltage interlock failure

Description

When the HCU detects an abnormal high voltage interlock loop feedback voltage, the HCU records DTC.

DTC	DTC detection conditions	Faulty location
P1B1100	(a) High voltage interlock circuit open.	• High voltage assembly interlock switch • Service switch • Harness and connector • HCU

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal

Results	Go to
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

2	Check the service switch

(a) Check whether the service switch is installed correctly.

NG → **Reinstall the service switch**

HC

OK

3	Check high-voltage harness and connector

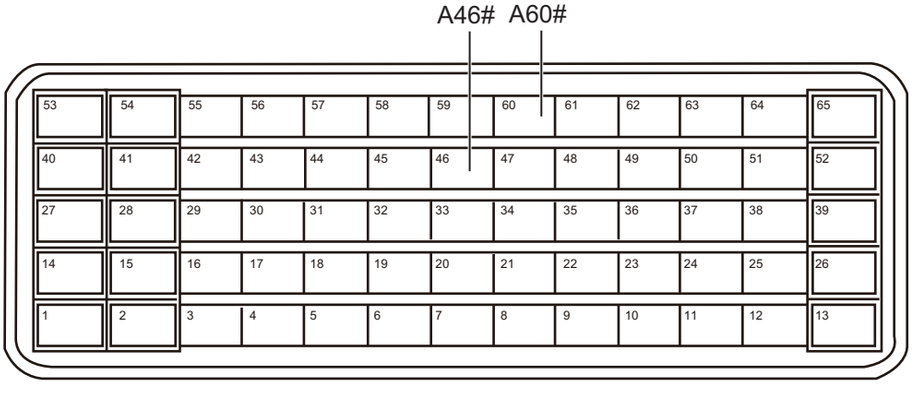
(a) Check whether the high-voltage harness connector is properly connected.

(b) Check whether the high-voltage harness is damaged.

NG → **Repair or replace the high-voltage harness and connector**

OK

4	Check the high voltage interlock circuit



HCU A connector

HC00701RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the HCU connector.

(d) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
HCU connector A46# - HCU connector A60#	Always connected	⩽ 100 Ω

NG → **Repair or replace harness and connector and interlock switch**

OK

5	**Replace HCU (See page HC-126)**

DTC	P1B1217	Accelerator pedal 1 sensor power supply voltage above upper limit
DTC	P1B1216	Accelerator pedal 1 sensor power supply voltage below lower limit
DTC	P212312	Accelerator pedal 1 sensor voltage above upper limit
DTC	P212211	Accelerator pedal 1 sensor voltage below lower limit
DTC	P1B1417	Accelerator pedal 2 sensor power supply voltage above upper limit
DTC	P1B1416	Accelerator pedal 2 sensor power supply voltage below lower limit
DTC	P212812	Accelerator pedal 2 sensor voltage above upper limit
DTC	P212711	Accelerator pedal 2 sensor voltage below lower limit

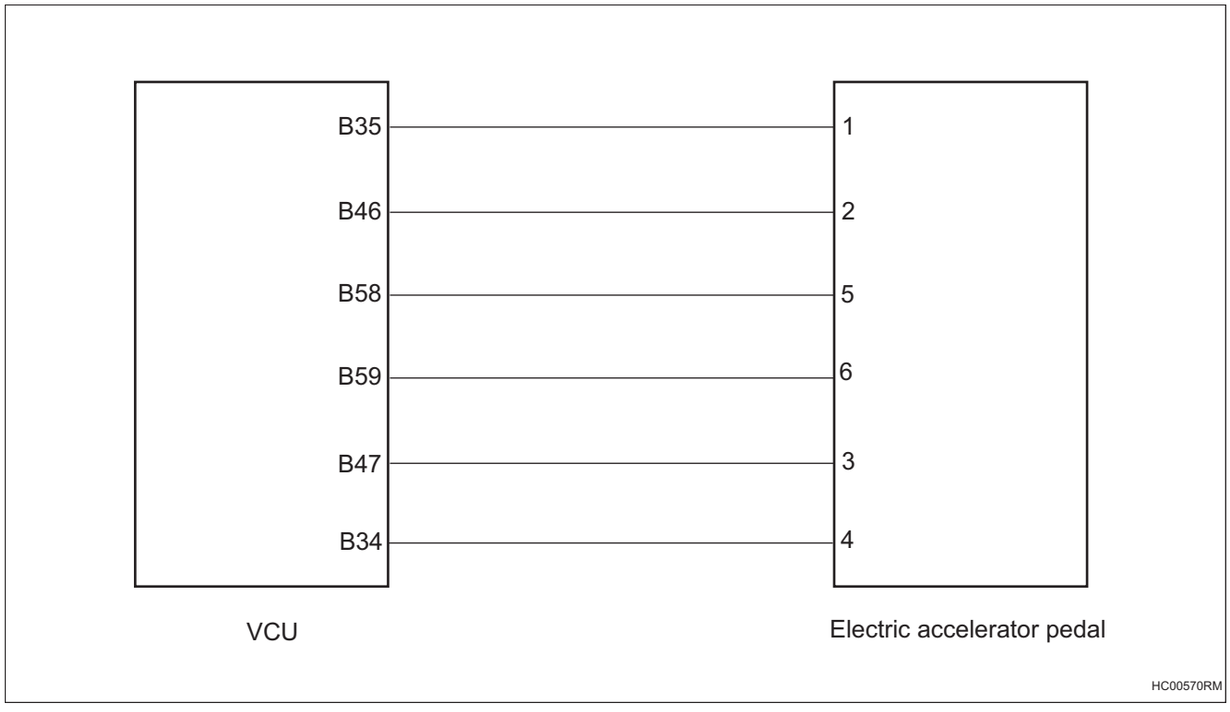
Description

When electronic accelerator pedal 1 and 2 are powered or signal voltage is out of range, the HCU will record the DTC.

DTC	DTC detection conditions	Faulty location
P1B1217	(a) Electronic accelerator pedal 1 power supply voltage above upper limit.	• Electric accelerator pedal • Harness and connector • VCU
P1B1216	(a) Electronic accelerator pedal 1 power supply voltage below lower limit.	• Electric accelerator pedal • Harness and connector • VCU
P212312	(a) Electronic accelerator pedal 1 signal voltage above upper limit.	• Electric accelerator pedal • Harness and connector • VCU
P212211	(a) Electronic accelerator pedal 1 signal voltage below lower limit.	• Electric accelerator pedal • Harness and connector • VCU
P1B1417	(a) Electronic accelerator pedal 2 power supply voltage above upper limit.	• Electric accelerator pedal • Harness and connector • VCU
P1B1416	(a) Electronic accelerator pedal 2 power supply voltage below lower limit.	• Electric accelerator pedal • Harness and connector • VCU

DTC	DTC detection conditions	Faulty location
P212812	(a) Electronic accelerator pedal 2 signal voltage above upper limit.	• Electric accelerator pedal • Harness and connector • VCU
P212711	(a) Electronic accelerator pedal 2 signal voltage below lower limit.	• Electric accelerator pedal • Harness and connector • VCU

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

OK

2	Check electronic accelerator pedal harness and connector for circuit shorted to each other

(a) Check whether the electronic accelerator pedal harness and connector are aging.

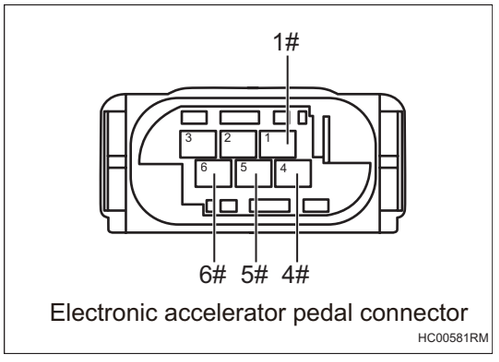
(b) check the electronic accelerator pedal harness and connector for circuit shorted to each other.

NG → **Repair or replace the harness and connector**

OK

HC

3	Check electronic accelerator pedal power supply



Electronic accelerator pedal connector
HC00581RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the electronic accelerator pedal connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the voltage according to the values in the table below.

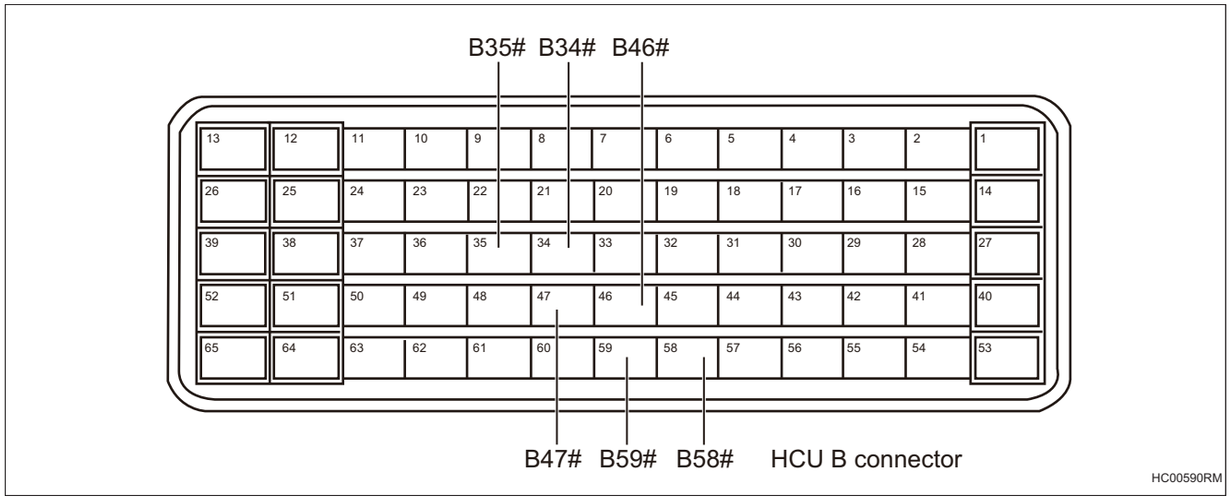
Standard value

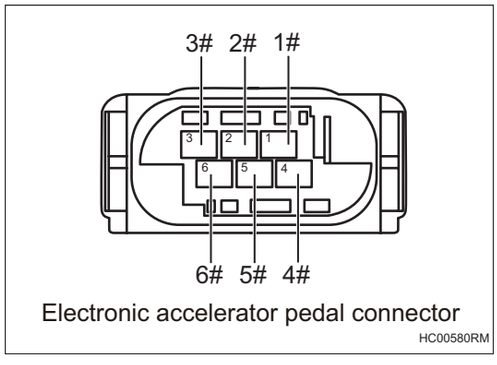
Detector connection	Detection conditions	Specified state
Electronic accelerator pedal connector 1# - electronic accelerator pedal connector 5#	Set the ignition switch to "ON"	4.9 ~ 5.1V
Electronic accelerator pedal connector 4# - electronic accelerator pedal connector 6#	Set the ignition switch to "ON"	4.9 ~ 5.1V

NG → **Repair or replace harness and connector and HCU**

OK

4	Check electronic accelerator pedal harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the HCU connector.

(d) Measure the resistance according to the values in the table below.

Standard value

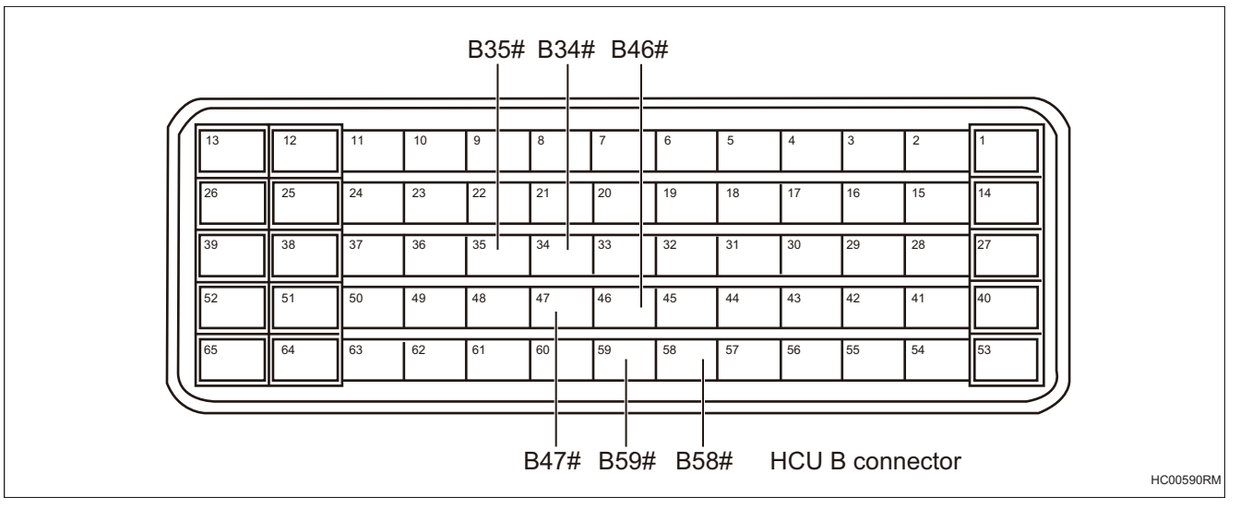
Detector connection	Detection conditions	Specified state
HCU connector B35# - electronic accelerator pedal connector 1#	Always connected	Less than 1Ω
HCU connector B46# - electronic accelerator pedal connector 2#	Always connected	Less than 1Ω
HCU connector B58# - electronic accelerator pedal connector 5#	Always connected	Less than 1Ω
HCU connector B59# - electronic accelerator pedal connector 6#	Always connected	Less than 1Ω
HCU connector B47# - electronic accelerator pedal connector 3#	Always connected	Less than 1Ω
HCU connector B34# - electronic accelerator pedal connector 4#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

5	**Check electronic accelerator pedal harness and connector for circuit shorted to ground**

HC



HC

(a) Measure the resistance according to the values in the table below.

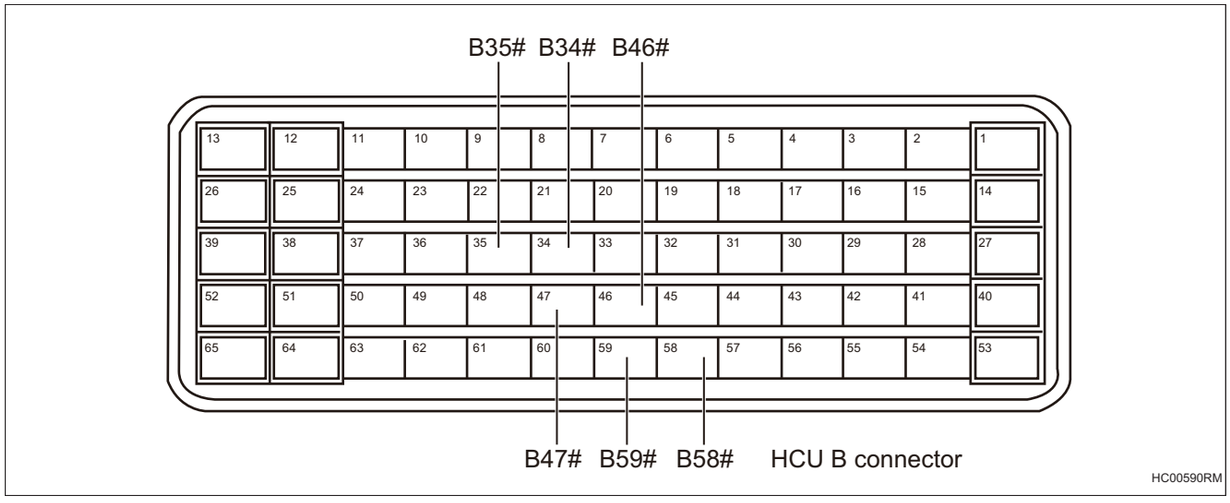
Standard value

Detector connection	Detection conditions	Specified state
HCU connector B35# - body GND	Always connected	10 KΩ or greater
HCU connector B46# - body GND	Always connected	10 KΩ or greater
HCU connector B58# - body GND	Always connected	10 KΩ or greater
HCU connector B59# - body GND	Always connected	10 KΩ or greater
HCU connector B47# - body GND	Always connected	10 KΩ or greater
HCU connector B34# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

6	**Check electronic accelerator pedal harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

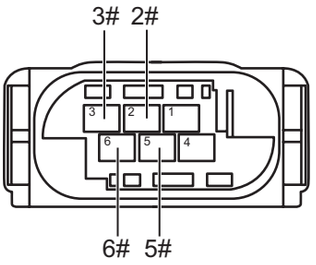
Standard value

Detector connection	Detection conditions	Specified state
HCU connector B35# - body GND	Set the ignition switch to "ON"	Less than 1 V
HCU connector B46# - body GND	Set the ignition switch to "ON"	Less than 1 V
HCU connector B58# - body GND	Set the ignition switch to "ON"	Less than 1 V
HCU connector B59# - body GND	Set the ignition switch to "ON"	Less than 1 V
HCU connector B47# - body GND	Set the ignition switch to "ON"	Less than 1 V
HCU connector B34# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

7	**Check electronic accelerator pedal**



Electronic accelerator pedal connector
HC00591RM

(a) Set the ignition switch to "OFF".
(b) Disconnect the battery negative terminal.
(c) Connect the electronic accelerator pedal connector.
(d) Connect the HCU connector.
(e) Connect battery negative terminal.
(f) Start the vehicle.
(g) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Electronic accelerator pedal connector 3# - electronic accelerator pedal connector 6#	The Ignition switch is set to "ST"	0.35 ~ 2.35V
Electronic accelerator pedal connector 2# - electronic accelerator pedal connector 5#	The Ignition switch is set to "ST"	0.725 ~ 4.7V

HC

NG → **Replace electronic accelerator pedal (See page ES-459)**

OK

8	**Replace HCU (See page HC-126)**

DTC	P1B2B00	Pre-charge timeout

Description

When a pre-charge timeout system fault is detected, the HCU records DTC.

DTC	DTC detection conditions	Faulty location
P1B2B00	(a) Pre-charge timeout.	• BMU • Harness and connector • HCU

Inspection procedure

1	Check the BMU

(a) Check the BMU for DTC.

(b) Check whether the BMU is damaged.

NG → Repair according to the fault

OK

2	Check the BMU low-voltage harness and connector

(a) Check whether the BMU low-voltage harness and connector of BMU are connected tightly.

(b) Check whether the BMU low-voltage harness and connector are short-circuited or open-circuited.

NG → Repair or replace the harness and connector

OK

3	Check the high voltage battery high-voltage harness and connector

(a) Check whether the high voltage battery high-voltage harness and connector are connected tightly.

(b) Check whether the high voltage battery high-voltage harness and connector are short-circuited or open-circuited.

NG → Repair or replace the harness and connector

OK

4	Replace the BMU (See page HB-11)

HC

(a) Replace the BMU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace HCU (See page HC-126)**

OK

5	**End**

DTC	P1B3008	MCU identifies BMS control unit node abnormality
DTC	P1B3108	MCU identifies VCU node abnormality
DTC	P0DE700	Traction battery cell overvoltage
DTC	P0DE600	Traction battery cell undervoltage
DTC	P1B3217	Traction battery cell OCV voltage out of limit
DTC	P058E00	Traction battery module overtemperature
DTC	P0C6E00	Critical excessive traction battery temperature difference
DTC	P0B2400	Total traction battery overvoltage
DTC	P0B2800	Total traction battery undervoltage
DTC	P0CA700	Traction battery discharge current failure
DTC	P0CA600	Traction battery feedback current failure
DTC	P0A7D00	Traction battery SOC undervoltage
DTC	P057F00	Traction battery cell SOC deviation alarm
DTC	P1B3300	Thermal runaway
DTC	P0AC501	Traction battery current sensor failure
DTC	P0B1300	Traction battery current sensor message receiving error
DTC	P1B3700	Traction battery high voltage sampling failure
DTC	P1B380A	Traction battery cell voltage sampling line open
DTC	P058C00	Traction battery module temperature sampling circuit failure
DTC	P0DAC01	Traction battery equalization circuit short
DTC	P1B3A0A	Daisy chain open circuit
DTC	P1B3B05	Traction battery AFE initialization addressing failure
DTC	P1B3D0A	Traction battery AFE communication lost

DTC	P1B3E0A	Traction battery AFE communication message CRC error
DTC	P1B3F0A	Traction battery AFE communication message Rolling counter error
DTC	P0DB801	Traction battery equalization open circuit
DTC	P0DB001	Traction battery diagnostic equalization switch disconnection
DTC	P1B4017	Traction battery AFE communication module power supply overvoltage
DTC	P1B410A	Traction battery AFE communication module power supply circuit shorted to ground/ undervoltage
DTC	P1B420A	Traction battery AFE internal ADC module power supply overvoltage
DTC	P1B430A	Traction battery AFE internal ADC module power supply shorted to ground/undervoltage
DTC	P1B440A	Traction battery AFE chip power supply overvoltage
DTC	P1B450A	Traction battery AFE chip power supply undervoltage
DTC	P1B460A	Traction battery AFEADC function failure
DTC	P0A9B01	Traction battery AFE overtemperature alarm
DTC	P0A9C1C	Traction battery AFE overtemperature
DTC	P1B470A	AFE diagnosis timeout
DTC	P0AC61C	Traction battery SBC overtemperature alarm
DTC	P0C3301	Traction battery SBC overtemperature
DTC	P1B4800	Traction battery E2P error
DTC	P0ACB1C	Traction battery MCU overtemperature alarm
DTC	P0C7C01	Traction battery MCU overtemperature
DTC	P0AD913	Traction battery main positive coil failure
DTC	P0ADD13	Traction battery main negative coil failure

DTC	P0AE413	Traction battery pre-charge coil failure
DTC	P0AA001	Traction battery main positive or pre-charge contact adhesion
DTC	P0AA301	Traction battery main negative contact adhesion
DTC	P0D0701	Traction battery main positive or pre-charge contact circuit open
DTC	P0D0E01	Traction battery main negative contact circuit open
DTC	P1B4904	Battery assembly connection failure (blown fuse or disconnection of copper bar between modules)
DTC	P0AA600	Battery insulation failure
DTC	P1B4A08	CAN fault
DTC	P0A8113	Traction battery fan failure

Description

When the HCU detects a battery system OBD related fault, the HCU records DTC.

DTC	DTC detection conditions	Faulty location
P1B3008	(a) MCU identifies BMS control unit node abnormality	• BMU • Harness and connector
P1B3108	(a) MCU identifies VCU node abnormality	• BMU • Harness and connector
P0DE700	(a) Traction battery cell overvoltage	• BMU • Harness and connector
P0DE600	(a) Traction battery cell undervoltage	• BMU • Harness and connector
P1B3217	(a) traction battery cell OCV voltage out of limit	• BMU • Harness and connector
P058E00	(a) Traction battery module overtemperature	• BMU • Harness and connector
P0C6E00	(a) Critical excessive traction battery temperature difference	• BMU • Harness and connector
P0B2400	(a) Total traction battery overvoltage	• BMU • Harness and connector
P0B2800	(a) Total traction battery undervoltage	• BMU • Harness and connector

DTC	DTC detection conditions	Faulty location
P0CA700	(a) Traction battery discharge current failure	• BMU • Harness and connector
P0CA600	(a) Traction battery feedback current failure	• BMU • Harness and connector
P0A7D00	(a) Traction battery SOC too low	• BMU • Harness and connector
P057F00	(a) Traction battery cell SOC deviation alarm	• BMU • Harness and connector
P1B3300	(a) Thermal runaway	• BMU • Harness and connector
P0AC501	(a) Traction battery current sensor failure	• BMU • Harness and connector
P0B1300	(a) Traction battery current sensor message receiving error	• BMU • Harness and connector
P1B3700	(a) Traction battery high voltage sampling failure	• BMU • Harness and connector
P1B380A	(a) Traction battery cell voltage sampling line circuit open	• BMU • Harness and connector
P058C00	(a) Traction battery module temperature sampling circuit failure	• BMU • Harness and connector
P0DAC01	(a) Traction battery equalization circuit short	• BMU • Harness and connector
P1B3A0A	(a) Daisy chain open circuit	• BMU • Harness and connector
P1B3B05	(a) Traction battery AFE initialization addressing failure	• BMU • Harness and connector
P1B3D0A	(a) Traction battery AFE communication lost	• BMU • Harness and connector
P1B3E0A	(a) Traction battery AFE communication message CRC error	• BMU • Harness and connector
P1B3F0A	(a) Traction battery AFE communication message Rolling counter error	• BMU • Harness and connector
P0DB801	(a) Traction battery equalization open circuit	• BMU • Harness and connector
P0DB001	(a) Traction battery diagnostic equalization switch disconnection failure	• BMU • Harness and connector
P1B4017	(a) Traction battery AFE communication module power supply overvoltage	• BMU • Harness and connector
P1B410A	(a) Traction battery AFE communication module power supply circuit shorted to ground/undervoltage	• BMU • Harness and connector
P1B420A	(a) Traction battery AFE internal ADC module power supply overvoltage	• BMU • Harness and connector

DTC	DTC detection conditions	Faulty location
P1B430A	(a) Traction battery AFE internal ADC module power supply shorted to ground/undervoltage	• BMU • Harness and connector
P1B440A	(a) Traction battery AFE chip power supply overvoltage	• BMU • Harness and connector
P1B450A	(a) Traction battery AFE chip power supply undervoltage	• BMU • Harness and connector
P1B460A	(a) Traction battery AFEADC function failure	• BMU • Harness and connector
P0A9B01	(a) Traction battery AFE overtemperature alarm	• BMU • Harness and connector
P0A9C1C	(a) Traction battery AFE overtemperature	• BMU • Harness and connector
P1B470A	(a) AFE diagnostic timeout	• BMU • Harness and connector
P0AC61C	(a) Traction battery SBC overtemperature alarm	• BMU • Harness and connector
P0C3301	(a) Traction battery SBC overtemperature	• BMU • Harness and connector
P1B4800	(a) Traction battery E2P error	• BMU • Harness and connector
P0ACB1C	(a) Traction battery MCU overtemperature alarm	• BMU • Harness and connector
P0C7C01	(a) Traction battery MCU overtemperature	• BMU • Harness and connector
P0AD913	(a) Traction battery main positive coil failure	• BMU • Harness and connector
P0ADD13	(a) Traction battery main negative coil failure	• BMU • Harness and connector
P0AE413	(a) Traction battery pre-charge coil failure	• BMU • Harness and connector
P0AA001	(a) Traction battery main positive or pre-charge contact adhesion	• BMU • Harness and connector
P0AA301	(a) Traction battery main negative contact adhesion	• BMU • Harness and connector
P0D0701	(a) Traction battery main positive or pre-charge contact circuit open	• BMU • Harness and connector
P0D0E01	(a) Traction battery main negative contact circuit open	• BMU • Harness and connector
P1B4904	(a) Battery assembly connection failure (blown fuse or disconnection of copper bar between modules)	• BMU • Harness and connector
P0AA600	(a) Battery insulation failure	• BMU • Harness and connector

DTC	DTC detection conditions	Faulty location
P1B4A08	(a) CAN fault	• BMU • Harness and connector
P0A8113	(a) Traction battery fan failure	• BMU • Harness and connector

Inspection procedure

1	Check BMU harness and connector

(a) Check whether the BMU harness and connector are connected tightly.

(b) Check whether the BMU harness and connector are short-circuited or open-circuited.

(c) Check whether the battery system high-voltage harness and connector are connected tightly.

(d) Check whether the battery system high-voltage harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

2	Replace the BMU (See page HB-11)

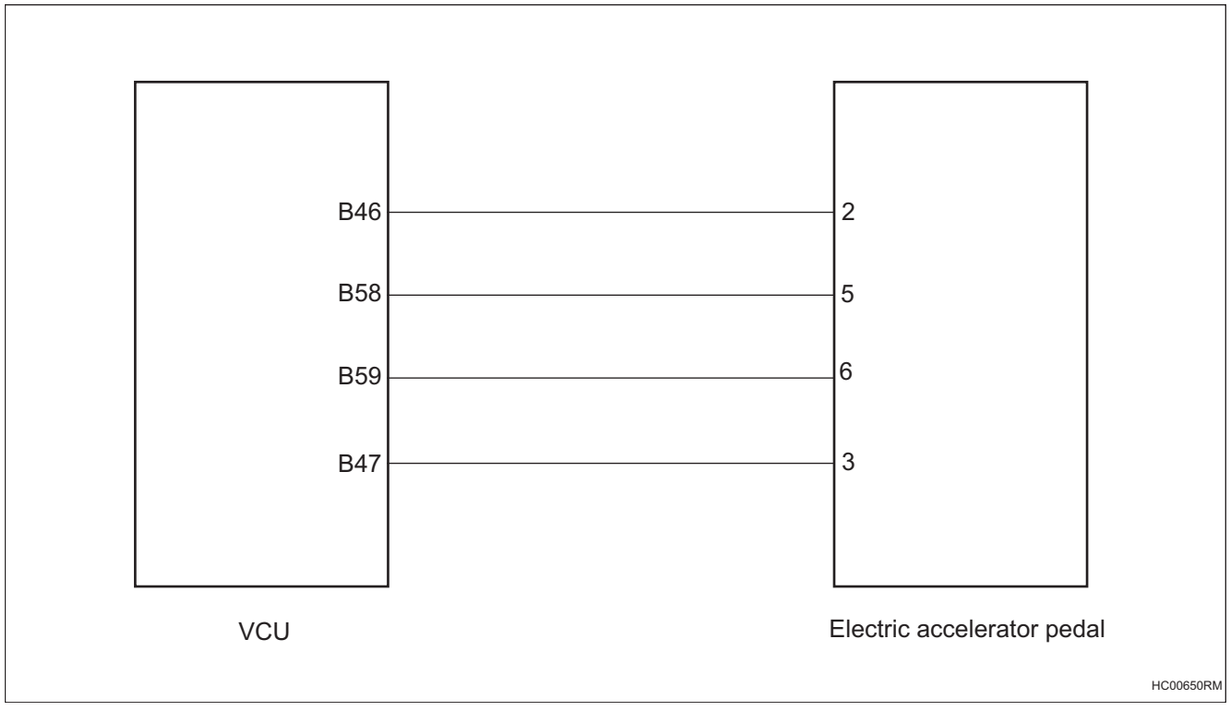
DTC	P213800	Accelerator pedal sensor discrepancy error

Description

When a electronic accelerator pedal discrepancy fault is detected, the HCU records the DTC.

DTC	DTC detection conditions	Faulty location
P213800	(a) Electronic accelerator pedal difference fault.	• Electronic accelerator pedal • Harness and connector • HCU

Circuit diagram



Inspection procedure

1	Check electronic accelerator pedal harness and connector for circuit shorted to each other

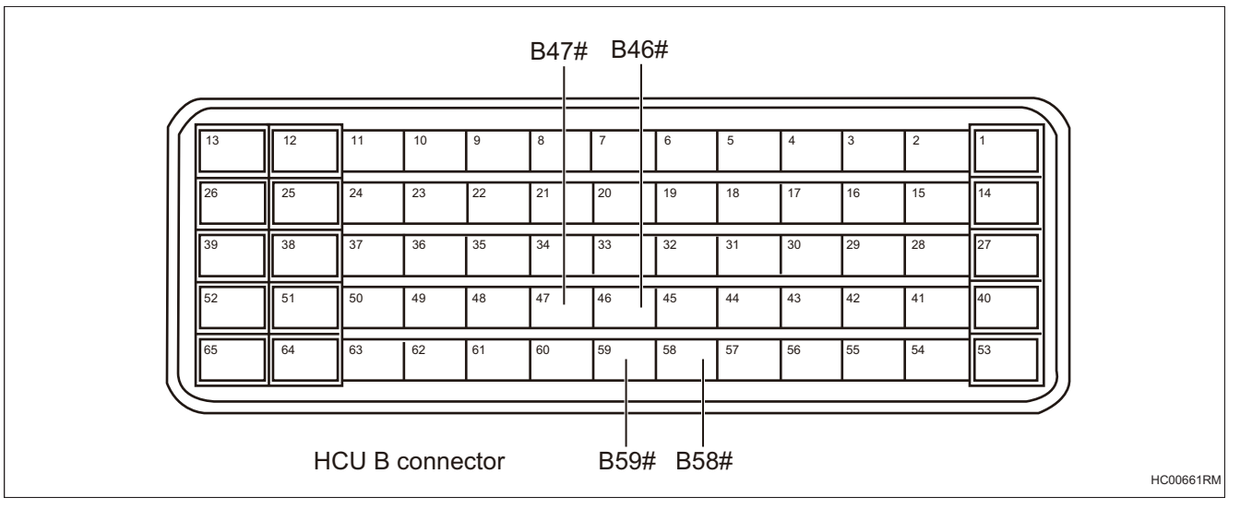
(a) Check whether the electronic accelerator pedal harness and connector are aging.

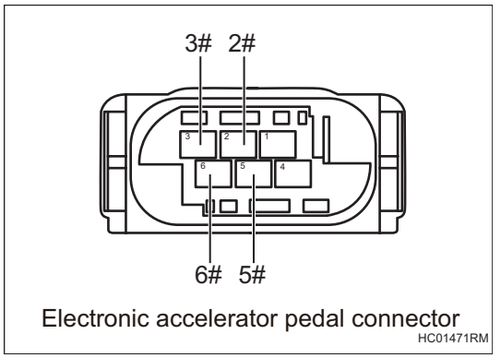
(b) check the electronic accelerator pedal harness and connector for circuit shorted to each other.

NG → **Repair or replace the harness and connector**

OK

2	Check electronic accelerator pedal harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the electronic accelerator pedal connector.

(d) Disconnect the HCU connector.

(e) Measure the resistance according to the values in the table below.

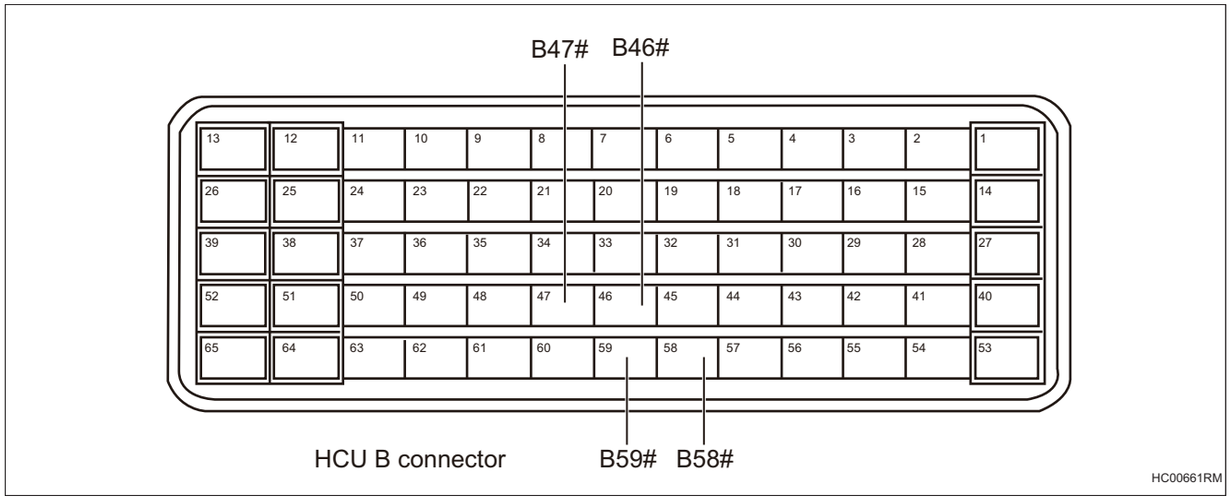
Standard value

Detector connection	Detection conditions	Specified state
HCU connector B46# - electronic accelerator pedal connector 2#	Always connected	Less than 1Ω
HCU connector B47# - electronic accelerator pedal connector 3#	Always connected	Less than 1Ω
HCU connector B58# - electronic accelerator pedal connector 5#	Always connected	Less than 1Ω
HCU connector B59# - electronic accelerator pedal connector 6#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check electronic accelerator pedal harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

HC

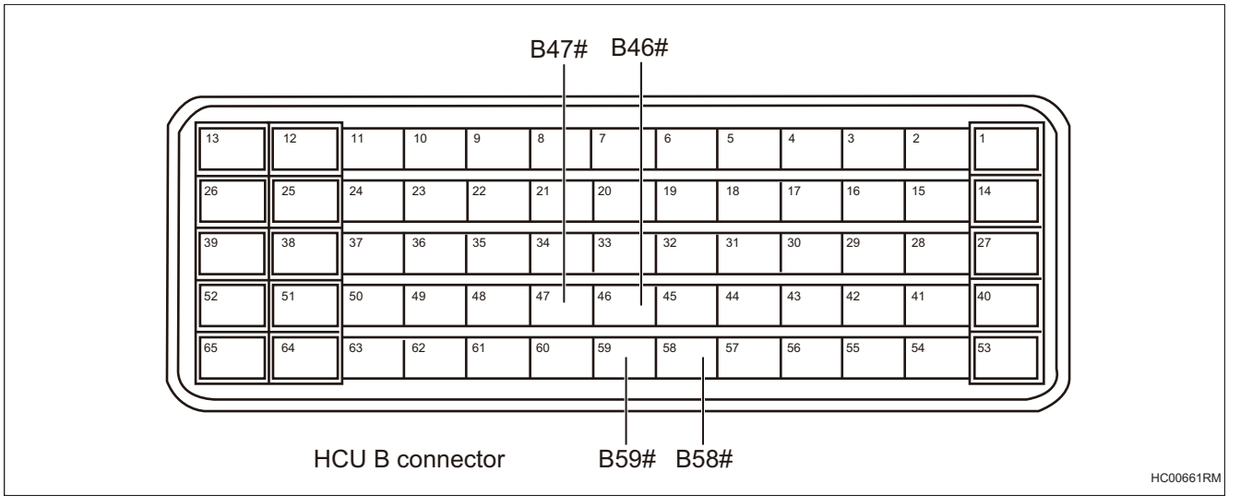
Standard value

Detector connection	Detection conditions	Specified state
HCU connector B46# - body GND	Always connected	10 KΩ or greater
HCU connector B47# - body GND	Always connected	10 KΩ or greater
HCU connector B58# - body GND	Always connected	10 KΩ or greater
HCU connector B59# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check electronic accelerator pedal harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
HCU connector B46# - body GND	Set the ignition switch to "ON"	Less than 1 V
HCU connector B47# - body GND	Set the ignition switch to "ON"	Less than 1 V
HCU connector B58# - body GND	Set the ignition switch to "ON"	Less than 1 V
HCU connector B59# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Check electronic accelerator pedal**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Connect the electronic accelerator pedal connector.

(d) Connect the HCU connector.

(e) Connect battery negative terminal.

(f) Start the vehicle.

(g) Measure and record accelerator pedal position sensor signal voltage.

Criteria:

| Voltage value of electronic accelerator pedal 1/2 - voltage value of electronic accelerator pedal 2 | >0.07V

Note: The absolute value of half of the voltage value of sensor 1 minus the voltage value of sensor 2 is greater than 0.07 V.

NG	**Replace electronic accelerator pedal (See page ES-459)**

OK

6	**Replace HCU (See page HC-126)**

DTC	P261D12	Heater coolant pump output pin circuit shorted to power supply
DTC	P261C11	Heater coolant pump output pin circuit shorted to ground
DTC	P261A13	Heater coolant pump output pin circuit open
DTC	P1B0907	Heater coolant pump dry rotation
DTC	P1B0906	Heater coolant pump underspeed operation
DTC	P1B0971	Heater coolant pump overcurrent/stalling
DTC	P1B0916	Heater coolant pump undervoltage
DTC	P1B0917	Heater coolant pump overvoltage
DTC	P1B0998	Heater coolant pump overtemperature

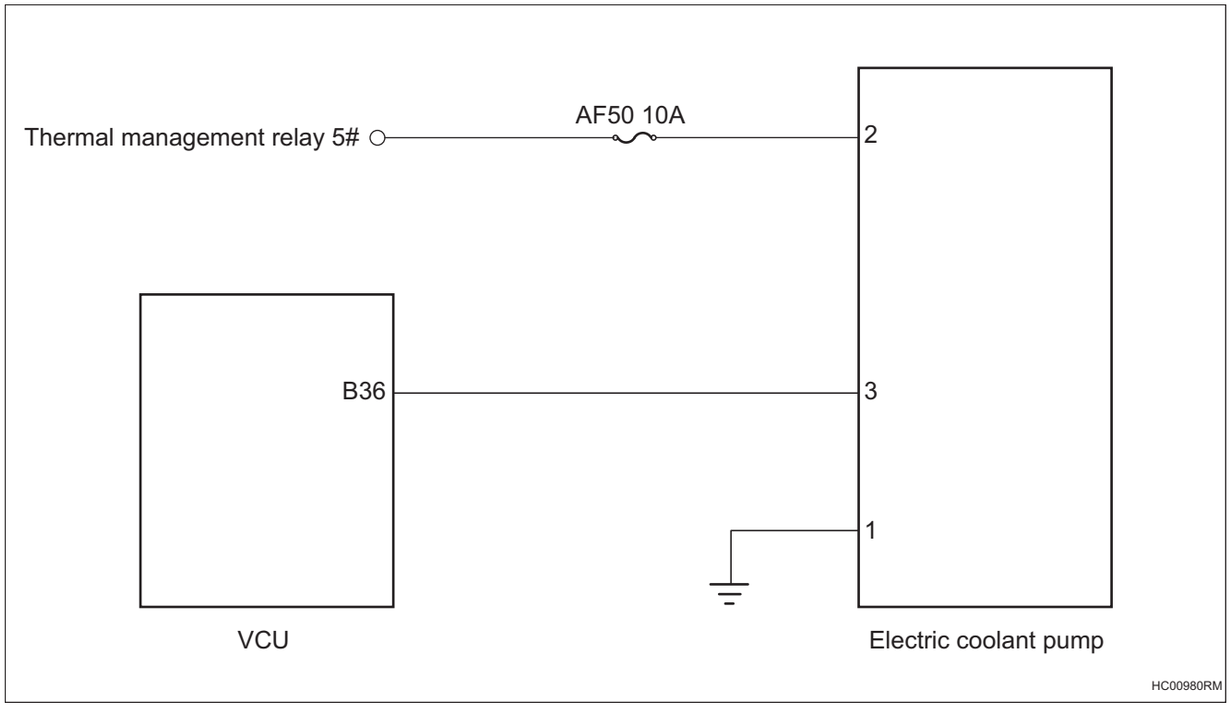
Description

When the electric coolant pump output pin fault or the body fault is detected, the HCU records the DTC.

DTC	DTC detection conditions	Faulty location
P261D12	(a) Heater coolant pump output pin circuit shorted to power supply.	• HCU • Harness and connector • Electric coolant pump (heater)
P261C11	(a) Heater coolant pump output pin circuit shorted to ground.	• VCU • Harness and connector • Electric coolant pump (heater)
P261A13	(a) Heater coolant pump output pin circuit open.	• VCU • Harness and connector • Electric coolant pump (heater)
P1B0907	(a) Heater coolant pump dry running.	• VCU • Harness and connector • Electric coolant pump (heater)
P1B0906	(a) Heater coolant pump underspeed operation.	• VCU • Harness and connector • Electric coolant pump
P1B0971	(a) Heater coolant pump overcurrent / stalling.	• VCU • Harness and connector • Electric coolant pump (heater)
P1B0916	(a) Heater coolant pump undervoltage.	• VCU • Harness and connector • Electric coolant pump (heater)
P1B0917	(a) Heater coolant pump overvoltage.	• VCU • Harness and connector • Electric coolant pump (heater)

DTC	DTC detection conditions	Faulty location
P1B0998	(a) Heater coolant pump overtemperature.	• VCU • Harness and connector • Electric coolant pump (heater)

Circuit diagram



Inspection procedure

1	Confirm and clear the DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Record and clear the DTC.

(d) Re-conduct the test drive under the conditions stated by the user.

(e) Check whether the DTC appears again.

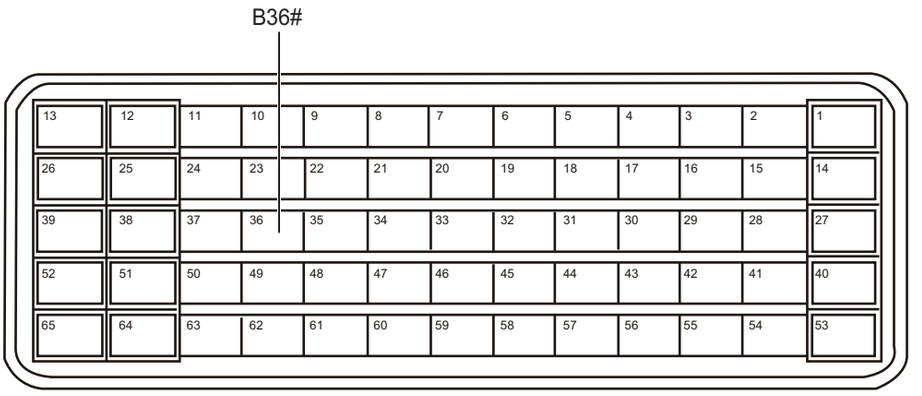
Results

Results	Go to
DTC reappears	Normal
DTC does not reappear	Abnormal

NG → **Check connector fit and clean connector**

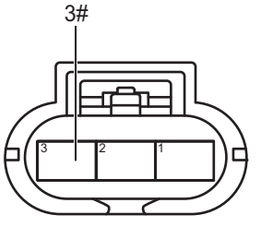
OK

2	Check electric coolant pump harness and connector for open circuit



HCU B connector

HC00991RM



Electric coolant pump connector

HC01001RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the electric coolant pump connector.

(d) Disconnect the HCU connector.

(e) Measure the resistance according to the values in the table below.

Standard value

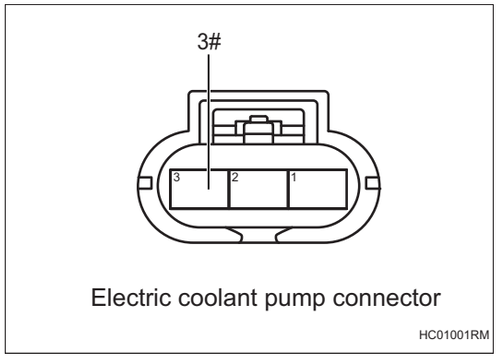
Detector connection	Detection conditions	Specified state
Electric coolant pump connector 3# -HCU connector B36#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	Check electric coolant pump harness and connector for circuit shorted to ground

HC



Electric coolant pump connector
HC01001RM

(a) Measure the resistance according to the values in the table below.

Standard value

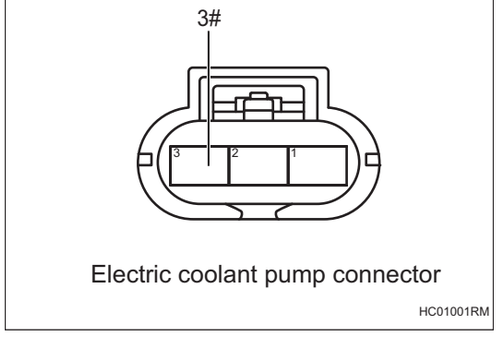
Detector connection	Detection conditions	Specified state
Electric coolant pump connector 3# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

HC

4	Check electric coolant pump harness and connector for circuit shorted to power supply



Electric coolant pump connector
HC01001RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

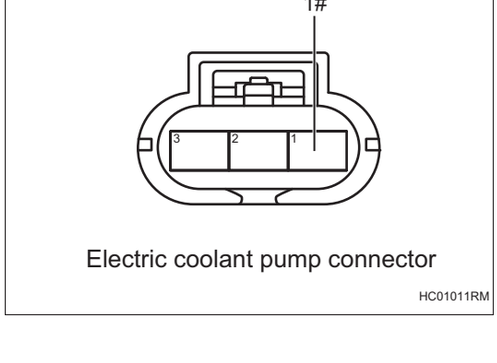
Standard value

Detector connection	Detection conditions	Specified state
Electric coolant pump connector 3# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Check the electric coolant pump ground



Electric coolant pump connector
HC01011RM

(a) Measure the resistance according to the values in the table below.

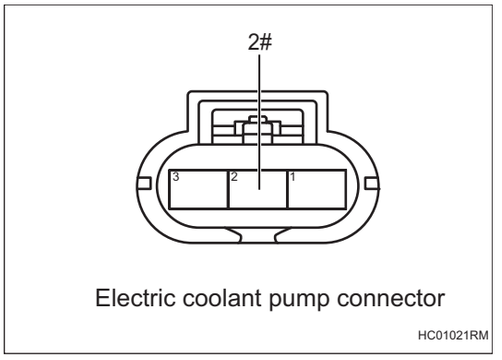
Standard value

Detector connection	Detection conditions	Specified state
Electric coolant pump connector 1# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

6	Check the electric coolant pump power supply



Electric coolant pump connector

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Connect the HCU connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Electric coolant pump connector 2# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace harness and connector, fuse and relay**

OK

7	Replace electric coolant pump (See page CO-25)

(a) Replace the electric coolant pump.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace HCU (See page HC-126)**

OK

8	End

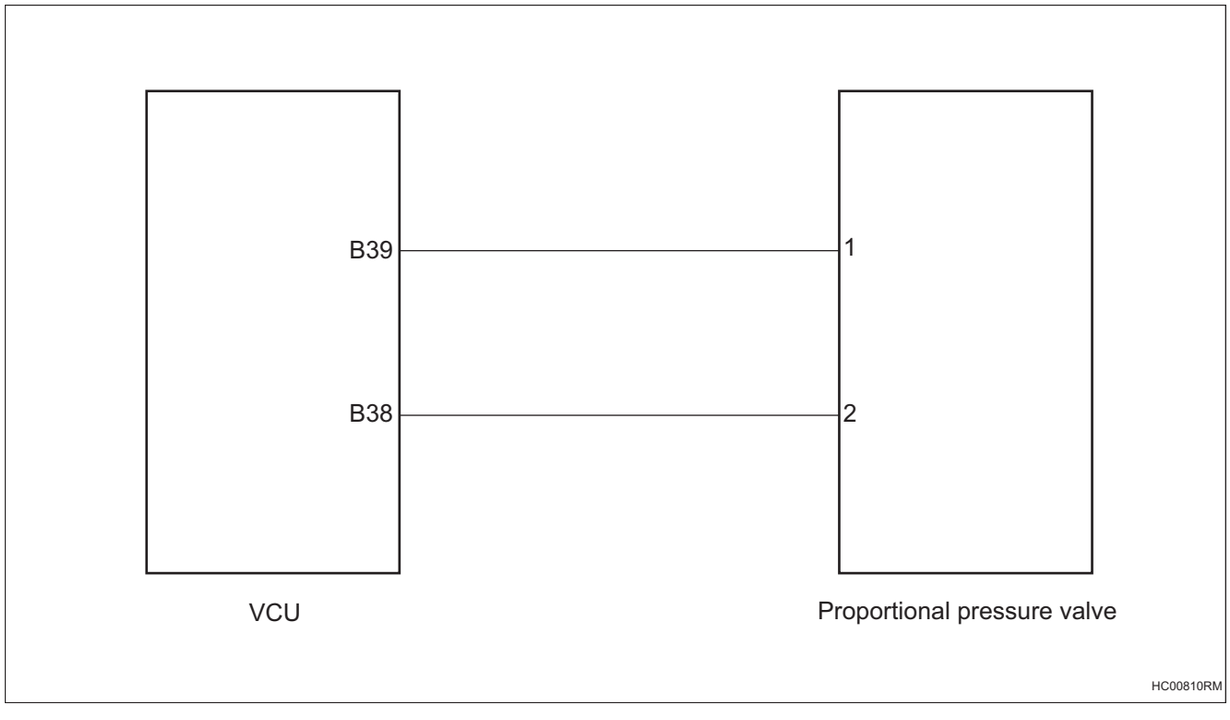
DTC	P273912	Proportional pressure valve number or frequency output pin circuit shorted to power supply
DTC	P273811	Proportional pressure valve number or / and frequency output pin circuit shorted to ground
DTC	P273613	Proportional pressure valve number or frequency output pin circuit open

Description

When a proportional pressure valve number or frequency output pin fault is detected, the HCU records the DTC.

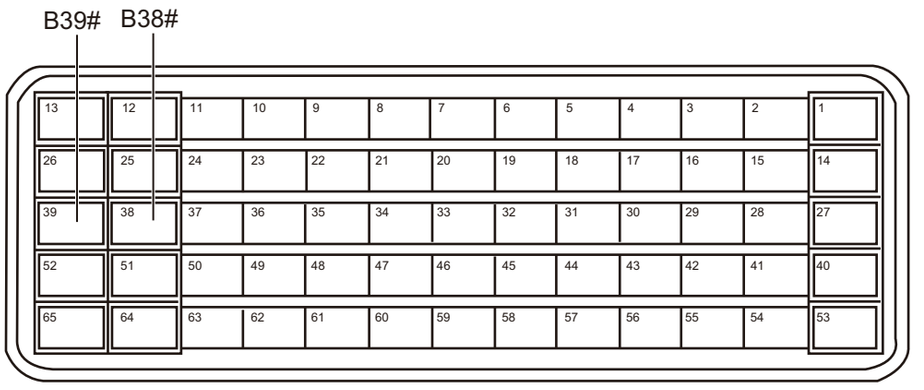
DTC	DTC detection conditions	Faulty location
P273912	(a) Proportional pressure valve output pin circuit shorted to power supply.	• Proportional pressure valve • Harness and connector • VCU
P273811	(a) Proportional pressure valve output terminal pin circuit shorted to ground.	• Proportional pressure valve • Harness and connector • VCU
P273613	(a) Proportional pressure valve output terminal pin open circuit.	• Proportional pressure valve • Harness and connector • VCU

Circuit diagram



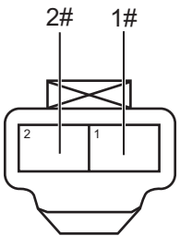
Inspection procedure

1	Check proportional pressure valve harness and connector for open circuit



HCU B connector

HC00821RM



Proportional pressure valve connector

HC00830RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the proportional pressure valve connector.

(d) Disconnect the HCU connector.

(e) Measure the resistance according to the values in the table below.

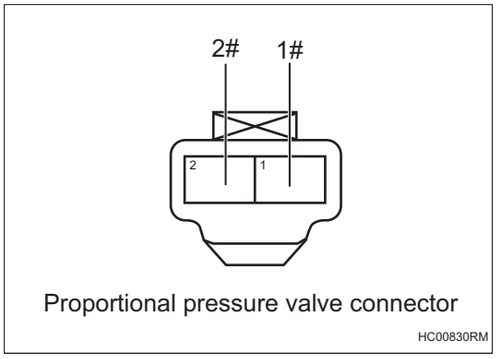
Standard value

Detector connection	Detection conditions	Specified state
Proportional pressure valve connector 1# - HCU connector B39#	Always connected	Less than 1Ω
Proportional pressure valve connector 2# - HCU connector B38#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check proportional pressure valve harness andconnector for circuit shorted to ground



Proportional pressure valve connector
HC00830RM

(a) Measure the resistance according to the values in the table below.

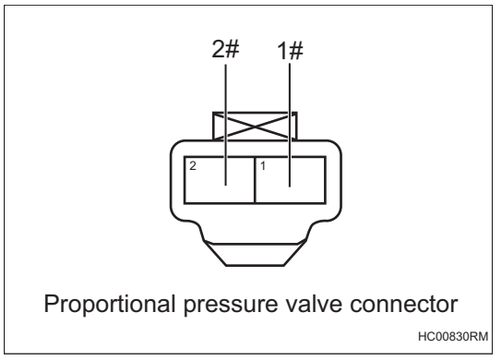
Standard value

Detector connection	Detection conditions	Specified state
Proportional pressure valve connector 1# - body GND	Always connected	10 KΩ or greater
Proportional pressure valve connector 2# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	Check proportional pressure valve harness and connector for circuit shorted to each other



Proportional pressure valve connector
HC00830RM

(a) Measure the resistance according to the values in the table below.

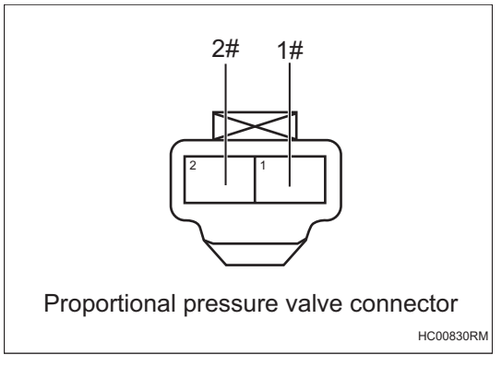
Standard value

Detector connection	Detection conditions	Specified state
Proportional pressure valve connector 1# - proportional pressure valve connector 2#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check proportional pressure valve harness and connector for circuit shorted to power supply



Proportional pressure valve connector
HC00830RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Proportional pressure valve connector 1# - body GND	The ignition switch is set to "ON"	Less than 1 V

Detector connection	Detection conditions	Specified state
Proportional pressure valve connector 2# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace proportional pressure valve (See page MC-70)**

(a) Replace the proportional pressure valve.

(b) Connect the HQ-VDS .

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace HCU (See page HC-126)**

OK

6	**End**

DTC	U000188	Powertrain CAN bus off
DTC	U014687	Powertrain CAN GW node lost
DTC	U005588	Hybrid CAN bus off
DTC	U014787	Hybrid CAN GW node lost
DTC	U010087	ECM node lost
DTC	U040183	ECM message Checksum error
DTC	U040182	ECM message Livecounter error
DTC	U029A87	BMS node lost
DTC	U059B83	BMS message checksum error
DTC	U059B82	BMS message livecounter error
DTC	U011087	MCU 1 node lost
DTC	U041183	MCU 1 message Checksum error
DTC	U041182	MCU 1 message Livecounter error
DTC	U029887	DCDC node lost
DTC	U059983	DCDC message Checksum error
DTC	U059982	DCDC message Livecounter error
DTC	U010387	EGSM node lost
DTC	U040483	EGSM message Checksum error
DTC	U040482	EGSM message Livecounter error
DTC	U015187	ACU node lost
DTC	U045283	ACU Checksum error
DTC	U045282	ACU message Livecounter error
DTC	U114687	GW message lost
DTC	U123587	IFC message lost
DTC	U043383	IFC message checksum error
DTC	U043382	IFC message Livecounter error
DTC	U112987	IBC message lost
DTC	U041883	IBC message Checksum error
DTC	U041882	IBC message Livecounter error

DTC	U113187	EPS ECU message lost
DTC	U042083	EPS ECU message Checksum error
DTC	U042082	EPS ECU message Livecounter error
DTC	U113887	DMS message lost
DTC	U043983	DMS message Checksum error
DTC	U043982	DMS message Livecounter error
DTC	U116487	A/C control unit message lost
DTC	U042483	A/C control unit message Checksum error
DTC	U042482	A/C control unit message Livecounter error
DTC	U114087	BCM message lost
DTC	U119987	Driver door module message lost
DTC	U115587	Instrument cluster control unit message lost
DTC	P1C7000	EMS _1 message Checksum error
DTC	P1C7100	EMS _1 message Livecounter error
DTC	P1C7200	EMS _1 message timeout
DTC	P1C7300	EMS _2 message Checksum error
DTC	P1C7400	EMS _2 message Livecounter error
DTC	P1C7500	EMS _2 message timeout
DTC	P1C7600	EMS _3 message Checksum error
DTC	P1C7700	EMS _3 message Livecounter error
DTC	P1C7800	EMS _3 message timeout
DTC	P1C7900	EMS _5 message timeout
DTC	P1C7A00	EMS _6 message timeout
DTC	P1C7B00	EMS _11 message Checksum error
DTC	P1C7C00	EMS _11 message Livecounter error
DTC	P1C7D00	EMS _11 message timeout
DTC	P1B7B00	BMS_1 message Checksum error
DTC	P1B8100	BMS_1 message Livecounter error
DTC	P1C8000	BMS_1 message timeout

DTC	P1B7C00	BMS_2 message Checksum error
DTC	P1B8200	BMS_2 message Livecounter error
DTC	P1C8100	BMS_2 message timeout
DTC	P1B7D00	BMS_3_1 message Checksum error
DTC	P1B8300	BMS_3_1 message Livecounter error
DTC	P1C8200	BMS_3_1 message timeout
DTC	P1B7E00	BMS_3_2 message Checksum error
DTC	P1B8400	BMS_3_2 message Livecounter error
DTC	P1C8300	BMS_3_2 message timeout
DTC	P1C8400	BMS_5_1 message timeout
DTC	P1C8500	BMS_5_2 message timeout
DTC	P1B7F00	BMS_6 message Checksum error
DTC	P1B8500	BMS_6 message Livecounter error
DTC	P1C8600	BMS_6 message timeout
DTC	P1B8000	BMS_7 message Checksum error
DTC	P1B8600	BMS_7 message Livecounter error
DTC	P1C8700	BMS_7 message timeout
DTC	P1C8800	IMCU_1 message timeout
DTC	P1C8900	GM_1 message Checksum error
DTC	P1C8A00	GM_1 message Livecounter error
DTC	P1C8B00	GM_1 message timeout
DTC	P1C8C00	GM_2 message Checksum error
DTC	P1C8D00	GM_2 message Livecounter error
DTC	P1C8E00	GM_2 message timeout
DTC	P1C8F00	GM_3 message timeout
DTC	P1B8700	MCU1_1 message Checksum error
DTC	P1B8900	MCU1_1 message Livecounter error
DTC	P1C9000	MCU1_1 message timeout
DTC	P1B8800	MCU1_2 message Checksum error

DTC	P1B8A00	MCU1_2 message Livecounter error
DTC	P1C9100	MCU1_2 message timeout
DTC	P1C9200	MCU1_3 message timeout
DTC	P1B8F00	ABS_1 message Checksum error
DTC	P1B9800	ABS_1 message Livecounter error
DTC	P1BA100	ABS_1 message timeout
DTC	P1B9000	ABS_2 message Checksum error
DTC	P1B9900	ABS_2 message Livecounter error
DTC	P1BA200	ABS_2 message timeout
DTC	P1B9100	ESC_1_FW message Checksum error
DTC	P1B9A00	ESC_1_FW message Livecounter error
DTC	P1BA300	ESC_1_FW message timeout
DTC	P1B9300	ESC_2 message Checksum error
DTC	P1B9C00	ESC_2 message Livecounter error
DTC	P1BA500	ESC_2 message timeout
DTC	P1B9400	ESC_3 message Checksum error
DTC	P1B9D00	ESC_3 message Livecounter error
DTC	P1BA600	ESC_3 message timeout
DTC	P1B9700	ESC_6 message Checksum error
DTC	P1BA000	ESC_6 message Livecounter error
DTC	P1BA900	ESC_6 message timeout
DTC	P1C9600	IBC_1 message Checksum error
DTC	P1C9700	IBC_1 message Livecounter error
DTC	P1C9800	IBC_1 message timeout
DTC	P1BC200	IFC_1 message Checksum error
DTC	P1BC300	IFC_1 message Livecounter error
DTC	P1C9900	IFC_1 message timeout
DTC	P1BC400	IFC_7 message Checksum error
DTC	P1BC500	IFC_7 message Livecounter error

DTC	P1BC600	IFC_7 message timeout
DTC	P1BC800	CSC_1 message timeout
DTC	P1C9A00	ESC_2: AvailableSt_MSR signal implausible
DTC	P1C9B00	ESC_1_FW: TorqueReductionFast_TCS signal invalid
DTC	P1C9C00	ESC_1_FW: TorqueIncrease_MSR signal invalid
DTC	P1C9F00	ESC_6: RegenerationTorqueRequest signal invalid
DTC	P1CA000	IFC_1: TorqueRequest _ACC signal invalid
DTC	P1CA100	EMS _1: Engine torque ActualNetTorq signal invalid
DTC	P1CA200	GM_1: GM_ActGMTorque signal invalid
DTC	P1CA300	EMS_3:EngineSpeed signal and GM_1:GM_-Speed signal invalid
DTC	P1CA400	MCU1_Speed signal and ABS vehicle speed signal invalid
DTC	P1CA500	BMS_7: BMS_BatteryPackSOC signal invalid
DTC	P1CA600	MCU1_1(MCU1_Speed) message and ABS vehicle speed (ABS_1) communication failure

Description

When the communication between the HCU and other systems is abnormal or interrupted, the HCU records the DTC.

DTC	DTC detection conditions	Faulty location
U000188	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U005588	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014787	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

DTC	DTC detection conditions	Faulty location
U010087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U040183	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U040182	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U029A87	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059B83	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059B82	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U011087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041183	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041182	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U029887	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059983	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059982	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U010387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U040483	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U040482	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U015187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U045283	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U045282	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U123587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U043383	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

DTC	DTC detection conditions	Faulty location
U043382	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U112987	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041883	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041882	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U113187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042083	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042082	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U113887	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U043983	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U043982	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U116487	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042483	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042482	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U119987	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C7000	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C7100	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C7200	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C7300	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C7400	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

DTC	DTC detection conditions	Faulty location
P1C7500	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C7600	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C7700	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C7800	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C7900	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C7A00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C7B00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C7C00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C7D00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B7B00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B8100	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C8000	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B7C00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B8200	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C8100	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B7D00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B8300	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C8200	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B7E00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B8400	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C8300	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

DTC	DTC detection conditions	Faulty location
P1C8400	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C8500	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B7F00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B8500	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C8600	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B8000	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B8600	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C8700	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C8800	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C8900	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C8A00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C8B00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C8C00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C8D00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C8E00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C8F00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B8700	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B8900	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C9000	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B8800	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B8A00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

DTC	DTC detection conditions	Faulty location
P1C9100	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C9200	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B8F00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B9800	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1BA100	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B9000	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B9900	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1BA200	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B9100	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B9A00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1BA300	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B9300	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B9C00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1BA500	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B9400	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B9D00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1BA600	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1B9700	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1BA000	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1BA900	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C9600	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

DTC	DTC detection conditions	Faulty location
P1C9700	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C9800	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1BC200	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1BC300	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C9900	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1BC400	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1BC500	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1BC600	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1BC800	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C9A00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C9B00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C9C00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1C9F00	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1CA000	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1CA100	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1CA200	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1CA300	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1CA400	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1CA500	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
P1CA600	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

DTC	P1B2C00	Engine shutdown disenable

Description

When a engine start failure is detected, the HCU records DTC.

DTC	DTC detection conditions	Faulty location
P1B2C00	(a) Engine start failure.	• Harness and connector • ECM

Inspection procedure

1	Check the ECM harness and connector

(a) Check whether the ECM harness and connector are connected tightly.

(b) Check whether the ECM harness and connector are short-circuited or open-circuited.

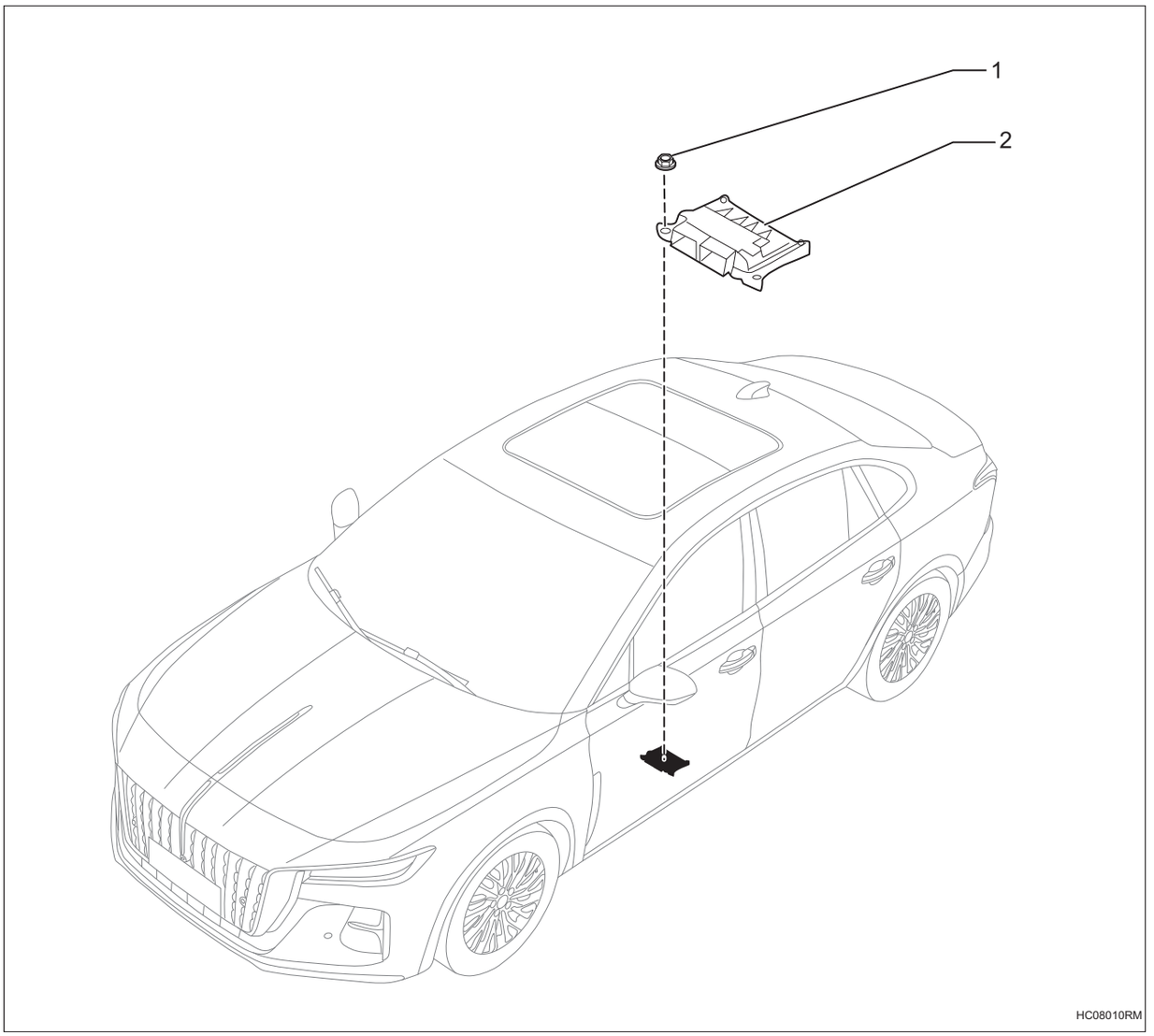
NG → **Repair or replace the harness and connector**

OK

2	Replace ECM (See page ES-54)

VCU

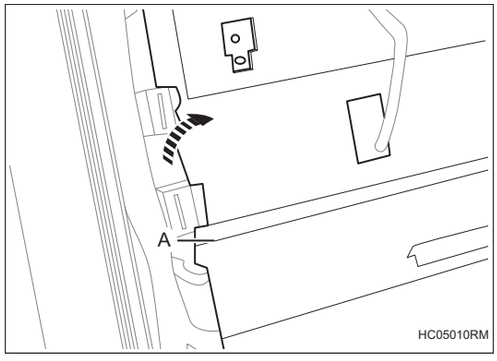
Parts



1. **Hexagon flange nut**
   - X4
   - Torque: 8 ~ 12 N·m
2. **HCU assembly**

Removal

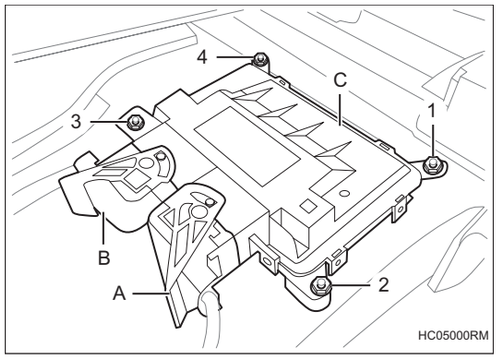
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the driver seat (See page SE-93)**
3. **Remove the driver door sill guard plate (See page IR-40)**
4. **Remove HCU**



(a) Lift carpet assembly -A- along the direction of -arrow-.

Hint:

Please do not damage the carpet assembly when lifting it.



(b) Disconnect the HCU -C- harness connector -A-B-.

(c) Remove the nut -1-4- and remove the HCU-C-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Motor control system

MCU MC-1
Precautions MC-1
Location of parts MC-3
System diagram MC-6
System description MC-7
ECU terminal MC-8
DTC chart MC-8
P1D0101 ..... MC-13
P1D0201 ..... MC-13
P1D0301 ..... MC-13
P1D0401 ..... MC-13
P1D0501 ..... MC-13
P1D0600 ..... MC-13
P1D4000 ..... MC-13
P1D2900 ..... MC-13
P1D2A00 ..... MC-13
P1D5500 ..... MC-13
P1D0701 ..... MC-18
P1D4101 ..... MC-18
P1D0817 ..... MC-19
P1D4217 ..... MC-19
P1D0901 ..... MC-21
P1D4301 ..... MC-21
P1D0916 ..... MC-23
P1D4316 ..... MC-23
P1D0917 ..... MC-24
P1D4317 ..... MC-24
P1D0A00 ..... MC-25
P1D4400 ..... MC-25
P1D0B00 ..... MC-25
P1D4500 ..... MC-25
P1D0C00 ..... MC-25
P1D4600 ..... MC-25
P1D0D00 ..... MC-25
P1D4700 ..... MC-25
P1D0A01 ..... MC-25
P1D4401 ..... MC-25
P1D0B01 ..... MC-25
P1D4501 ..... MC-25

P1D0C01 ..... MC-25
P1D4601 ..... MC-25
P1D0D01 ..... MC-25
P1D4701 ..... MC-25
P1D0A02 ..... MC-26
P1D4402 ..... MC-26
P1D0B02 ..... MC-26
P1D4502 ..... MC-26
P1D0C02 ..... MC-26
P1D4602 ..... MC-26
P1D0D02 ..... MC-26
P1D4702 ..... MC-26
P1D0F19 ..... MC-26
P1D4919 ..... MC-26
P1D1000 ..... MC-26
P1D4A00 ..... MC-26
P1D0E19 ..... MC-33
P1D4819 ..... MC-33
P1D1100 ..... MC-37
P1D4B00 ..... MC-37
P1D114B MC-39
P1D4B4B MC-39
P1D1200 ..... MC-41
P1D4C00 ..... MC-41
P1D124B MC-43
P1D4C4B MC-43
P1D1300 ..... MC-45
P1D4D00 ..... MC-45
P1D134B MC-47
P1D4D4B MC-47
P1D1500 ..... MC-49
P1D4E00 ..... MC-49
P1D1600 ..... MC-49
P1D4F00 ..... MC-49
P1D1900 ..... MC-51
P1D1A00 ..... MC-51
P1D1B00 ..... MC-51
P1D2113 ..... MC-51
P1D5013 ..... MC-51
P1D2300 ..... MC-51
P1D5200 ..... MC-51
P1D1C00 ..... MC-52
P1D1D00 ..... MC-52

P1D1E00 ..... MC-52
P1D2200 ..... MC-53
P1D5100 ..... MC-53
P1D2400 ..... MC-54
P1D5400 ..... MC-54
P1D2500 ..... MC-55
P1D5300 ..... MC-55
P1D2600 ..... MC-56
P1D2700 ..... MC-57
P1D2800 ..... MC-57
P1D5616 ..... MC-58
P1D5617 ..... MC-58
U112187 ..... MC-62
U115187 ..... MC-62
U029387 ..... MC-62
U010087 ..... MC-62
U029887 ..... MC-62
U115587 ..... MC-62
U114087 ..... MC-62
U029A87 ..... MC-62
U014687 ..... MC-62
U114687 ..... MC-62
U005588 ..... MC-62
U041582 ..... MC-62
U041583 ..... MC-62
U045282 ..... MC-62
U045283 ..... MC-62
U059482 ..... MC-62
U059483 ..... MC-62
U059B82 ..... MC-62
U059B83 ..... MC-62
U059982 ..... MC-62
U059983 ..... MC-62
U300316 ..... MC-64
U300317 ..... MC-64

Electric drive system transmission fluid MC-68

Drain MC-68
Add MC-68

Electric drive system MC-70

Parts MC-70
Parts MC-72
Removal MC-74

Installation MC-82

MCU

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Warning:

Before repairing the high voltage system or adjacent high voltage system components, be sure to carefully read the "Instructions and precautions for maintenance work" in the introduction carefully!

(b) Replace the damaged high-voltage harness in time.

(c) High-voltage electrical connection parts such as high-voltage harness must be in a dry state during assembly, and the connected metal parts must be bright.

(d) Persons wearing electronic/medical life and health maintenance devices (e. g. with pacemakers) are not permitted to approach electric vehicles.

(e) The measuring instrument used must be approved and within the validity period.

(f) After insulation failure, the high voltage components shall not be contacted, because the case can be conductive.

(g) When removing the high voltage system, special tools for electricians shall be used.

(h) Tools with insulation protection shall be used when working on the inside of the traction battery.

(i) Be extra careful when checking and fixing the high voltage system or high voltage components that are flooded (high voltage component with snow melting salts are particularly dangerous).

2. ENGINE START/STOP button (ignition switch) representation:

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in ON (IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

3. Removal and installation of battery terminal

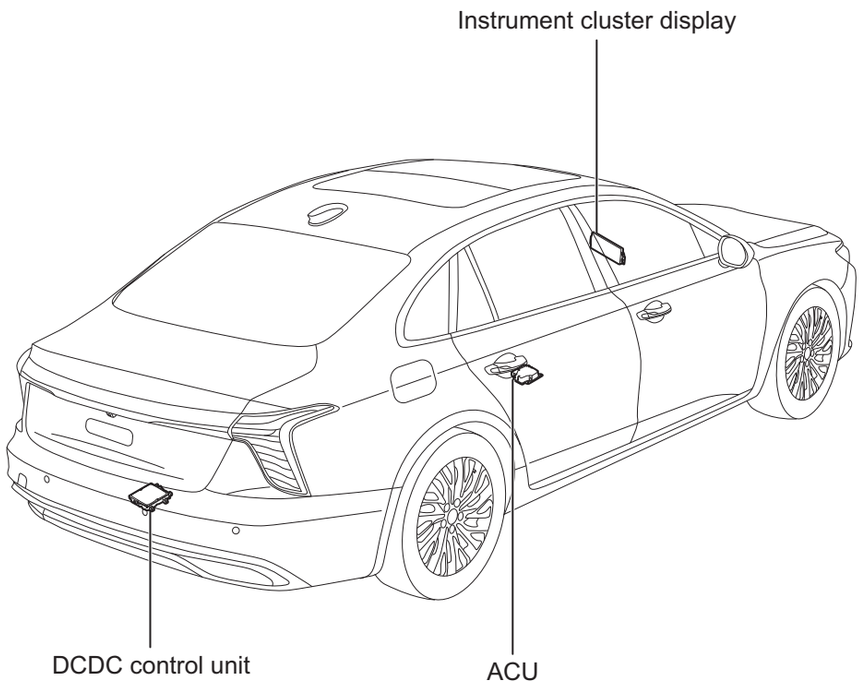
(a) Before removal and repair of electrical components, disconnect the battery negative (-) terminal to prevent the system from short circuit.

(b) Before disconnecting or reconnecting the battery cable terminal, first turn off the power (ignition) switch and lighting switch, and then completely loosen or tighten the battery cable terminal nut.

(c) When reconnecting after disconnecting the battery cable, some systems need to be initialized.

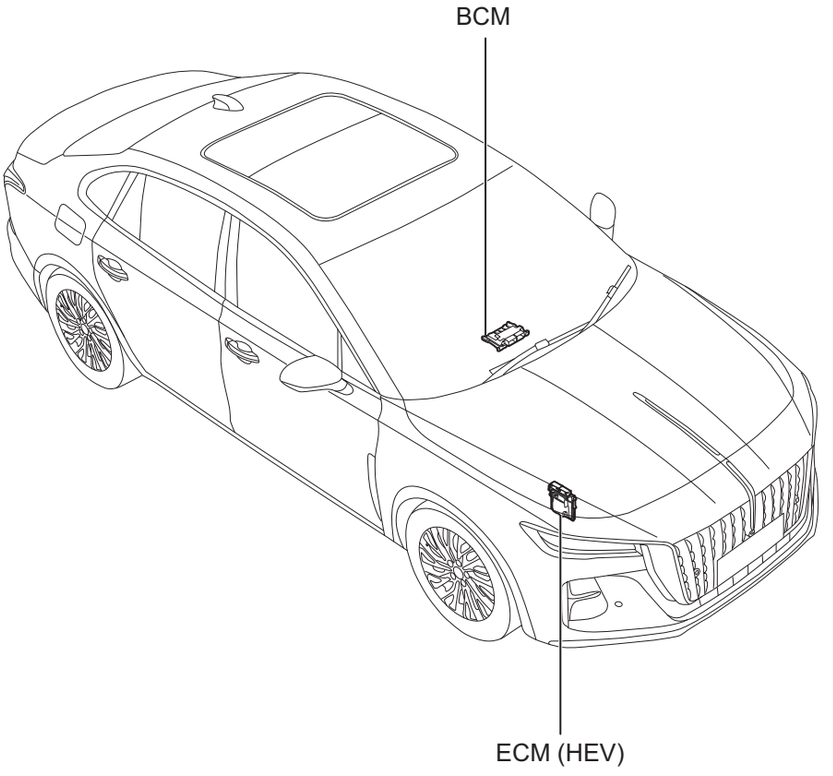
4. After replacing the electric drive system inverter, the initial angle of the electric drive system motor shall be written.

Location of parts



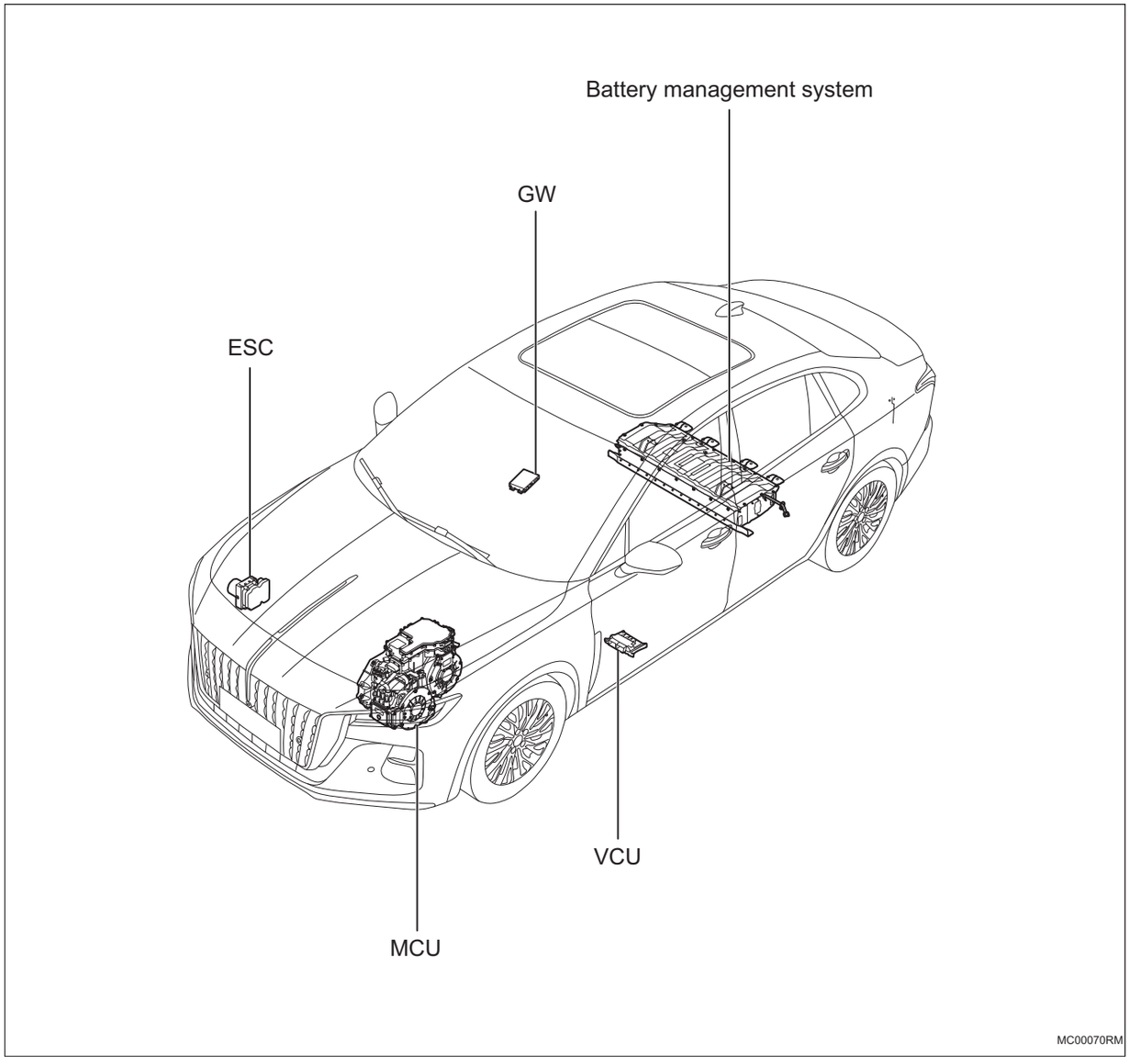
MC00050RM

Location of parts

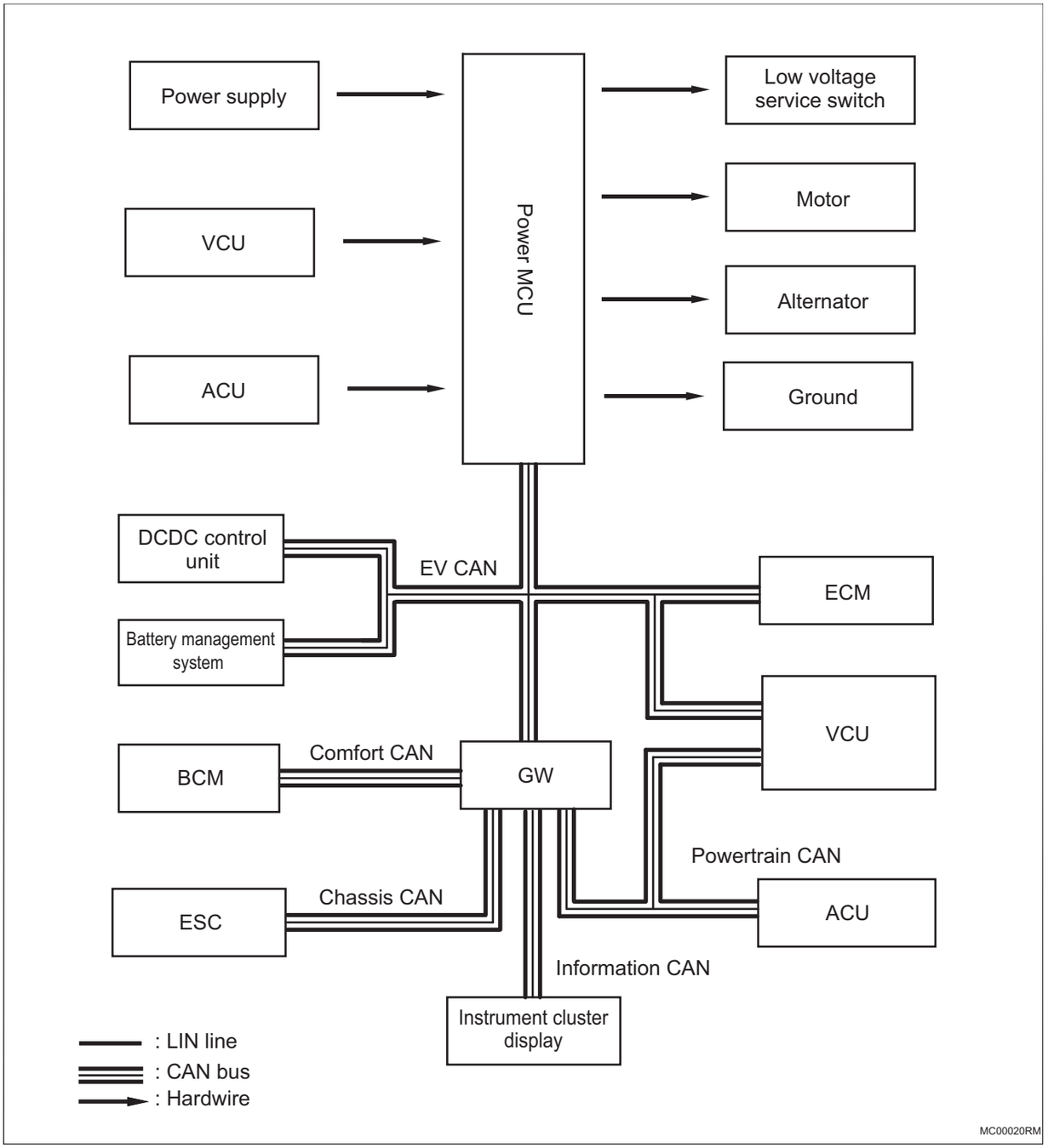


MC00060RM

Location of parts



System diagram



System description

1. Technical characteristics

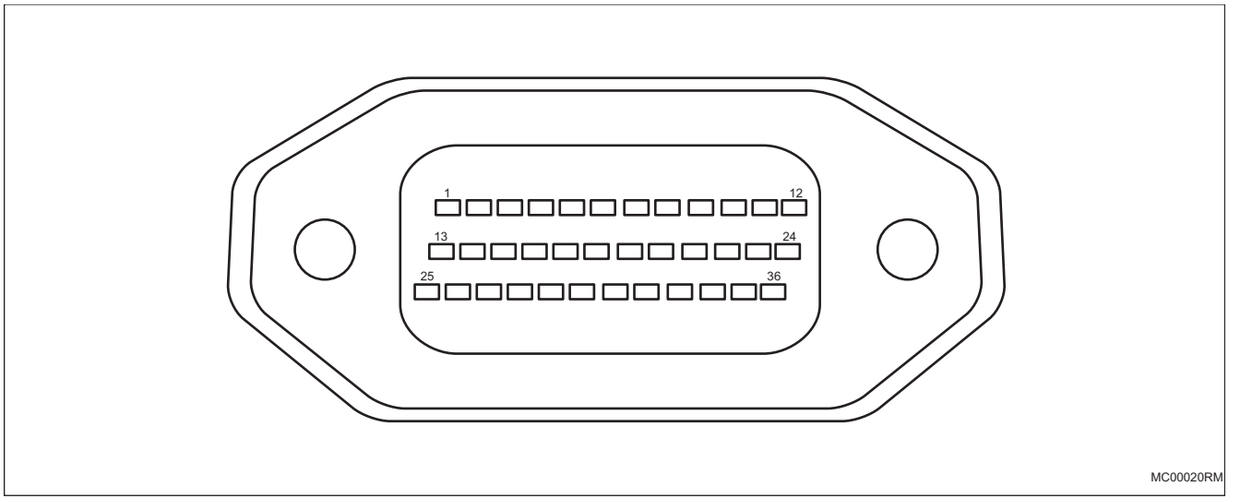
(a) Adopt permanent magnet synchronization drive motor, permanent magnet synchronization alternator, motor inverter and reducer.

2. Function brief description

(a) The high-voltage DC power supply is converted into three-phase AC with adjustable voltage amplitude and frequency through DC/AC (inverter) to drive the permanent magnet synchronous motor to operate.

(b) MCU communicates with HCU through the CAN bus, obtains the torque command and operation mode of drive motor and alternator respectively from the HCU, obtains the current and motor position signals according to the feedback of drive motor and alternator, controls the drive motor and the alternator to generate the required three-phase alternating current, and outputs the command torque respectively.

ECU terminal



MC

MCU			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	M-NTC + (motor temperature)	19	M-S4 (motor sine negative)
2	G-NTC + (alternator temperature)	20	High voltage interlock
3	G-S1 (alternator cosine plus)	21	High voltage interlock
4	G-S2 (alternator sine positive)	22	HSDN (hardwire emergency stop signal)
5	G-R1 (alternator excitation positive)	23	GND (power supply ground)
6	M-S1 (motor cosine positive)	24	GND (power supply ground)
7	M-S2 (motor sine positive)	25	—
8	Debugging CAN_H	26	—
9	Debugging CAN_L	27	—
10	IG ignition signal	28	—
11	12 V (12 V B+)	29	—
12	12 V (12 V B+)	30	M-R1 (motor excitation positive)
13	M-NTC-(motor temperature ground)	31	M-R2 (motor excitation negative)
14	G-NTC-(alternator temperature ground)	32	CAN_H
15	G-S3 (alternator cosine negative)	33	CAN_L
16	G-S4 (alternator sine negative)	34	—
17	G-R2 (alternator excitation negative)	35	GND
18	M-S3 (motor cosine negative)	36	—

DTC chart

DTC	Description	Reference page
P1D0101	Abnormal current sensor power supply	(See page MC-13)
P1D0201	Abnormal position sensor power supply voltage	(See page MC-13)

DTC	Description	Reference page
P1D0301	Abnormal AD reference voltage power supply	(See page MC-13)
P1D0401	Driver board power supply voltage abnormal	(See page MC-13)
P1D0501	SCM power supply voltage abnormal (motor temperature sensor voltage abnormal)	(See page MC-13)
P1D0600	Drive motor phase current zero error flag	(See page MC-13)
P1D0701	Drive motor bus voltage abnormity flag bit	(See page MC-18)
P1D0817	Drive motor bus voltage hardware overvoltage flag bit	(See page MC-19)
P1D0916	Drive motor bus undervoltage flag bit	(See page MC-23)
P1D0917	Drive motor bus overvoltage flag bit	(See page MC-24)
P1D0901	Drive motor bus voltage characteristic abnormity flag bit	(See page MC-21)
P1D0A00	Drive motor IGBT U phase upper bridge arm fault flag bit	(See page MC-26)
P1D0B00	Drive motor IGBT U phase lower bridge arm fault flag bit	(See page MC-26)
P1D0C00	Drive motor IGBT U phase upper bridge arm Ready fault identification	(See page MC-26)
P1D0D00	Drive motor IGBT U phase lower bridge arm Ready fault identification	(See page MC-26)
P1D0A01	Drive motor IGBT V phase upper bridge arm fault flag bit	(See page MC-26)
P1D0B01	Drive motor IGBT V phase lower bridge arm fault flag bit	(See page MC-26)
P1D0C01	Drive motor IGBT V phase upper bridge arm Ready fault identification	(See page MC-26)
P1D0D01	Drive motor IGBT V phase lower bridge arm Ready fault identification	(See page MC-26)
P1D0A02	Drive motor IGBT W phase upper bridge arm fault flag bit	(See page MC-26)
P1D0B02	Drive motor IGBT W phase lower bridge arm fault flag bit	(See page MC-26)
P1D0C02	Drive motor IGBT W phase upper bridge arm Ready fault identification	(See page MC-26)
P1D0D02	Drive motor IGBT W phase lower bridge arm Ready fault identification	(See page MC-26)
P1D0E19	Drive motor output software overcurrent flag bit	(See page MC-33)
P1D0F19	Drive motor output hardware overcurrent flag bit	(See page MC-26)
P1D1000	Drive motor three-phase current and checksum error status flag	(See page MC-26)
P1D1100	Drive motor IGBT temperature derating flag bit	(See page MC-37)
P1D114B	Drive motor IGBT overtemperature flag bit	(See page MC-39)
P1D1200	Drive motor temperature derating flag bit	(See page MC-41)
P1D124B	Drive motor overtemperature flag bit	(See page MC-43)

DTC	Description	Reference page
P1D1300	Drive motor driver board overtemperature alarm	(See page MC-45)
P1D134B	Drive motor driver board overtemperature	(See page MC-47)
P1D1500	Drive motor resolver signal acquisition abnormity	(See page MC-49)
P1D1600	Drive motor resolver plausibility check abnormity	(See page MC-49)
P1D1900	Watchdog monitoring abnormality	(See page MC-51)
P1D1A00	ROM abnormal	(See page MC-51)
P1D1B00	RAM abnormal	(See page MC-51)
P1D1C00	Diagnostic memory data error (EEPROM)	(See page MC-52)
P1D1D00	Resolver compensation amount memory data error (EEPROM)	(See page MC-52)
P1D1E00	Resolver compensation not set (EEPROM)	(See page MC-52)
P1D2113	Drive motor circuit open	(See page MC-51)
P1D2200	Drive motor torque monitoring abnormity	(See page MC-53)
P1D2300	Drive motor demagnetization	(See page MC-51)
P1D2400	Drive motor IGBT temperature sensor disconnection flag bit	(See page MC-54)
P1D2500	Drive motor stator temperature sensor disconnection flag bit	(See page MC-55)
P1D2600	Internal EEPROM reading abnormal	(See page MC-56)
P1D2700	Loop communication abnormity flag bit	(See page MC-57)
P1D2800	Persistent communication abnormity flag bit	(See page MC-57)
P1D2900	CPLD power supply 1 voltage abnormal	(See page MC-13)
P1D2A00	CPLD power supply 2 voltage abnormal	(See page MC-13)
P1D4000	Alternator phase current zero error flag	(See page MC-13)
P1D4101	Alternator bus voltage abnormity flag bit	(See page MC-18)
P1D4217	Alternator bus voltage hardware overvoltage flag bit	(See page MC-18)
P1D4316	Alternator bus voltage undervoltage flag bit	(See page MC-23)
P1D4317	Alternator bus voltage overvoltage flag bit	(See page MC-24)
P1D4301	Alternator bus voltage characteristic abnormity flag bit	(See page MC-21)
P1D4400	Alternator IGBT U phase upper bridge arm fault flag	(See page MC-26)
P1D4500	Alternator IGBT U phase lower bridge arm fault flag	(See page MC-26)
P1D4600	Alternator IGBT U phase upper bridge arm Ready fault identification	(See page MC-26)
P1D4700	Alternator IGBT U phase lower bridge arm Ready fault identification	(See page MC-26)
P1D4401	Alternator IGBT V phase upper bridge arm fault flag bit	(See page MC-26)

DTC	Description	Reference page
P1D4501	Alternator IGBT V phase lower bridge arm fault flag bit	(See page MC-26)
P1D4601	Alternator IGBT V phase upper bridge arm Ready fault identification	(See page MC-26)
P1D4701	Alternator IGBT V phase lower bridge arm Ready fault identification	(See page MC-26)
P1D4402	Alternator IGBT W phase upper bridge arm fault flag bit	(See page MC-26)
P1D4502	Alternator IGBT W phase lower bridge arm fault flag bit	(See page MC-26)
P1D4602	Alternator IGBT W phase upper bridge arm Ready fault identification	(See page MC-26)
P1D4702	Alternator IGBT W phase lower bridge arm Ready fault identification	(See page MC-26)
P1D4819	Alternator output software overcurrent flag bit	(See page MC-33)
P1D4919	Alternator output hardware overcurrent flag bit	(See page MC-26)
P1D4A00	Alternator three-phase current and check-sum error status flag	(See page MC-26)
P1D4B00	Alternator IGBT temperature derating flag bit	(See page MC-37)
P1D4B4B	Alternator IGBT overtemperature flag bit	(See page MC-39)
P1D4C00	Alternator temperature derating flag bit	(See page MC-41)
P1D4C4B	Alternator overtemperature flag bit	(See page MC-43)
P1D4D00	Alternator driver board overtemperature alarm	(See page MC-45)
P1D4D4B	Alternator driver board overtemperature	(See page MC-47)
P1D4E00	Alternator resolver signal acquisition abnormity	(See page MC-49)
P1D4F00	Alternator resolver plausibility check abnormity	(See page MC-49)
P1D5013	Alternator circuit open	(See page MC-51)
P1D5100	Alternator torque monitoring abnormity	(See page MC-53)
P1D5200	Alternator demagnetization	(See page MC-51)
P1D5300	Alternator IGBT temperature sensor disconnection flag bit	(See page MC-55)
P1D5400	Alternator stator temperature sensor disconnection flag bit	(See page MC-54)
P1D5500	Alternator driver board digital 5 V power supply abnormal	(See page MC-13)
U112187	ABS/ESP/ESPwithAPB message lost	(See page MC-62)
U115187	ACU message lost	(See page MC-62)
U029387	HCU node lost	(See page MC-62)
U010087	ECM node lost	(See page MC-62)
U029887	DCDC (high voltage) node lost	(See page MC-62)
U115587	Instrument cluster control unit message lost	(See page MC-62)

DTC	Description	Reference page
U114087	BCM 1 message lost	(See page MC-62)
U029A87	BMS node lost	(See page MC-62)
U014687	GW node lost	(See page MC-62)
U114687	GW message lost	(See page MC-62)
U005588	Hybrid/electric CAN bus off	(See page MC-62)
U041582	ABS message LiveCounter abnormal	(See page MC-62)
U041583	ABS message Checksum abnormal	(See page MC-62)
U045282	ACU message LiveCounter abnormal	(See page MC-62)
U045283	ACU message Checksum abnormal	(See page MC-62)
U059482	HCU message LiveCounter abnormal	(See page MC-62)
U059483	HCU message Checksum abnormal	(See page MC-62)
U059B82	BMS message LiveCounter abnormal	(See page MC-62)
U059B83	BMS message Checksum abnormal	(See page MC-62)
U059982	DCDC message LiveCounter abnormal	(See page MC-62)
U059983	DCDC message Checksum abnormal	(See page MC-62)
U300316	MCU weak current undervoltage flag bit	(See page MC-64)
U300317	MCU weak current overvoltage flag bit	(See page MC-64)
P1D5616	MCU weak current serious undervoltage flag	(See page MC-58)
P1D5617	MCU weak current serious overvoltage flag	(See page MC-58)

DTC	P1D0101	Abnormal current sensor power supply
DTC	P1D0201	Abnormal position sensor power supply voltage
DTC	P1D0301	Abnormal AD reference voltage power supply
DTC	P1D0401	Driver board power supply voltage abnormal
DTC	P1D0501	SCM power supply voltage abnormal (motor temperature sensor voltage abnormal)
DTC	P1D0600	Drive motor phase current zero error flag
DTC	P1D4000	Alternator phase current zero error flag
DTC	P1D2900	CPLD power supply 1 voltage abnormal
DTC	P1D2A00	CPLD power supply 2 voltage abnormal
DTC	P1D5500	Alternator driver board digital 5 V power supply abnormal

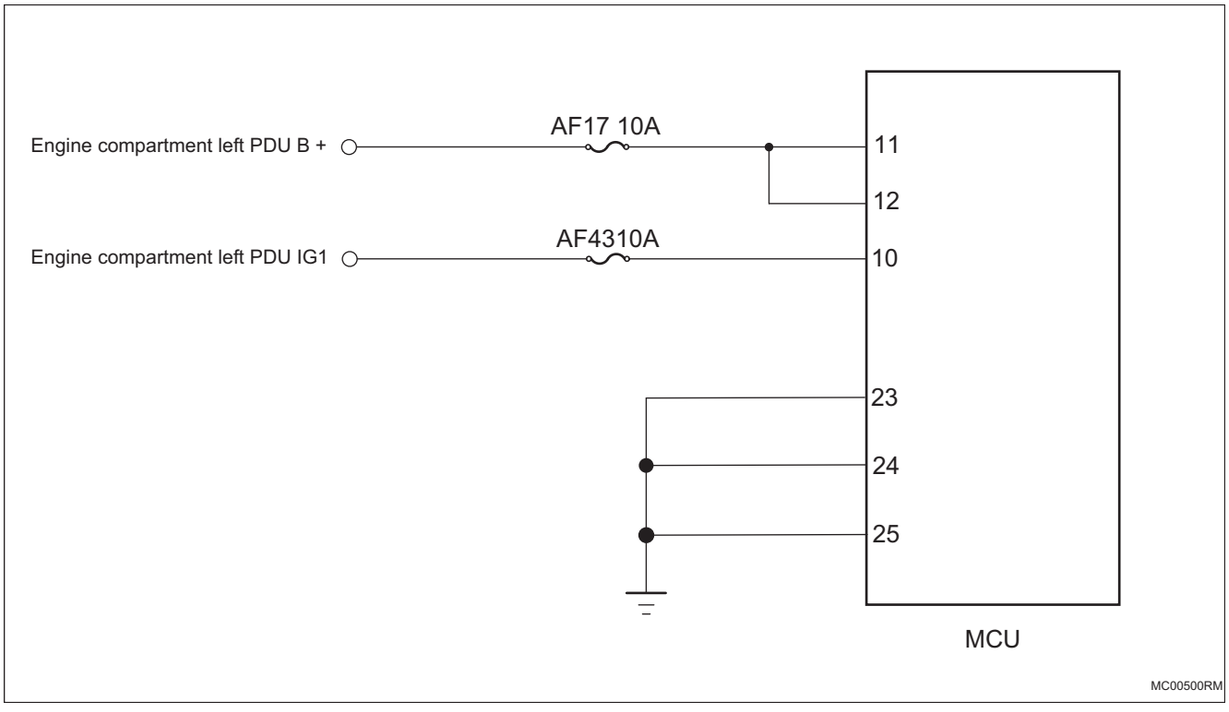
Description

When the sensor and driver board low voltage power supply voltage exceed the normal working range, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D0101	(a) Abnormal current sensor power supply.	• MCU (motor assembly) • Fuse • Harness and connector • Charging system
P1D0201	(a) Abnormal position sensor power supply voltage.	• MCU (motor assembly) • Harness and connector • Fuse • Charging system
P1D0301	(a) AD reference voltage power supply abnormal.	• MCU (motor assembly) • Fuse • Harness and connector • Charging system
P1D0401	(a) Driver board power supply voltage is abnormal.	• MCU (motor assembly) • Harness and connector • Fuse • Charging system
P1D0501	(a) Abnormal motor temperature sensor voltage.	• MCU (motor assembly) • Harness and connector • Fuse • Charging system

DTC	DTC detection conditions	Faulty location
P1D0600	(a) Drive motor phase current zero error flag.	• MCU (motor assembly) • Harness and connector • Fuse • Charging system
P1D4000	(a) Alternator phase current zero error flag.	• MCU (motor assembly) • Fuse • Harness and connector • Charging system
P1D2900	(a) The CPLD power supply 1 voltage is abnormal.	• MCU (motor assembly) • Harness and connector • Fuse • Charging system
P1D2A00	(a) The CPLD power supply 2 voltage is abnormal.	• MCU (motor assembly) • Harness and connector • Fuse • Charging system
P1D5500	(a) Alternator driver board digital 5 V power supply abnormal.	• MCU (motor assembly) • Harness and connector • Fuse • Charging system

Circuit diagram



Inspection procedure

1	**Read DTC**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC, power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → **End**

NG

2	Check low-voltage battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal - battery negative terminal	Always connected	Battery voltage

NG → **Overhaul the charging system**

OK

3	Check the low-voltage power supply fuse of MCU

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the MCU fuse.

(d) Measure the resistance according to the values in the table below.

Standard value

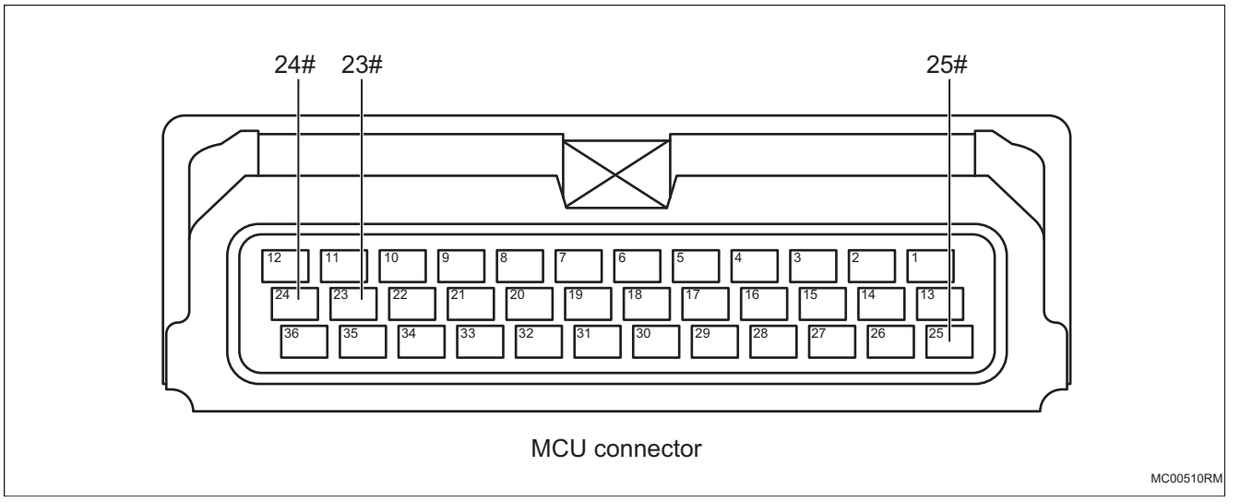
Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

MC

OK

4	Check MCU ground



MCU connector

MC

(a) Disconnect the MCU connector.

(b) Measure the resistance according to the values in the table below.

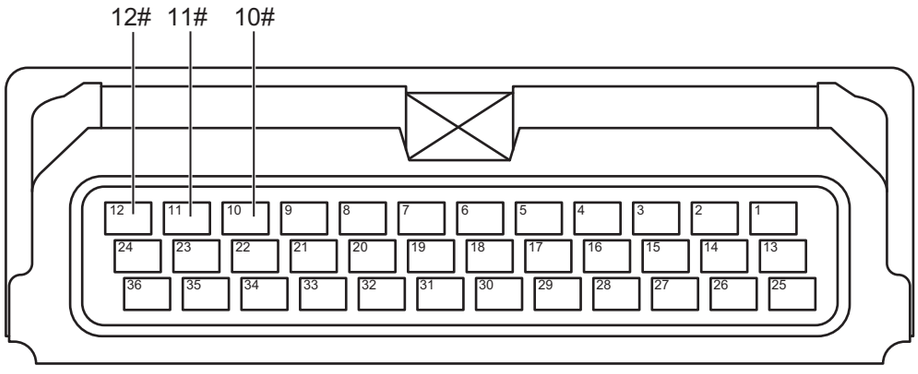
Standard value

Detector connection	Detection conditions	Specified state
MCU connector 23# -body GND	Always connected	Less than 1Ω
MCU connector 24# -body GND	Always connected	Less than 1Ω
MCU connector 25# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

5	Check MCU low voltage power supply



MCU connector

MC00521RM

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
MCU connector 11# -body GND	The ignition switch is set to "ON"	Battery voltage
MCU connector 12# -body GND	The ignition switch is set to "ON"	Battery voltage
MCU connector 10# -body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

6	**Read data flow**

(a) Read low voltage power supply voltage.

NG → **Overhaul the low voltage charging system**

OK

7	**Replace MCU (motor assembly) (See page MC-74)**

MC

DTC	P1D0701	Drive motor bus voltage abnormity flag bit
DTC	P1D4101	Alternator bus voltage abnormity flag bit

Description

When the drive motor and alternator bus voltage are abnormal, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D0701	(a) Drive motor bus voltage abnormity flag bit.	• MCU (motor assembly) • High voltage battery system • High-voltage harness and connector
P1D4101	(a) Alternator bus voltage abnormity flag bit.	• MCU (motor assembly) • High voltage battery system • High-voltage harness and connector

Inspection procedure

1	Read DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC, power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → **End**

NG

2	Read data flow

(a) Read inverter bus voltage.

Criteria:

Inverter bus voltage: 220V~490V.

NG → **Check the traction battery system, high voltage harness and connector**

OK

3	Replace MCU (motor assembly) (See page MC-74)

DTC	P1D0817	Drive motor bus voltage hardware overvoltage flag bit
DTC	P1D4217	Alternator bus voltage hardware overvoltage flag bit

Description

When the drive motor and alternator bus hardware overvoltage, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D0817	(a) Drive motor bus voltage hardware overvoltage flag bit.	• MCU (motor assembly) • High voltage battery system • High-voltage harness and connector
P1D4217	(a) Alternator bus voltage hardware overvoltage flag bit.	• MCU (motor assembly) • High voltage battery system • High-voltage harness and connector

Inspection procedure

1	Read DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC, power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → **End**

NG

2	Read data flow

(a) Read inverter bus voltage.

Criteria:

Inverter bus voltage: 220V~500V.

NG → **Check the traction battery system, high voltage harness and connector**

OK

3	**Replace MCU (motor assembly) (See page MC-74)**

DTC	P1D0901	Drive motor bus voltage characteristic abnormity flag bit
DTC	P1D4301	Alternator bus voltage characteristic abnormity flag bit

Description

When the voltage characteristics of the drive motor and alternator bus are abnormal, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D0901	(a) Drive motor bus voltage characteristic abnormity flag bit.	• MCU (motor assembly) • High voltage battery system • High-voltage harness and connector
P1D4301	(a) Alternator bus voltage characteristic abnormity flag bit.	• MCU (motor assembly) • High voltage battery system • High-voltage harness and connector

Inspection procedure

1	**Read DTC**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC, power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → **End**

NG

2	**Read data flow**

(a) Read inverter bus voltage and traction battery voltage.

Criteria:

The inverter bus voltage is consistent with the traction battery voltage.

NG → **Check the traction battery system, high voltage harness and connector**

OK

3	**Replace MCU (motor assembly) (See page MC-74)**

DTC	P1D0916	Drive motor bus undervoltage flag bit
DTC	P1D4316	Alternator bus voltage undervoltage flag bit

Description

When the drive motor and alternator bus have undervoltage, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D0916	(a) Drive motor bus undervoltage flag bit.	• MCU (motor assembly) • High voltage battery system • High-voltage harness and connector
P1D4316	(a) Alternator bus voltage undervoltage flag bit.	• MCU (motor assembly) • High voltage battery system • High-voltage harness and connector

Inspection procedure

1	Read DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC, power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → **End**

NG

2	Read data flow

(a) Read inverter bus voltage.

Criteria:

Inverter bus voltage: 220V~490V.

NG → **Check the traction battery system, high voltage harness and connector**

OK

3	Replace MCU (motor assembly) (See page MC-74)

DTC	P1D0917	Drive motor bus overvoltage flag bit
DTC	P1D4317	Alternator bus voltage overvoltage flag bit

Description

When the drive motor and alternator bus have overvoltage, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D0917	(a) Drive motor bus overvoltage flag bit.	• MCU (motor assembly) • High voltage battery system • High-voltage harness and connector
P1D4317	(a) Alternator bus voltage overvoltage flag bit.	• MCU (motor assembly) • High voltage battery system • High-voltage harness and connector

Inspection procedure

1	Read DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC, power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → **End**

NG

2	Read data flow

(a) Read inverter bus voltage.

Criteria:

Inverter bus voltage: 220V~490V.

NG → **Check the traction battery system, high voltage harness and connector**

OK

3	Replace MCU (motor assembly) (See page MC-74)

DTC	P1D0A00	Drive motor IGBT U phase upper bridge arm fault flag bit
DTC	P1D4400	Alternator IGBT U phase upper bridge arm fault flag
DTC	P1D0B00	Drive motor IGBT U phase lower bridge arm fault flag bit
DTC	P1D4500	Alternator IGBT U phase lower bridge arm fault flag
DTC	P1D0C00	Drive motor IGBT U phase upper bridge arm Ready fault identification
DTC	P1D4600	Alternator IGBT U phase upper bridge arm Ready fault identification
DTC	P1D0D00	Drive motor IGBT U phase lower bridge arm Ready fault identification
DTC	P1D4700	Alternator IGBT U phase lower bridge arm Ready fault identification
DTC	P1D0A01	Drive motor IGBT V phase upper bridge arm fault flag bit
DTC	P1D4401	Alternator IGBT V phase upper bridge arm fault flag bit
DTC	P1D0B01	Drive motor IGBT V phase lower bridge arm fault flag bit
DTC	P1D4501	Alternator IGBT V phase lower bridge arm fault flag bit
DTC	P1D0C01	Drive motor IGBT V phase upper bridge arm Ready fault identification
DTC	P1D4601	Alternator IGBT V phase upper bridge arm Ready fault identification
DTC	P1D0D01	Drive motor IGBT V phase lower bridge arm Ready fault identification
DTC	P1D4701	Alternator IGBT V phase lower bridge arm Ready fault identification

DTC	P1D0A02	Drive motor IGBT W phase upper bridge arm fault flag bit
DTC	P1D4402	Alternator IGBT W phase upper bridge arm fault flag bit
DTC	P1D0B02	Drive motor IGBT W phase lower bridge arm fault flag bit
DTC	P1D4502	Alternator IGBT W phase lower bridge arm fault flag bit
DTC	P1D0C02	Drive motor IGBT W phase upper bridge arm Ready fault identification
DTC	P1D4602	Alternator IGBT W phase upper bridge arm Ready fault identification
DTC	P1D0D02	Drive motor IGBT W phase lower bridge arm Ready fault identification
DTC	P1D4702	Alternator IGBT W phase lower bridge arm Ready fault identification
DTC	P1D0F19	Drive motor output hardware overcurrent flag bit
DTC	P1D4919	Alternator output hardware overcurrent flag bit
DTC	P1D1000	Drive motor three-phase current and check-sum error status flag
DTC	P1D4A00	Alternator three-phase current and check-sum error status flag

Description

When the drive motor and alternator IGBT are faulty, the MCU records the DTC.

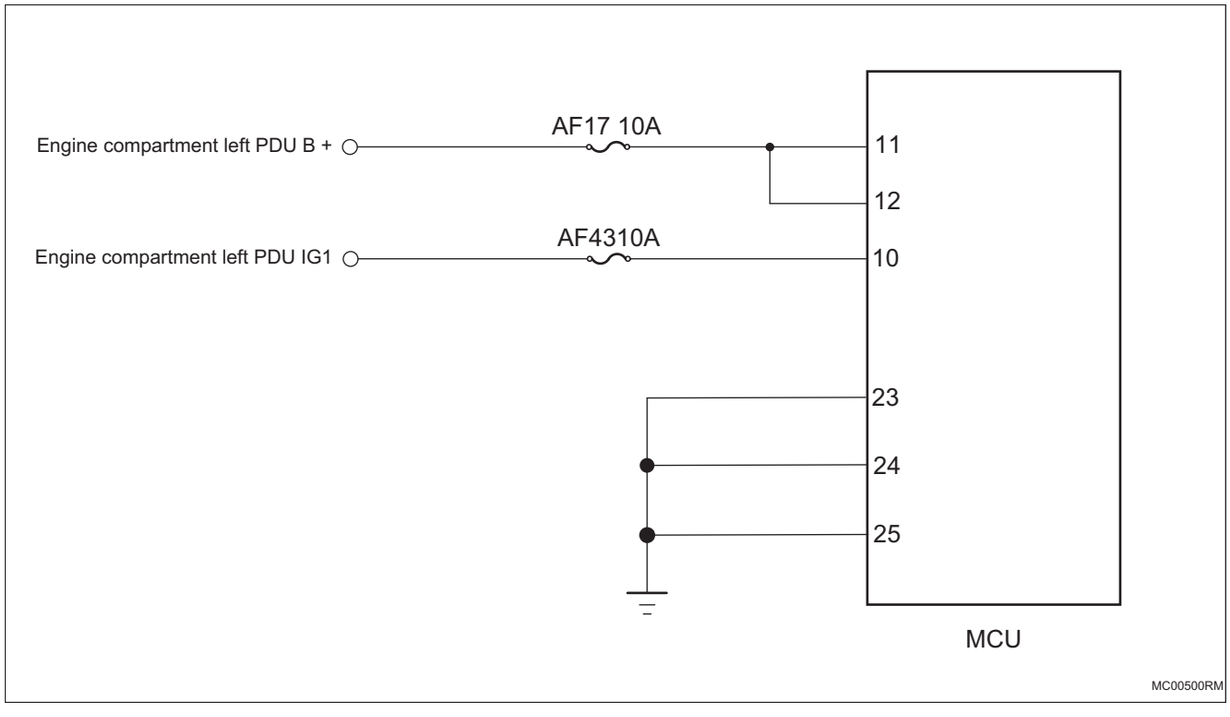
DTC	DTC detection conditions	Faulty location
P1D0A00	(a) Drive motor IGBT U phase upper bridge arm fault flag bit	• MCU (motor assembly) • Fuse • Harness and connector • Charging system
P1D4400	(a) Alternator IGBT U phase upper bridge arm fault flag bit	• MCU (motor assembly) • Harness and connector • Fuse • Charging system

DTC	DTC detection conditions	Faulty location
P1D0B00	(a) Drive motor IGBT U phase lower bridge arm fault flag bit	• MCU (motor assembly) • Fuse • Harness and connector • Charging system
P1D4500	(a) Alternator IGBT U phase lower bridge arm fault flag bit	• MCU (motor assembly) • Harness and connector • Fuse • Charging system
P1D0C00	(a) Drive motor IGBT U phase upper bridge arm Ready fault identification	• MCU (motor assembly) • Harness and connector • Fuse • Charging system
P1D4600	(a) Alternator IGBT U phase upper bridge arm Ready fault identification	• MCU (motor assembly) • Harness and connector • Fuse • Charging system
P1D0D00	(a) Drive motor IGBT U phase lower bridge arm Ready fault identification	• MCU (motor assembly) • Fuse • Harness and connector • Charging system
P1D4700	(a) Alternator IGBT U phase lower bridge arm Ready fault identification	• MCU (motor assembly) • Harness and connector • Fuse • Charging system
P1D0A01	(a) Drive motor IGBT V phase upper bridge arm fault flag bit	• MCU (motor assembly) • Harness and connector • Fuse • Charging system
P1D4401	(a) Alternator IGBT V phase upper bridge arm fault flag bit	• MCU (motor assembly) • Harness and connector • Fuse • Charging system
P1D0B01	(a) Drive motor IGBT V phase lower bridge arm fault flag bit	• MCU (motor assembly) • Fuse • Harness and connector • Charging system
P1D4501	(a) Alternator IGBT V phase lower bridge arm fault flag	• MCU (motor assembly) • Harness and connector • Fuse • Charging system
P1D0C01	(a) Drive motor IGBT V phase upper bridge arm Ready fault flag	• MCU (motor assembly) • Fuse • Harness and connector • Charging system

DTC	DTC detection conditions	Faulty location
P1D4601	(a) Alternator IGBT V phase upper bridge arm Ready fault flag	• MCU (motor assembly) • Harness and connector • Fuse • Charging system
P1D0D01	(a) Drive motor IGBT V phase lower bridge arm Ready fault flag	• MCU (motor assembly) • Harness and connector • Fuse • Charging system
P1D4701	(a) Alternator IGBT V phase lower bridge arm Ready fault flag	• MCU (motor assembly) • Harness and connector • Fuse • Charging system
P1D0A02	(a) Drive motor IGBT W phase upper bridge arm fault flag	• MCU (motor assembly) • Fuse • Harness and connector • Charging system
P1D4402	(a) Alternator IGBT W phase upper bridge arm fault flag	• MCU (motor assembly) • Harness and connector • Fuse • Charging system
P1D0B02	(a) Drive motor IGBT W phase lower bridge arm fault flag	• MCU (motor assembly) • Harness and connector • Fuse • Charging system
P1D4502	(a) Alternator IGBT W phase lower bridge arm fault flag	• MCU (motor assembly) • Harness and connector • Fuse • Charging system
P1D0C02	(a) Drive motor IGBT W phase upper bridge arm Ready fault flag	• MCU (motor assembly) • Fuse • Harness and connector • Charging system
P1D4602	(a) Alternator IGBT W phase upper bridge arm Ready fault flag	• MCU (motor assembly) • Harness and connector • Fuse • Charging system
P1D0D02	(a) Drive motor IGBT W phase lower bridge arm Ready fault flag	• MCU (motor assembly) • Fuse • Harness and connector • Charging system
P1D4702	(a) Alternator IGBT W phase lower bridge arm Ready fault flag	• MCU (motor assembly) • Harness and connector • Fuse • Charging system

DTC	DTC detection conditions	Faulty location
P1D0F19	(a) Drive motor output hardware overcurrent flag bit	• MCU (motor assembly) • Harness and connector • Fuse • Charging system
P1D4919	(a) Alternator output hardware overcurrent flag bit	• MCU (motor assembly) • Harness and connector • Fuse • Charging system
P1D1000	(a) Drive motor three-phase current and checksum error status flag	• MCU (motor assembly) • Fuse • Harness and connector • Charging system
P1D4A00	(a) Alternator three-phase current and checksum error status flag	• MCU (motor assembly) • Harness and connector • Fuse • Charging system

Circuit diagram



Inspection procedure

1	**Read DTC**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC, power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → **End**

NG

2 Check low-voltage battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	Battery voltage

NG → **Overhaul the charging system**

OK

3 Check the low-voltage power supply fuse of MCU

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the MCU fuse.

(d) Measure the resistance according to the values in the table below.

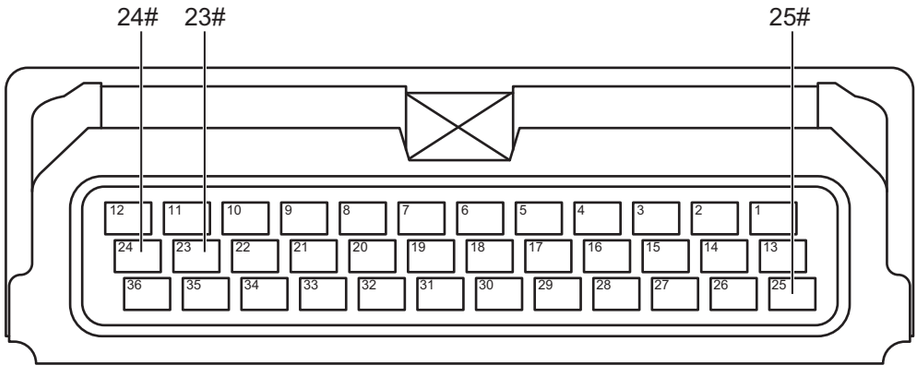
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

4 Check MCU ground



MCU connector

MC00510RM

(a) Disconnect the MCU connector.

(b) Measure the resistance according to the values in the table below.

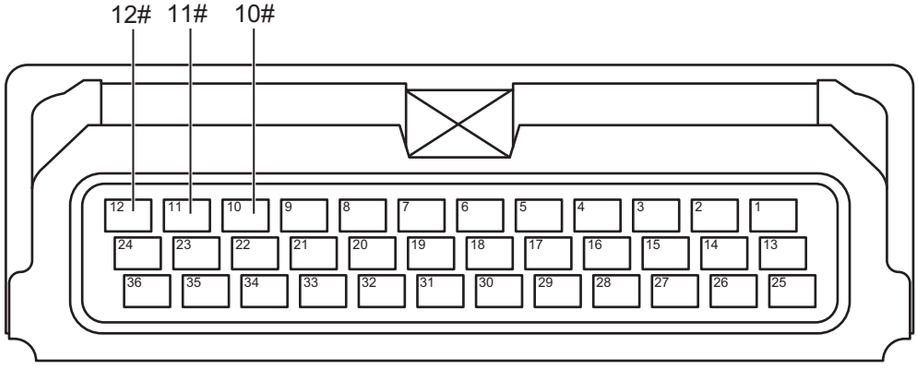
Standard value

Detector connection	Detection conditions	Specified state
MCU connector 23# - body GND	Always connected	Less than 1Ω
MCU connector 24# - body GND	Always connected	Less than 1Ω
MCU connector 25# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

5	**Check MCU low voltage power supply**



MCU connector

MC00521RM

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
MCU connector 11# - body GND	The ignition switch is set to "ON"	Battery voltage
MCU connector 12# - body GND	The ignition switch is set to "ON"	Battery voltage
MCU connector 10# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

6	**Read data flow**

(a) Read low voltage power supply voltage.

NG → **Overhaul the low voltage charging system**

OK

7	**Replace MCU (motor assembly) (See page MC-74)**

DTC	P1D0E19	Drive motor output software overcurrent flag bit
DTC	P1D4819	Alternator output software overcurrent flag bit

Description

When the drive motor and alternator output software have overcurrent, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D0E19	(a) Drive motor output software overcurrent.	• MCU (motor assembly) • Fuse • Harness and connector • Charging system
P1D4819	(a) Alternator output software overcurrent.	• MCU (motor assembly) • Harness and connector • Fuse • Charging system

Inspection procedure

1	Read DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC, power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → End

NG

2	Check low-voltage battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal - battery negative terminal	Always connected	Battery voltage

NG → **Overhaul the charging system**

OK

3	Check the low-voltage power supply fuse of MCU

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the MCU fuse.

(d) Measure the resistance according to the values in the table below.

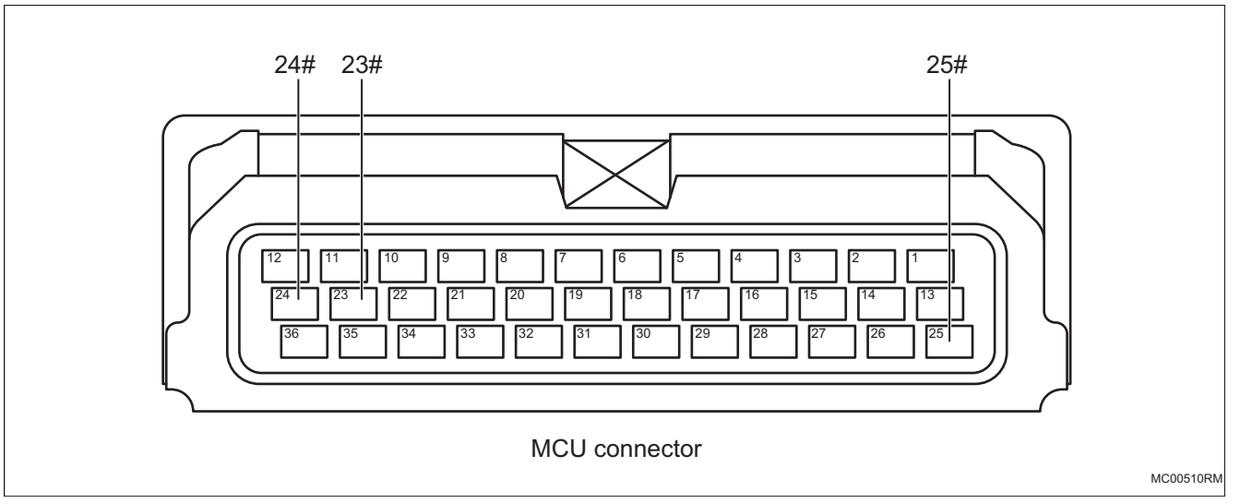
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

4	Check MCU ground



MCU connector

MC00510RM

(a) Disconnect the MCU connector.

(b) Measure the resistance according to the values in the table below.

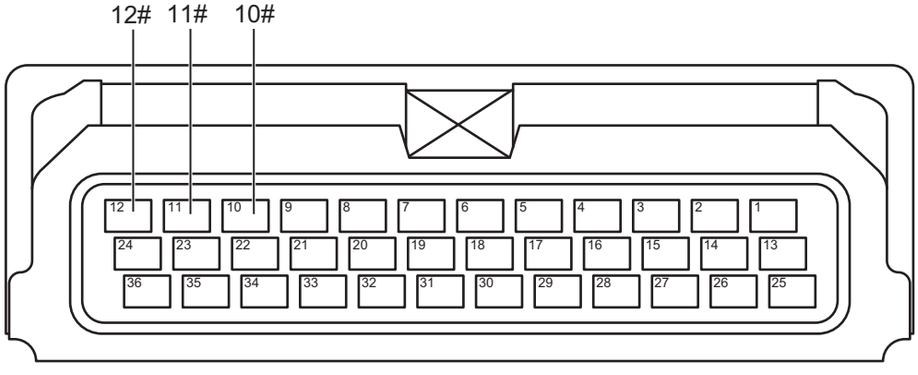
Standard value

Detector connection	Detection conditions	Specified state
MCU connector 23# - body GND	Always connected	Less than 1Ω
MCU connector 24# - body GND	Always connected	Less than 1Ω
MCU connector 25# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

5 Check MCU low voltage power supply



MCU connector

MC00521RM

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
MCU connector 11# - body GND	The ignition switch is set to "ON"	Battery voltage
MCU connector 12# - body GND	The ignition switch is set to "ON"	Battery voltage
MCU connector 10# - body GND	The ignition switch is set to "ON"	Battery voltage

MC

NG → **Repair or replace the harness and connector**

OK

6	**Read data flow**

(a) Read low voltage power supply voltage.

NG → **Overhaul the low voltage charging system**

OK

7	**Replace MCU (motor assembly) (See page MC-74)**

DTC	P1D1100	Drive motor IGBT temperature derating flag bit
DTC	P1D4B00	Alternator IGBT temperature derating flag bit

Description

When the MCU detects the drive motor and alternator IGBT temperature derating faults, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D1100	(a) Drive motor IGBT temperature derating flag bit.	• MCU (motor assembly) • Cooling system • Brake system
P1D4B00	(a) Alternator IGBT temperature derating flag bit.	• MCU (motor assembly) • Cooling system • Brake system

Inspection procedure

1	Read DTC

(a) Connect the HQ-VDS and read the DTC.

(b) Wait for 5 minutes. If the fault persists, clear the DTC.

(c) Power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → **End**

NG

2	Read data flow

(a) Read the data flow to check whether the drive motor and alternator temperature are normal.

Criteria:

Motor temperature: < 90°C.

NG → **Check coolant level and cooling system**

OK

3	**Check the brake system**

(a) Check whether the brake system is normal. (For example, set to N gear and push the vehicle manually to check whether the vehicle can run normally.)

NG → **Check and repair the brake system**

OK

4	**Replace MCU (motor assembly) (See page MC-74)**

DTC	P1D114B	Drive motor IGBT overtemperature flag bit
DTC	P1D4B4B	Alternator IGBT overtemperature flag bit

Description

When the MCU detects the drive motor and alternator IGBT overtemperature, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D114B	(a) Drive motor IGBT overtemperature flag bit.	• MCU (motor assembly) • Cooling system • Brake system
P1D4B4B	(a) Alternator IGBT overtemperature flag bit.	• MCU (motor assembly) • Cooling system • Brake system

Inspection procedure

1	Read DTC

(a) Connect the HQ-VDS and read the DTC.

(b) Wait for 5 minutes. If the fault persists, clear the DTC.

(c) Power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → **End**

NG

2	Read data flow

(a) Read the data flow to check whether the drive motor and alternator temperature are normal.

Criteria:

Motor temperature: < 90°C.

NG → **Check coolant level and cooling system**

OK

3	Check the brake system

(a) Check whether the brake system is normal. (For example, set to N gear and push the vehicle manually to check whether the vehicle can run normally.)

NG → **Check and repair the brake system**

OK

4	**Replace MCU (motor assembly) (See page MC-74)**

DTC	P1D1200	Drive motor temperature derating flag bit
DTC	P1D4C00	Alternator temperature derating flag bit

Description

When the MCU detects the drive motor and alternator temperature derating faults, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D1200	(a) Drive motor temperature derating flag bit.	• MCU (motor assembly) • Cooling system • Brake system
P1D4C00	(a) Alternator temperature derating flag bit.	• MCU (motor assembly) • Cooling system • Brake system

Inspection procedure

1	Read DTC

(a) Connect the HQ-VDS and read the DTC.

(b) Wait for 30 minutes. If the fault persists, clear the DTC.

(c) Power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → **End**

NG

2	Read data flow

(a) Read the data flow to check whether the drive motor and alternator temperature are normal.

Criteria:

Motor temperature: < 90°C.

NG → **Check coolant level and cooling system**

OK

3	**Check the brake system**

(a) Check whether the brake system is normal. (For example, set to N gear and push the vehicle manually to check whether the vehicle can run normally.)

NG → **Check and repair the brake system**

OK

4	**Replace MCU (motor assembly) (See page MC-74)**

DTC	P1D124B	Drive motor overtemperature flag bit
DTC	P1D4C4B	Alternator overtemperature flag bit

Description

When the MCU detects the drive motor and alternator overtemperature, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D124B	(a) Drive motor overtemperature flag bit.	• MCU (motor assembly) • Cooling system • Brake system
P1D4C4B	(a) alternator overtemperature flag bit.	• MCU (motor assembly) • Cooling system • Brake system

Inspection procedure

1	Read DTC

(a) Connect the HQ-VDS and read the DTC.

(b) Wait for 30 minutes. If the fault persists, clear the DTC.

(c) Power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → **End**

NG

2	Read data flow

(a) Read the data flow to check whether the drive motor and alternator temperature are normal.

Criteria:

Motor temperature: < 90°C.

NG → **Check coolant level and cooling system**

OK

3	Check the brake system

(a) Check whether the brake system is normal. (For example, set to N gear and push the vehicle manually to check whether the vehicle can run normally.)

NG → **Check and repair the brake system**

OK

4	**Replace MCU (motor assembly) (See page MC-74)**

DTC	P1D1300	Drive motor driver board overtemperature alarm
DTC	P1D4D00	Alternator driver board overtemperature alarm

Description

When the MCU detects the drive motor and alternator driver board overtemperature, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D1300	(a) Drive motor driver board overtemperature alarm.	• MCU (motor assembly) • Cooling system • Brake system
P1D4D00	(a) Alternator driver board overtemperture alarm	• MCU (motor assembly) • Cooling system • Brake system

Inspection procedure

1	Read DTC

(a) Connect the HQ-VDS and read the DTC.

(b) Wait for 30 minutes. If the fault persists, clear the DTC.

(c) Power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → End

NG

2	Read data flow

(a) Read the data flow to check whether the drive motor and alternator temperature are normal.

Criteria:

Motor temperature: < 90°C.

NG → Check coolant level and cooling system

OK

3	**Check the brake system**

(a) Check whether the brake system is normal. (For example, set to N gear and push the vehicle manually to check whether the vehicle can run normally.)

NG → **Check and repair the brake system**

OK

4	**Replace MCU (motor assembly) (See page MC-74)**

DTC	P1D134B	Drive motor driver board overtemperature
DTC	P1D4D4B	Alternator driver board overtemperature

Description

When the MCU detects the drive motor and alternator drive board overtemperature, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D134B	(a) Drive motor driver board overtemperature.	• MCU (motor assembly) • Cooling system • Brake system
P1D4D4B	(a) Alternator driver board overtemperature.	• MCU (motor assembly) • Cooling system • Brake system

Inspection procedure

1	Read DTC

(a) Connect the HQ-VDS and read the DTC.

(b) Wait for 30 minutes. If the fault persists, clear the DTC.

(c) Power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → **End**

NG

2	Read data flow

(a) Read the data flow to check whether the drive motor and alternator temperature are normal.

Criteria:

Motor temperature: < 90°C.

NG → **Check coolant level and cooling system**

OK

3	**Check the brake system**

(a) Check whether the brake system is normal. (For example, set to N gear and push the vehicle manually to check whether the vehicle can run normally.)

NG → **Check and repair the brake system**

OK

4	**Replace MCU (motor assembly) (See page MC-74)**

DTC	P1D1500	Drive motor resolver signal acquisition abnormity
DTC	P1D4E00	Alternator resolver signal acquisition abnormity
DTC	P1D1600	Drive motor resolver plausibility check abnormity
DTC	P1D4F00	Alternator resolver plausibility check abnormity

Description

When the MCU detects the resolver signal abnormity, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D1500	(a) Drive motor resolver signal acquisition abnormity.	• MCU (motor assembly)
P1D4E00	(a) Alternator resolver signal acquisition abnormity.	• MCU (motor assembly)
P1D1600	(a) Drive motor resolver plausibility check abnormity.	• MCU (motor assembly)
P1D4F00	(a) Alternator resolver plausibility check abnormity.	• MCU (motor assembly)

MC

Inspection procedure

1	**Read DTC**

(a) Connect HQ-VDS and clear the DTC.

(b) Power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again.

(c) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → **End**

NG

2	**Read data flow**

(a) Read motor speed.

Criteria:

Motor speed: ⩽ 100rpm.

NG → **Replace MCU (motor assembly) (See page MC-74)**

DTC	P1D1900	Watchdog monitoring abnormality
DTC	P1D1A00	ROM abnormal
DTC	P1D1B00	RAM abnormal
DTC	P1D2113	Drive motor circuit open
DTC	P1D5013	Alternator circuit open
DTC	P1D2300	Drive motor demagnetization
DTC	P1D5200	Alternator demagnetization

Description

When a fault is detected inside the motor, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D1900	(a) Watchdog monitoring abnormality.	• MCU (motor assembly)
P1D1A00	(a) ROM abnormal.	• MCU (motor assembly)
P1D1B00	(a) RAM abnormal.	• MCU (motor assembly)
P1D2113	(a) Drive motor circuit open.	• MCU (motor assembly)
P1D5013	(a) Alternator circuit open.	• MCU (motor assembly)
P1D2300	(a) Drive motor demagnetization.	• MCU (motor assembly)
P1D5200	(a) Alternator demagnetization.	• MCU (motor assembly)

MC

Inspection procedure

1	**Read DTC**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC, power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → **End**

NG

2	**Replace MCU (motor assembly) (See page MC-74)**

DTC	P1D1C00	Diagnostic memory data error (EEPROM)
DTC	P1D1D00	Resolver compensation amount memory data error (EEPROM)
DTC	P1D1E00	Resolver compensation not set (EEPROM)

Description

When a fault is detected inside the MCU, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D1C00	(a) Diagnostic memory data error (EEPROM).	• MCU (motor assembly)
P1D1D00	(a) Resolver compensation amount memory data error (EEPROM).	• MCU (motor assembly)
P1D1E00	(a) Resolver compensation not set (EEPROM).	• MCU (motor assembly)

Inspection procedure

1	Read DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC, power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → **End**

NG

2	Replace MCU (motor assembly) (See page MC-74)

DTC	P1D2200	Drive motor torque monitoring abnormity
DTC	P1D5100	Alternator torque monitoring abnormity

Description

When the MCU detects the torque monitoring abnormity, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D2200	(a) Drive motor torque monitoring abnormity.	• MCU (motor assembly) • Initial angle of motor resolver
P1D5100	(a) Alternator torque monitoring abnormity.	• MCU (motor assembly) • Initial angle of motor resolver

Inspection procedure

1	Read DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC, power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → **End**

NG

2	Read data flow

(a) Read the initial angle of motor resolver.

(b) Check whether the initial angle of motor resolver is correct (whether it is consistent with the initial angle indicated on the label pasted on the motor housing).

NG → **Re-write the initial angle of the resolver**

OK

3	Replace MCU (motor assembly) (See page MC-74)

MC

DTC	P1D2400	Drive motor stator temperature sensor disconnection flag bit
DTC	P1D5400	Alternator stator temperature sensor disconnection flag bit

Description

When the MCU detects the temperature sensor disconnection, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D2400	(a) Drive motor stator temperature sensor disconnection flag bit.	• MCU (motor assembly)
P1D5400	(a) Alternator stator temperature sensor disconnection flag bit.	• MCU (motor assembly)

Inspection procedure

MC

1	Read DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC, power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again and wait for 5 minutes.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → End

NG

2	Read data flow

(a) Read motor temperature.

(b) Check whether the motor temperature is normal (it should be similar to the ambient temperature).

NG → Replace MCU (motor assembly) (See page MC-74)

DTC	P1D2500	Drive motor IGBT temperature sensor disconnection flag bit
DTC	P1D5300	Alternator IGBT temperature sensor disconnection flag bit

Description

When the MCU detects the open circuit of IGBT temperature sensor, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D2500	(a) Drive motor IGBT temperature sensor disconnection flag bit.	• MCU (motor assembly)
P1D5300	(a) Alternator IGBT temperature sensor disconnection flag bit.	• MCU (motor assembly)

Inspection procedure

1	Read DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC, power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again and wait for 5 minutes.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → End

NG

2	Read data flow

(a) Read inverter temperature.

(b) Check whether the inverter temperature is normal (it should be close to the ambient temperature).

NG → Replace MCU (motor assembly) (See page MC-74)

DTC	P1D2600	Internal EEPROM reading abnormal

Description

When a fault inside the MCU is detected, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D2600	(a) Internal EEPROM reading abnormal.	• MCU (motor assembly)

Inspection procedure

1	Read DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC, power off the vehicle, wait for 5 minutes, and then make the vehicle in Ready state again.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → End

NG

2	Replace MCU (motor assembly) (See page MC-74)

DTC	P1D2700	Loop communication abnormity flag bit
DTC	P1D2800	Persistent communication abnormity flag bit

Description

When the MCU detects the communication failure, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D2700	(a) Abnormal communication.	• MCU (motor assembly) • Low-voltage harness and connector
P1D2800	(a) Abnormal communication.	• MCU (motor assembly) • Low-voltage harness and connector

Inspection procedure

1	Check for the following DTCs

(a) Read the DTC.

(b) Check for the following DTCs.

U029387	HCU node lost
U029A87	BMS node lost
U005588	Hybrid/electric CAN bus off
U059482	HCU message LiveCounter abnormal
U059483	HCU message Checksum abnormal
U059B82	BMS message LiveCounter abnormal
U059B83	BMS message Checksum abnormal

Results

Results	Go to
All the DTCs in the above table appear	Abnormal
Part of the DTCs in the above table appears	Normal

NG → **Check the CAN line, MCU low-voltage harness and connector**

OK

2	Check whether other systems report corresponding DTC and repair them according to the DTC

MC

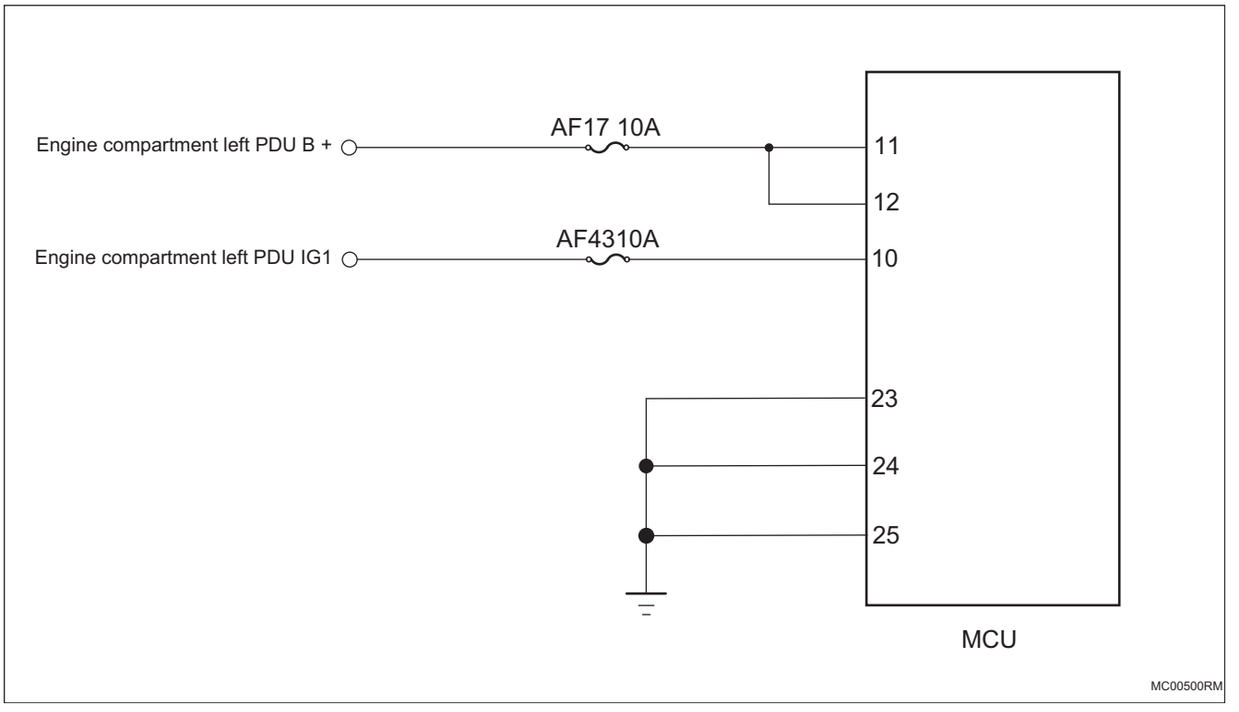
DTC	P1D5616	MCU weak current serious undervoltage flag bit
DTC	P1D5617	MCU weak current serious overvoltage flag bit

Description

When the MCU low voltage power supply voltage is seriously undervoltage or overvoltage, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D5616	(a) Weak current serious undervoltage.	• MCU (motor assembly) • Fuse • Harness and connector • Charging system
P1D5617	(a) Weak current serious overvoltage.	• MCU (motor assembly) • Harness and connector • Fuse • Charging system

Circuit diagram



Inspection procedure

1	**Read DTC**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC, power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → **End**

NG

2	Check low-voltage battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal - battery negative terminal	Always connected	Battery voltage

NG → **Overhaul the charging system**

OK

3	Check the low-voltage power supply fuse of MCU

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the MCU fuse.

(d) Measure the resistance according to the values in the table below.

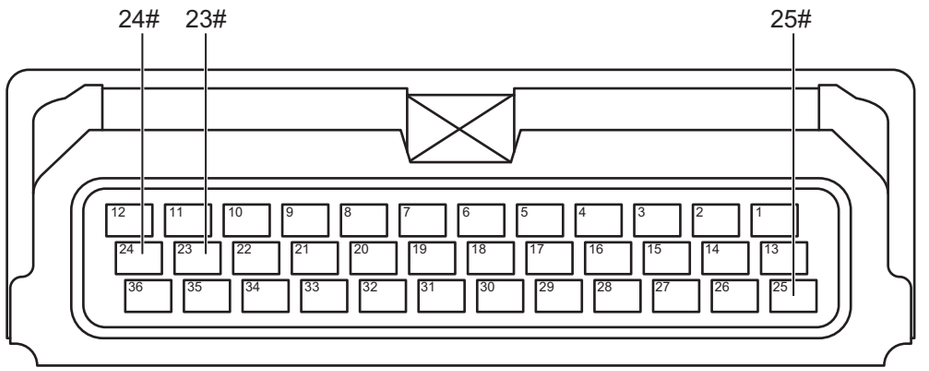
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

4	Check MCU ground



MCU connector

MC00510RM

(a) Disconnect the MCU connector.

(b) Measure the resistance according to the values in the table below.

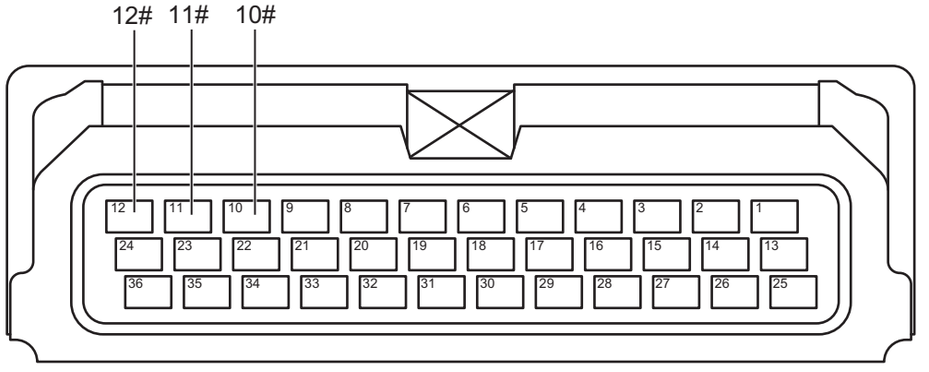
Standard value

Detector connection	Detection conditions	Specified state
MCU connector 23# - body GND	Always connected	Less than 1Ω
MCU connector 24# - body GND	Always connected	Less than 1Ω
MCU connector 25# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

5	Check MCU low voltage power supply



MCU connector

MC00521RM

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
MCU connector 11# -body GND	The ignition switch is set to "ON"	Battery voltage
MCU connector 12# -body GND	The ignition switch is set to "ON"	Battery voltage
MCU connector 10# -body GND	The ignition switch is set to "ON"	Battery voltage

MC

NG → **Repair or replace the harness and connector**

OK

6	**Read data flow**

(a) Read low voltage power supply voltage.

NG → **Overhaul the low voltage charging system**

OK

7	**Replace MCU (motor assembly) (See page MC-74)**

DTC	U112187	ABS/ESP/ESPwithAPB message lost
DTC	U115187	ACU message lost
DTC	U029387	HCU node lost
DTC	U010087	ECM node lost
DTC	U029887	DCDC (high voltage) node lost
DTC	U115587	Instrument cluster control unit message lost
DTC	U114087	BCM 1 message lost
DTC	U029A87	BMS node lost
DTC	U014687	GW node lost
DTC	U114687	GW message lost
DTC	U005588	Hybrid/electric CAN bus off
DTC	U041582	ABS message LiveCounter abnormal
DTC	U041583	ABS message Checksum abnormal
DTC	U045282	ACU message LiveCounter abnormal
DTC	U045283	ACU message Checksum abnormal
DTC	U059482	HCU message LiveCounter abnormal
DTC	U059483	HCU message Checksum abnormal
DTC	U059B82	BMS message LiveCounter abnormal
DTC	U059B83	BMS message Checksum abnormal
DTC	U059982	DCDC message LiveCounter abnormal
DTC	U059983	DCDC message Checksum abnormal

Description

When the communication between the MCU and other systems is abnormal or interrupted, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
U112187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U029387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

DTC	DTC detection conditions	Faulty location
U010087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U029887	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U029A87	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U005588	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041582	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041583	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U045282	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U045283	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059482	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059483	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059B82	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059B83	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059982	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059983	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

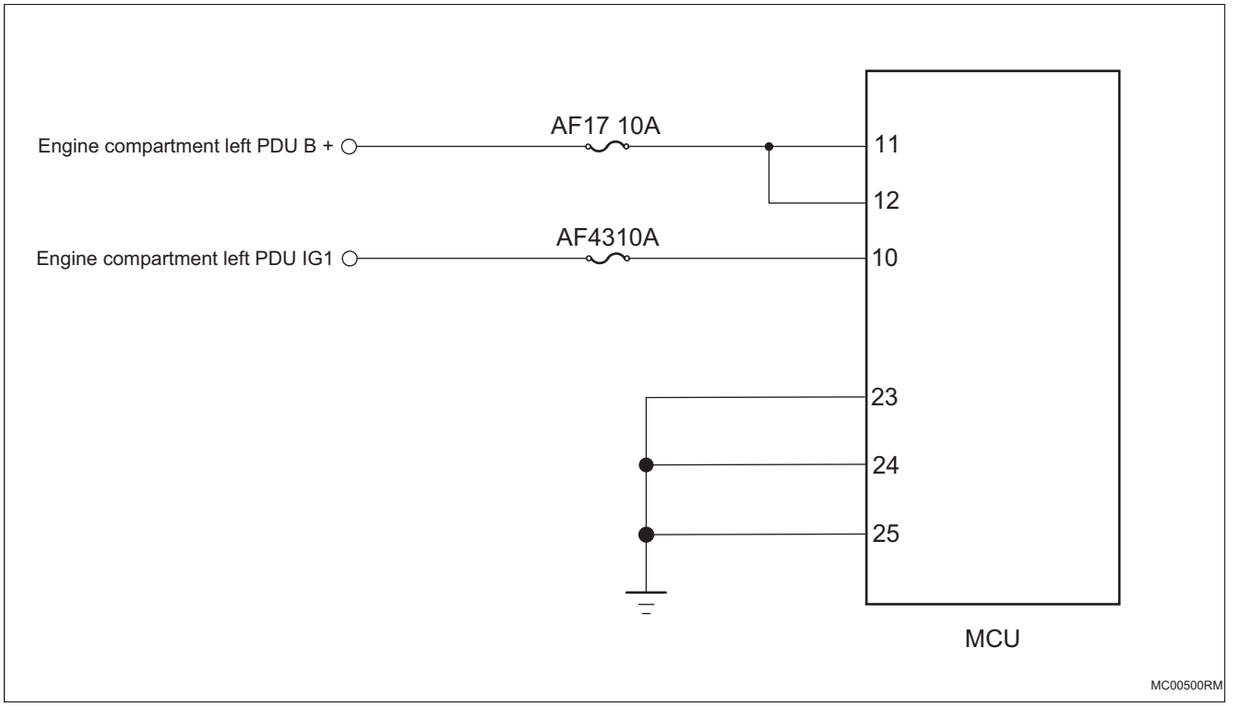
DTC	U300316	MCU weak current undervoltage flag bit
DTC	U300317	MCU weak current overvoltage flag bit

Description

When the MCU low voltage power supply voltage is abnormal, the MCU records the DTC.

DTC	DTC detection conditions	Faulty location
U300316	(a) Weak current undervoltage.	• MCU (motor assembly) • Fuse • Harness and connector • Charging system
U300317	(a) Weak current overvoltage.	• MCU (motor assembly) • Harness and connector • Fuse • Charging system

Circuit diagram



Inspection procedure

1	Read DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC, power off the vehicle and wait for 2 minutes, and then make the vehicle in Ready state again.

(d) Read DTC again.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

OK → End

NG

2 Check low-voltage battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	Battery voltage

NG → Overhaul the charging system

OK

3 Check the low-voltage power supply fuse of MCU

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the MCU fuse.

(d) Measure the resistance according to the values in the table below.

Standard value

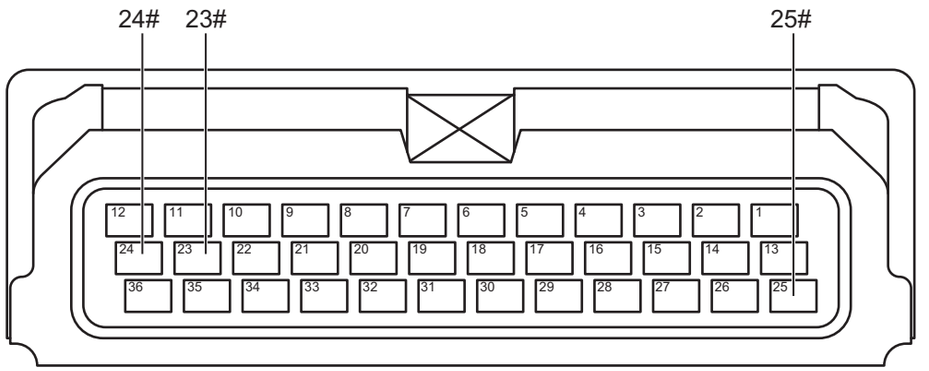
Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → Replace fuse

OK

4 Check MCU ground

MC



MCU connector

MC00510RM

(a) Disconnect the MCU connector.

(b) Measure the resistance according to the values in the table below.

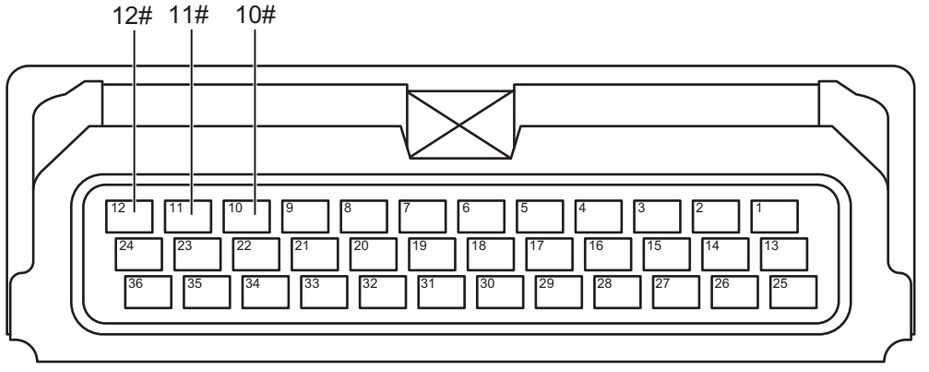
Standard value

Detector connection	Detection conditions	Specified state
MCU connector 23# - body GND	Always connected	Less than 1Ω
MCU connector 24# - body GND	Always connected	Less than 1Ω
MCU connector 25# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

5	Check MCU low voltage power supply



MCU connector

MC00521RM

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
MCU connector 11# -body GND	The ignition switch is set to "ON"	Battery voltage
MCU connector 12# -body GND	The ignition switch is set to "ON"	Battery voltage
MCU connector 10# -body GND	The ignition switch is set to "ON"	Battery voltage

MC

NG → **Repair or replace the harness and connector**

OK

6	**Read data flow**

(a) Read low voltage power supply voltage.

NG → **Read low voltage power supply voltage.**

OK

7	**Replace MCU (motor assembly) (See page MC-74)**

Electric drive system transmission fluid

Drain

1. **ATF**

   Caution:

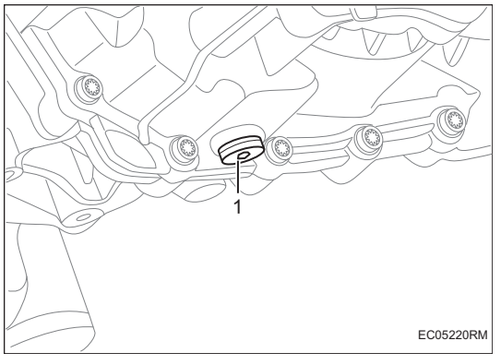
   Dispose of the drained transmission fluid properly. One drop of transmission fluid can contaminate 600 L of drinking water.

2. **Drain electric drive system transmission fluid**

   (a) Park the vehicle on a lifting platform or assembling service pit, in a horizontal position, with the shift lever in "P" gear position.

   (b) Remove the drain plug

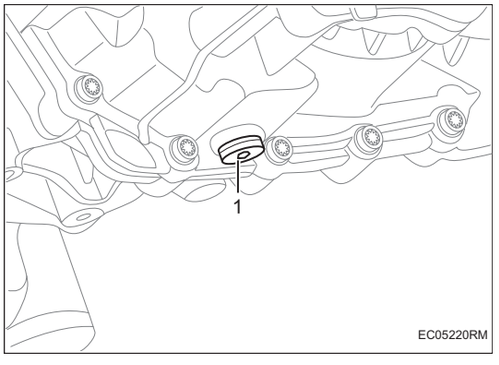
   (1) Use the Allen wrench to remove the oil drain plug assembly -1- and remove the gasket.



   (c) Discharge the transmission fluid. Let it stand until no fluid flows out.

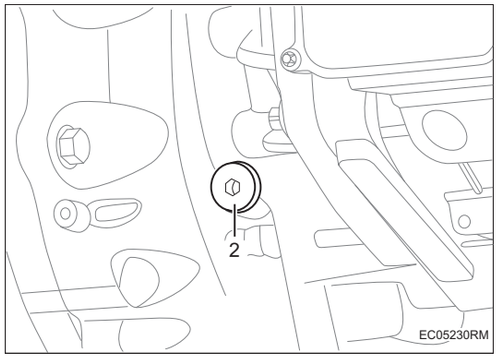
   (d) Install drain plug

   (1) Use Allen wrench to install oil drain plug assembly -1- and gasket.
   Torque: 21 ~ 27 N · m



Add

1. **Fill electric drive system transmission fluid**



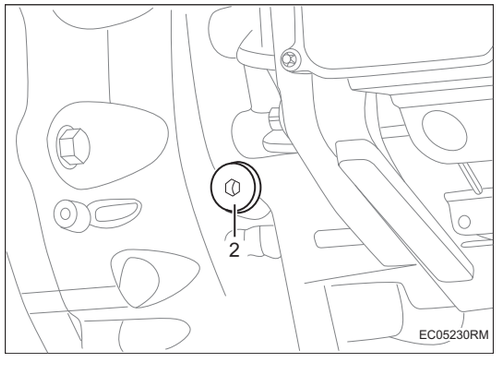
(a) Remove the oil filler plug.

(1) Use a Allen wrench to remove the oil filler plug assembly -1- and remove the gasket.

(b) Use the electric drive system transmission fluid filling tool to add the transmission fluid of the electric drive system.

(c) Standard capacity:

First filling volume of new engine	The filling volume in after-sales maintenance (oil drain by gravity)	The filling volume in after-sales maintenance (Thorough oil change)	Oil type
2.2 L (0.3L oil in new machine)	2.2 L	2.5 L	FUCHS BluEV EG DHTF 3932

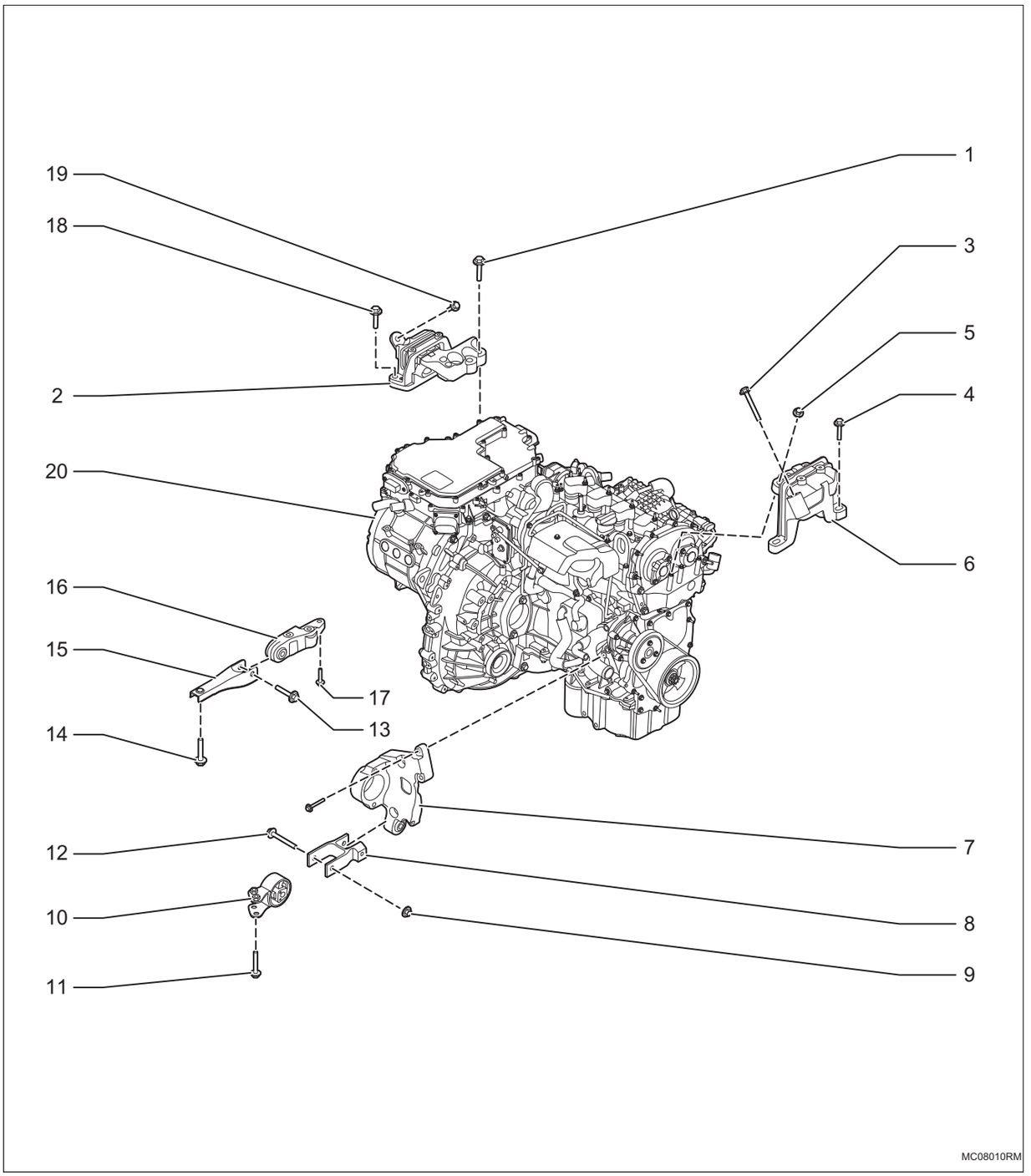


(d) Install the oil filler plug.

(1) Use the Allen wrench to install the oil filler plug assembly -1- and the sealing washer.
Torque: 21 ~ 27 N · m

Electric drive system

Parts

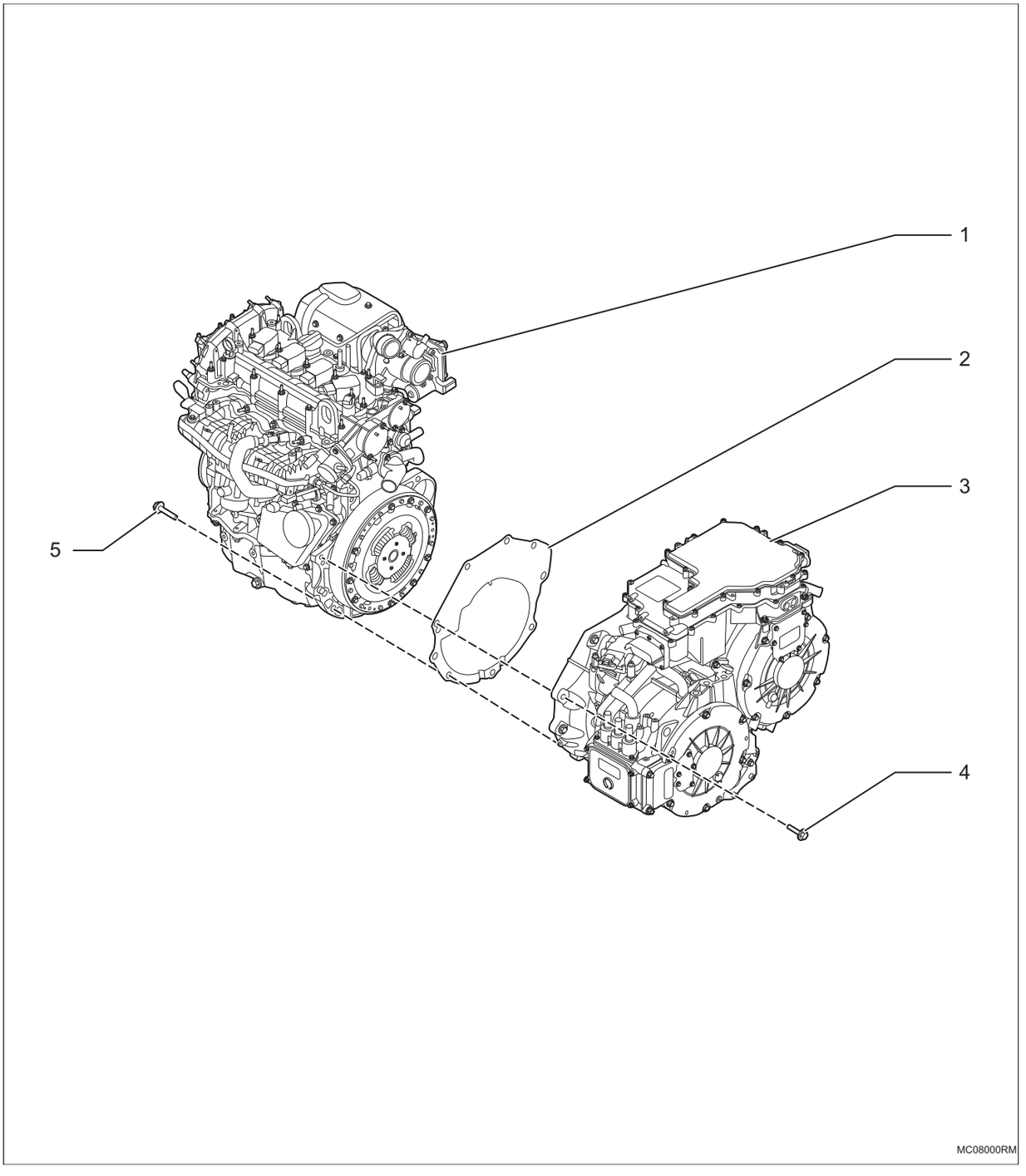


1. **Hexagon flange bolt**
   - X3
   - Torque: 90 ~ 110 N·m
2. **Powertrain left suspension assembly**
3. **Hexagon flange bolt**

- Torque: 90 ~ 110 N·m

4. **Hexagon flange bolt**
   - X2
   - Torque: 90 ~ 110 N·m
5. **Hexagon flange nut**
   - X3
   - Torque: 90 ~ 110 N·m
6. **Powertrain right suspension assembly**
7. **Powertrain rear bracket assembly II**
8. **Powertrain rear suspension tie rod II**
9. **Hexagon flange nut**
10. **Powertrain rear mounting assembly**
11. **Hexagon flange bolt**
    - X2
    - Torque: 28 ~ 32 N·m + 85 ~ 95°
12. **Hexagon flange bolt**
    - X2
    - Torque: 90 ~ 110 N·m
13. **Hexagon flange bolt**
    - Torque: 90 ~ 110 N·m
14. **Hexagon flange bolt**
    - Torque: 57 ~ 63 N·m + 85.5 ~ 94.5°
15. **Rear suspension tie rod**
16. **Powertrain rear bracket assembly**
17. **Hexagon flange bolt**
    - X3
    - Torque: 60 ~ 80 N·m
18. **Hexagon flange bolt**
    - X2
    - Torque: 90 ~ 110 N·m
19. **Hexagon flange bolt**
    - Torque: 90 ~ 110 N·m
20. **Electric drive system assembly**
21. **Hexagon flange bolt**
    - X5
    - Torque: 46 ~ 62 N·m

Parts



1. **Engine assembly**
2. **Dustproof shim**
3. **Electric drive system assembly**
4. **Hexagon flange bolt**
   - X4
   - Torque: 72 ~ 88 N·m

5. Hexagon flange bolt

- X5
- Torque: 72 ~ 88N·m

Removal

1. **Check the DTC**

   Notice:

   Before performing the battery removal, confirm that the traction battery voltage system insulation failure is not output. If the relevant DTC is output, first perform troubleshooting of this DTC.

2. **Place the vehicle power supply in OFF mode.**

3. **Disconnect the battery negative terminal**

   Notice:

   Disconnect the battery negative terminal after waiting for 5s.

4. **Detach the service switch**

   Notice:

   Detach the service switch and wait 5 min for the high voltage components to be discharged before proceeding.

   Wear insulating gloves.

5. **Remove the air cleaner assembly (See page IT-10)**

6. **Remove turbocharger to intercooler pipeline assembly (See page IT-16)**

7. **Remove intercooler to throttle valve pipeline assembly (See page IT-16)**

8. **Remove the catalytic converter weldment (See page EX-6)**

9. **Remove the expansion tank (See page CO-29)**

10. **Remove low temperature expansion tank (See page CO-20)**

11. **Drain coolant (See page CO-2)**

12. **Remove and drain low temperature coolant (See page CO-1)**

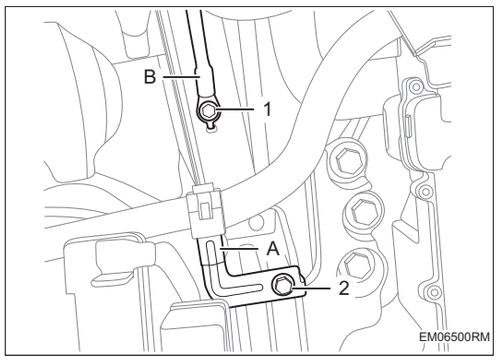
13. **Recover the refrigerant (See page AC-98)**

14. **Remove the compressor (See page AC-124)**

15. **Remove engine and electric drive assembly**

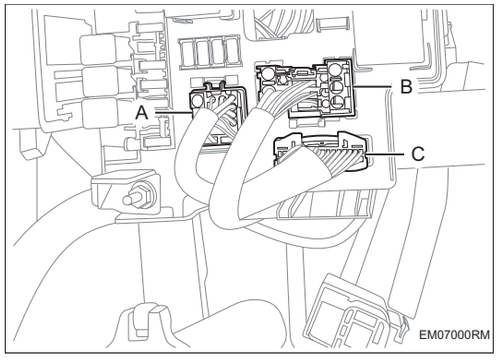
    Hint:

    Removal of the engine and electric drive assembly requires two people.

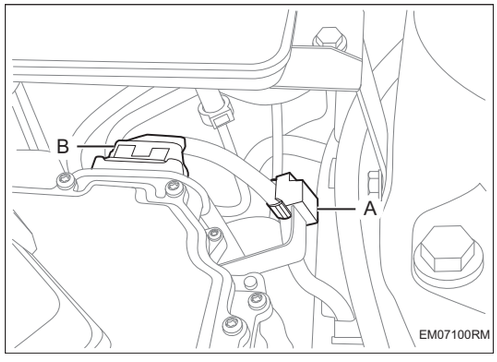


(a) Remove the bolt -1- and disconnect the ground wire -B-.

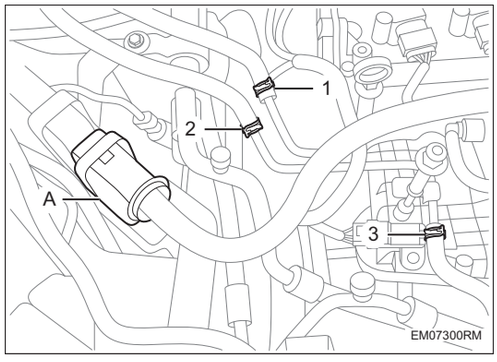
(b) Remove the bolt -2- and detach the harness fixing bracket -A-.



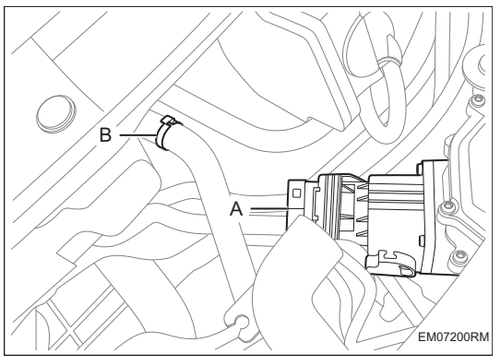
(c) Disconnect the harness connector-A-C- in the fuse box.



(d) Disconnect the electric drive assembly low voltage harness connector -B- and detach the harness -A-.

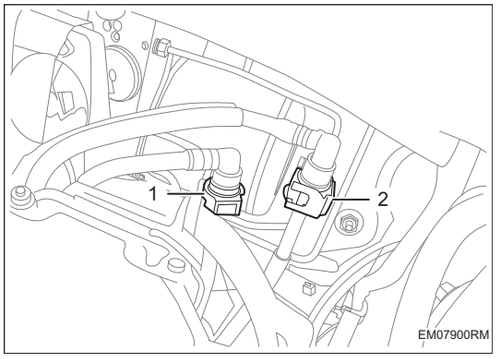


(e) Disconnect the water pipe -1-3- and the ECM harness connector-A-.



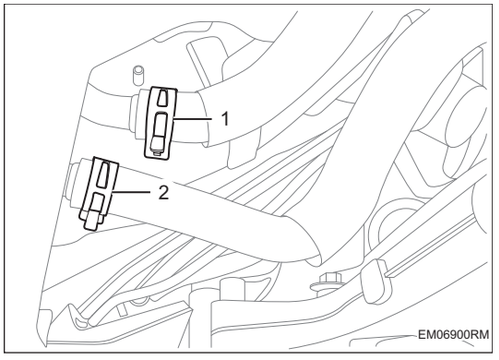
(f) Disconnect the DC bus high-voltage harness assembly connector -A- and detach the connector bracket.

(g) Disconnect the heater water pipe -B-.

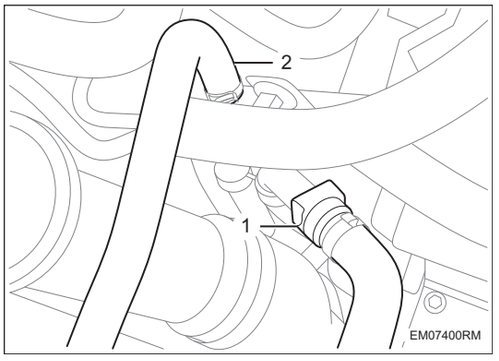


(h) Disconnect the fuel pipe -2- and the desorption pipe assembly -1-.

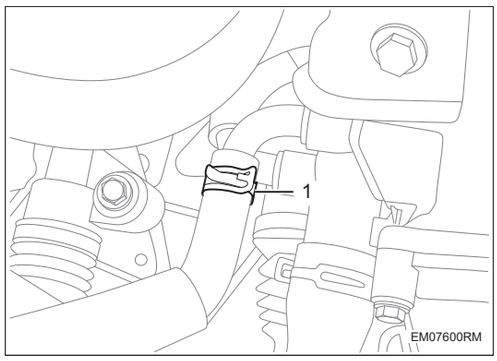
(i) And detach the tubing retaining clip -arrow-.



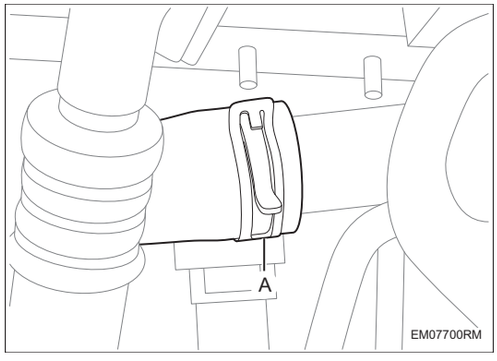
(j) Disconnect the DCDC coolant pipe -1-2- under the body.



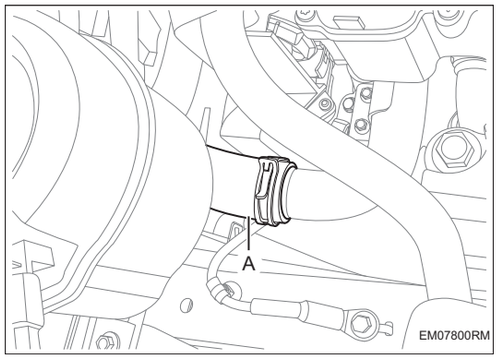
(k) Disconnect the low-temperature coolant pipe -1-2-.



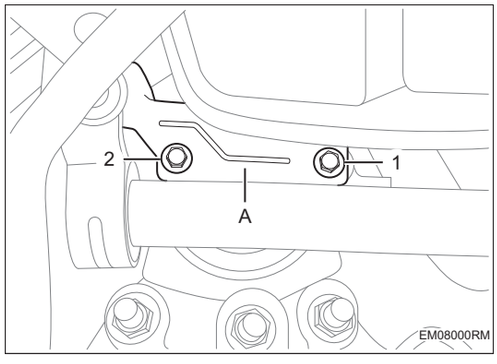
(l) Disconnect heater water outlet pipe assembly -1-.



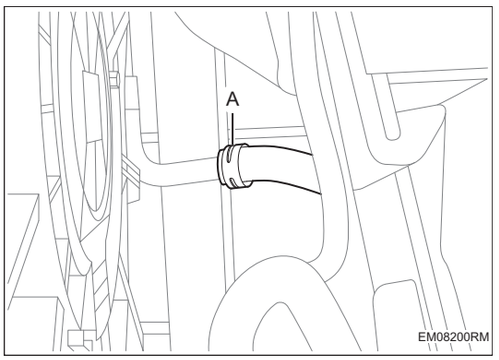
(m) Disconnect the radiator water outlet hose assembly -A-.



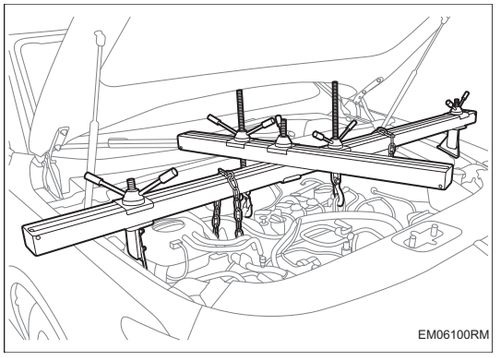
(n) Disconnect the radiator coolant inlet hose assembly-A-.



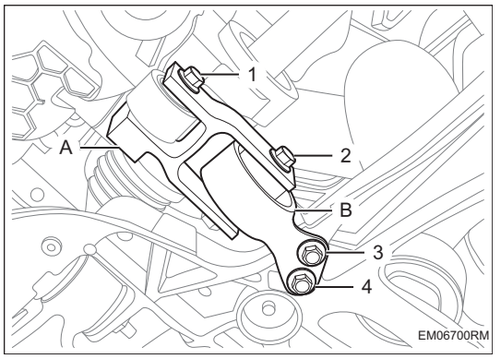
(o) Remove the bolt -1-2- and detach the fixing bracket -A- for A/C pipeline.



(p) Disconnect the low-temperature radiator coolant outlet hose assembly -A-.

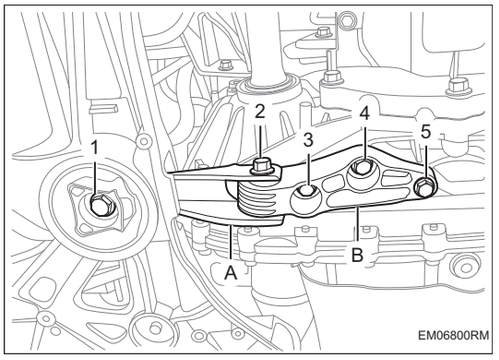


(q) Install the whole support bracket SST (9503025HF01) to the engine and electric drive assembly lifting ring, and adjust it to a stressed state.



(r) Remove the bolt -1-2- and remove the powertrain rear mounting tie rod Ⅱ -A-.

(s) Remove the bolt -3-4-, and remove the power-train rear mounting assembly-B-.

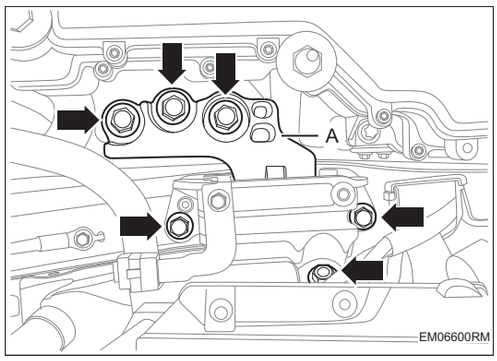


(t) Remove the bolt -2-5- and remove the powertrain rear bracket assembly-B-.

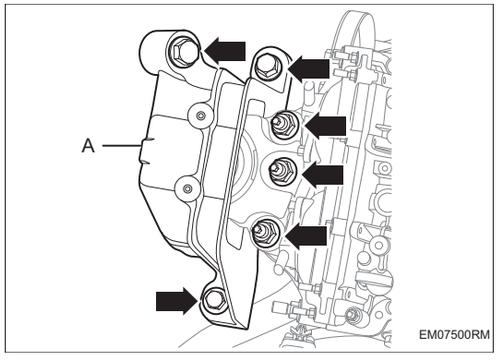
(u) Remove the bolt -1- and remove the powertrain rear mounting tie rod-A-.

(v) Remove driving axle (See page DS-6)

(w) Remove subframe (See page SP-10)



(x) Remove the bolt as arrowed, and remove the powertrain left mounting assembly -A-.



(y) Remove the bolt and nut -arrow-, and remove the powertrain right suspension assembly -A-.

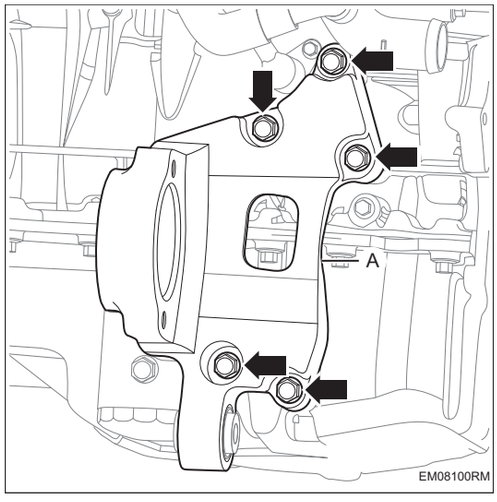
(z) Slowly lift the powertrain using the pallet jack and remove the support frame SST (9503025 HF01).

Caution:

Make sure there are no wiring and hose connections on the powertrain.

When lowering the powertrain, do not touch the vehicle body and other components.

16. Remove the powertrain rear bracket assembly II



(a) Remove the bolt as arrowed and remove the powertrain rear bracket assembly Ⅱ -A-.

17. Remove the low-temperature cooling temperature sensor (See page CO-4)

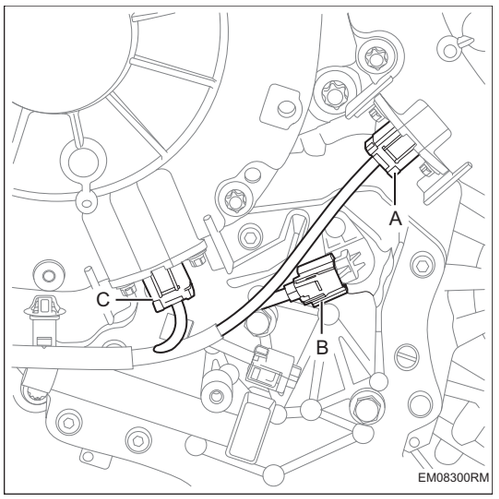
18. Remove the electric coolant pump assembly (See page CO-15)

19. Remove the motor rear metal pipe assembly (See page CO-18)

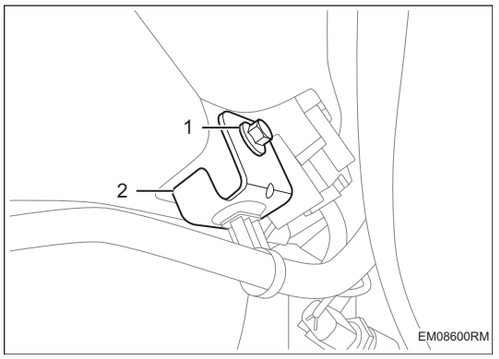
20. Remove the metal water pipe I assembly (See page CO-23)

21. Remove electric drive assembly

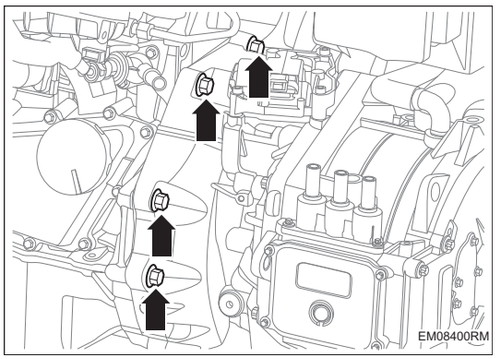
(a) Disconnect the harness connector-A-C-.

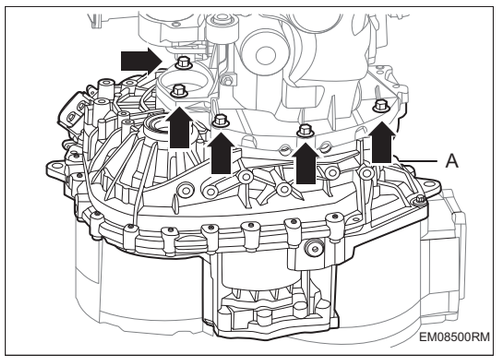


(b) Remove the bolt -1- and remove the electric drive assembly harness bracket -2-.



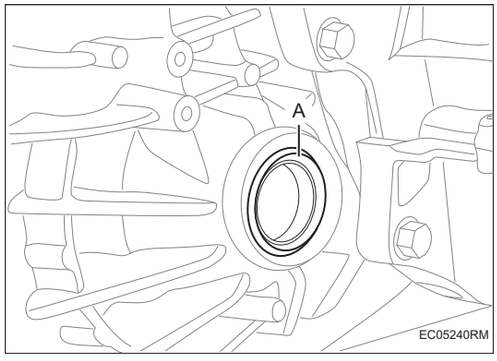
(c) Remove the fixing bolt -arrow- of electric drive assembly.





(d) Remove the bolt -arrow-, and remove the electric drive assembly -A-.

22. Remove the right output shaft seal



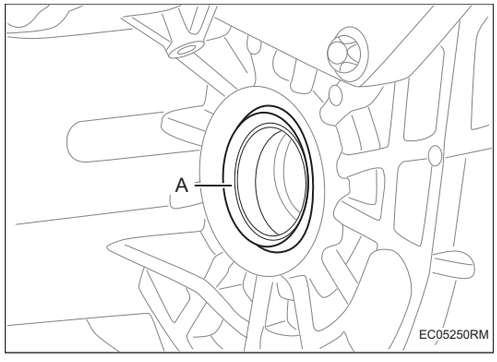
(a) Use a screwdriver to remove the right output shaft seal -A- from the differential.

Caution:

Stick adhesive tape on the tip of the screwdriver before use.

Take care not to damage the oil seal and contact surfaces.

23. Remove the left output shaft seal



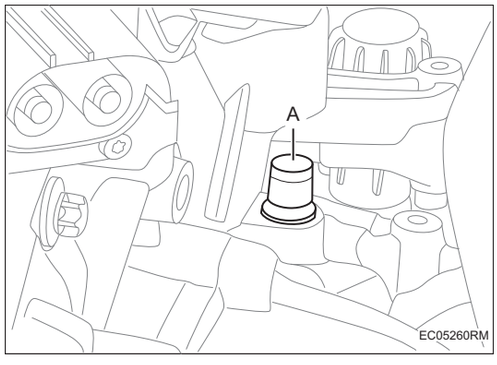
(a) Use a screwdriver to remove the left output shaft seal -A- from the differential.

Caution:

Stick adhesive tape on the tip of the screwdriver before use.

Take care not to damage the oil seal and contact surfaces.

24. Remove the breather



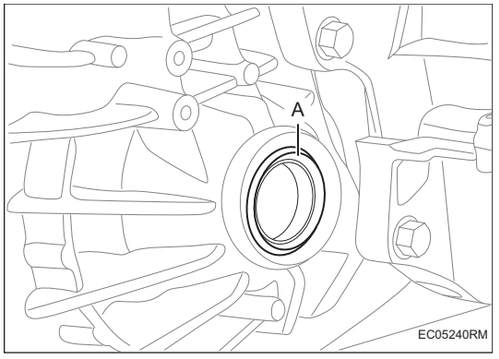
(a) Use a suitable tool to remove the respirator -A-.

Caution:

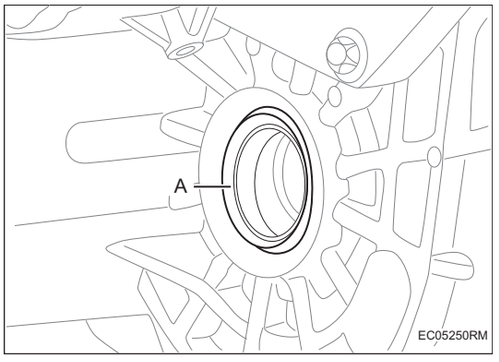
Avoid foreign objects falling into the motor system during operation.

Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**
2. **Remove the right output shaft seal**
   (a) Use a hammer to tap the SST (9503710HF01) and install the new oil seal-a- into the corresponding hole so that the oil seal end face is flush with the housing machined end face.



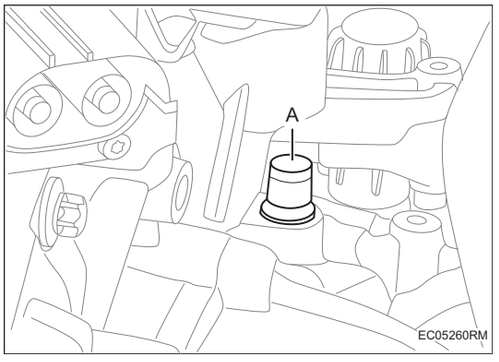
3. **Remove the left output shaft seal**
   (a) Use a hammer to tap the SST (9503710HF01) and install the new oil seal-a- into the corresponding hole so that the oil seal end face is flush with the housing machined end face.



4. **Install the breather**
   (a) Use SST (9503210HF01) to install a new breather - A -.

   Caution:

   Avoid foreign objects falling into the motor system during operation.



BMS

BMU PB-1

Precautions PB-1
Location of parts PB-19
Internal schematic diagram of traction battery PB-20
System description PB-22
ECU terminal PB-24
DTC chart PB-26
P1D8016 ..... PB-30
P1DC016 ..... PB-30
P1D8117 ..... PB-32
P1D8216 ..... PB-33
P1D8316 ..... PB-33
P1DC616 ..... PB-33
P1D8698 ..... PB-36
P1D8598 ..... PB-36
P1D8798 ..... PB-39
P1D8800 ..... PB-42
P1D8984 ..... PB-45
P1D8985 ..... PB-46
P1D8A18 ..... PB-47
P1DCC00 ..... PB-47
P1D8A19 ..... PB-48
P1DCB00 ..... PB-48
P1D8B74 ..... PB-49
P1D8C1A PB-50
P1D8D1A PB-50
P1D8F16 ..... PB-52
P1D8F17 ..... PB-53
P1D8F51 ..... PB-54
P1D8F82 ..... PB-55
P1D8F83 ..... PB-56
P1D8F87 ..... PB-57
P1D9013 ..... PB-58
P1D9117 ..... PB-59
P1D9116 ..... PB-59
P1D9213 ..... PB-63
P1D9317 ..... PB-64
P1D9316 ..... PB-64
P1D9417 ..... PB-65

P1D9416 ..... PB-65
P1D9504 ..... PB-66
P1D9698 ..... PB-67
P1D9798 ..... PB-67
P1D9804 ..... PB-68
P1D9911 ..... PB-69
P1D9A11 ..... PB-69
P1D9B98 ..... PB-71
P1D9C98 ..... PB-71
P1D9D11 ..... PB-72
P1D9D13 ..... PB-72
P1D9D1D PB-74
P1D9E13 ..... PB-75
P1D9F41 ..... PB-76
P1D9F42 ..... PB-76
P1DA288 ..... PB-77
P1DA300 ..... PB-79
P1DA400 ..... PB-79
P1DA598 ..... PB-80
P1DA698 ..... PB-80
P1DA711 ..... PB-81
P1DA712 ..... PB-82
P1DA713 ..... PB-83
P1DA719 ..... PB-87
P1DA71D PB-87
P1DA811 ..... PB-88
P1DA812 ..... PB-89
P1DA813 ..... PB-90
P1DA819 ..... PB-94
P1DA81D PB-94
P1DA911 ..... PB-95
P1DA912 ..... PB-96
P1DA913 ..... PB-97
P1DA919 ..... PB-101
P1DA91D PB-101
P1DAA00 ..... PB-102
P1DAB00 ..... PB-102
P1DAE00 ..... PB-103
P1DAF00 ..... PB-105
P1DB785 ..... PB-107
P1DB885 ..... PB-107
P1DAC00 ..... PB-107
P1DB900 ..... PB-110

P1DBA00 ..... PB-111
P1DBC00 ..... PB-112
P1DBD00 ..... PB-113
P1DC017 ..... PB-114
P1D8217 ..... PB-115
P1D8317 ..... PB-115
P1DC317 ..... PB-117
P1DC417 ..... PB-118
P1DC516 ..... PB-119
P1D8116 ..... PB-119
P1DCD00 ..... PB-120
P1DD300 ..... PB-121
P1DD600 ..... PB-122
P1DE000 ..... PB-123
P1DE200 ..... PB-125
P1DE400 ..... PB-126
P1DE600 ..... PB-127
P1DE700 ..... PB-128
P1DE800 ..... PB-130
P1DE900 ..... PB-131
P1DEB09 ..... PB-132
P1DEC02 ..... PB-133
P1DEC09 ..... PB-135
U029387 ..... PB-136
U059482 ..... PB-136
U059483 ..... PB-136
U115187 ..... PB-136
U045282 ..... PB-136
U045283 ..... PB-136
U041583 ..... PB-136
U041582 ..... PB-136
U112187 ..... PB-136
U115587 ..... PB-136
U011087 ..... PB-136
U041182 ..... PB-136
U041183 ..... PB-136
U014687 ..... PB-136
U005588 ..... PB-136
U116487 ..... PB-136
P1D8017 ..... PB-138
P1DA289 ..... PB-139
P1D9913 ..... PB-140
P1D9A13 ..... PB-140

P1D8E85 ..... PB-141
P1D8985 ..... PB-141
P1DAD00 ..... PB-142
P1D9504 ..... PB-144
P1D9698 ..... PB-145
P1D9798 ..... PB-145
P1D9804 ..... PB-146

BMU

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

(b) High voltage protection shall be provided during maintenance.

Notice:

Before repairing the high voltage systems or adjacent high voltage system components, be sure to read the Instructions and Precautions for Maintenance carefully!

2. ENGINE START/STOP button (ignition switch) representation:

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	**LOCK**	**LOCK (LOCK)**
ENGINE START/STOP button (ignition switch) in ON(IG) position	**ON**	**On (IG)**
Vehicle started	START	Start (READY)

3. Troubleshooting precautions.

(a) Read the BMS DTC in the IG On state, if it cannot be read, try to read the related information of other control units such as HCU. If only BMS information cannot be read, check the low voltage harness of traction battery.

(b) Method for checking the low voltage harness of the whole vehicle: connect the battery, set the ignition switch to IG On (not ready), and measure whether the low voltage connector harness of the battery is short-circuited or open-circuited; if it is abnormal, further check according to the maintenance guide of the whole vehicle harness; If it is normal, check the internal harness of the traction battery.

(c) If the harness is normal, replace the BMS and update the procedure for retest.

(d) Save all DTCs and corresponding fault snapshots after the DTCs are successfully read.

(e) If there are faults of different severity levels (such as "alarm" and "fault"), the troubleshooting shall be carried out according to the highest severity level (fault).

(f) DTC removal method: shut down the engine (IG Off) after executing the removal command, and keep it in the shutdown state for more than 10 minutes; Other precautions:

(1) This fault can be cleared immediately only if it is displayed as historical fault;

(2) For special lock faults such as thermal runaway (P1DBC00), insulation failure (P1D8C1A, P1D8D1A, P1DE700), collision fault (P1DA300, P1DA400), low SOH (P1DCE00), low cell voltage limit (P1DC016), single OCV voltage out of limit (critical) (P1DA289), single SOC deviation (P1DAD00), etc., "current and historical faults" will still be displayed after the fault point is eliminated, at this time, the normal clearing action can be performed. Although the read DTC still exists after clearing, the DTC can be cleared after 10 minutes of flameout;

(3) If the engine is not shut down for 10 minutes after clearing the DTC, and the battery is disconnected during this period, the DTC will not be effectively cleared.

(g) Overall inspection method for low voltage harness false connection: check whether the connector is loose, whether the terminal is rusted and whether the pin is withdrawn; Check whether the crimping terminal is loose; Observe whether the sampling value reported by BMS fluctuates by shaking harness and connector;

(h) When the HQ-VDS is used to read DTC and "current and historical faults" are displayed, it indicates that the fault occurs. If "historical fault" is displayed, it indicates that the fault has occurred before and does not occur at present.

4. Precautions for traction battery internal inspection

(a) Contact the after-sales personnel of the traction battery manufacturer if further troubleshooting is required for traction battery faults.

(b) The troubleshooting tools mainly include HQ-VDS, multimeter and insulation tester.

5. Precautions for module replacement: after replacing the module, keep the 12 V battery normal power supply and HQ-VDS normal connection; Reading by HQ-VDS is operated as follows.

(a) Practical replacement module;

(b) After the module is replaced and the battery pack is reinstalled, connect the high-voltage harness outside the battery pack;

(c) Connect the external low voltage harness of the battery pack;

(d) Close the low voltage service switch in engine compartment;

(e) Connect the HQ-VDS to enter "Auto Configuration";

(f) Double-click "battery replacement module" to keep the 12 V battery connected and keep the IG ON state;



PB00060RM

(g) Click "Please confirm completion of module replacement" in the HQ-VDS - option "Yes".



PB00070RM

(h) Click to confirm "Configuration completed, please turn off the ignition switch, and then turn the ignition switch to ON position again";



PB00080RM

(i) Clear the DTC, disconnect the HQ-VDS, set the vehicle IG OFF, wait for 10 mins, power on again, and use the HQ-VDS to read the following information:

(1) Read the battery soc, which is 0.

(2) Read the eeprom soh reading value, which is 100%.

6. Precautions for BMS replacement: after replacing the BMS, keep the 12 V battery normal power supply and HQ-VDS normal connection;

(a) If the BMS can read data from the original vehicle, use the HQ-VDS to perform the following operations:

(1) Enter the data recorder through the HQ-VDS, select "BMS", double-click the BMS, and read and record the eeprom soh read value;



PB00100RM



PB00110RM

(2) Read the data flow eeprom soh and read the value and record it manually. The data flow information is as follows:

S/N	Description
1	Read and record eeprom soh read values



PB00120RM



PB00130RM

(3) Operate the HQ-VDS to enter "Read Module Serial Number" to read the FAW VIN and Pack Bar Code Read as follows:

S/N	Description
1	Read and record FAW VIN
2	Read and record the battery bar code (Pack Bar Code Read)

PB

(4) According to the read "eeprom soh", refer to the "SOH and charge and discharge throughput correspondence", and look up the table to obtain the throughput

Table of correspondence between SOH and charge and discharge throughput	
SOH(%)	Throughput (Ah)
100	0
99	2080
98	4160
97	6240
96	8320
95	10400
94	15600
93	20800
92	26000
91	31200
90	34667
89	38133
88	41600
87	46800
86	52000
85	57200
84	62400

83	67600
82	72800
81	78000
80	83200
79	88400
78	93600
77	97067
76	100533
75	104000
74	109200
73	114400
72	117867
71	121333
70	124800
69	128267
68	131733
67	135200
66	140400
65	145600

(5) After the BMS is replaced and the battery pack is reinstalled, connect the high-voltage harness outside the battery pack;

(6) Connect the external low voltage harness of the battery pack;

(7) Close the low voltage service switch in engine compartment;

(8) Connect the HQ-VDS to enter "Auto Configuration", select "BMS", and double-click to enter;



PB00100RM



PB00140RM

(9) When the prompt as shown in the figure appears, click "Yes";



PB00150RM

(10) If the VIN fails to be obtained, manual input is required; (If successful, go to the next step)



PB00160RM

PB



PB00170RM



PB00180RM



PB00190RM



PB00200RM

(11) According to the HQ-VDS prompt, write the battery bar code (Pack Bar Code Read), battery SOH and battery throughput respectively;

PB



PB00210RM

(12) Click to confirm "Configuration completed, please turn off the ignition switch, and then turn the ignition switch to ON position again";



PB00220RM

(13) Clear the DTC, disconnect the HQ-VDS, set the vehicle IG OFF, wait for 10 mins, power on again, and use the HQ-VDS to read the following information:

- Read the battery SOC, which should not be 0;
- Read the eeprom soh reading value, which is the written SOH value.

(b) If the BMS cannot read data from the original vehicle, use the HQ-VDS to perform the following operations:

(1) Read and record the following data:



PB00130RM

S/N	Description	Handling method
1	VIN	See windshield VIN code
2	Pack serial number	See Pack nameplate: battery code (Code)
3	SOH value	Obtain throughput based on big data buried point
4	Throughput value	Table of correspondence between SOH and the charge and discharge throughput

(2) After the BMS is replaced and the battery pack is reinstalled, connect the high-voltage harness outside the battery pack;

(3) Connect the external low voltage harness of the battery pack;

(4) Close the low voltage service switch in engine compartment;

PB



PB00100RM

(5) Connect the HQ-VDS to enter "Auto Configuration", select "BMS", and double-click to enter;



PB00140RM

(6) When the prompt as shown in the figure appears, click "Yes";



PB00150RM

(7) If the VIN fails to be obtained, manual input is required; (If successful, go to the next step)



PB00160RM

PB



PB00170RM



PB00180RM



PB00190RM



PB00200RM

(8) According to the HQ-VDS prompt, write the battery bar code (Pack Bar Code Read), battery SOH and battery throughput respectively;

PB



PB00210RM

(9) Click to confirm "Configuration completed, please turn off the ignition switch, and then turn the ignition switch to ON position again";



PB00220RM

(10) Clear the DTC, disconnect the HQ-VDS, set the vehicle IG OFF, wait for 10 mins, power on again, and use the HQ-VDS to read the following information:

- Read the battery SOC, which should not be 0;
- Read the eeprom soh reading value, which is the written SOH value.

(c) If the procedure needs to be updated for a new BMS, please proceed as follow:

(1) After the BMS replacement, write the information according to step (a) or (b), and then flash the program;

(2) Clear the DTC, disconnect the HQ-VDS, set the vehicle IG OFF, wait for 10 mins, power on again, and use the HQ-VDS to read the following information:

- Read the battery SOC, which should not be 0;
- Read the eeprom soh reading value, which is the written SOH value.



PB00220RM

7. Precautions for replacing the battery pack (traction battery assembly):

(a) After replacing the battery pack, the normal power supply of the 12 V battery and the normal connection of the diagnostic scan tool shall be maintained;

(b) Use HQ-VDS to perform the following operations:

PB



PB00250RM

(1) Enter the data recorder through the HQ-VDS, select "BMS", double-click the BMS, and read and record the eeprom soh read value;



PB00260RM

(2) Read the data flow eeprom soh and read the value and record it manually. The data flow information is as follows:

S/N	Description
1	Read and record eeprom soh read values



PB00270RM

(3) Operate the HQ-VDS to enter "Read module serial number", read the Pack Bar Code Read, or obtain the Pack Bar Code Read from the battery pack nameplate information:

(4) Obtain the VIN number from the front windshield of the vehicle;

(5) Pack Bar Code Read (battery bar code) and VIN as follows:

S/N	Description
1	Read and record FAW VIN
2	Read and record the battery bar code (Pack Bar Code Read)



PB00280RM

PB

(6) According to the read "eeprom soh", refer to the "SOH and charge and discharge throughput correspondence", and look up the table to obtain the throughput

Table of correspondence between SOH and charge and discharge throughput	
SOH(%)	Throughput (Ah)
100	0
99	2080
98	4160
97	6240
96	8320
95	10400
94	15600
93	20800
92	26000
91	31200
90	34667
89	38133
88	41600
87	46800
86	52000
85	57200
84	62400
83	67600
82	72800
81	78000
80	83200
79	88400
78	93600
77	97067
76	100533
75	104000
74	109200
73	114400
72	117867
71	121333
70	124800
69	128267
68	131733
67	135200

66	140400
65	145600

(7) After the battery pack is replaced and reinstalled, connect the battery pack high-voltage harness;

(8) Connect the external low voltage harness of the battery pack;

(9) Close the low voltage service switch in engine compartment;

(10) Connect the HQ-VDS to enter "Auto Configuration", select "BMS", and double-click to enter;



PB00100RM

(11) When the prompt as shown in the figure appears, click "Yes";



PB00140RM

PB



PB00150RM



PB00160RM

(12) If the VIN fails to be obtained, manual input is required; (If successful, go to the next step)



PB00170RM



PB00180RM



PB00190RM



PB00200RM

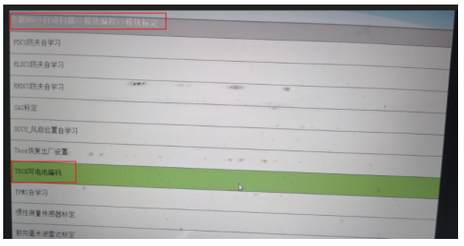
(13) According to the HQ-VDS prompt, write the battery bar code (Pack Bar Code Read), battery SOH and battery throughput respectively;

PB



PB00210RM

(14) Click to confirm "Configuration completed, please turn off the ignition switch, and then turn the ignition switch to ON position again";



PB00290RM

(15) Operate HQ-VDS: Automatic configuration-Module programming-Module calibration, then select TBOX to write the battery bar code. If it is indicated that the writing is successful, then the calibration is completed;



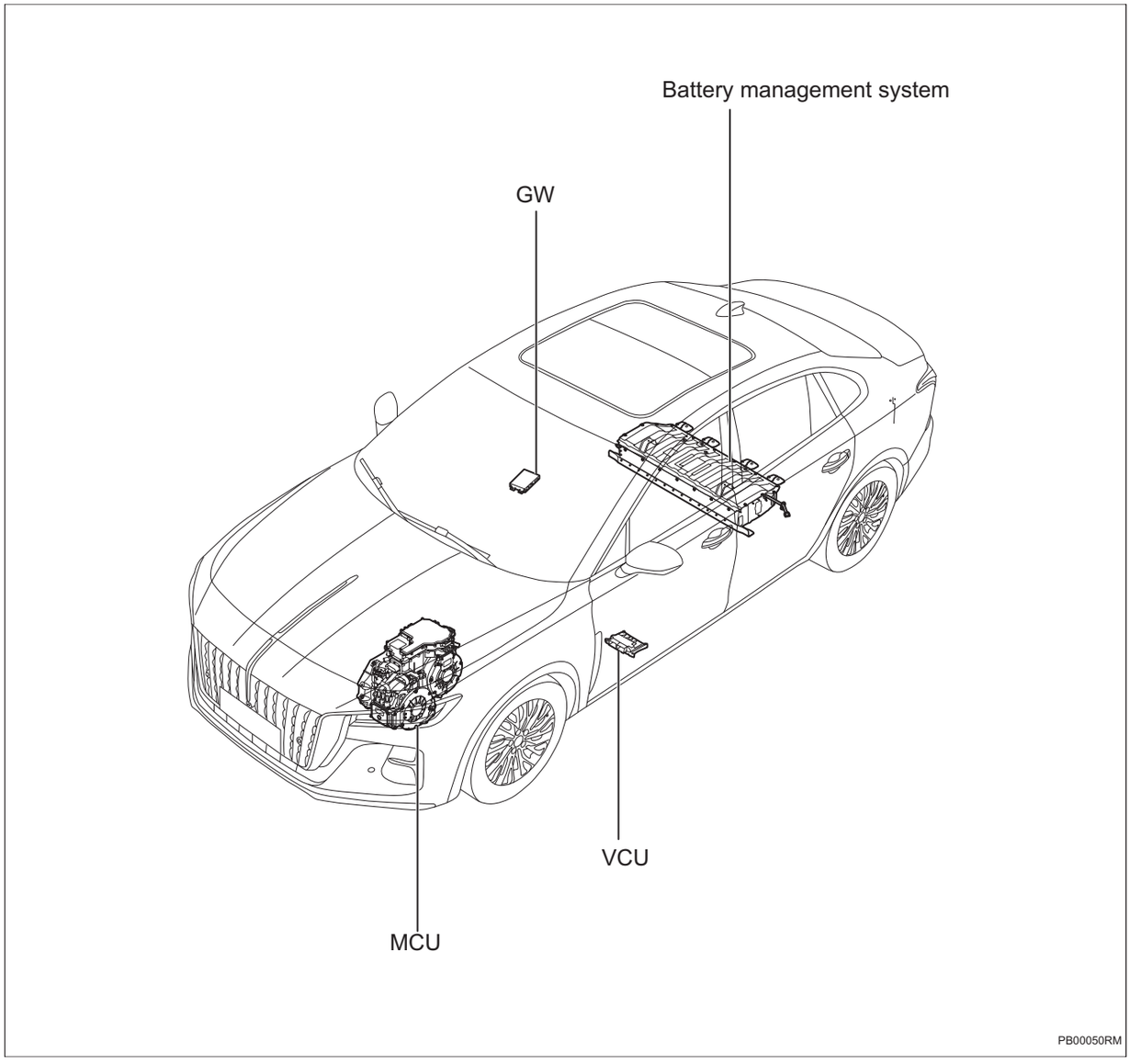
PB00220RM

(16) Clear the DTC, disconnect the HQ-VDS, set the vehicle IG OFF, wait for 10 mins, power on again, and use the HQ-VDS to read the following information:

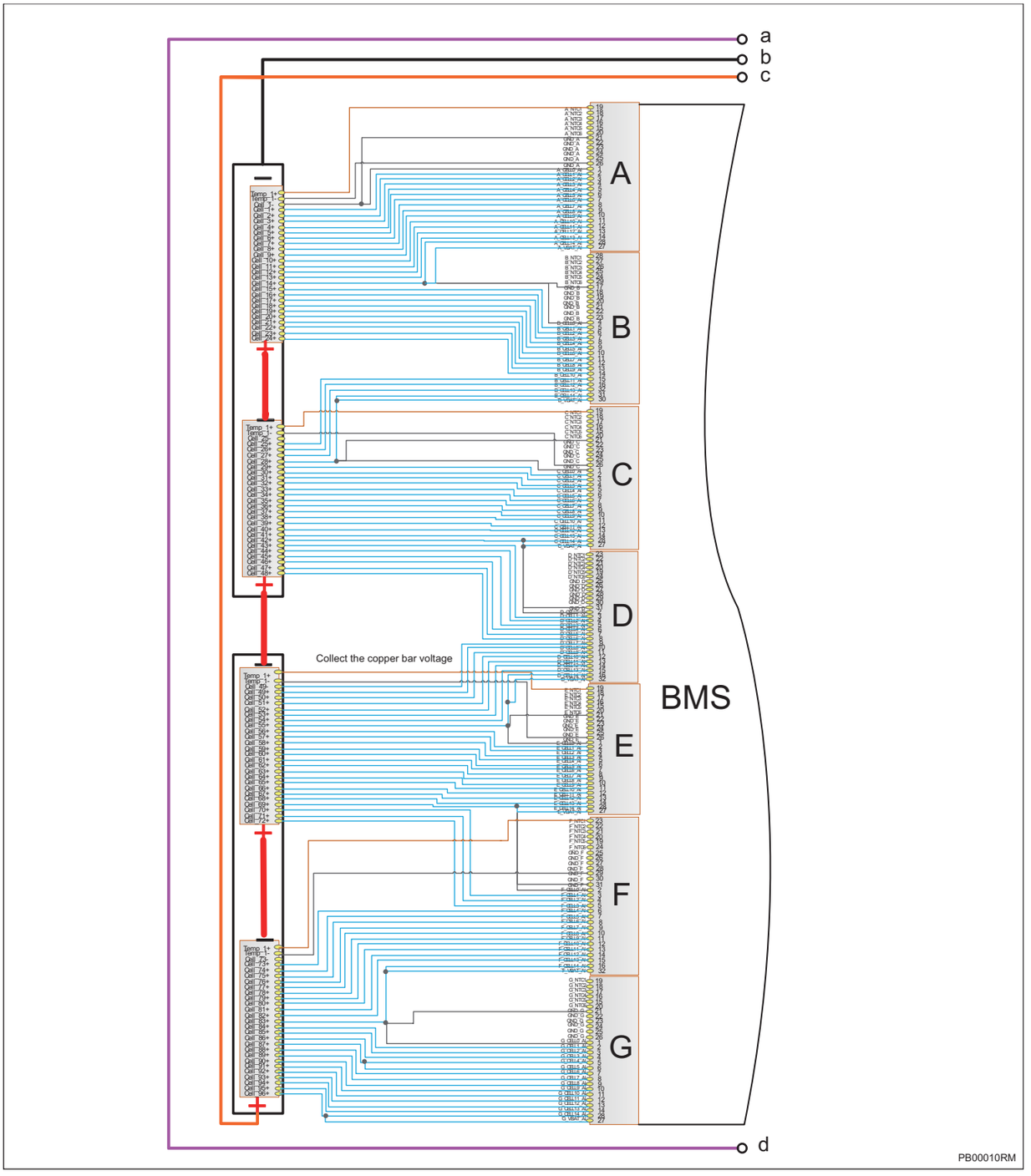
- Read the battery SOC, which should not be 0;
- Read the eeprom soh reading value, which is the written SOH value.

PB

Location of parts

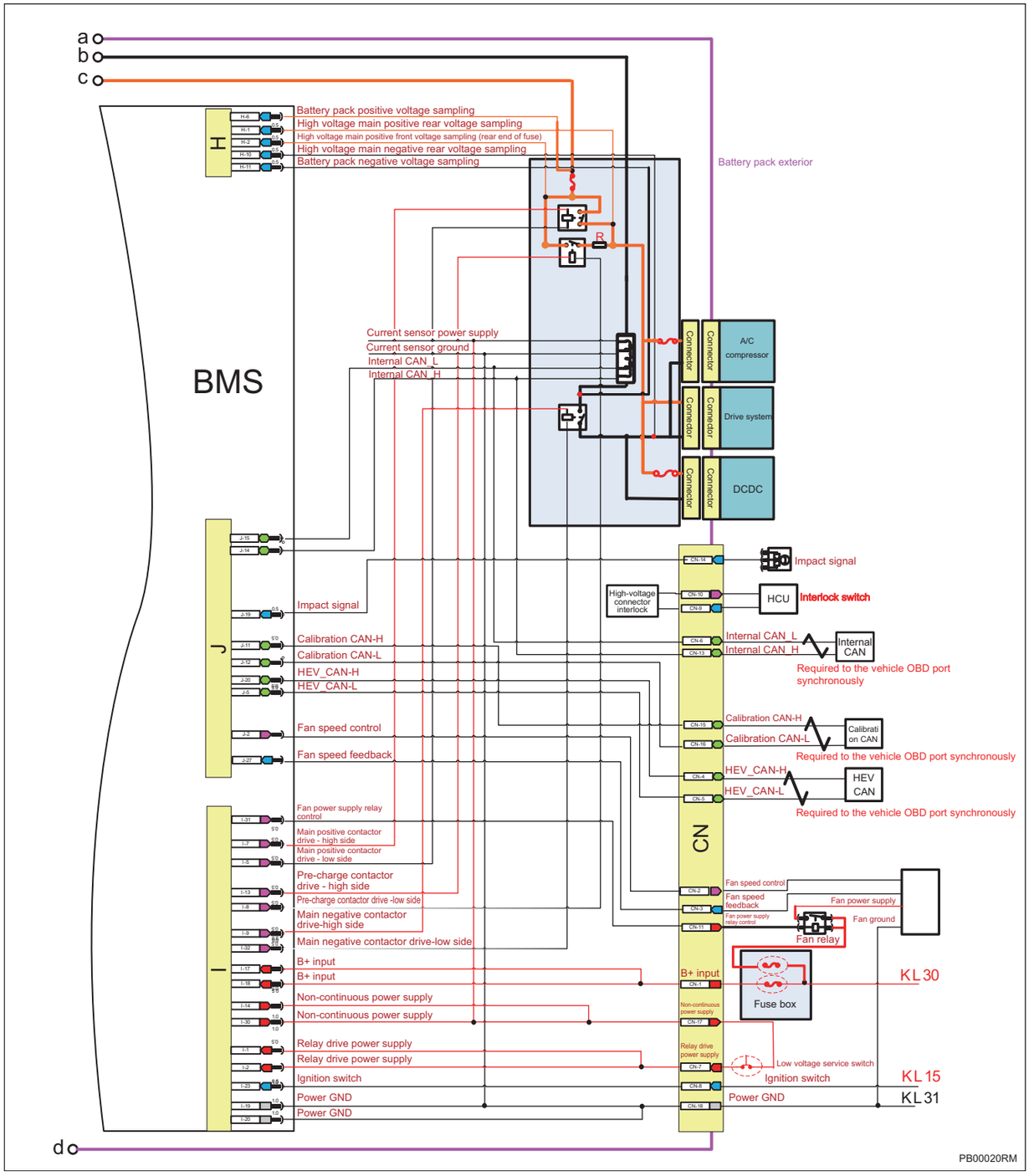


Internal schematic diagram of traction battery



PB

Internal schematic diagram of traction battery



PB

System description

1. Function overview

(a) The centralized traction battery management system(BMS) is responsible for monitoring and managing the lithium-ion traction battery, monitoring the status of the traction battery, ensuring the performance and safety of the battery system, meeting the communication requirements of vehicle control, and controlling the high-voltage contactor and other executive components.

(b) The high-voltage PDU includes three high-voltage relays, one pre-charging resistor and one current sensor, and is responsible for outputting the total battery voltage and the voltage sampling signal of the high-voltage relay external contact terminal to the BMS.

(c) The traction battery has 2 modules, and the module connector S/N 1-4 (cell voltage and temperature sampling interface) are arranged according to the 1st string to the 96th string; Each module has 48 cells and 2 temperature sensors.

(d) The cell voltage and temperature read through the HQ-VDS are arranged in sequence: the cell voltage interfaces S/N 1-4 respectively correspond to the cell voltage 1~96 of CellVolOfCSC1 ~ CellVolOfCSC8 in the HQ-VDS, and the temperature corresponds to the HQ-VDS CellTempOfCSC1.

(e)

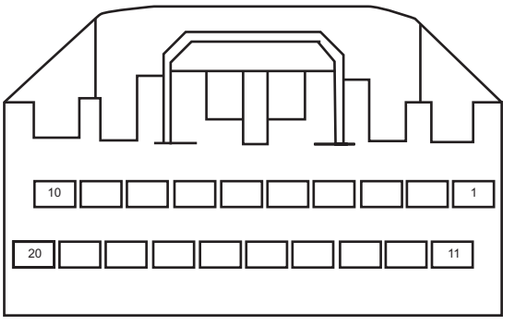
2. Control function

Function		Description
Signal sampling	Total voltage signal sampling	Collect the total voltage between the positive and negative poles of the battery assembly
	Total current signal sampling	Collect battery assembly working current
	Cell voltage signal sampling	Collect each cell voltage value
	Battery temperature signal sampling	Collect battery temperature value
	Impact signal sampling	Collision hardwire signal collecting
SOC estimation		Estimate the battery state of charge
SOH estimation		Estimate the battery health

Function	Description
SOP estimation	Estimate the instantaneous and continuous allowable maximum charging and discharging power of battery system
SOE estimation	Estimate the remaining available energy of the battery
Battery protection	Ensure the safety and performance of the battery and diagnose battery related faults
Cell equilibrium	Ensure cell consistency
Thermal management	Air cooling control: drive fan, relay control, speed feedback detection
High voltage contactor control	With contactor control, contact status detection, coil status and fault detection capabilities
Insulation monitoring function	Monitor high voltage system insulation resistance
Power supply management	With CAN sleep and CAN wake-up functions, meeting BMS power consumption requirements, BMS power-on and power-off requirements, and working voltage requirements
CAN communication	Completing the signal interaction with HCU and meeting the requirements of relevant standards
Battery independent diagnosis	With battery assembly independent diagnosis based on UDS
Calibration	With bench calibration and vehicle adaptability calibration function

ECU terminal

Battery management system



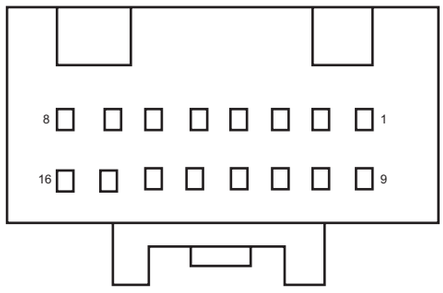
BMU (vehicle terminal)

PB00030RM

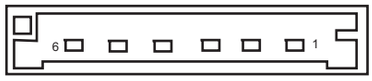
PB

BMU (vehicle terminal)	
Pin No.	**DEFINITIONS**
1	interlock
2	interlock
3	Ignition switch
4	Contactor drive power supply
5	Internal CAN-L
6	HEV_CAN-L
7	HEV_CAN-H
8	Fan speed feedback signal
9	Fan speed control signal
10	Power supply +
11	—
12	—
13	Power GND
14	Non-continuous power supply
15	Fast charging CAN_L calibration
16	Fast charging CAN_H calibration
17	Impact signal
18	Internal CAN-H
19	—
20	Fan power supply relay control

High-voltage PDU



High-voltage PDU (low voltage terminal)



High-voltage PDU (high voltage terminal)

PB00040RM

High-voltage PDU (low voltage terminal)	
Pin No.	**DEFINITIONS**
1	Main positive relay 12 V+
2	Main negative relay 12 V+
3	Pre-charge relay 12 V+
4	—
5	—
6	—
7	Uc (12 V) (pin D)
8	GND (pin C)
9	Main positive relay 12 V-
10	Main negative relay 12 V-
11	Pre-charge relay 12 V-
12	—
13	—
14	—
15	CAN_H (pin B)
16	CAN_L (pin A)

High-voltage PDU (high voltage terminal)	
Pin No.	**DEFINITIONS**
1	B+
2	HV+
3	—
4	B-
5	FUSE-
6	HV-

DTC chart

DTC	Description	Reference page
P1DC017	Critical high cell voltage	(See page PB-138)
P1D8017	Cell overvoltage	(See page PB-138)
P1D8117	Cell overvoltage alarm	(See page PB-32)
P1DC317	Cell voltage slightly too high	(See page PB-117)
P1DC516	Cell voltage slightly too slow	(See page PB-119)
P1D8116	Cell undervoltage alarm	(See page PB-119)
P1D8016	Cell undervoltage	(See page PB-30)
P1DC016	Cell voltage limit (critical) low	(See page PB-30)
P1D8217	Battery overvoltage	(See page PB-115)
P1D8317	Battery overvoltage	(See page PB-115)
P1DC417	Total voltage slightly too high	(See page PB-118)
P1D8216	Battery undervoltage	(See page PB-33)
P1D8316	Battery undervoltage	(See page PB-33)
P1DC616	Total voltage slightly too low	(See page PB-33)
P1D8698	Battery module overtemperature	(See page PB-36)
P1D8798	Battery module overtemperature alarm	(See page PB-36)
P1D8598	Critical high module temperature	(See page PB-36)
P1D8800	Module undertemperature	(See page PB-42)
P1DB785	Battery module temperature difference excessive	(See page PB-107)
P1DB885	Battery module temperature difference excessive	(See page PB-107)
P1D8A18	Feedback charge current out of limit	(See page PB-47)
P1DCC00	Feedback charge current out of limit alarm	(See page PB-47)
P1D8A19	Discharge current out of limit	(See page PB-48)
P1DCB00	Discharge current out of limit	(See page PB-48)
P1DAC00	Critical excessive module temperature difference	(See page PB-107)
P1DBA00	Insulation detection hardware failure	(See page PB-111)
P1D8C1A	Insulation alarm	(See page PB-50)
P1D8D1A	Major insulation failure	(See page PB-50)
P1DEC09	Current sensor failure	(See page PB-135)
P1DEC02	Current sensor message reception error	(See page PB-133)
P1D9F41	E2P read data CRC error	(See page PB-76)
P1D9F42	E2P failed to write data	(See page PB-76)
P1D9117	Low voltage power supply overvoltage	(See page PB-59)
P1D9116	Low voltage power supply undervoltage	(See page PB-59)
P1DA713	Main positive contactor coil open	(See page PB-83)

DTC	Description	Reference page
P1DA711	Main positive contactor coil circuit shorted to ground	(See page PB-81)
P1DA712	Main positive contactor coil circuit shorted to power supply	(See page PB-82)
P1DA719	Main positive contactor coil drive overcurrent	(See page PB-87)
P1DA71D	Main positive contactor coil drive output not available	(See page PB-87)
P1DA813	Main negative contactor coil open	(See page PB-90)
P1DA811	Main negative contactor coil circuit shorted to ground	(See page PB-88)
P1DA812	Main negative contactor coil circuit shorted to power supply	(See page PB-89)
P1DA819	Main negative contactor coil drive overcurrent	(See page PB-94)
P1DA81D	Main negative contactor coil drive output not available	(See page PB-94)
P1DA913	Pre-charge contactor coil open	(See page PB-97)
P1DA911	Pre-charge contactor coil circuit shorted to ground	(See page PB-95)
P1DA912	Pre-charge contactor coil circuit shorted to power supply	(See page PB-96)
P1DA919	Pre-charge contactor coil drive overcurrent	(See page PB-101)
P1DA91D	Pre-charge contactor coil drive output not available	(See page PB-101)
P1D9911	Main positive or pre-charge contactor contact short circuit	(See page PB-95)
P1D9A11	Main negative contactor contact short circuit	(See page PB-69)
P1DAF00	High voltage sampling communication failure	(See page PB-105)
P1DD600	Main circuit open	(See page PB-122)
P1DE000	Battery assembly open circuit	(See page PB-123)
P1DE800	BMS pre-charge verification failed	(See page PB-130)
P1DE600	Contactor high-side drive power supply circuit open	(See page PB-127)
P1DE700	Battery insulation alarm	(See page PB-128)
P1D9E13	Cell voltage sampling line open circuit	(See page PB-75)
P1DBD00	Module temperature sampling circuit failure	(See page PB-113)
P1D8B74	Equalization circuit short	(See page PB-49)
P1DD300	Daisy chain open circuit	(See page PB-121)
P1D8F51	AFE initialization addressing failure	(See page PB-54)
P1D8F87	Communication lost	(See page PB-57)
P1D8F83	Communication message CRC error	(See page PB-56)
P1D8F82	Communication message Rolling counter error	(See page PB-55)
P1D9013	Equalization open circuit	(See page PB-58)

DTC	Description	Reference page
P1D9213	Diagnostic equalization switch disconnection failure	(See page PB-63)
P1D8F17	Communication module power supply over-voltage	(See page PB-53)
P1D8F16	Communication module power supply circuit shorted to ground/undervoltage	(See page PB-52)
P1D9317	AFE internal ADC module power supply overvoltage	(See page PB-64)
P1D9316	AFE internal ADC module power supply circuit shorted to ground/undervoltage	(See page PB-64)
P1D9417	AFE chip power supply overvoltage	(See page PB-65)
P1D9416	AFE chip power supply undervoltage	(See page PB-65)
P1D9504	ADC function failure	(See page PB-66)
P1D9698	AFE overtemperature alarm	(See page PB-67)
P1D9798	AFE overtemperature	(See page PB-67)
P1D9804	AFE diagnosis timeout	(See page PB-68)
P1D9B98	SBC overtemperature alarm	(See page PB-71)
P1D9C98	SBC overtemperature	(See page PB-71)
P1DEB09	Fan failure	(See page PB-132)
P1D9D11	Fan drive coil circuit shorted to ground	(See page PB-72)
P1D9D13	Fan drive coil open circuit	(See page PB-72)
P1D9D1D	Fan drive output not available	(See page PB-74)
P1D9F41	E2P read data CRC error	(See page PB-76)
P1D9F42	E2P failed to write data	(See page PB-76)
P1DA598	MCU overtemperature alarm	(See page PB-80)
P1DA698	MCU overtemperature	(See page PB-80)
P1DA300	CAN collision fault	(See page PB-79)
P1DA400	Airbag failure	(See page PB-79)
P1DE200	Crash PWM signal connection fault	(See page PB-125)
P1DAA00	Battery feedback charge power out of limit	(See page PB-102)
P1DAB00	Battery discharge power out of limit	(See page PB-102)
P1DBC00	Battery thermal runaway alarm	(See page PB-112)
U029387	HCU node lost	(See page PB-136)
U059482	HCU message livecounter error	(See page PB-136)
U059483	HCU message checksum error	(See page PB-136)
P1DA288	Subnet CAN BusOff	(See page PB-77)
P1DAE00	Low SOH	(See page PB-103)
P1DCD00	Low SOH	(See page PB-120)
P1DB900	SOC jump fault	(See page PB-110)
P1D8984	SOC low alarm	(See page PB-45)
P1D8985	High SOC	(See page PB-46)

DTC	Description	Reference page
P1DE400	BMS initialization failure	(See page PB-126)
U115187	ACU_1 message timeout	(See page PB-136)
U045282	ACU_1 message livecounter error	(See page PB-136)
U045283	ACU_1 message checksum error	(See page PB-136)
U041583	ABS_1 message checksum error	(See page PB-136)
U041582	ABS_1 message livecounter error	(See page PB-136)
U112187	ABS/ESP/ESPwithAPB message lost	(See page PB-136)
U115587	Instrument cluster control unit message lost	(See page PB-136)
U011087	MCU node lost	(See page PB-136)
U041182	MCU message livecounter error	(See page PB-136)
U041183	MCU1 message checksum error	(See page PB-136)
U014687	GW message lost	(See page PB-136)
U005588	Hybrid/electric CAN bus off	(See page PB-136)
U116487	A/C control unit 1 message lost	(See page PB-136)
P1DE900	IG Off HCU CAN Fail	(See page PB-131)
P1DA289	Cell OCV voltage out of limit (critical)	(See page PB-139)
P1D9913	Main positive or pre-charge contactor contact open circuit	(See page PB-140)
P1D9A13	Main negative contactor contact open circuit	(See page PB-140)
P1D8985	High SOC	(See page PB-46)
P1DAD00	Cell SOC deviation error	(See page PB-142)

DTC	P1D8016	Cell undervoltage
DTC	P1DC016	Cell voltage limit (critical) low

Description

When the BMU detects the cell undervoltage, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D8016	(a) Minimum cell voltage ⩽ 2.1 V (>-5 ℃); (b) Minimum cell voltage ⩽ 1.9 V(-20 ℃⩽ T ⩽ -5 ℃); (c) Minimum cell voltage ⩽ 1.5 V (T<-20 ℃).	• Traction battery internal • Battery module
P1DC016	(a) Minimum cell voltage ⩽ 1.8 V (>-5 ℃); (b) Minimum cell voltage ⩽ 1.6 V(-20 ℃⩽ T ⩽ -5 ℃). (c) Minimum cell voltage ⩽ 1.2 V (T<-20 ℃)	• Traction battery internal • Battery module

Inspection procedure

PB

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Read voltage value

(a) After the system is powered off, put the vehicle into hibernation and condition the vehicle for 2 hours.

(b) Connect the HQ-VDS.

(c) Read and check whether the current minimum voltage is ⩽ 2 V.

Results

Results	Go to
Cell voltage ⩽ 2 V	Abnormal
Cell voltage> 2 V	Normal

NG → **Replace the module where the voltage is less than or equal to 2 V (See page HB-14)**

OK

2	Check for the following DTCs

(a) Read the DTC.

(b) Check whether there is a "cell SOC deviation".

Results

Results	Go to
DTC mentioned above appears	Abnormal

Results	Go to
No DTC mentioned above appears	Normal

NG → **Repair according to the DTC**

OK

3	**The above faults are not found, and the troubleshooting method is the same as the P1D8116.**

DTC	P1D8117	Cell overvoltage alarm

Description

When the BMU detects the cell overvoltage alarm, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D8117	(a) Maximum cell voltage> 4.3 V.	• Traction battery internal • Battery module

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) After the system is powered off, put the vehicle into hibernation and condition the vehicle for 2 hours.

(b) Connect the HQ-VDS.

(c) Power on again, clear the DTC, and check whether the system works normally.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Check other component faults of traction battery system**

OK

2	End

DTC	P1D8216	Battery undervoltage
DTC	P1D8316	Battery undervoltage
DTC	P1DC616	Total voltage slightly too low

Description

When the BMU detects the battery undervoltage, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D8216	(a) Total battery voltage ⩽ cell undervoltage limit * 96.	• Traction battery internal • Battery module • Copper bar false connection • Sampling harness • Battery management system • Fuse
P1D8316	(a) Total battery voltage < cell undervoltage alarm limit *96	• Traction battery internal • Battery module • Copper bar false connection • Sampling harness • Battery management system • Fuse
P1DC616	(a) Total battery voltage < cell voltage alarm limit * 96.	• Traction battery internal • Battery module • Copper bar false connection • Sampling harness • Battery management system • Fuse

PB

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Read DTC

(a) Check for the DTCs in the table below.

P1DC016	Cell voltage limit (critical) low
P1D8116	Cell undervoltage alarm
P1D8016	Cell undervoltage

Results

Results	Go to
DTC in the table above appears	Abnormal
No DTC in the table above appears	Normal

NG → **Repair according to the DTC**

OK

2	Measure the voltage between the positive and negative poles of the battery pack

(a) Measure the voltage between the positive and negative poles of the battery pack.

Results

Results	Go to
Voltage is 0 V	Abnormal
Voltage is not 0 V	Normal
Voltage is not 0 V and is close to the average battery cell voltage*96	Step 4

NG → **Repair or replace the fuse**

Note: If the fuse is broken, replace the fuse and clear the DTC. Investigate other short-circuit fault points in the high-voltage loop of the whole vehicle. Power-on is not allowed until the cause of the short circuit is found.

OK

3	Check copper bar

(a) Check whether the copper bar is installed correctly.

(b) Check whether the copper bar bolt is installed and tightened.

(c) Check whether the copper bar circuit is open.

NG → **Repair according to the fault**

OK

4	Check harness and connector (BMS-battery)

(a) Check whether the harness and connector are connected tightly.

(b) Disconnect the BCU connector.

(c) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BCU connector H6# -battery positive wire crimping terminal	Always connected	Proper continuity

Detector connection	Detection conditions	Specified state
BCU connector H11# -battery negative wire crimping terminal	Always connected	Proper continuity

NG → **Repair or replace the harness and connector**

OK

5	**Replace BMS (See page HB-14)**

DTC	P1D8698	Battery module overtemperature
DTC	P1D8598	Critical high module temperature

Description

When the BMU detects the battery module overtemperature, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D8698	(a) Module maximum temperature> 70°C.	• Traction battery internal • Battery module • Traction battery fan • Sampling harness
P1D8598	(a) Battery temperature level 7 fault.	• Traction battery internal • Battery module • Traction battery fan • Sampling harness

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).This kind of DTC is analyzed in two cases: the current fault is detected according to method 1; The historical fault shall be detected according to method 2.

Method 1:

1	Read module temperature

(a) Keep the vehicle fully stationary at room temperature for more than 10 hours.

(b) Locate the faulty module according to the temperature point.

OK

2	Check harness and connector (module - BMS)

(a) Check whether the harness and connector are damaged or cracked.

(b) Check whether the harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

3	Check battery module resistance

(a) Disconnect the battery module connector.

(b) Check battery module resistance.

Standard value

Detector connection	Detection conditions	Specified state
Battery module 3# -Battery module 17#	Always connected	Not less than 2.2 kΩ
Battery module 6# -Battery module 21#	Always connected	Not less than 2.2 kΩ

NG → **Replace battery module (temperature point of faulty module is abnormal compared with other modules)**

Method 2:

OK

4	Check harness and connector (module - BMS)

(a) Keep the vehicle fully stationary at room temperature for more than 10 hours.

(b) If the difference between the current maximum temperature and the minimum temperature is greater than 5°C, and the maximum temperature point is the same as the temperature point in the fault snapshot, locate the faulty module according to the temperature point.

(c) Check whether the harness and connector are damaged or cracked.

(d) Check whether the harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

5	Check and compare the resistance of maximum and minimum temperature modules

(a) Disconnect the battery module connector.

(b) Check battery module resistance.

(c) Compare with the resistance of other normal module.

Standard value

PB

Resistance of battery module with abnormal temperature	Resistance of battery module with normal temperature	Contrast status	
Battery module with maximum temperature 3# - battery module with maximum temperature 17#	Battery module with normal temperature 3# - battery module with normal temperature 17#	Abnormal	Normal
Battery module with maximum temperature 6# -Battery module with maximum temperature 21#	Battery module with normal temperature 6# - Battery module with normal temperature 21#		
Battery module with minimum temperature 3# -Battery module with minimum temperature 17#	Battery module with normal temperature 3# - battery module with normal temperature 17#		
Battery module with minimum temperature 6# -Battery module with minimum temperature 21#	Battery module with normal temperature 6# - Battery module with normal temperature 21#		

NG → **Replace battery module**

PB

OK

6 **Check reported temperature and resistance**

(a) Check the matching between the reported temperature and the resistance value.

Results

Results	Go to
Match	Normal
Mismatch	Abnormal

NG → **Replace BMS (See page HB-14)**

OK

7 **Replace the module according to the highest temperature position (check the problem of the traction battery blower; do not use it until the problem is solved)**

DTC	P1D8798	Battery module overtemperature alarm

Description

When the BMU detects the battery module overtemperature, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D8798	(a) Module maximum temperature> 60°C.	• Traction battery internal • Battery module • Traction battery fan • Sampling harness

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).This kind of DTC is analyzed in two cases: the current fault is detected according to method 1; The historical fault shall be detected according to method 2.

Method 1:

1	Read module temperature

PB

(a) Keep the vehicle fully stationary at room temperature for more than 10 hours.

(b) Locate the faulty module according to the temperature point.

OK

2	Check harness and connector (module - BMS)

(a) Check whether the harness and connector are damaged or cracked.

(b) Check whether the harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

3	Check battery module resistance

(a) Disconnect the battery module connector.

(b) Check battery module resistance.

Standard value

Detector connection	Detection conditions	Specified state
Battery module 3# -Battery module 17#	Always connected	Not less than 2.9 kΩ
Battery module 6# -Battery module 21#	Always connected	Not less than 2.9 kΩ

NG → **Replace battery module (temperature point of faulty module is abnormal compared with other modules)**

OK

4	**Replace BMS (See page HB-14)**

Method 2:

PB

OK

5	**Read module temperature**

(a) Keep the vehicle fully stationary at room temperature for more than 10 hours.

(b) If the difference between the current maximum temperature and the minimum temperature is greater than 5°C, and the maximum temperature point is the same as the temperature point in the fault snapshot, locate the faulty module according to the temperature point.

OK

6	**Check harness and connector (module - BMS)**

(a) Check whether the harness and connector are damaged or cracked.

(b) Check whether the harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

7	**Check and compare the resistance of maximum and minimum temperature modules**

(a) Disconnect the battery module connector.

(b) Check battery module resistance.

(c) Compare with the resistance of other normal module.

Standard value

Resistance of battery module with abnormal temperature	Resistance of battery module with normal temperature	Contrast status	
Battery module with maximum temperature 3# - battery module with maximum temperature 17#	Battery module with normal temperature 3# - battery module with normal temperature 17#	Abnormal	Normal
Battery module with maximum temperature 6# -Battery module with maximum temperature 21#	Battery module with normal temperature 6# - Battery module with normal temperature 21#		
Battery module with minimum temperature 3# -Battery module with minimum temperature 17#	Battery module with normal temperature 3# - battery module with normal temperature 17#		
Battery module with minimum temperature 6# -Battery module with minimum temperature 21#	Battery module with normal temperature 6# - Battery module with normal temperature 21#		

PB

NG → **Replace battery module (See page HB-14)**

OK

8	**Check reported temperature and resistance**

(a) Check the matching between the reported temperature and the resistance value.

Results

Results	Go to
Match	Normal
Mismatch	Abnormal

NG → **Replace BMS (See page HB-14)**

OK

9	**Replace the module according to the highest temperature position (check the problem of the traction battery blower; do not use it until the problem is solved)**

DTC	P1D8800	Module undertemperature

Description

When the BMU detects the battery module undertemperature, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D8800	(a) Module minimum temperature < -35°C.	• Traction battery internal • Battery module • Traction battery fan • Sampling harness

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).This kind of DTC is analyzed in two cases: the current fault is detected according to method 1; The historical fault shall be detected according to method 2.

Method 1:

1	Check harness and connector (module - BMS)

(a) Keep the vehicle fully stationary at room temperature for more than 10 hours.

(b) Locate the faulty module according to the temperature point.

(c) Check whether the harness and connector are damaged or cracked.

(d) Check whether the harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

2	Check battery module resistance

(a) Disconnect the battery module connector.

(b) Check battery module resistance.

Standard value

Detector connection	Detection conditions	Specified state
Battery module 3# -Battery module 17#	Always connected	Not higher than 165 kΩ
Battery module 6# -Battery module 21#	Always connected	Not higher than 165 kΩ

Detector connection	Detection conditions	Specified state
Battery module 3# -Battery module 17#	Always connected	Not higher than 165 kΩ
Battery module 6# -Battery module 21#	Always connected	Not higher than 165 kΩ

NG → **Replace battery module (temperature point of faulty module is abnormal compared with other modules) (See page HB-14)**

OK

3	**Replace BMS (See page HB-14)**

Method 2:

OK

4	**Check harness and connector (module - BMS)**

(a) Keep the vehicle fully stationary at room temperature for more than 10 hours.

(b) If the difference between the current maximum temperature and the minimum temperature is greater than 5 ℃ , and the position of the minimum temperature point is the same as that in the fault snapshot, locate the faulty module according to the temperature point.

(c) Check whether the harness and connector are damaged or cracked.

(d) Check whether the harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

5	**Check and compare the resistance of maximum and minimum temperature modules**

(a) Disconnect the battery module connector.

(b) Check battery module resistance.

(c) Compare with the resistance of other normal module.

Standard value

Resistance of battery module with abnormal temperature	Resistance of battery module with normal temperature	Contrast status	
Battery module with maximum temperature 3# - battery module with maximum temperature 17#	Battery module with normal temperature 3# - battery module with normal temperature 17#	Abnormal	Normal
Battery module with maximum temperature 6# -Battery module with maximum temperature 21#	Battery module with normal temperature 6# - Battery module with normal temperature 21#		
Battery module with minimum temperature 3# -Battery module with minimum temperature 17#	Battery module with normal temperature 3# - battery module with normal temperature 17#		
Battery module with minimum temperature 6# -Battery module with minimum temperature 21#	Battery module with normal temperature 6# - Battery module with normal temperature 21#		

NG → **Replace battery module (See page HB-14)**

PB

OK

6	Check reported temperature and resistance

(a) Check the matching between the reported temperature and the resistance value.

Results

Results	Go to
Match	Normal
Mismatch	Abnormal

NG → **Replace BMS (See page HB-14)**

OK

7	Replace the module according to the lowest temperature position (check the problem of the traction battery blower problem; do not use it again until the problem is solved)

DTC	P1D8984	SOC low alarm

Description

When the BMU detects the low SOC alarm, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D8984	(a) Battery pack SOC <20%.	• Traction battery internal

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Read DTC after waiting for 10 min.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Charge the vehicle**

OK

2	End

DTC	P1D8985	High SOC

Description

When the BMU detects the SOC jump, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D8985	(a) Battery pack SOC >80%.	• Traction battery internal

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off the vehicle for 10 min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Discharge the vehicle**

OK

2	End

DTC	P1D8A18	Feedback charge current out of limit
DTC	P1DCC00	Feedback charge current out of limit alarm

Description

When the BMU detects the feedback charge current out of limit, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D8A18	(a) Current ⩽ -500A.	• Vehicle high voltage system • Traction battery internal
P1DCC00	(a) Current ⩽ -400A.	• Vehicle high voltage system • Traction battery internal

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Check DTC

(a) Clear the DTC.

(b) Wait for 10min.

(c) Power on again to read DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Check motor or HCU**

OK

2	End

PB

DTC	P1D8A19	Discharge current out of limit
DTC	P1DCB00	Discharge current out of limit

Description

When the BMU detects the discharge current out of limit, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D8A19	(a) Current ⩾ 500A.	• Vehicle high voltage system • Traction battery internal
P1DCB00	(a) Current ⩾ 400A.	• Vehicle high voltage system • Traction battery internal

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Check traction battery external high voltage component

PB

(a) Check whether there is a short circuit in the high voltage circuit outside the battery.

NG → **Repair according to the DTC**

OK

2	Replace the high-voltage PDU inside the traction battery (See page HB-14)

DTC	P1D8B74	Equalization circuit short

Description

When the BMU detects the equalization circuit short, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D8B74	(a) Equalization circuit short.	• Traction battery internal: module, harness, BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 10min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Check traction battery internal module, harness, BMS (See page HB-14)**

OK

2	End

PB

DTC	P1D8C1A	Insulation alarm
DTC	P1D8D1A	Major insulation failure

Description

When the BMU detects a insulation alarm fault, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D8C1A	(a) Insulation resistance <240 kΩ.	• Vehicle high voltage system • Traction battery internal • Battery module • Copper bar • Sampling line
P1D8D1A	(a) Insulation resistance <55 kΩ.	• Vehicle high voltage system • Traction battery internal • Battery module • Copper bar • Sampling line

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off the vehicle for 10 min, then power on for 1 min, and read the current BMS DTC and insulation resistance.

(c) Hold Start for 5 minutes and read the current BMS DTC.

Results

Results	Go to
DTC exists and insulation resistance value is less than 300 kΩ before start	Abnorma
There is no DTC before start, but DTC appears after start	Normal

NG → **Check traction battery internal insulation failure**

OK

2	Check vehicle insulation failure other than battery

(a) Check whether other components of the high voltage system have insulation failure.

NG → **Repair according to the fault**

OK

3	**Check BMS**

(a) Disconnect all battery module connectors.

(b) Disconnect the BMS connector.

(c) Use insulation meter to measure the insulation resistance of high voltage positive and negative poles to the internal ground point of the battery.

Results

Results	Go to
Infinite insulation resistance	Abnormal
Infinite insulation resistance	Normal

OK → **Replace BMS (See page HB-14)**

NG

4	**Check battery module**

(a) Disconnect the high voltage copper bar from the middle.

(b) Use the insulation meter to measure the insulation resistance at both ends. (Repeat the operation of disconnecting the copper bar on the side with the problem of insulation resistance value, and gradually narrow down the problem point by stages and finally locate it.)

NG → **Repair according to the fault**

OK

5	**Replace traction battery (See page HB-8)**

DTC	P1D8F16	Communication module power supply circuit shorted to ground/undervoltage

Description

When the BMU detects the communication module power supply shorted to ground/undervoltage, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D8F16	(a) Communication module supply circuit shorted to ground/undervoltage.	• Traction battery internal: BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 5min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	End

DTC	P1D8F17	Communication module power supply over-voltage

Description

When the BMU detects the communication module power supply overvoltage, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D8F17	(a) Communication module power supply overvoltage.	• Traction battery internal: BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 5min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	End

DTC	P1D8F51	AFE initialization addressing failure

Description

When the BMU detects an AFE initialization addressing failure, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D8F51	(a) AFE initialization addressing failure.	• Traction battery internal: module, harness, BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 10min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Troubleshoot battery pack temperature sampling harness, battery module, and BMS (See page HB-14)**

OK

2	End

DTC	P1D8F82	Communication message Rolling counter error

Description

When the BMU detects a communication message Rolling counter error, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D8F82	(a) communication message Rolling counter error.	• Traction battery internal: BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 5min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	End

PB

DTC	P1D8F83	Communication message CRC error

Description

When the BMU detects a communication message CRC error, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D8F83	(a) Communication message CRC error.	• Traction battery internal: BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 5min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	End

DTC	P1D8F87	Communication lost

Description

When the BMU detects a communication loss, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D8F87	a) Communication lost.	• Traction battery internal: BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 5min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	End

DTC	P1D9013	Equalization open circuit

Description

When the BMU detects a equalization open circuit, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D9013	(a) Equalization open circuit.	• Traction battery internal: module, harness, BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 5min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Troubleshoot battery pack module sampling harness, battery module, and BMS (See page HB-14)**

OK

2	End

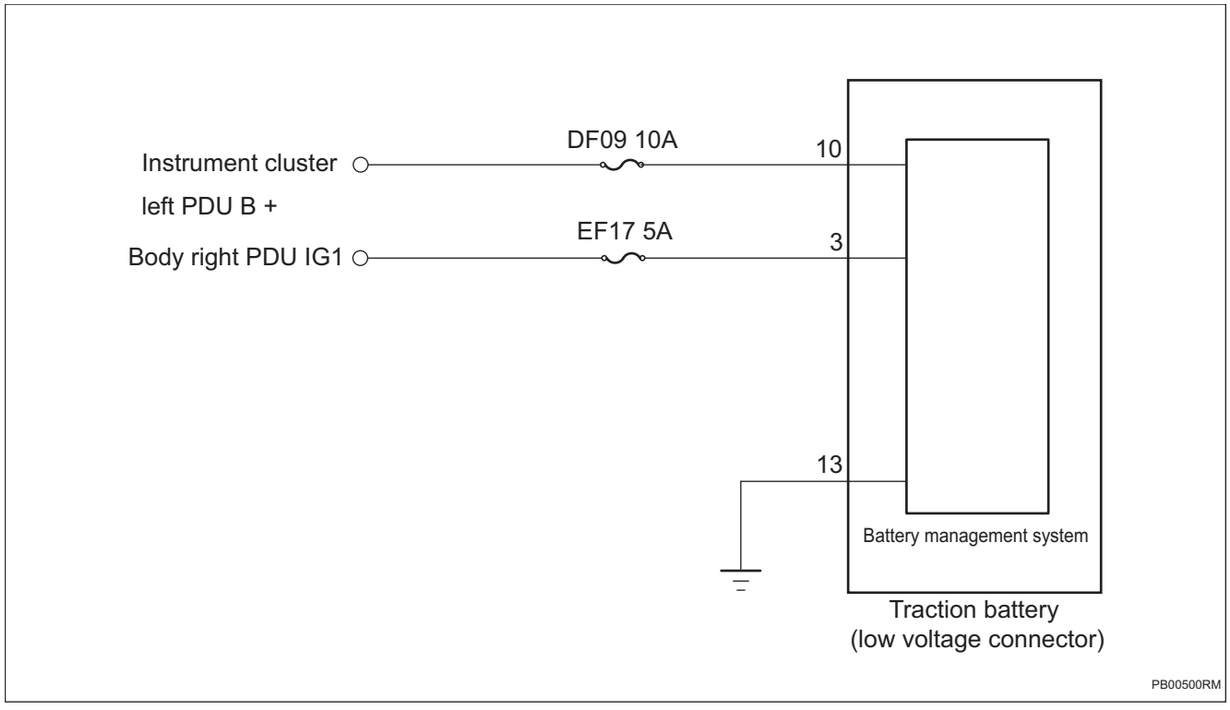
DTC	P1D9117	Low voltage power supply overvoltage
DTC	P1D9116	Low voltage power supply undervoltage

Description

When the BMU detects an abnormal 12V power supply voltage, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D9117	(a) Power supply voltage>16 V.	• 12 V battery • Traction battery internal: BMS, harness
P1D9116	(a) Power supply voltage<9 V.	• 12 V battery • Low voltage harness and connector (traction battery external) • Traction battery internal: BMS, harness

Circuit diagram



Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC and wait for 30 s before reading DTC.

Results

Results	Go to
Output DTC	Abnormal
No DTC output	Normal

OK → End

NG

2	Check the 12 V battery voltage

(a) Start the vehicle and measure the 12 V battery voltage.

Standard value

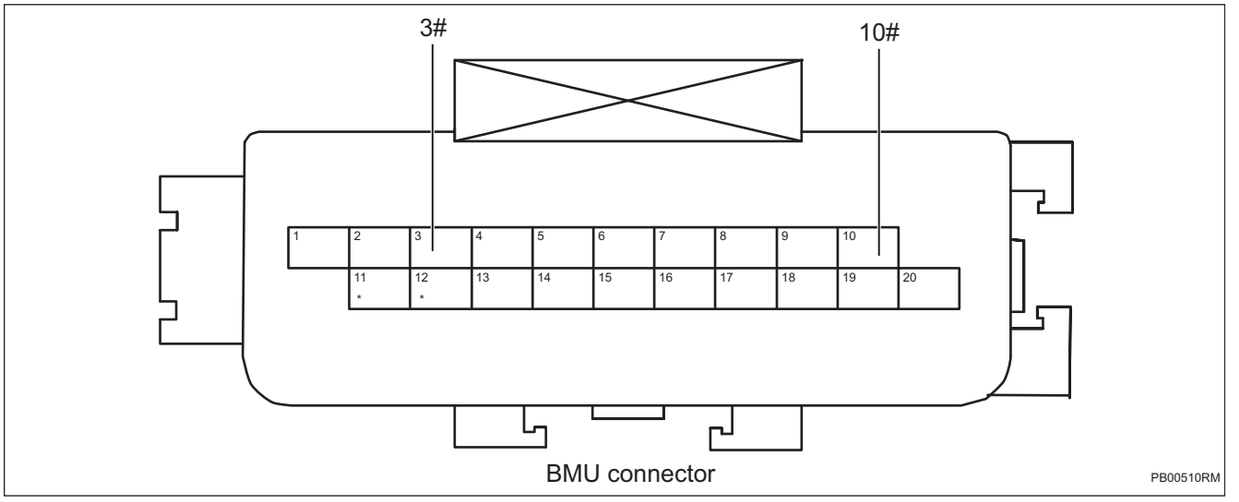
Detector connection	Detection conditions	Specified state
12 V battery + - 12 V battery -	Always connected	About 9~14 V

NG → **Repair or replace 12V battery (See page CH-20)**

PB

OK

3	Check BMU 12 V power supply



BMU connector

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the BMU connector.

(d) Connect the battery negative terminal.

(e) Set the ignition switch to "ON".

(f) Measure the voltage according to the values in the table below.

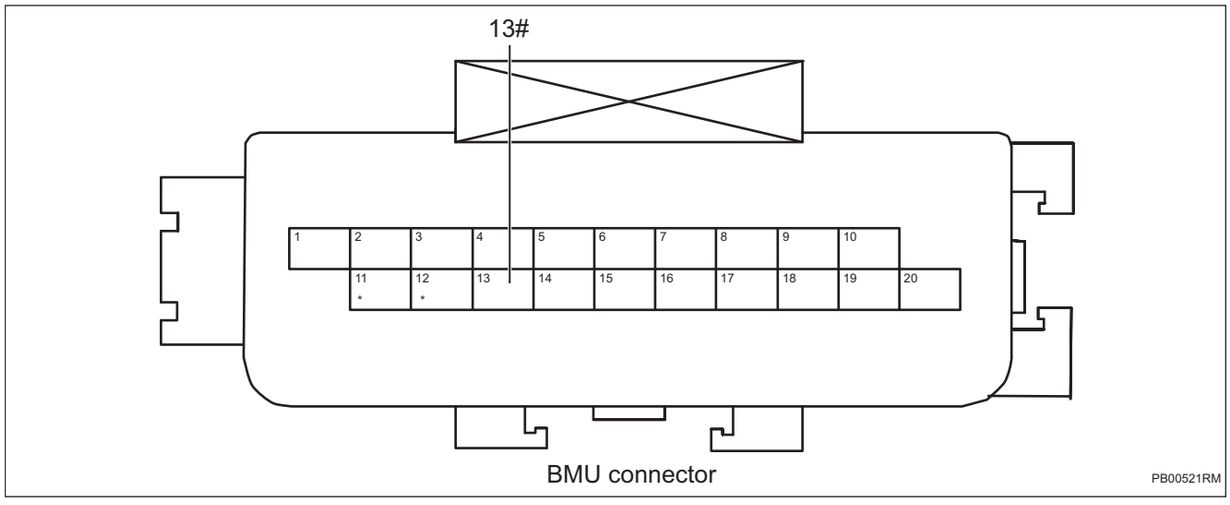
Standard value

Detector connection	Detection conditions	Specified state
BMU connector 3# - body GND	The ignition switch is set to "ON"	12V battery voltage
BMU connector 10# - body GND	The ignition switch is set to "ON"	12V battery voltage

NG → **Repair or replace the harness and connector, fuse and relay**

OK

4	**Check BMU ground**



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BMU connector 13# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

5	**Check traction battery internal harness and connector**

(a) Check whether the traction battery internal harness and connector are connected tightly.

PB

(b) Check whether the traction battery internal harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

6	**Replace BMS (See page HB-14)**

DTC	P1D9213	Diagnostic equalization switch disconnection failure

Description

When the BMU detects a diagnostic equalization switch open failure, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D9213	(a) Diagnostic equalization switch disconnection failure.	• Traction battery internal: BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 5min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	End

DTC	P1D9317	AFE internal ADC module power supply overvoltage
DTC	P1D9316	AFE internal ADC module power supply circuit shorted to ground/undervoltage

Description

When the BMU detects an AFE internal ADC module power supply related fault, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D9317	(a) AFE internal ADC module power supply overvoltage.	• Traction battery internal: BMS
P1D9316	(a) The AFE internal ADC module power supply shorted to ground/undervoltage.	• Traction battery internal: BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

PB

1	**Clear DTC**

(a) Clear the DTC.

(b) Power off and wait for 5min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	**End**

DTC	P1D9417	AFE chip power supply overvoltage
DTC	P1D9416	AFE chip power supply undervoltage

Description

When the BMU detects an abnormal power supply to the AFE chip, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D9417	(a) AFE chip power supply overvoltage.	• Traction battery internal: BMS
P1D9416	(a) AFE chip power supply undervoltage.	• Traction battery internal: BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC

(b) Power off and wait for 5min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	End

PB

DTC	P1D9504	ADC function failure

Description

When the BMU detects an ADC function failure, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D9504	(a) ADC function failure.	• Traction battery internal: BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 5min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	End

DTC	P1D9698	AFE overtemperature alarm
DTC	P1D9798	AFE overtemperature

Description

When the BMU detects an AFE overtemperature, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D9698	(a) AFE overtemperature alarm.	• Traction battery internal: BMS
P1D9798	(a) AFE overtemperature.	• Traction battery internal: BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 5min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	End

DTC	P1D9804	AFE diagnosis timeout

Description

When the BMU detects an AFE diagnosis timeout, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D9804	(a) AFE diagnostic timeout.	• Traction battery internal: BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 5min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	End

DTC	P1D9911	Main positive or pre-charge contactor contact short circuit
DTC	P1D9A11	Main negative contactor contact short circuit

Description

When the BMU detects a main positive or pre-charge contactor contact short circuit, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D9911	(a) Main positive or pre-charge contactor contact short circuit.	• Vehicle high voltage component • Traction battery internal • PDU
P1D9A11	(a) Main negative contactor contact short circuit.	• Vehicle high voltage component • Traction battery internal • PDU

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off the vehicle for 10 min.

(c) Re-read the current DTC of the BMS after power-on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **End**

NG

2	Check relay

(a) Remove the battery pack.

(b) Use the multimeter continuity mode to confirm whether the relay is stuck according to the PRA principle.

Results

Results	Go to
Relay stuck	Abnormal

Results	Go to
Relay not stuck	Normal

OK → Replace the relay

NG

3	Release the relay again

(a) The drive relay is disconnected again.

(b) Use the multimeter continuity mode to confirm whether the relay is operating according to the drive.

Results

Results	Go to
Relay not disconnected	Abnormal
Relay disconnection	Normal

NG → Replace the relay

OK

4	Troubleshoot other high-voltage devices outside the traction battery and replace the PDU (See page HB-14)

DTC	P1D9B98	SBC overtemperature alarm
DTC	P1D9C98	SBC overtemperature

Description

When the BMU detects the SBC overtemperature, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D9B98	(a) SBC overtemperature alarm.	• Traction battery internal: BMS
P1D9C98	(a) SBC overtemperature.	• Traction battery internal: BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 5min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	End

DTC	P1D9D11	Fan drive coil circuit shorted to ground
DTC	P1D9D13	Fan drive coil open circuit

Description

When the BMU detects the fan drive coil circuit is shorted or open, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D9D11	(a) Fan drive coil circuit shorted to ground.	• Traction battery internal: harness, BMS • Traction battery blower • Harness and connector
P1D9D13	(a) Fan drive coil open circuit.	• Traction battery internal: harness, BMS • Traction battery blower • Harness and connector

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

PB

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 5min.

(c) Power on again to read DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **End**

NG

2	Check the traction battery blower harness and connector

(a) Check whether the traction battery blower harness and connector are connected tightly.

(b) Check whether the traction battery blower harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

3	**Check the low voltage harness and connector at the traction battery vehicle terminal**

(a) Check whether the traction battery vehicle terminal low-voltage harness and connector are connected tightly.

(b) Check the traction battery vehicle terminal low-voltage harness and connector for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

4	**Check the traction battery internal low-voltage harness and connector**

(a) Check whether the inner traction battery low-pressure harness and connector are connected tightly.

(b) Check the low-voltage harness and connector inside the traction battery for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

5	**Replace the traction battery blower (See page HB-8)**

(a) Replace the traction battery blower.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace BMS (See page HB-14)**

OK

6	**End**

PB

DTC	P1D9D1D	Fan drive output not available

Description

When the BMU detects the fan drive output not available, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D9D1D	(a) Fan drive output not available.	• Traction battery internal • BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC, power off and wait for 5min.

(b) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	End

DTC	P1D9E13	Cell voltage sampling line open circuit

Description

When the BMU detects the open circuit of cell voltage sampling line, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D9E13	(a) Cell voltage sampling line open circuit.	• Traction battery internal: module, harness, BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 5min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **End**

NG

2	Check traction battery internal module, harness and BMS

(a) Use the HQ-VDS to read the daughter board status information.

(b) Check the battery pack cell voltage sampling harness, battery module and BMS according to the inspection information.

NG → **Repair according to the fault**

OK

3	End

PB

DTC	P1D9F41	E2P read data CRC error
DTC	P1D9F42	E2P failed to write data

Description

When the BMU detects E2 P reading and writing data errors, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D9F41	(a) E2P reading data CRC error.	• Traction battery internal: BMS
P1D9F42	(a) E2P failed to write data.	• Traction battery internal: BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 5min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	End

DTC	P1DA288	Subnet CAN busoff

Description

When the BMU detects the internal CAN busoff failure, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DA288	(a) Subnet CAN busoff.	• Vehicle terminal harness • Traction battery internal: harness, BMS, module

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Check traction battery low voltage connector

(a) Check whether the battery pack low voltage connector is connected normally.

(b) Check whether the plugs of vehicle terminal harnesses 6# and 13# are normal.

PB

NG → **Repair according to the fault**

OK

2	Check internal CAN harness and terminal resistor

(a) Disconnect the battery pack low voltage connector.

(b) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Battery pack low voltage connector 6# - battery pack low voltage connector 13#	Always connected	About 120 Ω
Battery pack low voltage connector 6# - battery metal case	Always connected	Greater than 1 kΩ
Battery pack low voltage connector 6# - battery pack low voltage connector 1#	Always connected	Greater than 1 kΩ
Battery pack low voltage connector 6# - battery pack low voltage connector 18#	Always connected	Greater than 1 kΩ
Battery pack low voltage connector 13# - battery metal case	Always connected	Greater than 1 kΩ
Battery pack low voltage connector 13# - battery pack low voltage connector 1#	Always connected	Greater than 1 kΩ
Battery pack low voltage connector 13# - battery pack low voltage connector 18#	Always connected	Greater than 1 kΩ

NG → **Repair or replace harness and connector and BMS (See page HB-14)**

OK

3	**Check traction battery internal harness**

(a) Check the traction battery internal harness for crimping or wear.

NG → **Repair according to the fault**

OK

4	**End**

DTC	P1DA300	CAN collision fault
DTC	P1DA400	Airbag failure

Description

When the BMU detects the CAN collision failure, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DA300	(a) CAN impact signal reporting failure.	• Traction battery internal • Airbag
P1DA400	(a) The hardwire detects the occurrence of a collision.	• Traction battery internal • Airbag

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Confirm whether the vehicle has been collided

(a) Confirm whether the vehicle has been collided.

Results

Results	Go to
Collision occurred	Abnormal
No collision occurred	Normal

NG → **If the connector is disconnected or there is visible battery damage during the impact, the battery must be further repaired**

OK

2	Clear DTC

(a) Clear the DTC.

(b) Power off the vehicle for 10 min.

(c) Re-read the current DTC of the BMS after power-on.

Criteria:

No DTC is output.

NG → **Repair the SRS**

OK

3	End

DTC	P1DA598	MCU overtemperature alarm
DTC	P1DA698	MCU overtemperature

Description

When the BMU detects the MCU overtemperature, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DA598	(a) MCU overtemperature alarm.	• Traction battery internal: BMS
P1DA698	(a) MCU overtemperature.	• Traction battery internal: BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 5min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	End

DTC	P1DA711	Main positive contactor coil circuit shorted to ground

Description

When the BMU detects the circuit shorted to ground of the main positive contactor coil, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DA711	(a) Main positive contactor coil circuit shorted to ground.	• Low voltage service switch circuit • Traction battery internal: BMS, harness, PDU

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Check traction battery Internal harness and connector (BMS-PDU PDU)

(a) Disconnect the BMS connector.

(b) Disconnect the PDU connector.

(c) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BMS connector I7# - traction battery connector 18#	Always connected	No continuity
BMS connector I5# - traction battery connector 18#	Always connected	No continuity

NG → **Repair or replace the harness and connector**

OK

2	Replace PDU assembly or BMS (See page HB-14)

PB

DTC	P1DA712	Main positive contactor coil circuit shorted to power supply

Description

When the BMU detects the circuit shorted to power supply of the main positive contactor coil, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DA712	(a) Main positive contactor coil circuit shorted to power supply.	• Low voltage service switch circuit • Traction battery internal: BMS, harness, PDU

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Check traction battery Internal harness and connector (BMS-PDU PDU)

(a) Disconnect the BMS connector.

(b) Disconnect the PDU connector.

(c) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BMS connector I7# - traction battery connector 1#	Always connected	No continuity
BMS connector I5# - traction battery connector 1#	Always connected	No continuity

NG → **Repair or replace the harness and connector**

OK

2	Replace PDU assembly or BMS (See page HB-14)

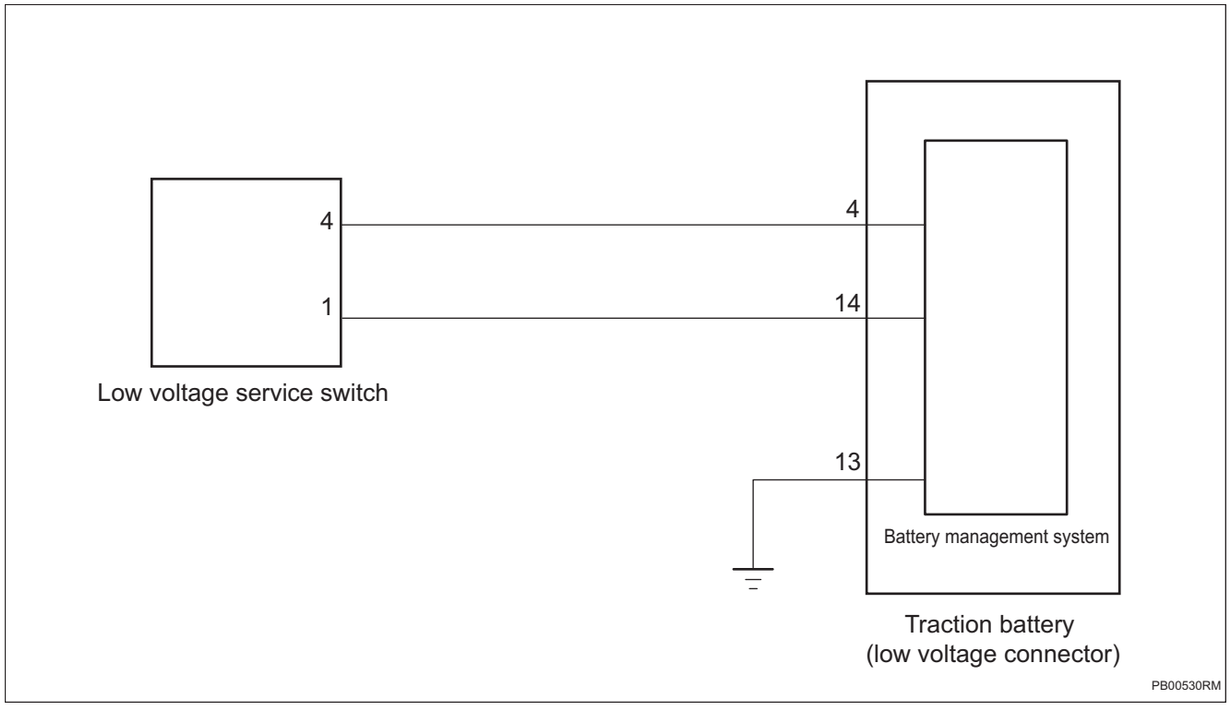
DTC	P1DA713	Main positive contactor coil open

Description

When the BMU detects the main positive contactor coil open, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DA713	(a) Main positive contactor coil open circuit.	• Low voltage service switch circuit • Traction battery internal: BMS, harness, PDU

Circuit diagram



Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).This kind of DTC is analyzed in two cases: if 3 contactor coil open faults are reported at the same time, perform detection according to method 1; If only a single fault is reported, perform detection according to method 2.

Method 1:

1	Check low voltage service switch

(a) Check whether the low voltage service switch is installed correctly.

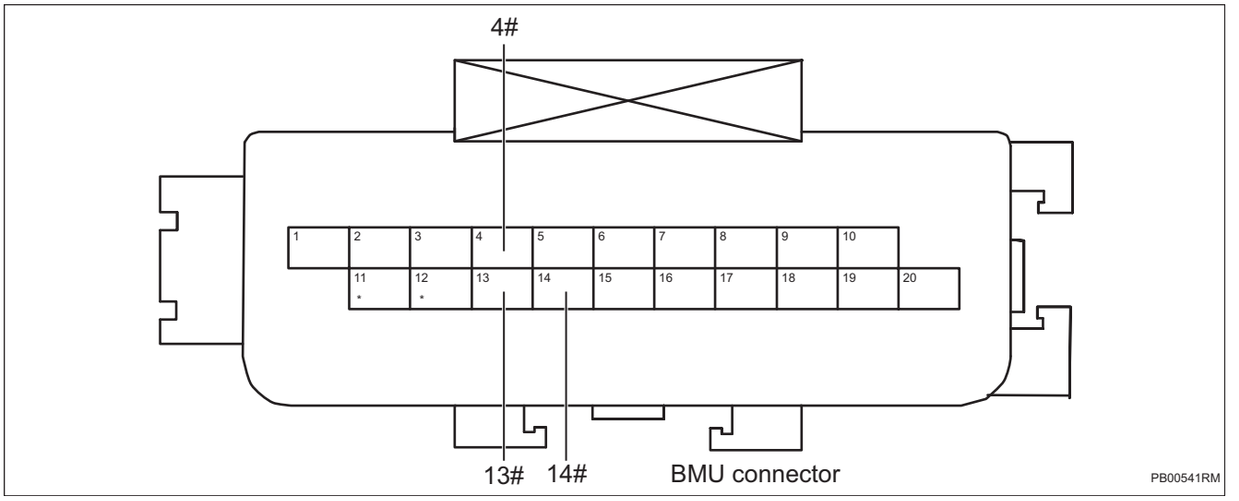
(b) Check whether the low voltage service switch is damaged.

PB

NG → **Do repair according to the fault (clear the DTC after repair, power off and wait for 10 min, read the DTC again after power-on, and confirm whether the fault still exists)**

OK

2	Check traction battery low voltage



(a) Set the ignition switch to "ON".

(b) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Traction battery connector 4# - traction battery connector 13#	The ignition switch is set to "ON"	Battery voltage
Traction battery connector 14# - traction battery connector 13#	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

3	Check traction battery internal harness

(a) Check whether the PDU connector and BMS connector are loose.

NG → **Repair according to the fault**

PB

OK

4	Check traction battery internal harness and connector

(a) Disconnect the traction battery internal harness connector.

(b) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Traction battery connector 7# - BMS connector I1#	Always connected	Proper continuity
Traction battery connector 7# - BMS connector I2#	Always connected	Proper continuity
Traction battery connector 17# - BMS connector I14#	Always connected	Proper continuity
Traction battery connector 17# - BMS connector I30#	Always connected	Proper continuity

PB

NG **Repair or replace the harness and connector**

OK

5	Replace high-voltage PDU (See page HB-14)

Method 2:

OK

6	Check traction battery Internal harness and connector (BMS-PDU PDU)

(a) Disconnect the BMS connector.

(b) Disconnect the PDU connector.

(c) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BMS connector I7# -PDU PDU connector 1#	Always connected	Proper continuity
BMS connector I5# -PDU PDU connector 9#	Always connected	Proper continuity

NG → Repair or replace the harness and connector

OK

7	Replace PDU assembly or daughter board (See page HB-14)

DTC	P1DA719	Main positive contactor coil drive overcurrent
DTC	P1DA71D	Main positive contactor coil drive output not available

Description

When the BMU detects the failure related to the main positive contactor coil drive, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DA719	(a) Main positive contactor coil drive overcurrent.	• Traction battery internal • BMS
P1DA71D	(a) Main positive contactor coil drive output not available.	• Traction battery internal • BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	**Clear DTC**

(a) Clear the DTC.

(b) Power off the vehicle for 10 min.

(c) Power on again to read the current DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	**End**

DTC	P1DA811	Main negative contactor coil circuit shorted to ground

Description

When the BMU detects the main negative contactor coil circuit shorted to ground, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DA811	(a) Main negative contactor coil circuit shorted to ground.	• Low voltage service switch circuit • Traction battery internal: BMS, harness, PDU

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Check traction battery Internal harness and connector (BMS-PDU PDU)

(a) Disconnect the BMS connector.

(b) Disconnect the PDU connector.

(c) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BMS connector I9# - traction battery connector 18#	Always connected	No continuity
BMS connector I32# - traction battery connector 18#	Always connected	No continuity
BMS connector I9# - metal enclosure	Always connected	No continuity
BMS connector I32# - metal enclosure	Always connected	No continuity

NG → **Repair or replace the harness and connector**

OK

2	Replace PDU assembly or BMS (See page HB-14)

DTC	P1DA812	Main negative contactor coil circuit shorted to power supply

Description

When the BMU detects the circuit shorted to power supply of the main negative contactor coil, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DA812	(a) Main negative contactor coil circuit shorted to power supply.	• Low voltage service switch circuit • Traction battery internal: BMS, harness, PDU

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Check traction battery Internal harness and connector (BMS-PDU PDU)

(a) Disconnect the BMS connector.

(b) Disconnect the PDU connector.

(c) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BMS connector I9# - traction battery connector 1#	Always connected	No continuity
BMS connector I32# - traction battery connector 1#	Always connected	No continuity

NG → **Repair or replace the harness and connector**

OK

2	Replace PDU assembly or BMS (See page HB-14)

PB

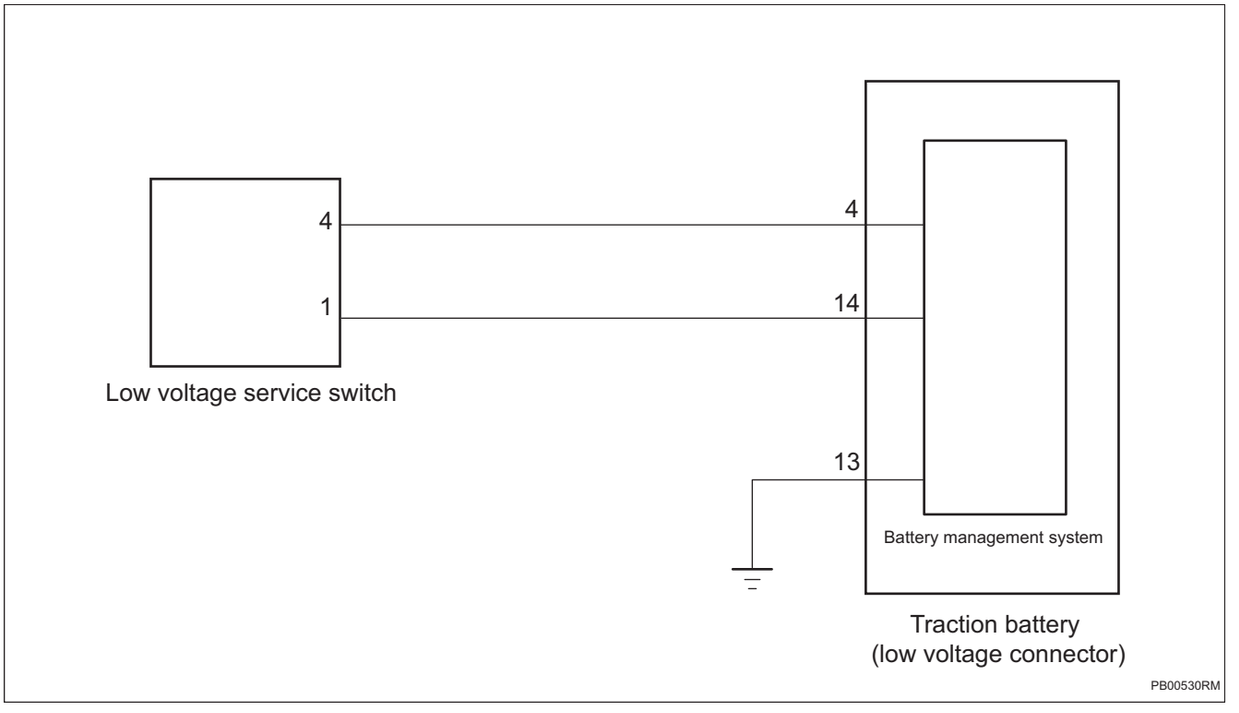
DTC	P1DA813	Main negative contactor coil open

Description

When the BMU detects the main negative contactor coil open circuit, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DA813	(a) Main negative contactor coil open circuit.	• Low voltage service switch circuit • Traction battery internal: BMS, harness, PDU

Circuit diagram



Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).This kind of DTC is analyzed in two cases: if 3 contactor coil open faults are reported at the same time, perform detection according to method 1; If only a single fault is reported, perform detection according to method 2.

Method 1:

1	Check low voltage service switch

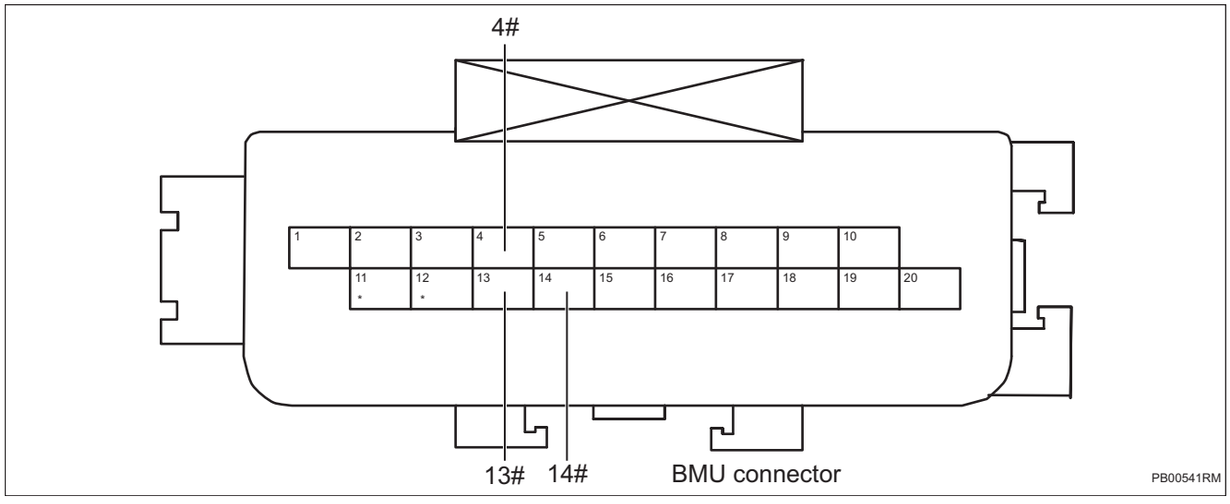
(a) Check whether the low voltage service switch is installed correctly.

(b) Check whether the low voltage service switch is damaged.

NG **Do repair according to the fault (clear the DTC after repair, power off and wait for 10 min, read the DTC again after power-on, and confirm whether the fault still exists)**

OK

2	**Check traction battery low voltage**



(a) Set the ignition switch to "ON".

(b) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Traction battery connector 4# - traction battery connector 13#	The ignition switch is set to "ON"	Battery voltage
Traction battery connector 14# - traction battery connector 13#	The ignition switch is set to "ON"	Battery voltage

NG **Repair or replace the harness and connector**

OK

3	**Check traction battery internal harness**

(a) Check whether the PDU connector and BMS connector are loose.

NG **Repair according to the fault**

PB

OK

4	Check traction battery internal harness and connector

(a) Disconnect the traction battery internal harness connector.

(b) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Traction battery connector 7# - BMS connector I1#	Always connected	Proper continuity
Traction battery connector 7# - BMS connector I2#	Always connected	Proper continuity
Traction battery connector 17# - BMS connector I14#	Always connected	Proper continuity
Traction battery connector 17# - BMS connector I30#	Always connected	Proper continuity

NG → **Repair or replace the harness and connector**

OK

5	Replace high-voltage PDU or BMS (See page HB-14)

Method 2:

OK

6	Check traction battery Internal harness and connector (BMS-PDU PDU)

(a) Disconnect the BMS connector.

(b) Disconnect the PDU connector.

(c) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BMS connector I9# -PDU PDU connector 2#	Always connected	Proper continuity
BMS connector I32# -PDU PDU connector 10#	Always connected	Proper continuity

NG → **Repair or replace the harness and connector**

OK

7	**Replace PDU assembly or BMS (See page HB-14)**

DTC	P1DA819	Main negative contactor coil drive overcurrent
DTC	P1DA81D	Main negative contactor coil drive output not available

Description

When the BMU detects a main negative contactor coil drive related fault, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DA819	(a) Main negative contactor coil drive overcurrent.	• Traction battery internal • BMS
P1DA81D	(a) Main negative contactor coil drive output not available.	• Traction battery internal • BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

PB

1	**Clear DTC**

(a) Clear the DTC.

(b) Power off the vehicle for 10 min.

(c) Power on again to read the current DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	**End**

DTC	P1DA911	Pre-charge contactor coil circuit shorted to ground

Description

When the BMU detects a pre-charge contactor coil circuit shorted to ground, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DA911	(a) Pre-charge contactor coil circuit shorted to ground.	• Low voltage service switch circuit • Traction battery internal: BMS, harness, PDU

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Check traction battery Internal harness and connector (BMS-PDU PDU)

(a) Disconnect the BMS connector.

(b) Disconnect the PDU connector.

(c) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BMS connector I8# - traction battery connector 18#	Always connected	No continuity
BMS connector I13# - traction battery connector 18#	Always connected	No continuity
BMS connector I8# - metal enclosure	Always connected	No continuity
BMS connector I13# - metal enclosure	Always connected	No continuity

NG → **Repair or replace the harness and connector**

OK

2	Replace PDU assembly or BMS (See page HB-14)

PB

DTC	P1DA912	Pre-charge contactor coil circuit shorted to power supply

Description

When the BMU detects a pre-charge contactor coil circuit shorted to power supply, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DA912	(a) Pre-charge contactor coil circuit shorted to power supply.	• Low voltage service switch circuit • Traction battery internal: BMS, harness, PDU

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Check traction battery Internal harness and connector (BMS-PDU PDU)

(a) Disconnect the BMS connector.

(b) Disconnect the PDU connector.

(c) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BMS connector I8# - traction battery connector 1#	Always connected	No continuity
BMS connector I13# - traction battery connector 1#	Always connected	No continuity

NG → **Repair or replace the harness and connector**

OK

2	Replace PDU assembly or BMS (See page HB-14)

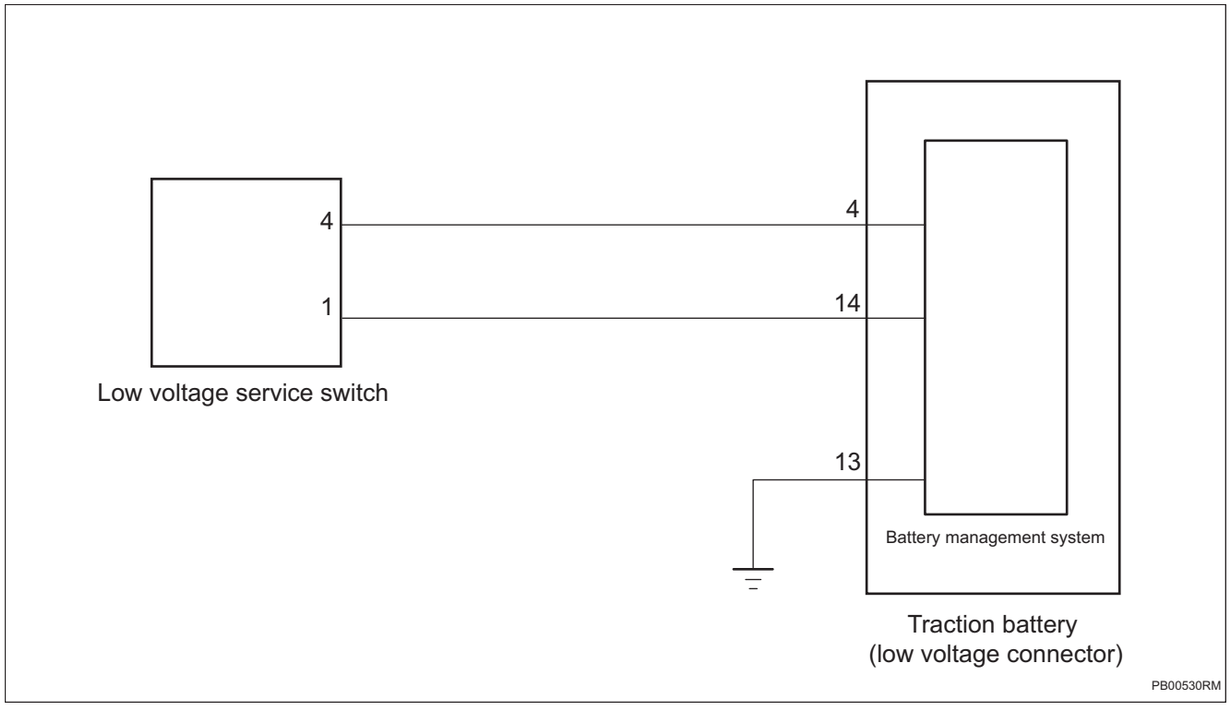
DTC	P1DA913	Pre-charge contactor coil open

Description

When the BMU detects a pre-charge contactor coil open circuit, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DA913	(a) Pre-charge contactor coil open circuit.	• Low voltage service switch circuit • Traction battery internal: BMS, harness, PDU

Circuit diagram



Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).This kind of DTC is analyzed in two cases: if 3 contactor coil open faults are reported at the same time, perform detection according to method 1; If only a single fault is reported, perform detection according to method 2.

Method 1:

1	Check low voltage service switch

(a) Check whether the low voltage service switch is installed correctly.

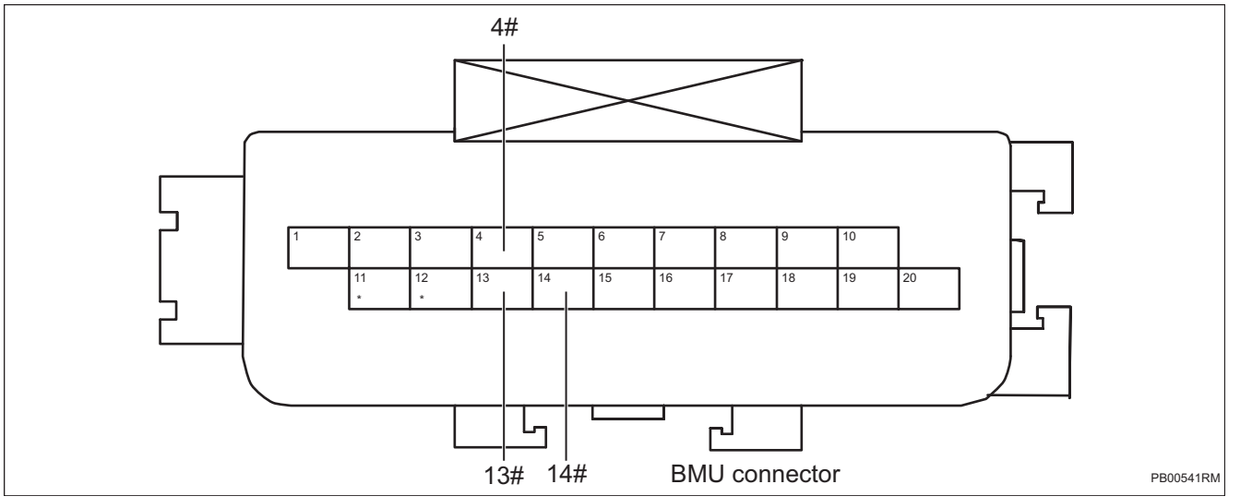
(b) Check whether the low voltage service switch is damaged.

PB

NG → **Do repair according to the fault (clear the DTC after repair, power off and wait for 10 min, read the DTC again after power-on, and confirm whether the fault still exists)**

OK

2	Check traction battery low voltage



(a) Set the ignition switch to "ON".

(b) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Traction battery connector 4# - traction battery connector 13#	The ignition switch is set to "ON"	Battery voltage
Traction battery connector 14# - traction battery connector 13#	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

3	Check traction battery internal harness

(a) Check whether the PDU connector and BMS connector are loose.

NG → **Repair according to the fault**

PB

OK

4	Check traction battery internal harness and connector

(a) Disconnect the traction battery internal harness connector.

(b) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Traction battery connector 7# - BMS connector I1#	Always connected	Proper continuity
Traction battery connector 7# - BMS connector I2#	Always connected	Proper continuity
Traction battery connector 17# - BMS connector I14#	Always connected	Proper continuity
Traction battery connector 17# - BMS connector I30#	Always connected	Proper continuity

PB

NG → **Repair or replace the harness and connector**

OK

5	Replace high-voltage PDU or BMS (See page HB-14)

Method 2:

OK

6	Check traction battery Internal harness and connector

(a) Disconnect the BMS connector.

(b) Disconnect the PDU connector.

(c) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BMS connector I13# -PDU PDU connector 3#	Always connected	Proper continuity
BMS connector I8# -PDU PDU connector 11#	Always connected	Proper continuity

NG → Repair or replace the harness and connector

OK

7	Replace PDU assembly or BMS (See page HB-14)

DTC	P1DA919	Pre-charge contactor coil drive overcurrent
DTC	P1DA91D	Pre-charge contactor coil drive output not available

Description

When the BMU detects a pre-charge contactor coil drive related fault, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DA919	(a) Pre-charge contactor coil drive overcurrent.	• Traction battery internal • BMS
P1DA91D	(a) Pre-charge contactor coil drive output not available.	• Traction battery internal • BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off the vehicle for 10 min.

(c) Power on again to read the current DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	End

DTC	P1DAA00	Battery feedback charge power out of limit
DTC	P1DAB00	Battery discharge power out of limit

Description

When the BMU detects the charging and discharging power failure, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DAA00	(a) Real-time calculation of power > 1.1 * instantaneous allowable charging power + 1 kw.	• High voltage electrical system • Traction battery internal
P1DAB00	(a) Real-time calculation of power > 1.1 * instantaneous allowable discharge power + 3 kw.	• High voltage electrical system • Traction battery internal

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).If the allowable charging and discharging power value in the fault snapshot is 0 kW, this fault can be ignored.

PB

1	Clear DTC

(a) Clear the DTC.

(b) Power off the vehicle for 10 min.

(c) Re-read the current DTC of the BMS after power-on.

Criteria:

No DTC is output.

NG → **Check the motor or HCU and high voltage components**

OK

2	End

DTC	P1DAE00	Low SOH

Description

When the BMU detects a low SOH alarm fault, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DAE00	(a) Battery pack SOH <65%.	• Traction battery internal

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off the vehicle for 10 min.

(c) Power on the BMS again and read the current DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **End**

NG

2	Reset SOH (throughput less than 291200)

Relationship between throughput and SOH:

SOH (%)	Throughput (Ah)
100	0
99	2080
98	4160
97	6240
96	8320
95	10400
94	15600
93	20800
92	26000
91	31200
90	34667
89	38133

SOH (%)	Throughput (Ah)
88	41600
87	46800
86	52000
85	57200
84	62400
83	67600
82	72800
81	78000
80	83200
79	88400
78	93600
77	97067
76	100533
75	104000
74	109200
73	114400
72	117867
71	121333
70	124800
69	128267
68	131733
67	135200
66	140400
65	145600

DTC	P1DAF00	High voltage sampling communication failure

Description

When the BMU detects a high voltage sampling communication failure, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DAF00	(a) Battery voltage sampling line open circuit.	• Traction battery internal • High-voltage PDU • BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 10min.

(c) Power on again to read DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **End**

NG

2	Check traction battery Internal harness and connector (BMS-PDU PDU)

(a) Disconnect the BMS connector.

(b) Disconnect the PDU connector.

(c) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BMS connector H6# -PDU (high pressure) connector 1#	Always connected	Proper continuity
BMS connector H11# -PDU (high pressure) connector 4#	Always connected	Proper continuity

PB

NG	Repair or replace the harness and connector

OK

3	Replace BMS or PDU (See page HB-14)

DTC	**P1DB785**	**Battery module temperature difference excessive**
DTC	**P1DB885**	**Battery module temperature difference excessive**
DTC	**P1DAC00**	**Critical excessive module temperature difference**

Description

When the BMU detects the large battery module temperature difference, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DB785	(a) Maximum module temperature difference ⩾ 10 ℃ .	• Traction battery internal • Battery module • Vehicle cooling system • Sampling harness
P1DB885	(a) Maximum module temperature difference ⩾ 15 ℃ .	• Traction battery internal • Battery module • Vehicle cooling system • Sampling harness
P1DAC00	(a) Maximum module temperature difference ⩾ 20 ℃ .	• Traction battery internal • Battery module • Vehicle cooling system • Sampling harness

PB

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).If the vehicle is in severe working conditions when the problem occurs, this fault will not be handled. This kind of DTC is analyzed in two cases: if the HQ-VDS displays "current fault and historical fault", perform detection according to method 1; If "historical fault" is displayed on the HQ-VDS, perform detection according to method 2.

Method 1:

1	**Check harness and connector (module - BMS)**

(a) Keep the vehicle fully stationary at room temperature for more than 10 hours.

(b) Locate the faulty module according to the temperature point.

(c) Check whether the module harness and connector are damaged or ruptured. (d) Check the module harness and connector for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

2	Check battery module resistance

(a) Disconnect the battery module connector.

(b) Check battery module resistance.

Standard value

Detector connection	Detection conditions	Specified state
Battery module 3# -Battery module 17#	Always connected	About 10 kΩ
Battery module 6# -Battery module 21#	Always connected	About 10 kΩ

NG **Replace battery module (temperature point of faulty module is abnormal compared with other modules)**

PB

OK

3	Replace BMS (See page HB-14)

Method 2:

OK

4	Check harness and connector (module - BMS)

(a) Keep the vehicle fully stationary at room temperature for more than 10 hours.

(b) If the difference between the current maximum temperature and the minimum temperature is greater than 5°C, and the maximum temperature point is the same as the temperature point in the fault snapshot, locate the faulty module according to the temperature point.

(c) Check whether the harness and connector are damaged or cracked.

(d) Check whether the harness and connector are short-circuited or open-circuited.

NG **Repair or replace the harness and connector**

OK

5	**Check and compare the resistance of maximum and minimum temperature modules**

(a) Disconnect the battery module connector.

(b) Check battery module resistance.

(c) Compare with the resistance of other normal module.

Standard value

Resistance of battery module with abnormal temperature	Resistance of battery module with normal temperature	Contrast status	
Battery module with maximum temperature 3# - battery module with maximum temperature 17#	Battery module with normal temperature 3# - battery module with normal temperature 17#	Abnormal	Normal
Battery module with maximum temperature 6# -Battery module with maximum temperature 21#	Battery module with normal temperature 6# - Battery module with normal temperature 21#		
Battery module with minimum temperature 3# -Battery module with minimum temperature 17#	Battery module with normal temperature 3# - battery module with normal temperature 17#		
Battery module with minimum temperature 6# -Battery module with minimum temperature 21#	Battery module with normal temperature 6# - Battery module with normal temperature 21#		

NG **Replace battery module (See page HB-14)**

OK

6	**Check reported temperature and resistance**

(a) Check the matching between the reported temperature and the resistance value.

Results

Results	Go to
Match	Normal
Mismatch	Abnormal

NG **Replace BMS (See page HB-14)**

OK

7	**Check vehicle cooling system (shall not be used again until the problem is solved)**

PB

DTC	P1DB900	SOC jump fault

Description

When the BMU detects the SOC jump, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DB900	(a) SOC jump value > 10%.	• Traction battery internal

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off the vehicle for 10 min.

(c) Re-read the current DTC of the BMS after power-on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Check the battery pack or vehicle, and check whether the self-discharge rate is too high or the vehicle has abnormal discharge.**

OK

2	End

DTC	P1DBA00	Insulation detection hardware failure

Description

When the BMU detects a insulation detection hardware failure, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DBA00	(a) Insulation circuit diagnosis result = 1.	• Traction battery internal

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Wait for 10min after power off.

(c) Power on again to read DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	End

PB

DTC	P1DBC00	Battery thermal runaway alarm

Description

When the BMU detects a battery thermal runaway alarm, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DBC00	(a) Battery thermal runaway.	• Traction battery internal

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	**Replace traction battery (See page HB-8)**

DTC	P1DBD00	Module temperature sampling circuit failure

Description

When the BMU detects a module temperature sampling circuit failure, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DBD00	(a) Module temperature sampling circuit failure.	• Traction battery internal: module, harness, BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 10min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **End**

NG

2	Check traction battery internal module, harness and BMS

(a) Use the HQ-VDS to read the daughter board status information.

(b) Check the battery pack module sampling harness, battery module and BMS according to the trouble-shooting information.

NG → **Repair according to the fault**

OK

3	End

PB

DTC	P1DC017	Critical high cell voltage

Description

When the BMU detects the cell overvoltage, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DC017	(a) Maximum cell voltage> 4.5 V.	• Traction battery internal • Battery module

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Read freeze frame data

(a) Read the "sampling point of the highest cell voltage" and locate the faulty module.

NG → **Replace the faulty module (See page HB-14)**

DTC	P1D8217	Battery overvoltage
DTC	P1D8317	Battery overvoltage

Description

When the BMU detects the total voltage is too high, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D8217	(a) Total battery voltage> critical high cell voltage limit * 96.	• Traction battery internal • Battery module • BMU
P1D8317	(a) Total battery voltage> cell overvoltage alarm limit * 96.	• Traction battery internal • Battery module • BMU

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).This kind of DTC is analyzed in two cases: if the HQ-VDS displays "current fault and historical fault", perform detection according to method 1; If "historical fault" is displayed on the HQ-VDS, perform detection according to method 2.

Method 1:

1	Read DTC

(a) If the HQ-VDS displays "current and historical faults", check for the DTC in the table below.

P1D8117	Cell overvoltage alarm
P1D8017	Cell overvoltage
P1DC017	Critical high cell voltage

Results

Results	Go to
DTC in the table above appears	Abnormal
No DTC in the table above appears	Normal

NG → **Repair it according to the DTC in the table above (repair it as the cell voltage failure)**

OK

2	Replace BMU (See page HB-14)

Method 2:

OK

3	Read DTC

(a) If the HQ-VDS displays "historical fault", check for the DTC in the table below.

P1D8117	Cell overvoltage alarm
P1D8017	Cell overvoltage
P1DC017	Critical high cell voltage

Results

Results	Go to
DTC in the table above appears	Abnormal
No DTC in the table above appears	Normal

NG → **Repair it according to the DTC in the table above (repair it as the cell voltage failure)**

OK

4	Check whether the total voltage sampling accuracy of BMU is normal

(a) Read "average cell voltage" and "total voltage of battery pack".

(b) Multiply the read "average cell voltage" by 96, and compare the voltage value with the read "total voltage of battery pack.

Criteria:

The difference between the two is not more than 5 V.

NG → **Replace BMU (See page HB-14)**

OK

5	Clear DTC

DTC	P1DC317	Cell voltage slightly too high

Description

When the BMU detects the cell overvoltage alarm, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DC317	(a) Maximum cell voltage> 4.2 V.	• Traction battery internal • Battery module

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) After the system is powered off, put the vehicle into hibernation and condition the vehicle for 2 hours.

(b) Connect the HQ-VDS.

(c) Power on again, clear the DTC, and check whether the system works normally.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Check other component faults of traction battery system**

OK

2	End

DTC	P1DC417	Total voltage slightly too high

Description

When the BMU detects a total voltage slightly high alarm fault, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DC417	(a) Total battery voltage> cell voltage alarm limit * 96	• Traction battery internal • Battery module • BMU

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Read DTC

(a) Check for the DTCs in the table below.

P1D8117	Cell overvoltage alarm
P1D8017	Cell overvoltage
P1DC017	Critical high cell voltage

Results

Results	Go to
DTC in the table above appears	Abnormal
No DTC in the table above appears	Normal

NG → **Repair according to the DTC**

OK

2	Check whether the total voltage sampling accuracy of BMU is normal

(a) Read "average cell voltage" and "total voltage of battery pack".

(b) Multiply the read "average cell voltage" by 96, and compare the voltage value with the read "total voltage of battery pack.

Criteria:

The difference between the two is not more than 5 V.

NG → **Replace BMU (See page HB-14)**

OK

3	Clear DTC

DTC	P1DC516	Cell voltage slightly too slow
DTC	P1D8116	Cell undervoltage alarm

Description

When the BMU detects the cell undervoltage, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DC516	(a) Minimum cell voltage ⩽ 2.8 V(>-5 ℃); (b) Minimum cell voltage ⩽ 2.6 V(-20 ℃⩽ T ⩽ -5 ℃); (c) Minimum cell voltage ⩽ 2.1 V (<-20 ℃).	• Traction battery internal • Battery module
P1D8116	(a) Minimum cell voltage ⩽ 2.6 V(>-5 ℃); (b) Minimum cell voltage ⩽ 2.4 V(-20 ℃⩽ T ⩽ -5 ℃); (c) Minimum cell voltage ⩽ 1.9 V (<-20 ℃).	• Traction battery internal • Battery module

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

PB

1	Clear DTC

(a) After the system is powered off, put the vehicle into hibernation and condition the vehicle for 2 hours.

(b) Power on again, clear the DTC, and check whether the system works normally.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Check other component faults of traction battery system**

OK

2	End

DTC	P1DCD00	Low SOH

Description

When the BMU detects low SOC, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DCD00	(a) SOC<3%. (b) Minimum cell voltage <3 V. (c) Vehicle speed <5 km/h (when the vehicle speed message fails, it is determined |Current|<10 A).	• Traction battery internal

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

Note: In case of undervoltage, carry out repair correspondingly.

1	Clear DTC

(a) Clear the DTC.

(b) Turn off the engine and wait for 10 min before starting.

(c) Read the BMS current DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Charge the vehicle**

OK

2	End

DTC	P1DD300	Daisy chain open circuit

Description

When the BMU detects a daisy chain open circuit, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DD300	(a) Daisy chain open circuit.	• Traction battery internal • BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 5min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	End

DTC	P1DD600	Main circuit open

Description

When the BMU detects vehicle high-voltage loop open, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DD600	(a) Vehicle high-voltage loop open circuit.	• Vehicle high voltage component

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Check DTC

(a) Clear the DTC.

(b) Wait for 10min after power off.

(c) Power on again to read DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Troubleshoot vehicle high-voltage loop**

OK

2	End

DTC	P1DE000	Battery assembly open circuit

Description

When the BMU detects a battery assembly connection failure, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DE000	(a) Sampling voltage <0.5 * Sum of cell voltage.	• Traction battery internal • BMS • Copper bar connection

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Read voltage value

(a) Clear the DTC.

(b) Wait for 10min.

(c) Recharge to read DTC.

(d) Use a multimeter to measure the main positive and main negative voltage, and check whether the difference between the measured voltage value and the sum of the cell voltage values is less than ± 5 V.

Results

Results	Go to
Voltage below ± 5 V	Abnormal
Voltage above ± 5 V	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	Check battery pack internal high voltage line

(a) Check whether the battery pack internal high voltage line is normal.

NG → **Repair according to the fault**

OK

3	Check main positive/main negative relay sampling line (PDU-BMS)

(a) Disconnect the battery pack internal high voltage line.

Standard value

PB

Detector connection	Detection conditions	Specified state
PDU (high pressure) connector 1# - BMS connector H6#	Always connected	Proper continuity
PDU (high pressure) connector 4# - BMS connector H11#	Always connected	Proper continuity

NG → **Repair or replace the harness and connector**

OK

4	**Replace PDU assembly or BMS (See page HB-14)**

DTC	P1DE200	Crash PWM signal connection fault

Description

When the BMU detects the an airbag feedback signal failure, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DE200	(a) HW Airbag circuit shorted to ground or power supply or open, and ACU message timeout or ACU fault status.	• ACU • CAN • Traction battery internal

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off the vehicle for 10 min.

(c) Re-read the DTC after power on.

Criteria:

No DTC is output.

NG → **Check low voltage harness of ACU and traction battery**

OK

2	End

PB

DTC	P1DE400	BMS initialization failure

Description

When the BMU detects a BMS initialization failure, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DE400	(a) Initialization phase high voltage contactor diagnosis timeout, or daughter board data processing timeout.	• Traction battery internal • Battery module

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off the vehicle for 10 min.

(c) Re-read the current DTC of the BMS after power-on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **End**

NG

2	Check traction battery internal harness and connector

(a) Read all CMC daughter board status signals, and locate the faulty module.

(b) Check whether the faulty module harness and connector in traction battery are well connected.

(c) Check the traction battery internal faulty module harness and connector for short circuit or open circuit.

NG → **Repair according to the fault**

OK

3	Replace faulty module (See page HB-14)

DTC	P1DE600	Contactor high-side drive power supply circuit open

Description

When the BMU detects an abnormal high side drive voltage, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DE600	(a) High side drive voltage <5.5 V.	• Traction battery internal • Low voltage electrical

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Check DTC

(a) Clear the DTC.

(b) Wait for 10min after power off.

(c) Power on again to read DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **End**

NG

2	Check low pressure system

(a) Check whether the low voltage service switch, low voltage power supply circuit and battery are normal.

NG → **Repair according to the fault**

OK

3	Replace BMS (See page HB-14)

PB

DTC	P1DE700	Battery insulation alarm

Description

When the BMU detects a battery insulation alarm fault, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DE700	(a) Insulation resistance <1000 kΩ.	• Traction battery internal • Battery module • Copper bar • BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Check traction battery internal insulation failure

(a) Check whether there is an insulation failure inside the traction battery.

NG → **Repair according to the fault**

OK

2	Check BMS

(a) Disconnect all battery module connectors.

(b) Disconnect the BMS connector.

(c) Use insulation meter to measure the insulation resistance of high voltage positive and negative poles to the internal ground point of the battery.

Results

Results	Go to
Infinite insulation resistance	Abnormal
Infinite insulation resistance	Normal

OK → **Replace BMS (See page HB-14)**

NG

3	Check battery module

(a) Disconnect the high voltage copper bar from the middle.

(b) Use the insulation meter to measure the insulation resistance at both ends. (Repeat the operation of disconnecting the copper bar on the side with the problem of insulation resistance value, and gradually narrow down the problem point by stages and finally locate it.)

NG → **Repair according to the fault**

OK

4	**Replace traction battery (See page HB-8)**

DTC	P1DE800	BMS pre-charge verification failed

Description

When the BMU detects insufficient vehicle power-on pre-charge voltag , the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DE800	(a) Vehicle power-on pre-charge voltage insufficient.	• Vehicle high voltage system • Traction battery internal: PDU, harness, BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Check DTC

(a) Clear the DTC.

(b) Wait for 10min.

(c) Recharge and read DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **End**

NG

2	Check vehicle high voltage system

(a) Check whether the vehicle high voltage system is normal.

NG → **Repair according to the fault**

OK

3	Replace PDU (See page HB-14)

PB

DTC	P1DE900	IG Off HCU CAN Fail

Description

When the BMU detects a HCU IG ON CAN signal failure, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DE900	(a) HCU_1_6 message checksum error, level 4 and | current | <10A.	• Traction battery internal • HCU • CAN communication

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off the vehicle for 10 min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Check whether the relevant peripheral power supply harness of HCU are normal**

OK

2	End

DTC	P1DEB09	Fan failure

Description

When the BMU detects a fan failure, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DEB09	(a) Fan failure.	• Traction battery blower • Harness and connector

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 5min.

(c) Power on again to read DTC.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **End**

NG

2	Check the traction battery blower harness and connector

(a) Check whether the traction battery blower harness and connector are connected tightly.

(b) Check whether the traction battery blower harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

3	Replace the traction battery blower (See page HB-8)

DTC	P1DEC02	Current sensor message reception error

Description

When the BMU detects that the current sensor is faulty, BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DEC02	(a) Current sensor message reception error ID = 1.	• Traction battery internal • High-voltage PDU interior

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).Please refer to the traction battery low-voltage schematic diagram for traction battery internal harness

1	Check traction battery Internal harness and connector (BMS - PDU)

(a) Check whether the harness and connector are connected tightly.

(b) Disconnect the BMS harness and connector.

(c) Disconnect the high-voltage PDU harness and connector.

(d) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BMS connector I30# -PDU connector connector 7#	Always connected	Proper continuity
BMS connector I19# -PDU connector connector 8#	Always connected	Proper continuity
BMS connector J14# -PDU connector connector 15#	Always connected	Proper continuity
BMS connector J15# -PDU connector connector 16#	Always connected	Proper continuity
BMS connector I30# -BMS connector J14#	Always connected	No continuity
BMS connector I30# -BMS connector J15#	Always connected	No continuity
BMS connector I19# -BMS connector J14#	Always connected	No continuity
BMS connector I19# -BMS connector J15#	Always connected	No continuity
BMS connector I19# -BMS connector I30#	Always connected	No continuity
BMS connector J14# -BMS connector J15#	Always connected	No continuity

NG → **Repair or replace the harness and connector**

OK

2	Check BMS

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BMS I30# - BMS J14#	Always connected	No continuity
BMS I30# - BMS J15#	Always connected	No continuity
BMS I19# - BMS J14#	Always connected	No continuity
BMS I19# - BMS J15#	Always connected	No continuity
BMS J14# - BMS J15#	Always connected	About 120 Ω

NG → **Replace BMS (See page HB-14)**

OK

3	Check high-voltage PDU

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
High-voltage PDU 7# -high-voltage PDU 15#	Always connected	No continuity
High-voltage PDU 7# -high-voltage PDU 16#	Always connected	No continuity
High-voltage PDU 8# -high-voltage PDU 15#	Always connected	No continuity
High-voltage PDU 8# -high-voltage PDU 16#	Always connected	No continuity
High-voltage PDU 15# -high-voltage PDU 16#	Always connected	About 120 Ω

NG → **Replace high-voltage PDU (See page HB-14)**

DTC	P1DEC09	Current sensor failure

Description

When the BMU detects the equalization circuit short, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DEC09	(a) Current sensor failure ID = 1.	• Traction battery internal • High-voltage PDU

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC 60 min after parking.

(b) Power off and wait for 10 min, power on and read the DTC again.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → **End**

NG

2	Check 12 V battery

(a) Check whether the 12 V battery voltage is normal.

Criteria: 9V ~ 14V

NG → **Repair or replace 12V battery (See page CH-20)**

OK

3	Replace PDU (See page HB-14)

PB

DTC	U029387	HCU node lost
DTC	U059482	HCU message livecounter error
DTC	U059483	HCU message checksum error
DTC	U115187	ACU_1 message timeout
DTC	U045282	ACU_1 message livecounter error
DTC	U045283	ACU_1 message checksum error
DTC	U041583	ABS_1 message checksum error
DTC	U041582	ABS_1 message livecounter error
DTC	U112187	ABS/ESP/ESPwithAPB message lost
DTC	U115587	Instrument cluster control unit message lost
DTC	U011087	MCU node lost
DTC	U041182	MCU message livecounter error
DTC	U041183	MCU1 message checksum error
DTC	U014687	GW message lost
DTC	U005588	Hybrid/electric CAN bus off
DTC	U116487	A/C control unit 1 message lost

Description

When the communication between the BMU and other control unit is abnormal or interrupted, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
U029387	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U059482	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U059483	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U115187	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U045282	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U045283	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U041583	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit

DTC	DTC detection conditions	Faulty location
U041582	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U112187	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U115587	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U011087	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U041182	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U041183	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U014687	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U005588	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U116487	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).For communication DTC, please refer to CAN communication system for specific analysis steps.

DTC	P1D8017	Cell overvoltage

Description

When the BMU detects the cell overvoltage, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D8017	(a) Maximum cell voltage> 4.4 V.	• Traction battery internal • Battery module

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Read the maximum cell voltage

(a) After the system is powered off, put the vehicle into hibernation. Condition the vehicle for 2 hours and do not use it.

(b) Power on again, judge the maximum cell voltage and locate the faulty module.

Results

Results	Go to
Maximum cell voltage over 4.4 V	Abnormal
Maximum cell voltage not exceeding 4.4 V	Normal

NG → **Replace the faulty module (See page HB-14)**

OK

2	End

DTC	P1DA289	Cell OCV voltage out of limit (critical)

Description

When the cell voltage is out of the normal range, BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DA289	(a) Minimum cell voltage ⩽ 2 V or maximum cell voltage ⩾ 4.25 V.	• Traction battery internal: battery module

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Read DTC

(a) After the system is powered off, put the vehicle into hibernation and condition the vehicle for 2 hours.

(b) Read the current cell maximum and minimum voltage.

Results

Results	Go to
Minimum cell voltage ⩽ 2 V or maximum cell voltage ⩾ 4.25 V	Abnormal
2 V <cell voltage <4.25 V	Normal

NG → **Replace the module where the faulty cell is located (See page HB-14)**

OK

2	End

PB

DTC	P1D9913	Main positive or pre-charge contactor contact open circuit
DTC	P1D9A13	Main negative contactor contact open circuit

Description

In case of open circuit of main positive, main negative or pre-charge contactor, BMU records DTC.

DTC	DTC detection conditions	Faulty location
P1D9913	(a) Main positive or pre-charge contactor contact open circuit.	• Vehicle high voltage system • PDU
P1D9A13	(a) Main negative contactor contact open circuit.	• Vehicle high voltage system • PDU

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

PB

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 10min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Disassemble the battery pack to confirm the relay engagement (check other high voltage component outside the traction battery, and replace the PDU)**

OK

2	End

DTC	P1D8E85	SOC high alarm
DTC	P1D8985	High SOC

Description

When the BMU detects excessive SOC, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D8E85	(a) SOC > 75%.	• Traction battery internal
P1D8985	(a) SOC > 80%.	• Traction battery internal

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 10min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Discharge the vehicle**

OK

2	End

DTC	P1DAD00	Cell SOC deviation error

Description

When the BMU detects cell SOC deviation, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1DAD00	(a) Maximum cell SOC difference > 20% (b) IG OFF time> 60 min	• Traction battery internal • Battery module

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Read DTC

(a) Clear the DTC.

(b) Read DTC after waiting for 10 min.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

OK → End

NG

2	Traction battery charging

(a) Charge the battery to 60% SOC (A/C is required to be turned on).

(b) Power on again after conditioning for 1 hour.

(c) Read and record the minimum cell voltage.

(d) Continue conditioning for 48 h.

(e) Read and record the minimum cell voltage every 24 h, with the reading duration ⩽ 10 S.

(f) Calculate the reduced value of the cell voltage from the voltage data of the last two readings.

Results

Results	Go to
Cell voltage drop more than 0.45 mV	Abnormal
Cell voltage drop not more than 0.45 mV	Normal

NG → **Replace the module corresponding to the cell (See page HB-14)**

OK

3	**Charge the cell with lower voltage separately. The charging current shall be ⩽ 5.2 A, or the pack shall be equalized with HQ-VDS.**

DTC	P1D9504	ADC function failure

Description

When the BMU detects an ADC function failure, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D9504	(a) ADC function failure.	• Traction battery internal: BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 5min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	End

DTC	P1D9698	AFE overtemperature alarm
DTC	P1D9798	AFE overtemperature

Description

When the BMU detects an AFE overtemperature, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D9698	(a) AFE overtemperature alarm.	• Traction battery internal: BMS
P1D9798	(a) AFE overtemperature.	• Traction battery internal: BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 5min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	End

DTC	P1D9804	AFE diagnosis timeout

Description

When the BMU detects an AFE diagnosis timeout, the BMU records the DTC.

DTC	DTC detection conditions	Faulty location
P1D9804	(a) AFE diagnostic timeout.	• Traction battery internal: BMS

Inspection procedure

Note: after reading the DTC successfully, save all DTCs and corresponding fault snapshots (freeze frame).

1	Clear DTC

(a) Clear the DTC.

(b) Power off and wait for 5min.

(c) Re-read the DTC after power on.

Results

Results	Go to
DTC reappears	Abnormal
DTC does not reappear	Normal

NG → **Replace BMS (See page HB-14)**

OK

2	End

Traction battery

Maintenance requirements HB-1
Scrapping HB-2
Traction battery assembly HB-4
Parts HB-4
Parts HB-6
Removal HB-8
Installation HB-10
Traction battery HB-11
Parts HB-11
Parts HB-12
Removal HB-14
Installation HB-20

HB

Maintenance requirements

1. Maintenance requirements

(a) Battery samples are maintained every three months. For the maintenance method of battery cell and module, refer to "Discharge capacity at room temperature" in GB/T 31486, and for the maintenance method of battery assembly, refer to "Standard cycle" in GB/T 31467.1 and GB/T 31467.2.

(b) Battery equalization should be started every three months to avoid degradation or even damage of battery performance, and measures should be taken in vehicle level or battery pack level.

(c) Vehicle level: The vehicle is in the Ready state, and then the vehicle is driven for $\geqslant$ 30 min.

(d) Battery pack level: charge to 100% SOC at 1 C CCCV and discharge to 70% SOC at 1 C; Disconnect the high-voltage connection, continue to supply power at 12 V, keep the BMS in the wake-up state (the upper computer can be sampled normally), and use the HQ-VDS to turn on the equalization (after the equalization is turned on, the HQ-VDS can be unplugged) for 18 h, then cut off the 12 V power supply. Then the maintenance is completed.

(e) When the battery pack is inconvenient to operate, the battery pack can be installed on the vehicle first and then the charge and discharge equalization can be carried out according to the vehicle level. The above cycle shall be carried out in 3 months.

Scrapping

1. Scrapped traction battery storage precautions

(a) It is prohibited to place waste traction battery in the open air to prevent waste battery from being exposed to rain and water.

(b) For the storage of batteries discarded in bulk, the containers used in the storage facilities shall ensure that the storage requirements are met, the cases of the discarded batteries shall be intact, the adverse effects on the environment shall be eliminated, and the emergency mechanism for safety management and hazards shall be established.

(c) Store in a clean environment with good ventilation.

(d) Do not place in the direct sunlight area.

(e) Keep away from heat sources that can warm the outside of the traction battery by 60 ℃ .

(f) Place flat in the packing box.

(g) Do not drop the traction battery and avoid surface impact.

2. Scrapped traction battery transportation precautions

(a) After the traction battery is scrapped, it shall be collected and transported in special containers conforming to national standards according to its type.

(b) The containers for storage and shipment of traction battery shall be designed according to the characteristics of the traction battery, which shall not be easy to be damaged or deformed, and the materials used can effectively prevent leakage and diffusion.

(c) The containers containing waste traction battery must bear the classification marks required by national standards.

(d) Before and during the packaging and transportation of waste traction battery, the battery structure shall be intact, and the waste traction battery shall not be broken and crushed in order to prevent the leakage and pollution of harmful components in the battery.

3. Scrapped traction battery pollution prevention precautions

(a) The collection, transportation, disassembly, regeneration and recycling of lithium battery shall strictly comply with the above requirements.

(b) The lithium battery shall be recycled and shall not be disposed by other means.

(c) Refer to GB/T 38698.1 for management methods, and divide the battery into three categories, that is A\B\C, for ease of management.

(d) Keep the lithium battery case intact during collection and transportation to prevent environmental pollution caused by liquid leakage.

4. Recycling standard

(a) Traction battery assembly is dangerous and needs to be recycled by a special recycling agency. It is forbidden for individuals to dispose of traction battery assembly without permission.

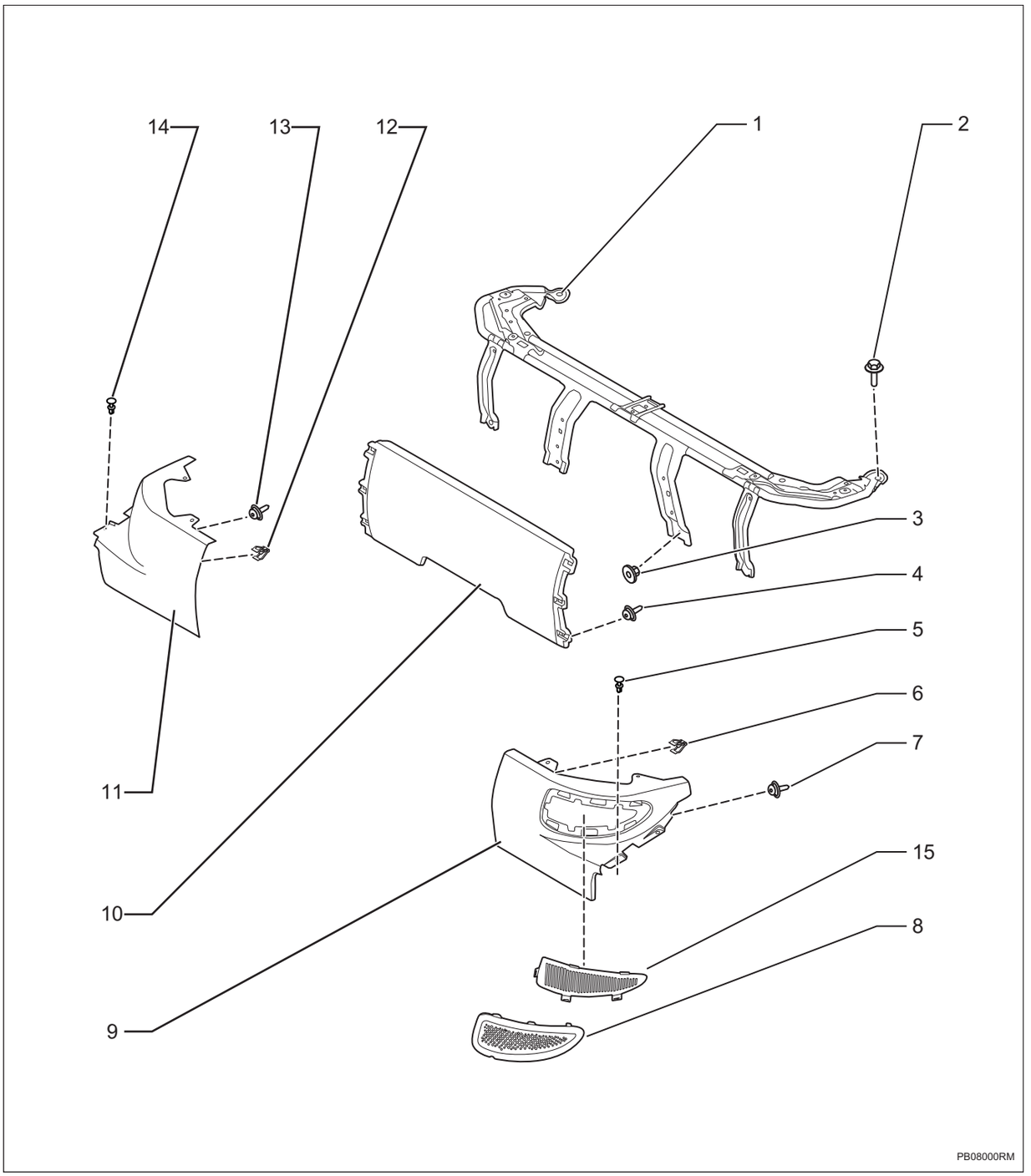
5. Transportation requirements

(a) Sea and air transportation: Special packaging certified as dangerous packaging is required, and ordinary packaging is not allowed to be transported; The air transportation shall meet the MH/T 1020-2009 standard and pass the UN38.3 test. The ambient temperature around the traction battery packing box shall not exceed 45 ℃ , and the product shall not be exposed to water or sunlight.

(b) Land transportation: The traction battery shall be transported by land transportation in accordance with relevant national standards. The logistics company shall hold a road transportation license for transportation. During transportation, it shall avoid squeezing and collision between the battery packs or between the battery pack and the transport vehicle body due to sudden braking. The ambient temperature around the traction battery battery packing box shall not exceed 45 ℃ , and the product shall not exposed to water or sunlight.

Traction battery assembly

Parts

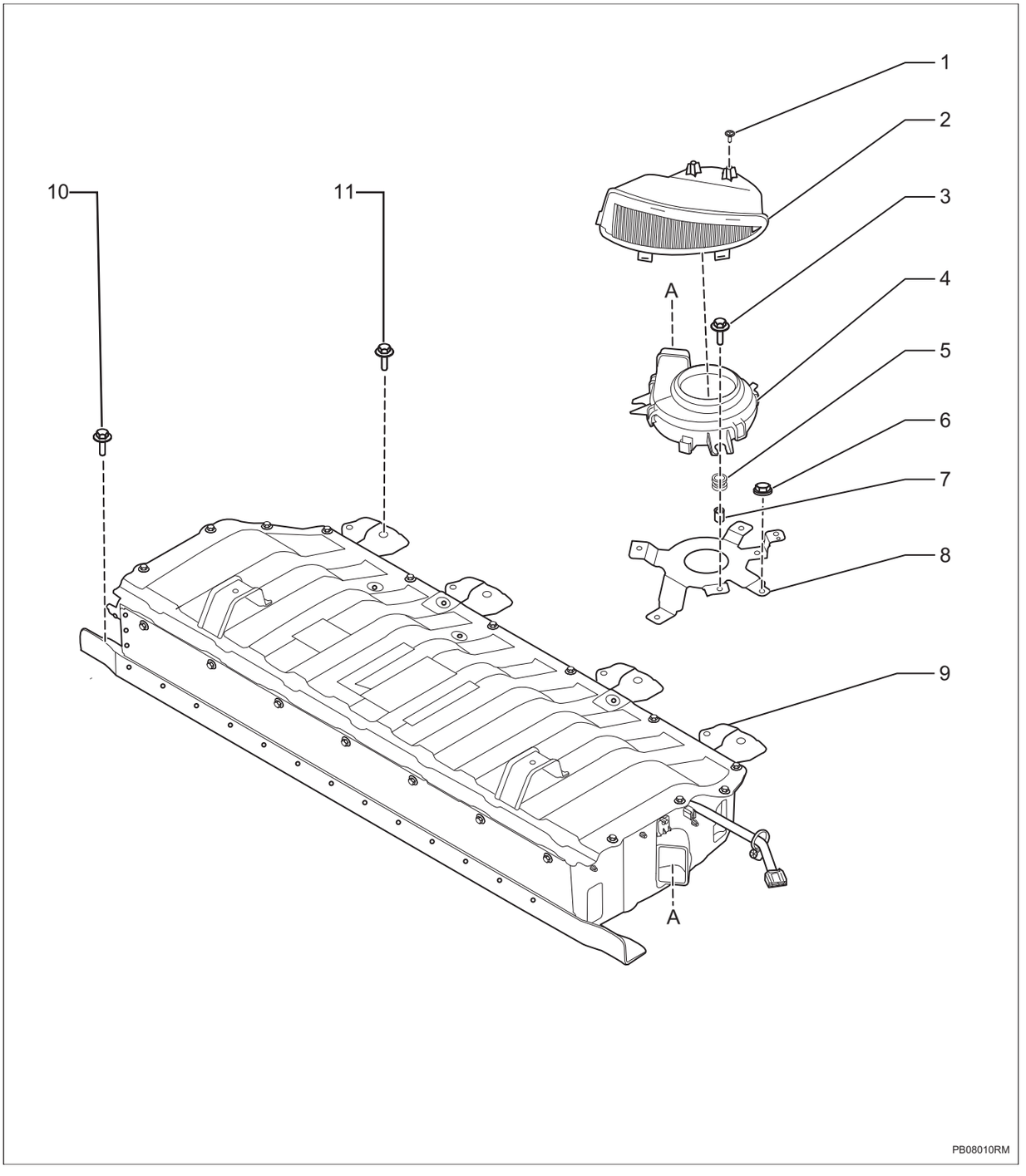


1. **Rear seat cushion bracket assembly**
2. **Hexagon flange bolt**
   - X4
   - Torque: 16.2 ~ 25 N · m
3. **Hexagon flange nut**

- X2
- Torque: 16.2 ~ 25 N · m

4. **Clip**
   - X2
5. **Clip**
   - X2
6. **Spring clip**
   - X3
7. **Clip**
   - X2
8. **Rear left air intake grille**
9. **Rear left guard plate**
10. **Rear middle guard plate**
11. **Rear right seat guard plate**
12. **Spring clip**
    - X3
13. **Clip**
    - X2
14. **Clip**
    - X2
15. **Filter element I**

Parts



1. **Cross recessed pan head tapping screw and flat washer assembly**
   - X2
   - Torque: 2.1~3 N · m
2. **Air duct-air inlet duct III**
3. **Assembling bolt**
   - X3

- Torque: 9~11 N · m

4. **Blower assembly**
5. **Fan suspend**
   - X3
6. **Hexagon flange nut**
   - X3
   - Torque: 9~11 N · m
7. **Bushing**
   - X3
8. **Blower bracket assembly**
9. **Traction battery assembly**
10. **Hexagon flange bolt scraping end**
    - X2
    - Torque: 54~66 N · m
11. **Hexagon flange bolt**
    - X4
    - Torque: 54~66 N · m

Removal

1. **Check the DTC**

   Notice:

   Before performing the battery removal, confirm that the traction battery voltage system insulation failure is not output. If the relevant DTC is output, first perform troubleshooting of this DTC.

2. **Place the vehicle power supply in OFF mode.**

3. **Disconnect the battery negative terminal**

   Notice:

   Disconnect the battery negative terminal after waiting for 5s.

4. **Detach service switch**

   Notice:

   Detach the service switch and wait 5 min for the high voltage components to be discharged before proceeding.

   Wear insulating gloves.

5. **Remove rear seat cushion assembly (See page SE-98)**

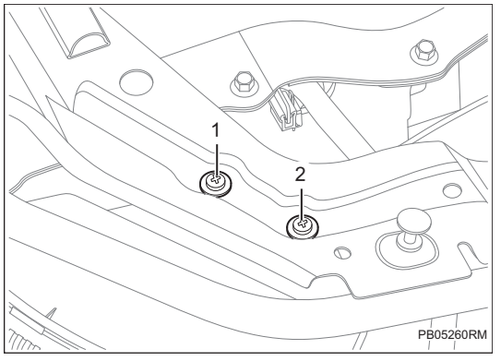
6. **Remove the rear seat left guard plate (See page IR-26)**

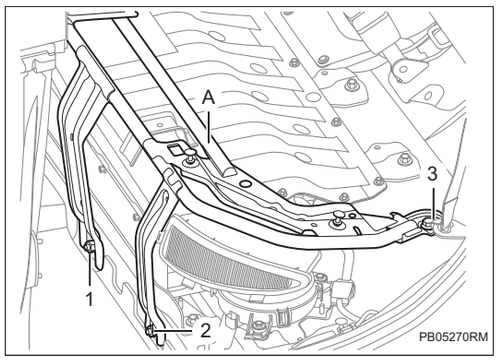
7. **Remove the rear seat right guard plate (See page IR-26)**

8. **Remove the rear seat middle guard plate (See page IR-26)**

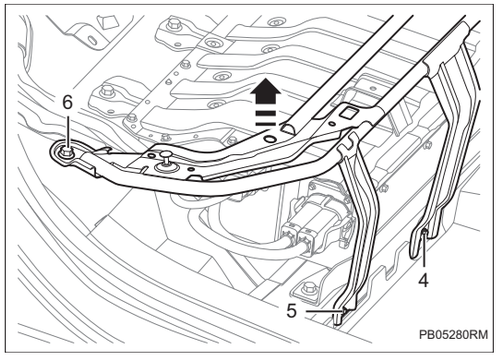
9. **Remove rear seat cushion bracket assembly**

   (a) Remove the screw -1-2-.



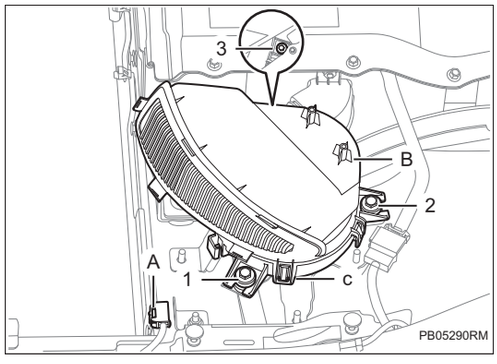


(b) Remove the fixing bolts -2-3- and nut -1- of the rear seat cushion bracket assembly -A-.



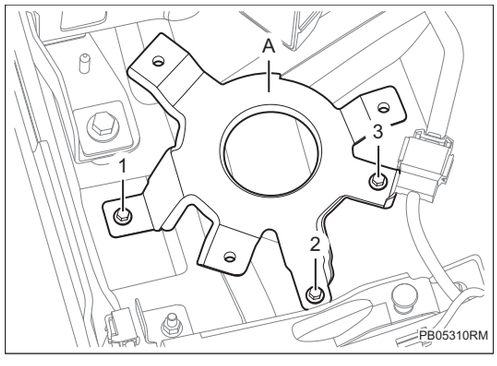
(c) Remove the bolts -5-6- and nut -4-, and remove the rear seat cushion bracket assembly -A-.

10. Remove the blower



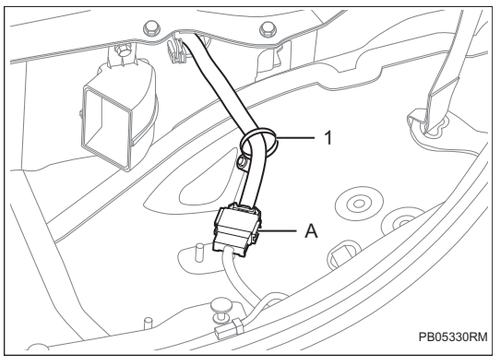
(a) Disconnect the harness connector -A-, and remove the air inlet duct III -B-.

(b) Remove the bolts -1-3-, and remove the blower assembly-C-.

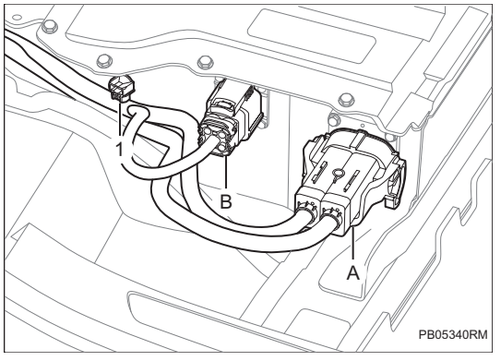


(c) Remove the nut -1-3- and remove the blower bracket assembly-A-.

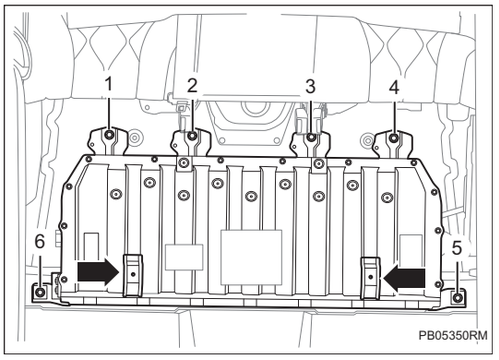
11. Remove the traction battery assembly



(a) Disconnect the low voltage harness connector-A- and detach the harness fixture -1-.



(b) Disconnect the high-voltage harness connectors-A-B-and detach the harness fixture -1-.



(c) Remove the bolt -1-6- and remove the traction battery assembly-A-.

Caution:

The hexagon flange bolt scraping end -5-6- is the ground working bolt.

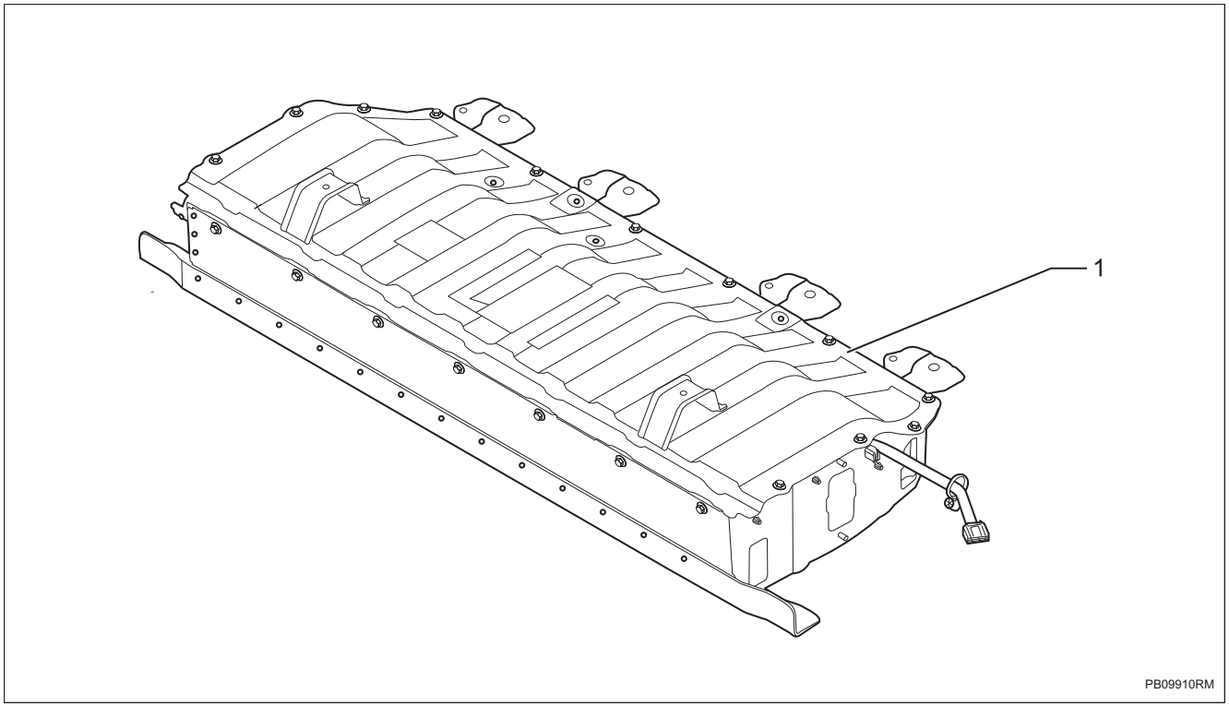
(d) Use a suitable tool to fix the arrow position and move it outside the vehicle.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Traction battery

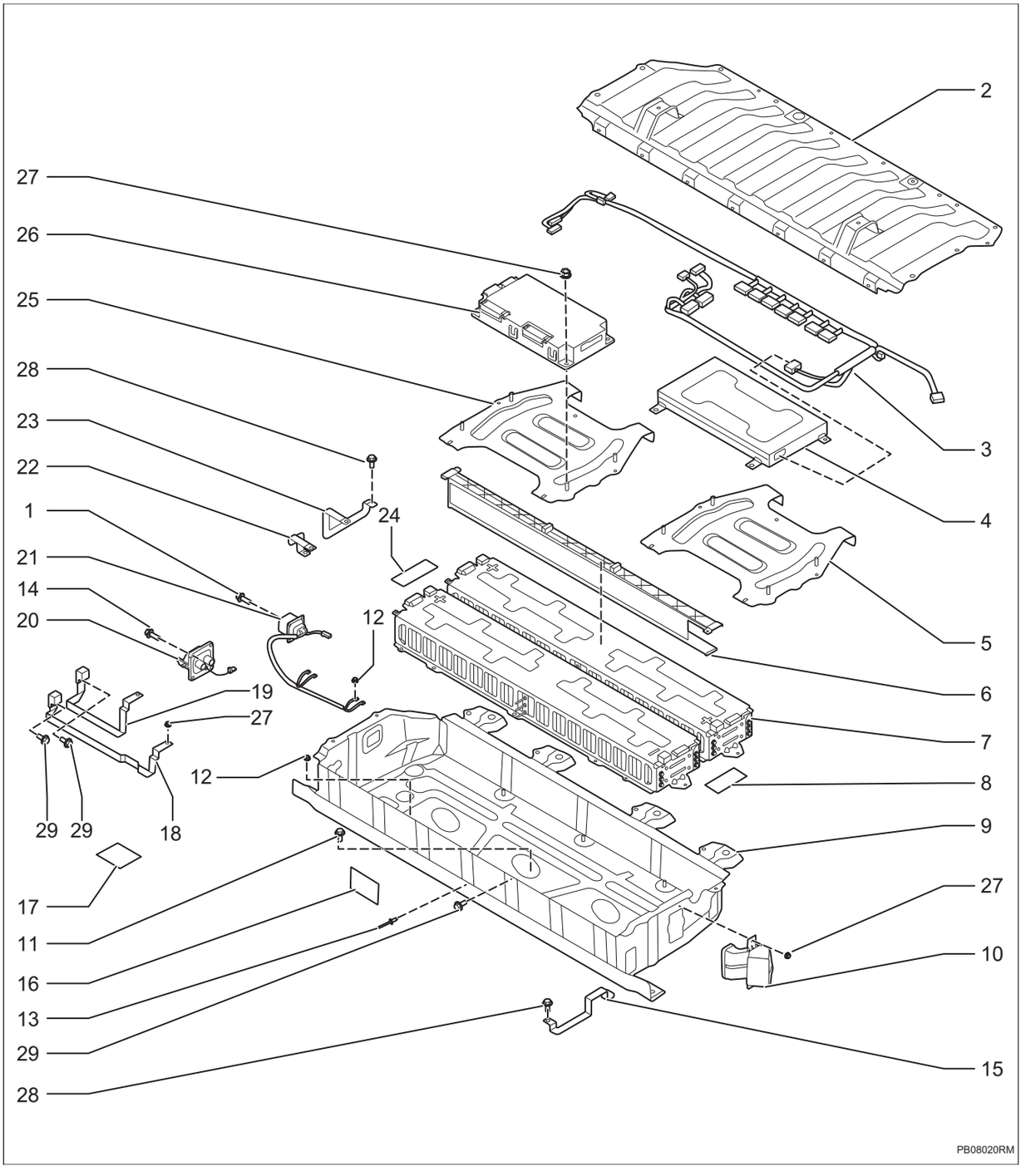
Parts



1. Traction battery assembly

- Battery type: ternary lithium ion traction battery
- Working voltage: 352 V (volt)
- Cooling method: air cooling
- Operating temperature: -30 ℃ ~ 60 ℃

Parts



1. **Hexagon flange bolt**
   - X4
   - Torque: 9~11 N · m
2. **Upper case assembly**
3. **Low-voltage harness assembly**
4. **BMU assembly**

5. **Member assembly-BMS bracket weldment**
6. **Air duct - air inlet duct II**
7. **Battery module assembly**
8. **Chemical type identification**
9. **Lower case assembly**
10. **Air duct - air inlet duct I**
11. **Hexagon flange bolt**
    - X13
    - Torque: 9~11 N · m
12. **Hexagon flange nut**
    - X7
    - Torque: 6~8 N · m
13. **Open flat round head blind rivet**
    - X4
14. **Hexagon flange bolt**
    - X4
    - Torque: 5.5~6.5 N · m
15. **Inter-module connecting copper bar**
16. **Nameplate label**
17. **Identification of hazardous chemicals**
18. **High-voltage PDU output I electric connection assembly**
19. **High-voltage PDU output electric connection assembly**
20. **Front DC bus high-voltage connector assembly**
21. **Traction battery high voltage component output harness assembly**
22. **High-voltage PDU input positive connection assembly**
23. **High-voltage PDU input negative connection assembly**
24. **High voltage identification**
25. **Member assembly-BDU bracket weldment**
26. **PDU assembly**
27. **Hexagon flange nut**
    - X20
    - Torque: 7~9 N · m
28. **Hexagon flange bolt**
    - X4
    - Torque: 9~11 N · m
29. **Hexagon flange bolt**
    - X21
    - Torque: 9~11 N · m

Removal

Notice:

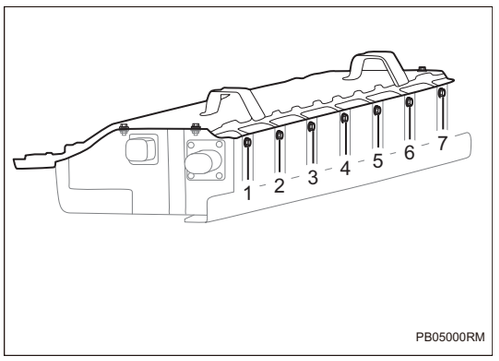
On-board high voltage network can be life-threatening.

Electric shock may cause death or serious physical injury.

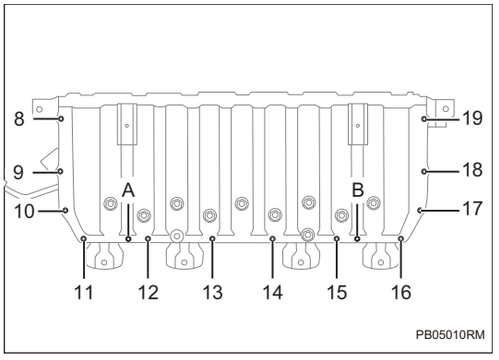
- Wear arc-tested clothing.
- Wear an insulated helmet with face protection.
- Wear insulating gloves.
- Wear insulating shoes.
- Cut off voltage of on-board high voltage network by qualified personnel.

1. Remove the upper case assembly

(a) Remove the traction battery side bolt -1-7-.



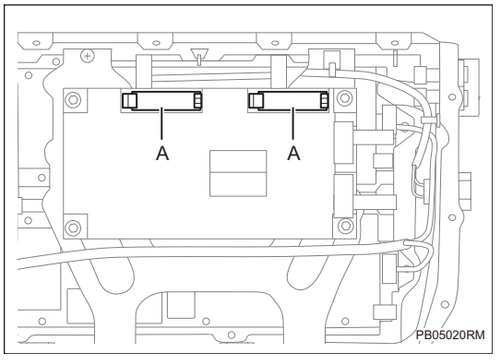
(b) -A-B- are two welded pins.

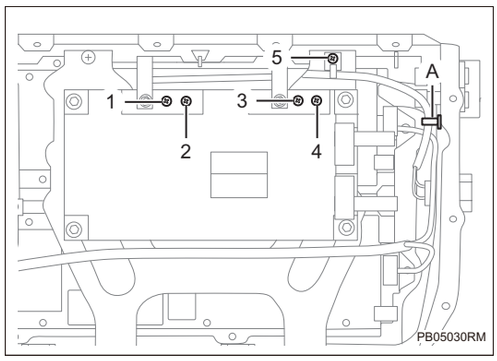


(c) Remove the bolt -8-19- and remove the upper case assembly.

2. Remove the high voltage component output harness assembly

(a) Detach the PDU assembly protective cover-A-.





(b) Remove the clip -5- clamped on the lower case assembly stud and the clip -A- clamped on the lower case assembly.

(c) Remove the negative -1- line and positive -3- line with yellow tape of the output harness assembly of the high voltage components.

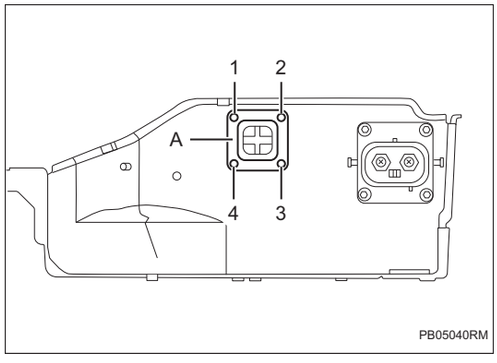
Caution:

The negative -1- line and positive -3-line with yellow tape correspond to the "AC -" and "AC +" marks on the PDU.

(d) Remove the negative -2- line and positive -4- line with red tape of output harness assembly.

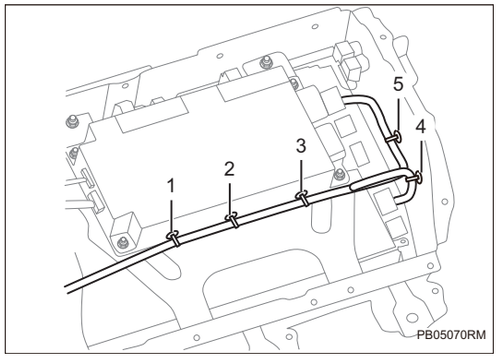
Caution:

The negative -2- line and positive -4-line with red tape correspond to the "PTC -" and "PTC +" marks on the PDU

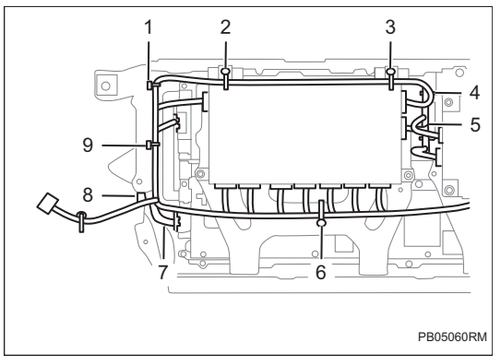


(e) Remove the bolt -1-4- and remove the high voltage component output harness assembly-A-.

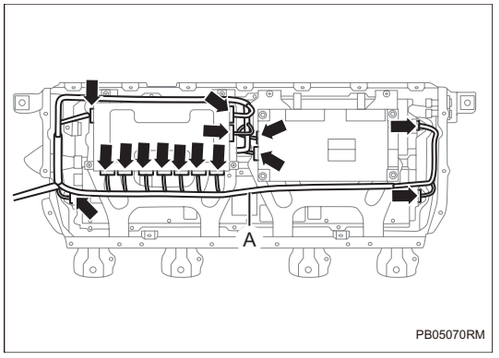
3. Remove the low voltage harness assembly



(a) Remove the retaining clip -1-5- of the low voltage harness assembly.

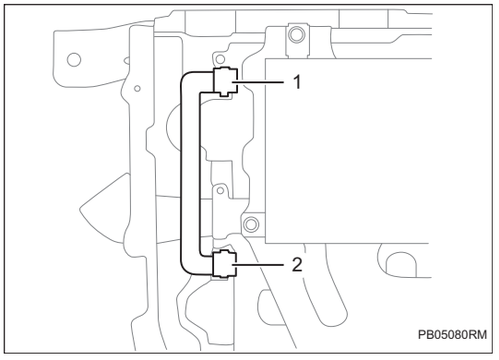


(b) Remove the stud tie -1-9- of the low voltage harness assembly.

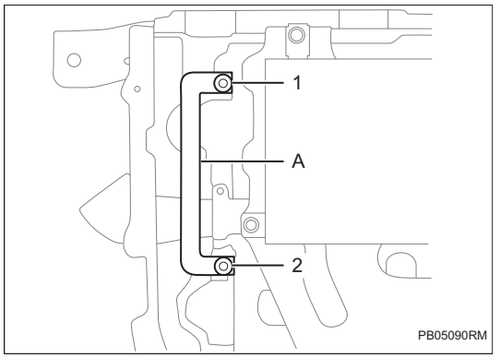


(c) Disconnect the harness connector -arrow- and remove the low voltage harness assembly -A-.

4. Remove the inter-module connecting copper bar assembly

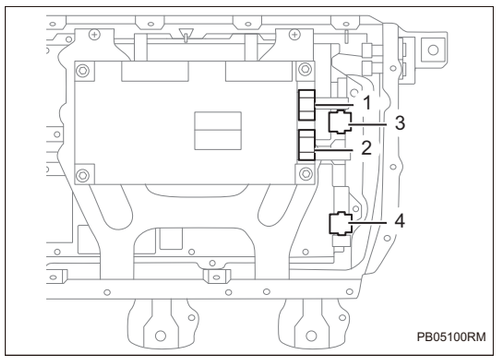


(a) Detach the battery module assembly output stage protective cover -1-2-.

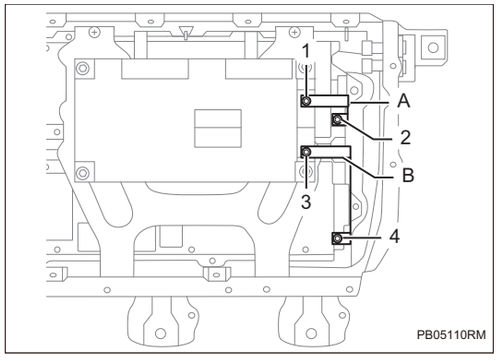


(b) Remove the bolt -1-2-, and remove the connection bus assembly between modules-A-.

5. Remove the BDU input electric connection assembly



(a) Detach the high-voltage PDU protective cover -1-2-.

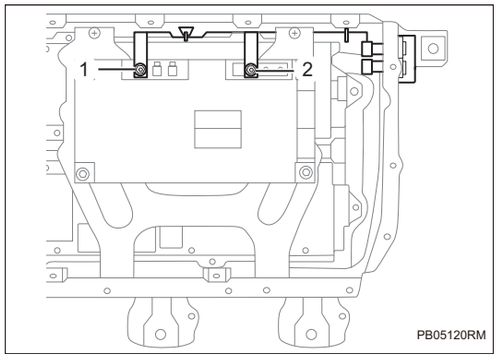


(b) Detach the battery module output stage protective cover -3-4-.

(c) Remove the nut -1- and bolt -2-, and remove the high-voltage PDU input positive connector -A-.

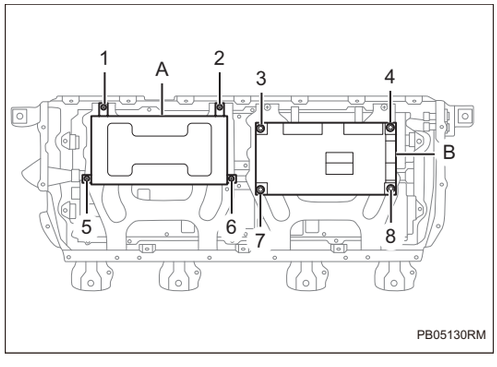
(d) Remove the nut -3- and bolt -4-, and remove the high-voltage PDU input negative connector -B-.

6. Remove the BDU output electric connection assembly



(a) Remove the nut -1-2- and detach the high-voltage PDU output electric connection assembly.

7. Remove the BDU and BMS

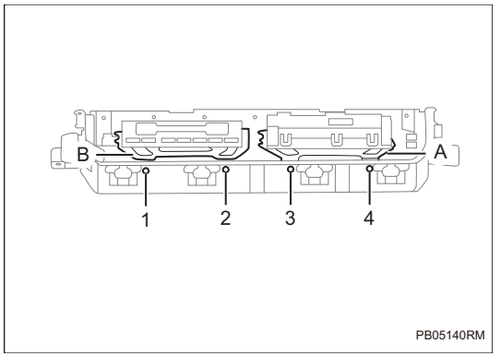


(a) Remove the nuts -1-2- and -5-6-, and remove the BMU assembly (BMS) -A-.

HB

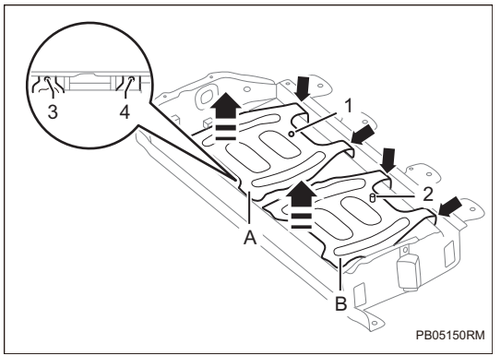
(b) Remove the nuts -3-4- and -7-8-, and remove the PDU (BDU) -B-.

8. Remove the BDU and BMS bracket



(a) Remove the fixing nuts -1-2- of the BMS bracket assembly -B-.

(b) Remove the fixing nuts -3-4- of the high-voltage PDU bracket assembly (BDU) -A-.



(c) Remove the nuts -3-4- and remove the high-voltage PDU bracket assembly (BDU) -A- in the direction of the -arrow-.

Hint:

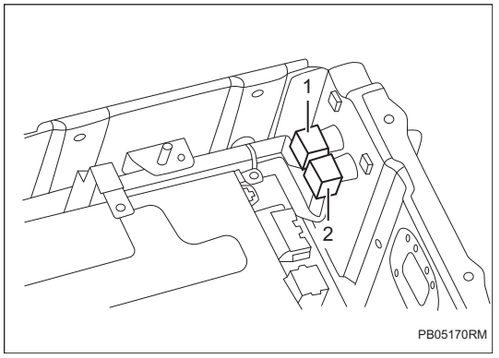
There is no stud at -1-on the PDU (BDU) and only one round hole.

(d) Remove the BMU bracket-B- as arrowed.

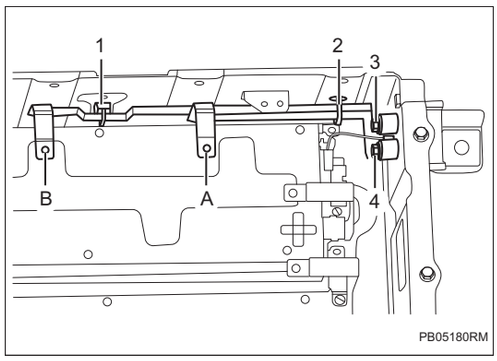
Hint:

BMU assembly (BMS) bracket with weld studs at -2.

9. Remove the connector and BDU output electric connection assembly

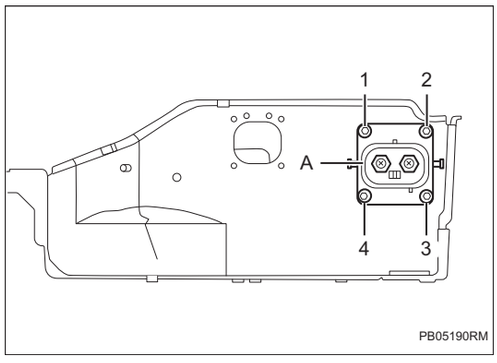


(a) Detach the silicone sheath of the electrical connection assembly -1-2-.



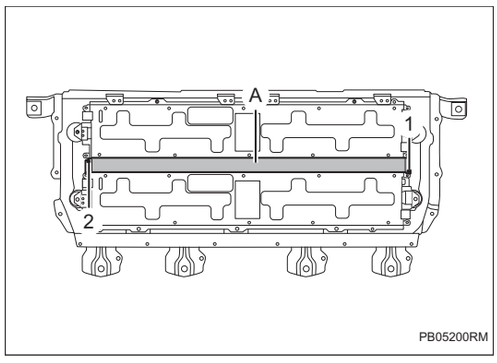
(b) Remove the bolt -3-4-.

(c) Detach the clip -1-2-, and remove the high-voltage PDU output electrical connection assembly-B- and the high-voltage PDU output I electrical connection assembly-A-.

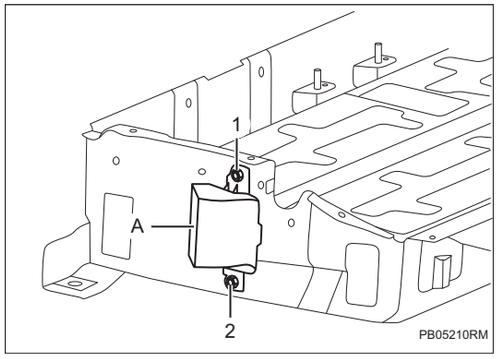


(d) Remove the bolt -1-4-, and remove the front DC bus high-voltage connector assembly -A-.

10. Remove the air inlet duct



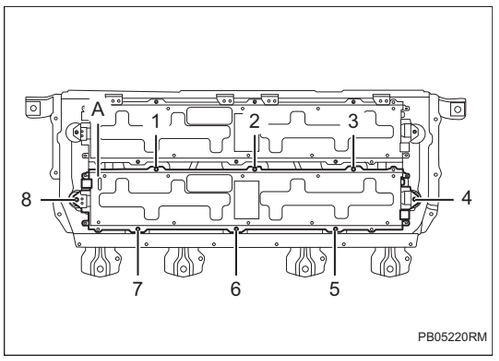
(a) Detach the clip -1-2-, and remove the air inlet duct II assembly-A-.



(b) Remove the nut -1-2-, and remove the air inlet duct I assembly-A-.

11. Remove the battery module assembly

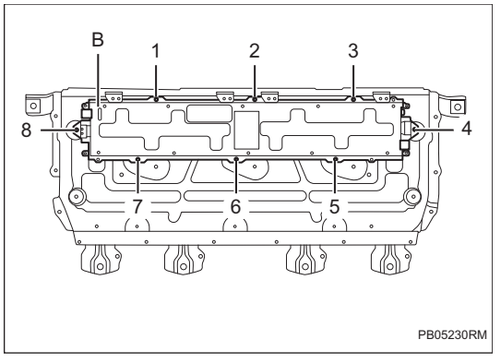
HB



(a) Remove the nut -5-7-.

(b) Remove the bolts -1-4-and -8-, and remove the battery module assembly-A-.

(c) Remove the nut -1-3-.



(d) Remove the bolt -4-8- and remove the battery module assembly-B-.

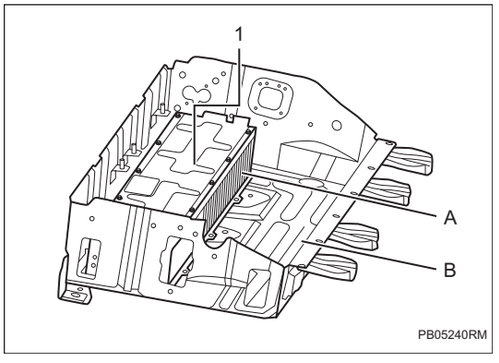
Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

   Hint:

   Make paint marks after the calibration of fastener torques

2. **Install the battery module assembly**



(a) Visually inspect the lower case assembly to ensure that there is no welding slag, particles and other foreign matters inside the case, and ensure that the case bottom is in a flat state.

(b) Install the battery module assembly-A- into the case-B- according to the movement trajectory of -1- in the figure.

Power steering system

Power steering PS-1
Precautions PS-1
Location of parts PS-4
System diagram PS-7
System description PS-8
Symptom chart PS-9
ECU terminal PS-10
DTC chart PS-10
C190049 ..... PS-13
C190404 ..... PS-13
C190645 ..... PS-13
C190896 ..... PS-13
C190A42 ..... PS-13
C190B48 ..... PS-13
C190C44 ..... PS-13
C190204 ..... PS-14
C197054 ..... PS-14
C19051F PS-15
C19011F PS-15
C190900 ..... PS-18
C190F56 ..... PS-18
C190D11 ..... PS-19
C191007 ..... PS-20
C191206 ..... PS-21
U006488 ..... PS-22
U014687 ..... PS-22
U012187 ..... PS-22
U013887 ..... PS-22
U129387 ..... PS-22
U110087 ..... PS-22
U110187 ..... PS-22
U123587 ..... PS-22
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U114687 ..... PS-22
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U040182 ..... PS-22
U040183 ..... PS-22
U040186 ..... PS-22
U040282 ..... PS-22
U040283 ..... PS-22
U040286 ..... PS-22
U043382 ..... PS-22
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U054482 ..... PS-22
U054483 ..... PS-22
U054486 ..... PS-23
U042386 ..... PS-23
U043982 ..... PS-23
U043983 ..... PS-23
U043986 ..... PS-23
U044786 ..... PS-23
Double gear type electric power steering gear & tie rod assembly PS-25
Parts PS-25
Removal PS-27
Installation PS-27
Outer tie rod ball joint of electric power steering gear PS-28
Parts PS-28
Removal PS-30
Installation PS-30

Power steering

Precautions

1. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

2. When checking and replacing the electronic component, ensure that the battery - is disconnected before the system can be repaired.

3. when the battery cable is disconnected and reconnected, some systems require initialization.

4. General repair instructions:

(a) A detailed visual inspection is required before diagnosing the electric power steering gear assembly to determine whether it is a mechanical failure or an electrical/electronic fault.

(b) If there is a fault in the electric power steering gear assembly, troubleshoot the mechanical failure first.

(c) The following three conditions indicate that electrical and electronic faults are detected in the electric power steering gear assembly system:

(1) Turn on the ignition switch, the system self-test is completed, and the warning lamp is still on.

(2) The warning lamp is always on during driving.

(3) During steering, the steering force is too high or there is no assist.

(d) When connecting the power cable and sensor harness on the electric power steering gear assembly, Pay attention to the following points:

(1) Before unplugging the power cable and sensor harness on the electric power steering gear assembly, turn off the ignition switch.

(2) Ensure that the connector is dry and clean to avoid any foreign matter.

(3) The power cable and sensor harness on the electric power steering gear assembly must be installed in place to avoid damage to the connector.

5. Precautions of CAN communication system:

(a) The EPS uses the CAN communication system to receive the signals from the ESC, EMS, BCM, GW and other electronic control systems.

(b) When the EPS ECU fails, a warning signal is sent to the instrument cluster to remind the driver. The EPS ECU is connected to the DLC through the diagnostic bus of the gateway ECU and can communicate with the HQ-VDS for relevant data.

(c) When the CAN communication system cannot communicate, the line shall be overhauled. When the data communication is normal, the EPS shall be overhauled.

(d) It is not recommended to use the method of piercing the wire skin to detect the electrical signals input and output of the part, so as to avoid harness short circuit.

6. The precautions for SRS during EPS ECU operation:

(a) Some maintenance operations will affect the SRS airbag. Be sure to read the "precautions" of the SRS airbag before maintenance .

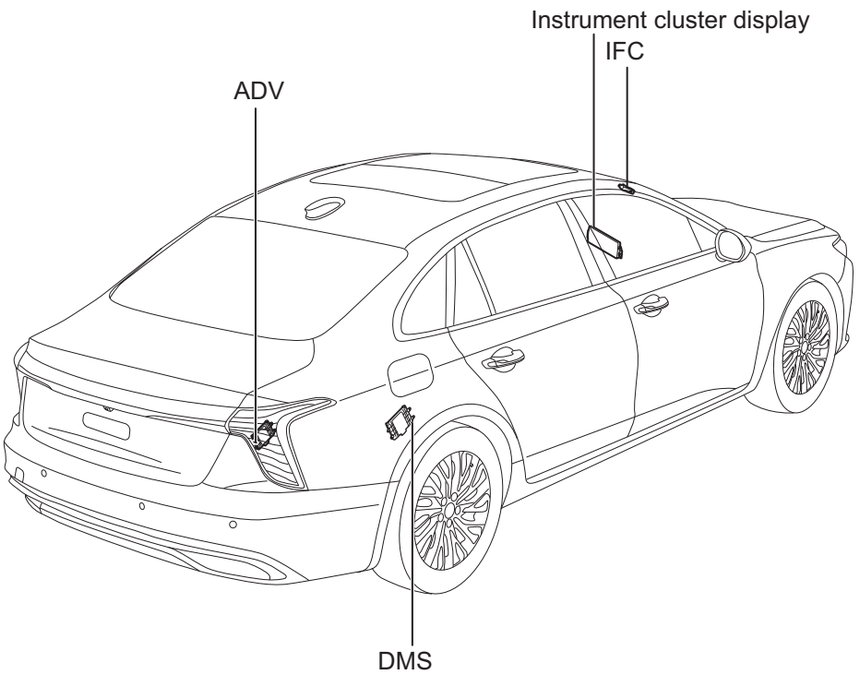
7. Precautions when disassembling and replacing EPS components:

(a) When disassembling the steering gear with tie rod assembly, place the steering wheel in the straight ahead position and align the front wheels.

(b) Make a mark before removing the steering wheel

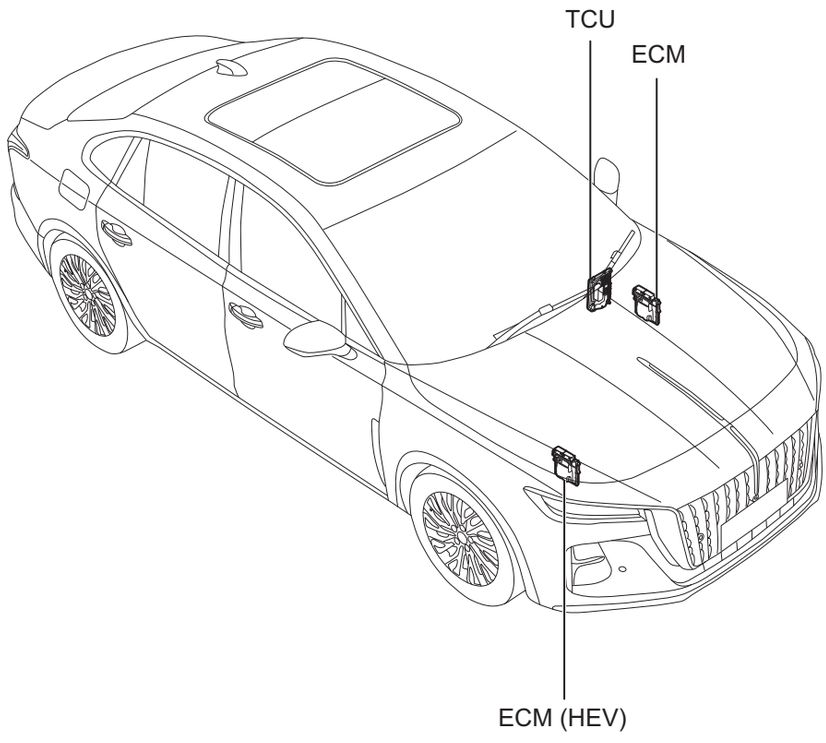
(c) When replacing the EPS assembly or re-calibrate the SAS, be sure to set the steering wheel and wheels in straight ahead position before calibration. It is recommended to do so under wheel alignment working conditions.

Location of parts



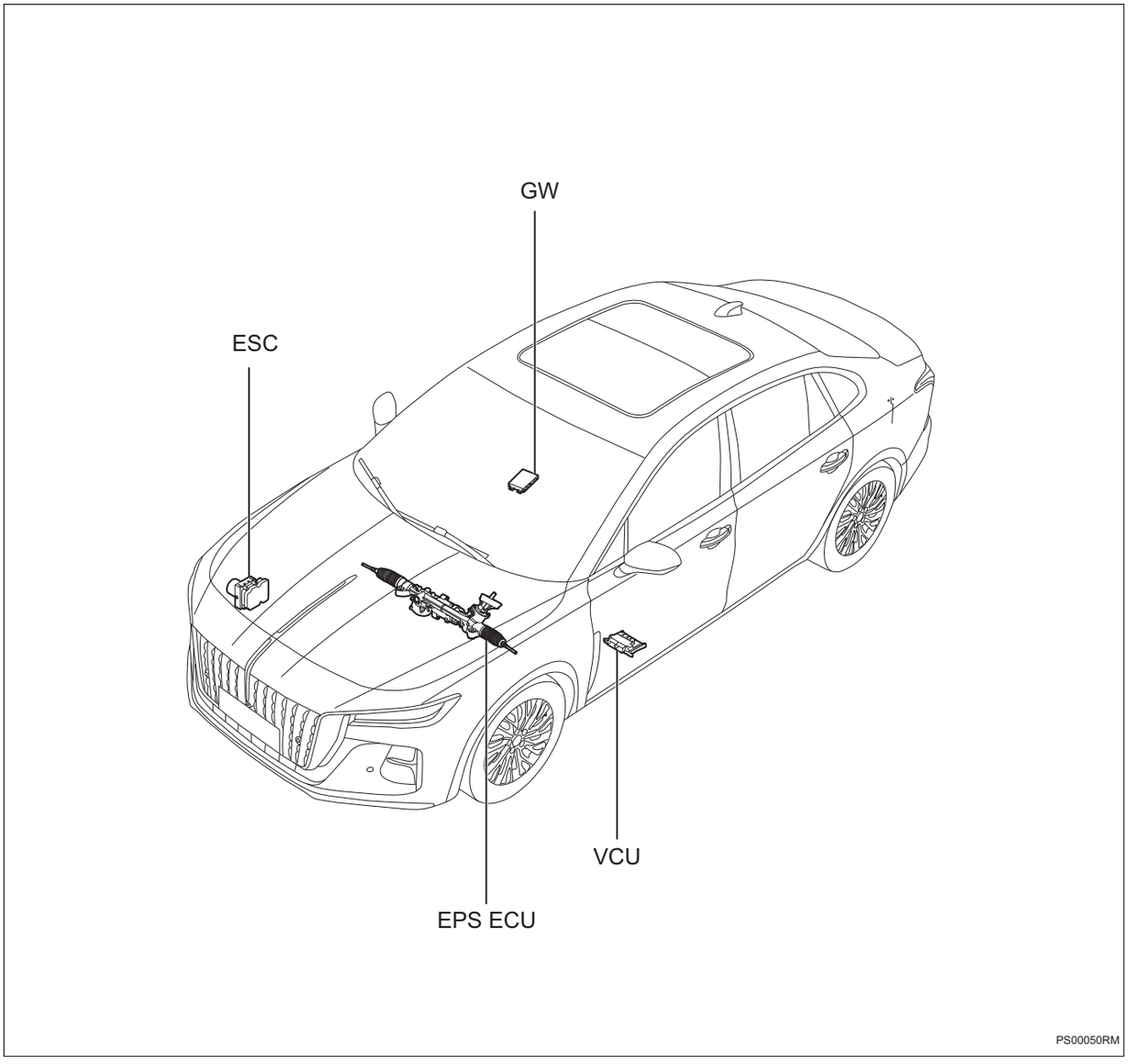
PS00030RM

Location of parts

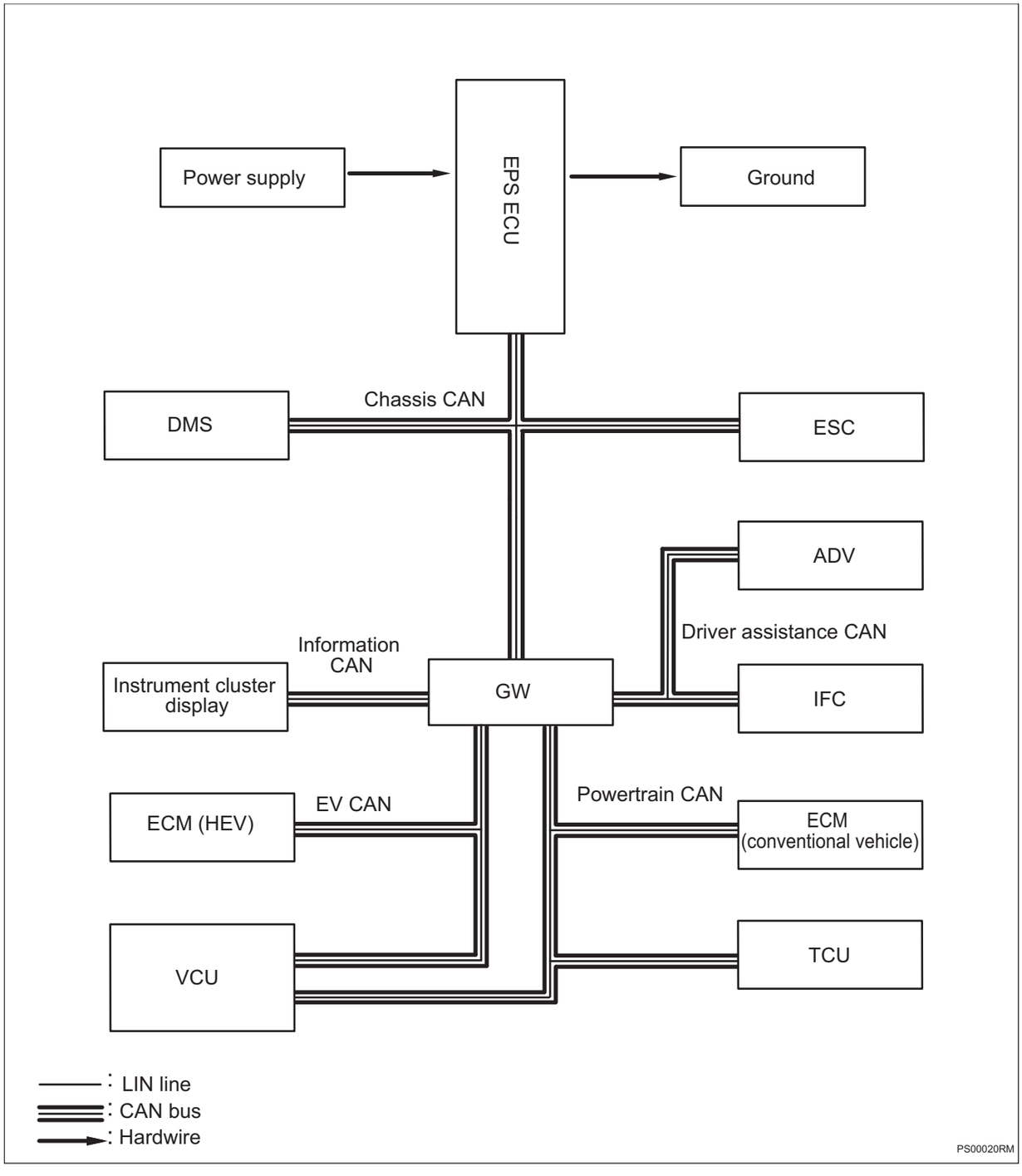


PS00040RM

Location of parts



System diagram



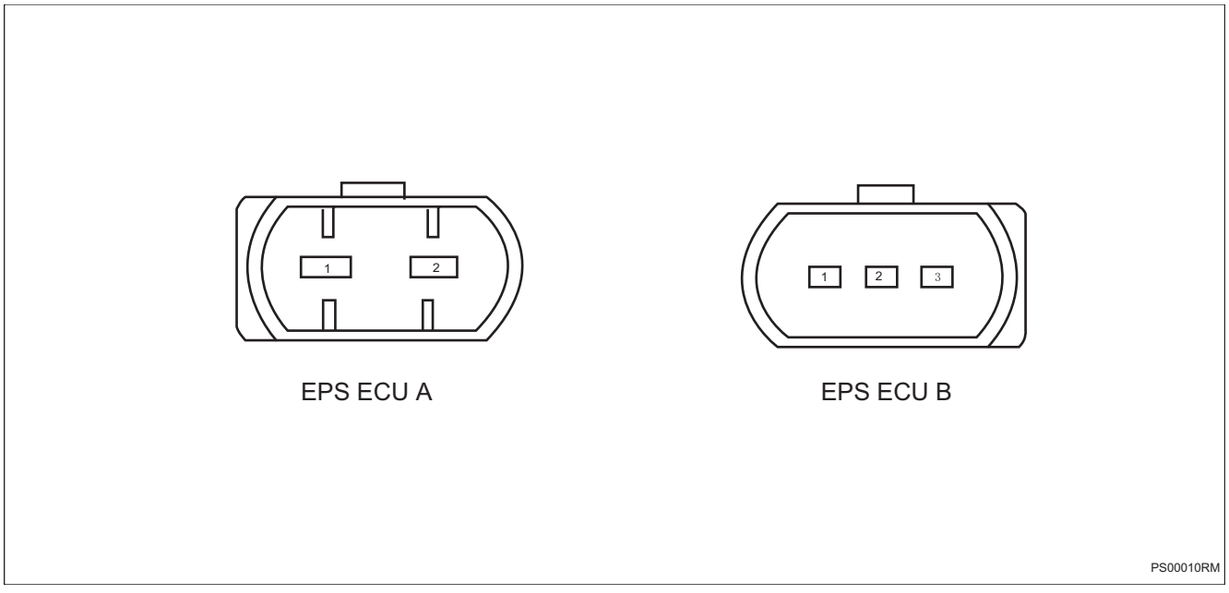
System description

1. **When the driver rotates the steering wheel, the steering action of the driver is converted into the swing of the wheel through the steering column, intermediate shaft and steering gear, and finally the steering function of the vehicle is realized. The EPS cooperates with the operation of the driver to provide electric power assistance for the steering system.**
2. **The EPS is composed of motor, electric power steering gear & tie rod assembly, dust cover, bellows, outer ball joint assembly and other parts.**
3. **The advantages of the electric power steering gear are as follows:**
   (a) Space saving.
   (b) Noise reduction.
   (c) Energy saving.
4. **The power of the electric power steering gear is provided by the battery, which reduces the parasitic loss of the engine power output. According to the difference between the steering wheel angle speed signal and the vehicle speed signal on the CAN bus, the motor of the electric power steering gear runs at different speeds, so as to realize the function of variable power steering with speed.**

Symptom chart

Fault	Possible location
Heavy steering operation	• Front tires are improperly inflated and worn unevenly • Incorrect front wheel alignment • Front suspension (lower ball joint) • Steering column and intermediate shaft • Battery and power supply system • SAS • Steering gear assembly
Inconsistent or uneven left and right steering force	• SAS calibration • Front tires are improperly inflated and worn unevenly • Incorrect front wheel alignment • Front suspension (lower ball joint) • Steering gear assembly
Steering force failure to change with vehicle speed when driving	• Front suspension (lower ball joint) • EPS ECU • Wheel speed sensor • SAS calibration • Steering gear assembly
Friction sound in turning steering wheel when driving at low speed	• Steering wheel and steering column shroud • Steering column assembly
Steering wheel cannot return normally	• Wheel alignment • Steering column and intermediate shaft • Steering column assembly

ECU terminal



EPS ECU A	
Pin No.	**DEFINITIONS**
1	GND
2	B+

EPS ECU B	
Pin No.	**DEFINITIONS**
1	KL15
2	CAN_H
3	CAN_L

DTC chart

DTC	Description	Reference page
C190049	EPS circuit module fault	(See page PS-13)
C190204	EPS basic function failure	(See page PS-14)
C197054	EPS calibration failure	(See page PS-14)
C190404	EPS motor fault	(See page PS-13)
C19051F	Power supply voltage failure	(See page PS-15)
C19011F	Voltage difference error	(See page PS-15)
C190645	EPS dataflash fault	(See page PS-13)
C190896	Torque sensor fault	(See page PS-13)
C190900	Programmed special software in EPS	(See page PS-18)
C190A42	EPS ECU ROM fault	(See page PS-13)
C190B48	EPS internal SW fault	(See page PS-13)
C190C44	EPS ECU RAM fault	(See page PS-13)

DTC	Description	Reference page
C190D11	Power assist degradation due to high ECU temperature	(See page PS-19)
C190F56	EPS data memory Layout fault	(See page PS-18)
C191007	EPS mechanical friction high.	(See page PS-20)
C191206	EPS advanced function failure	(See page PS-21)
U006488	Chassis CAN bus off	(See page PS-23)
U014687	GW node lost	(See page PS-23)
U012187	ESC/IBC node lost	(See page PS-23)
U013887	DMS node lost	(See page PS-23)
U129387	HCU message lost	(See page PS-23)
U110087	ECM message lost	(See page PS-23)
U110187	TCU message lost	(See page PS-23)
U123587	IFC message lost	(See page PS-23)
U112187	ESC/IBC message lost	(See page PS-23)
U124387	ADV message lost	(See page PS-23)
U115587	Instrument cluster control unit message lost	(See page PS-23)
U114687	GW message lost	(See page PS-23)
U059482	HCU message content error	(See page PS-23)
U059483	HCU message content error	(See page PS-23)
U059486	HCU message content error	(See page PS-23)
U040182	Engine message content error	(See page PS-23)
U040183	Engine message content error	(See page PS-23)
U040186	Engine message content error	(See page PS-23)
U040282	TCU message content error	(See page PS-23)
U040283	TCU message content error	(See page PS-23)
U040286	TCU message content error	(See page PS-23)
U043382	IFC message content error	(See page PS-23)
U043383	IFC message content error	(See page PS-23)
U043386	IFC message content error	(See page PS-23)
U041582	ESC/IBC message content error	(See page PS-23)
U041583	ESC/IBC message content error	(See page PS-23)
U041586	ESC/IBC message content error	(See page PS-23)
U054482	ADV message content error	(See page PS-23)
U054483	ADV message content error	(See page PS-23)
U054486	ADV message content error	(See page PS-23)
U042386	IPC message content error	(See page PS-23)
U043982	DMS message content error	(See page PS-23)
U043983	DMS message content error	(See page PS-23)
U043986	DMS message content error	(See page PS-23)

DTC	Description	Reference page
U044786	GW message content error	(See page PS-23)

DTC	**C190049**	**EPS circuit module fault**
DTC	**C190404**	**EPS motor fault**
DTC	**C190645**	**EPS dataflash fault**
DTC	**C190896**	**Torque sensor fault**
DTC	**C190A42**	**EPS ECU ROM fault**
DTC	**C190B48**	**EPS internal SW fault**
DTC	**C190C44**	**EPS ECU RAM fault**

Description

When the system functions abnormally due to internal failure of the EPS ECU, EPS ECU will record the DTC.

DTC	DTC detection conditions	Faulty location
C190049	(a) EPS circuit module fault.	• EPS ECU
C190404	(a) EPS motor fault.	• EPS ECU
C190645	(a) EPS dataflash fault.	• EPS ECU
C190896	(a) Torque sensor failure.	• EPS ECU
C190A42	(a) ECU ROM fault.	• EPS ECU
C190B48	(a) Internal SW failure.	• EPS ECU
C190C44	(a) ECU RAM fault.	• EPS ECU

PS

Inspection procedure

1	**Clear DTC**

(a) Power on and off for restart.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Standard

No DTC output

NG → **Replace the EPS ECU (See page PS-25)**

OK

2	**End**

DTC	C190204	EPS basic function failure
DTC	C197054	EPS calibration failure

Description

When the system detects a calibration failure or a system basic function failure, the EPS ECU will record the DTC.

DTC	DTC detection conditions	Faulty location
C190204	(a) EPS basic function fault.	• EPS ECU
C197054	(a) EPS calibration fault.	• EPS ECU

Inspection procedure

1	**Recalibrate the steering system**

(a) Power on and off again.

(b) Connect the HQ-VDS.

(c) Set the ignition switch to "ON".

(d) Recalibrate the steering system.

(e) Clear the DTC.

(f) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace the EPS ECU (See page PS-25)**

OK

2	**End**

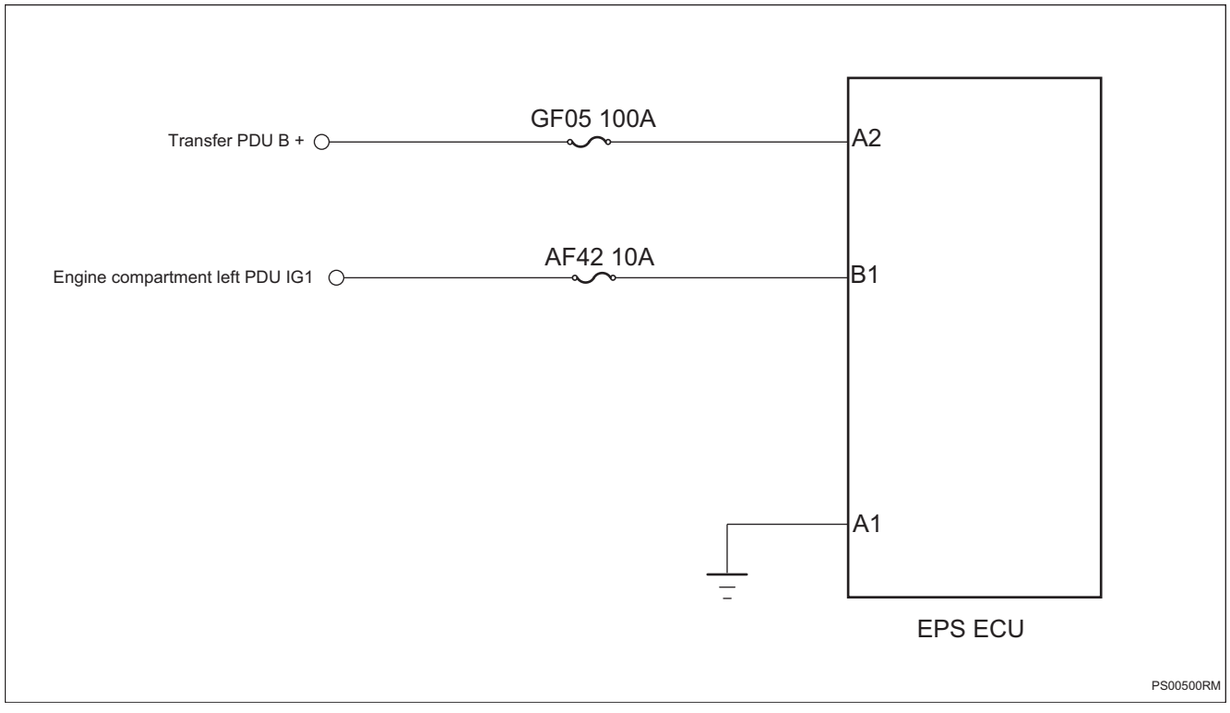
DTC	C19051F	Power supply voltage failure
DTC	C19011F	Voltage difference error

Description

When the EPS ECU power supply voltage exceeds the normal operating range, the EPS ECU records the DTC.

DTC	DTC detection conditions	Faulty location
C19051F	(a) Power supply voltage failure.	• EPS ECU • Harness and connector • Charging system
C19011F	(a) Voltage difference error.	• EPS ECU • Harness and connector • Charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) (a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

PS

NG → **Overhaul the charging system**

OK

2	**Check EPS ECU fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the EPS ECU fuse.

(d) Measure the resistance according to the values in the table below.

Standard value

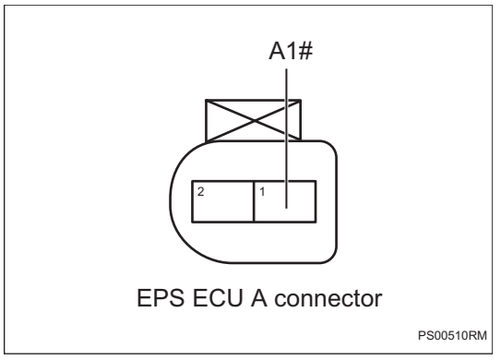
Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

PS

OK

3	**Check EPS ECU ground**



(a) Disconnect the EPS ECU connector.

(b) Measure the resistance according to the values in the table below.

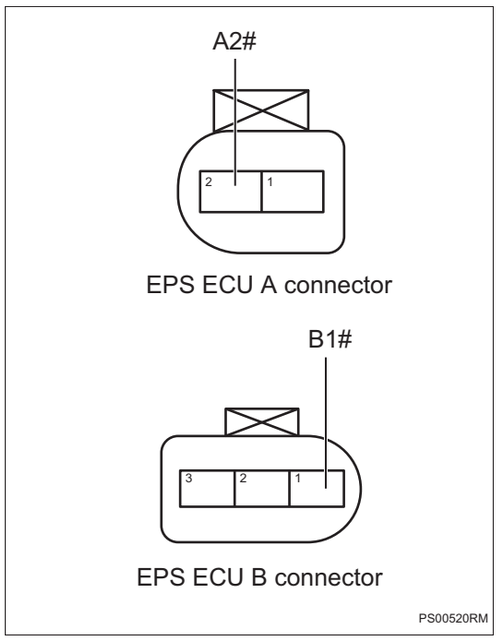
Standard value

Detector connection	Detection conditions	Specified state
EPS ECU connector A1# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check EPS ECU power supply**



(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
EPS ECU connector A2# - body GND	The ignition switch is set to "ON"	Battery voltage
EPS ECU connector B1# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace the EPS ECU (See page PS-25)**

PS

DTC	C190900	Programmed special software in EPS
DTC	C190F56	EPS data memory Layout fault

Description

In case of wrong software version, the EPS ECU will record the DTC.

DTC	DTC detection conditions	Faulty location
C190900	(a) Wrong software version.	• EPS ECU
C190F56	(a) Data memory Layout fault.	• EPS ECU

Inspection procedure

1	**Check software version**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Check if the software version is correct.

NG → **Rewrite the software version (if rewritting the software cannot solve the problem, the supplier's after-sales support is required)**

DTC	C190D11	Power assist degradation due to high ECU temperature

Description

When the EPS ECU detects that the system temperature is too high, the EPS ECU records the DTC.

DTC	DTC detection conditions	Faulty location
C190D11	(a) EPS system overtemperature.	• EPS ECU

Inspection procedure

1	Clear DTC

(a) Turn off the vehicle and condition it to room temperature.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the EPS ECU (See page PS-25)**

OK

2	End

DTC	C191007	EPS mechanical friction high.

Description

When excessive steering system frictional resistance is detected, the EPS ECU will record the DTC.

DTC	DTC detection conditions	Faulty location
C191007	(a) Mechanical friction high.	• EPS ECU

Inspection procedure

1	Check the steering gear

(a) Check whether the steering gear is installed correctly.

(b) Check whether the steering gear is damaged.

NG → **Repair according to the fault**

OK

2	Replace the EPS ECU (See page PS-25)

DTC	C191206	EPS advanced function failure

Description

When a restricted lane keeping function is detected, the EPS ECU records the DTC.

DTC	DTC detection conditions	Faulty location
C191206	(a) LKA function limited.	• EPS ECU

Inspection procedure

1	Check LKA activation prerequisites

(a) Check if the preconditions for LKA activation are met.

NG → **Repair according to the fault**

DTC	U006488	Chassis CAN bus off
DTC	U014687	GW node lost
DTC	U012187	ESC/IBC node lost
DTC	U013887	DMS node lost
DTC	U129387	HCU message lost
DTC	U110087	ECM message lost
DTC	U110187	TCU message lost
DTC	U123587	IFC message lost
DTC	U112187	ESC/IBC message lost
DTC	U124387	ADV message lost
DTC	U115587	Instrument cluster control unit message lost
DTC	U114687	GW message lost
DTC	U059482	HCU message content error
DTC	U059483	HCU message content error
DTC	U059486	HCU message content error
DTC	U040182	Engine message content error
DTC	U040183	Engine message content error
DTC	U040186	Engine message content error
DTC	U040282	TCU message content error
DTC	U040283	TCU message content error
DTC	U040286	TCU message content error
DTC	U043382	IFC message content error
DTC	U043383	IFC message content error
DTC	U043386	IFC message content error
DTC	U041582	ESC/IBC message content error
DTC	U041583	ESC/IBC message content error
DTC	U041586	ESC/IBC message content error
DTC	U054482	ADV message content error
DTC	U054483	ADV message content error

DTC	**U054486**	**ADV message content error**
DTC	**U042386**	**IPC message content error**
DTC	**U043982**	**DMS message content error**
DTC	**U043983**	**DMS message content error**
DTC	**U043986**	**DMS message content error**
DTC	**U044786**	**GW message content error**

Description

When the communication between the EPS ECU and other systems is abnormal or interrupted, the EPS ECU will record the DTC.

DTC	DTC detection conditions	Faulty location
U006488	(a) Abnormal or interrupted communication.	• Relevant system control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	
U012187	(a) Abnormal or interrupted communication.	
U013887	(a) Abnormal or interrupted communication.	
U129387	(a) Abnormal or interrupted communication.	
U110087	(a) Abnormal or interrupted communication.	
U110187	(a) Abnormal or interrupted communication.	
U123587	(a) Abnormal or interrupted communication.	
U112187	(a) Abnormal or interrupted communication.	
U124387	(a) Abnormal or interrupted communication.	
U115587	(a) Abnormal or interrupted communication.	
U114687	(a) Abnormal or interrupted communication.	
U059482	(a) Abnormal or interrupted communication.	
U059483	(a) Abnormal or interrupted communication.	
U059486	(a) Abnormal or interrupted communication.	
U040182	(a) Abnormal or interrupted communication.	
U040183	(a) Abnormal or interrupted communication.	
U040186	(a) Abnormal or interrupted communication.	
U040282	(a) Abnormal or interrupted communication.	
U040283	(a) Abnormal or interrupted communication.	
U040286	(a) Abnormal or interrupted communication.	
U043382	(a) Abnormal or interrupted communication.	
U043383	(a) Abnormal or interrupted communication.	
U043386	(a) Abnormal or interrupted communication.	
U041582	(a) Abnormal or interrupted communication.	
U041583	(a) Abnormal or interrupted communication.	
U041586	(a) Abnormal or interrupted communication.	
U054482	(a) Abnormal or interrupted communication.	
U054483	(a) Abnormal or interrupted communication.	
U054486	(a) Abnormal or interrupted communication.	
U042386	(a) Abnormal or interrupted communication.	
U043982	(a) Abnormal or interrupted communication.	
U043983	(a) Abnormal or interrupted communication.	
U043986	(a) Abnormal or interrupted communication.	
U044786	(a) Abnormal or interrupted communication.	

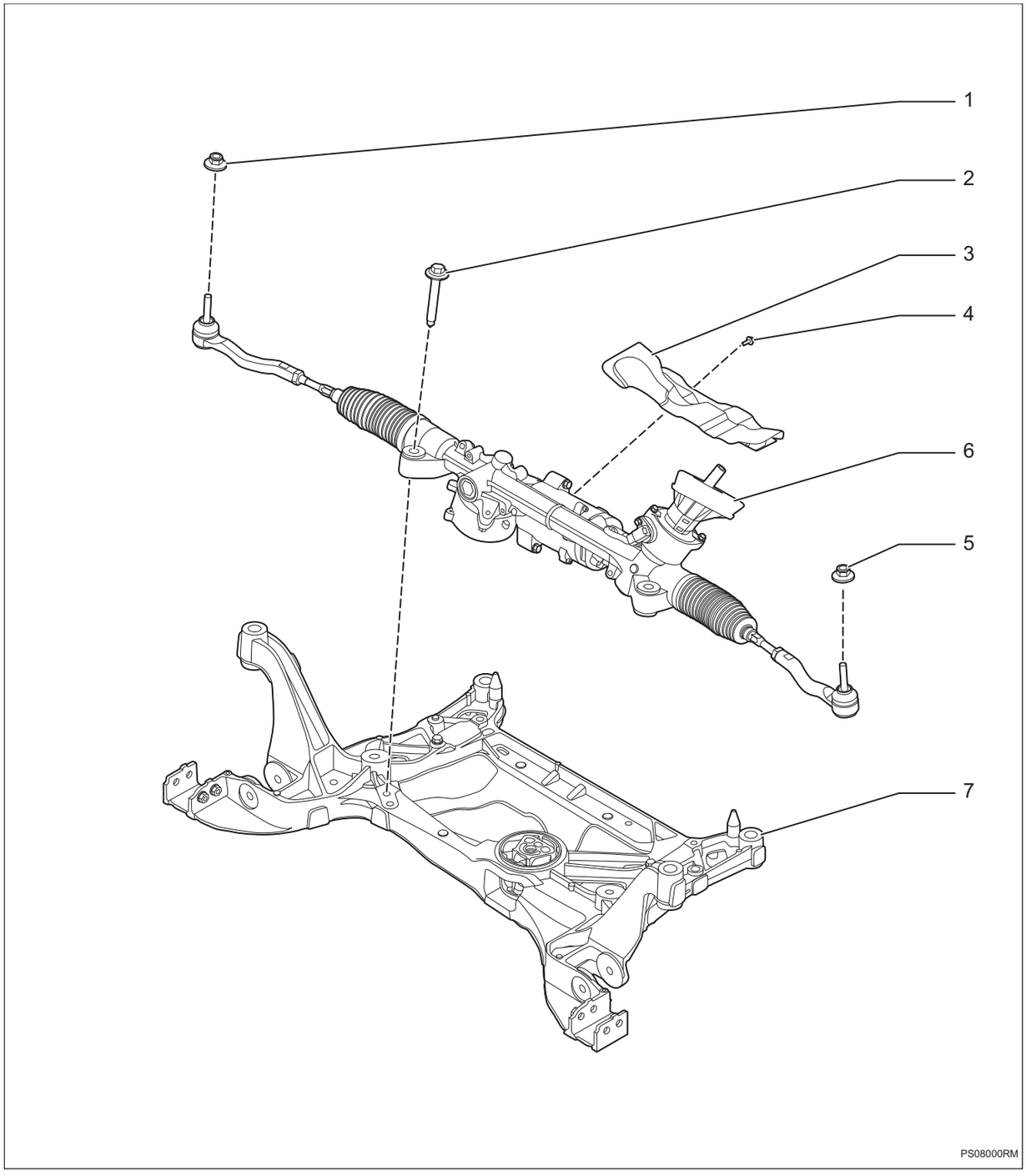
PS

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

Double gear type electric power steering gear & tie rod assembly

Parts



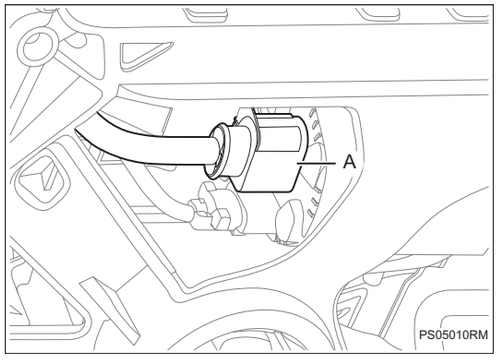
1. Hexagon flange nut

- Torque: 51~92 N · m
- Non-reusable

2. **Hexagon flange bolt**
   - X2
   - Torque: 45~55 N · m +(54 ° ~ 66 °)
   - Non-reusable
3. **Heat shield**
4. **Hexagon flange bolt**
   - X2
   - Torque: 8~12 N · m
5. **Hexagon flange nut**
   - Torque: 51~92 N · m
   - Non-reusable
6. **Double gear type electric power steering gear & tie rod assembly**
7. **Front subframe**

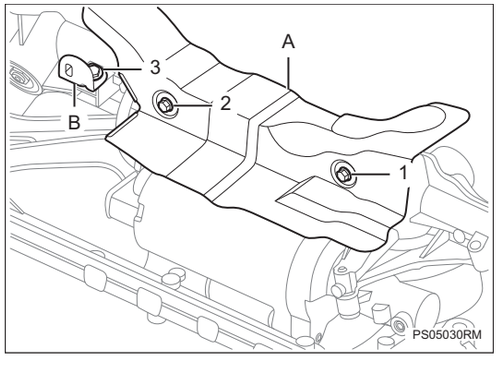
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the front wheel (See page TW-3)**
3. **Remove the outer tie rod ball joint of electric power steering gear (See page PS-30)**
4. **Remove the double gear type electric power steering gear & tie rod assembly**



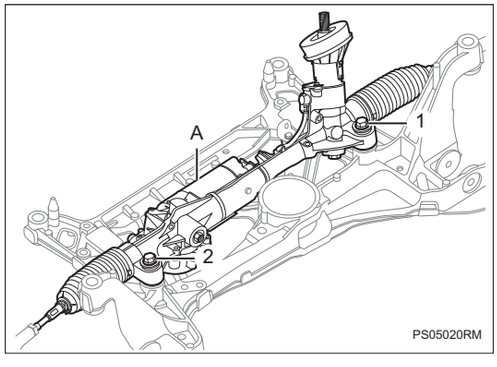
(a) Disconnect the harness connector-A-.

(b) Remove the front subframe (See page SP-10)



(c) Remove the bolt -1-2- and remove the heat shield-A-.

(d) Remove the bolt -3- and remove the harness bracket-B-.



(e) Remove the bolt -1-2-, and remove the double gear type electric power steering gear with tie rod assembly -A-.

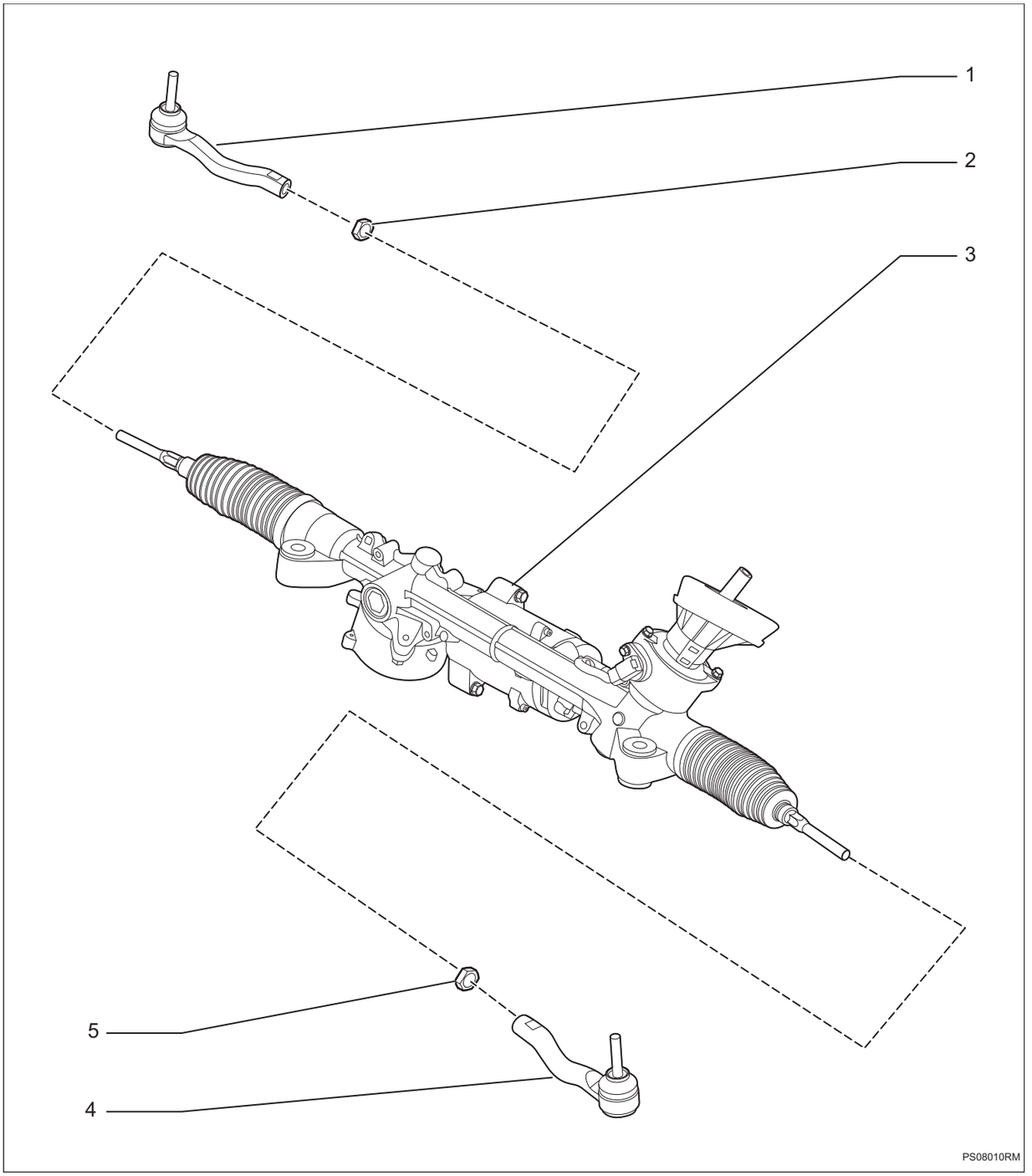
Installation

1. **The installation procedure is the reverse of removal procedure.**

PS

Outer tie rod ball joint of electric power steering gear

Parts



1. **Outer tie rod ball joint of electric power steering gear**
2. **Hexagon flange nut**
   - Torque: 68.6~98 N · m

3. **Double gear type electric power steering gear assembly**
4. **Outer tie rod ball joint of electric power steering gear**
5. **Hexagon flange nut**
   - Torque: 68.6~98 N · m

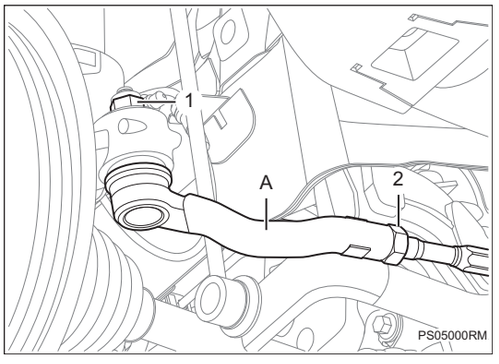
Removal

Hint:

The installation sequence on the right side is the same as that on the left side.

When separating the steering knuckle from the ball joint, special tools shall be used to push out the ball joint assembly. It is not allowed to be stressed under the condition of an angle. During removal, if the ball pin is pushed out by mistake, the steering knuckle and the ball joint cannot be used again.

1. **Remove front wheel (See page TW-3)**
2. **Remove the outer tie rod ball joint of electric power steering gear**
   (a) Remove nut -1-, detach nut -2-, and remove outer tie rod ball joint -A-with SST (39H7034010B).



Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**
   (a) Check the dust cover and ball joint

   Hint:

   Check the dust cover for damage and grease leakage during installation. Once the grease leaks, replace it with a new part.

   The thread surface of the ball pin shall be free of grease, foreign matter and other impurities.

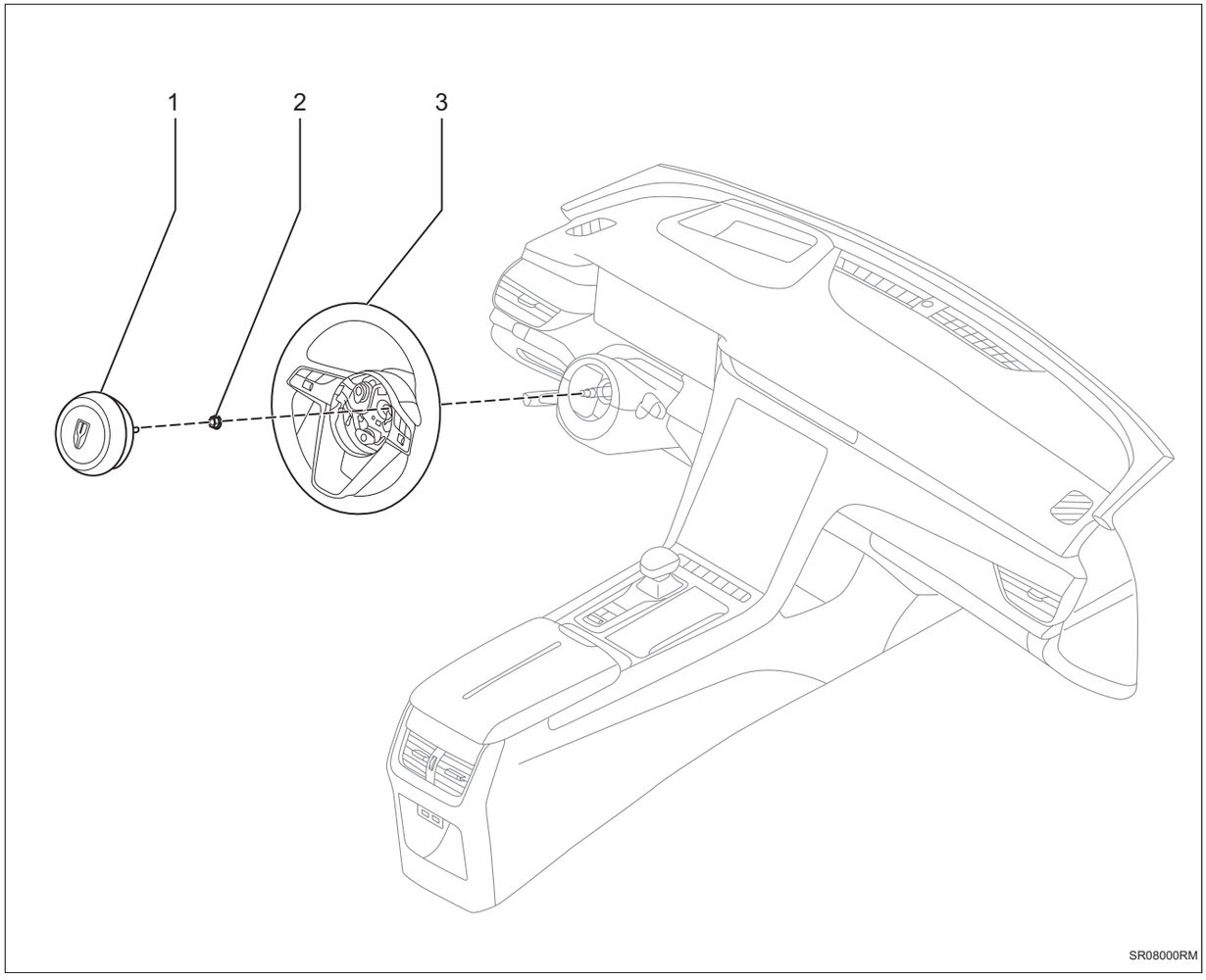
Steering column system

Steering wheel SR-1
Parts SR-1
Removal SR-2
Installation SR-2
Steering column shroud SR-3
Parts SR-3
Removal SR-4
Installation SR-4
Steering column assembly SR-5
Parts SR-5
Removal SR-6
Installation SR-8

SR

Steering wheel

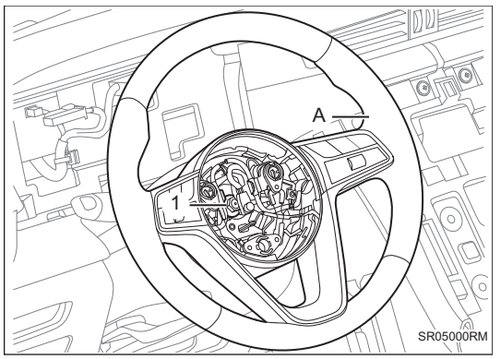
Parts



1. **Driver airbag**
2. **Hexagon flange nut**
   - Torque: 32~48 N · m
3. **Steering wheel**

Removal

1. **Disconnect the battery negative terminal**
2. **Remove the driver's airbag**
3. **Remove steering wheel**



(a) Disconnect the multi-function button harness connector.

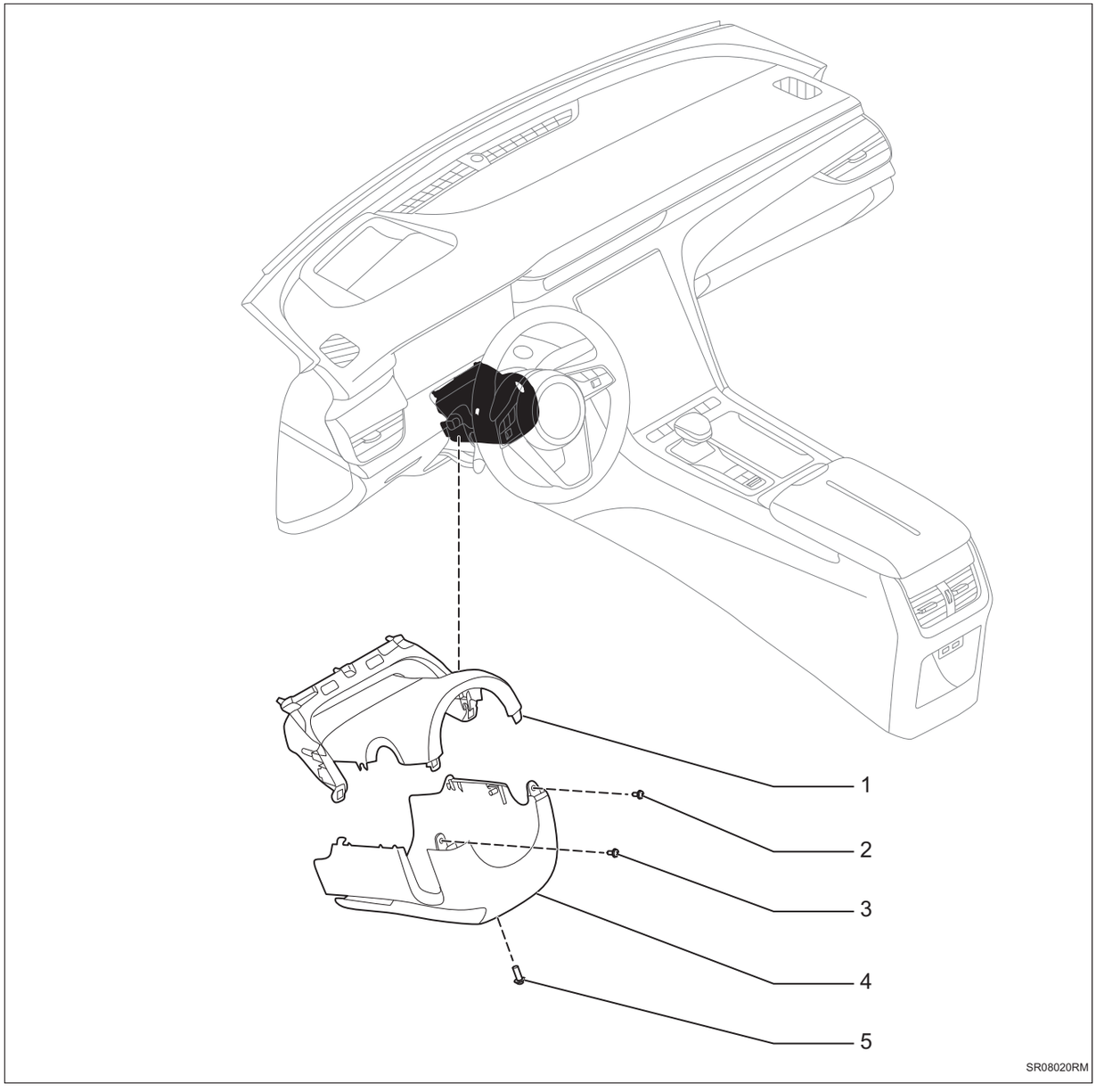
(b) Remove the nut -1- and remove the steering wheel-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Steering column shroud

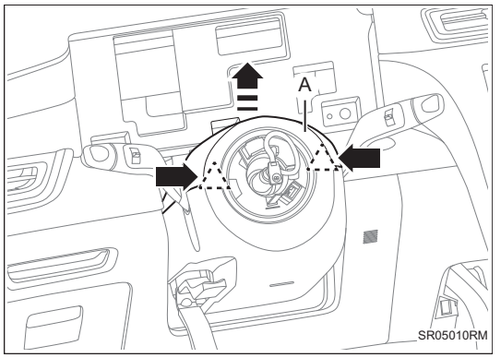
Parts



1. **Steering column assembly upper shield**
2. **Screw**
3. **Screw**
4. **Steering column assembly lower shield**
5. **Cylindrical head screw**

Removal

1. **Disconnect the battery negative terminal (see...)**
2. **Remove steering column upper shield**

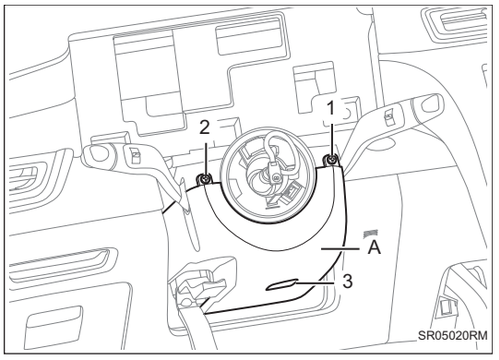


(a) Detach the fixing claw- arrow-, and remove the steering column upper shroud -A- in the direction of -movement arrow-.

Hint:

Lever off the steering column upper shroud using a taped screwdriver.

3. **Remove driver airbag (see...)**
4. **Remove steering wheel (see...)**
5. **Adjust the driver seat to the proper working position.**
6. **Remove steering column lower shield**



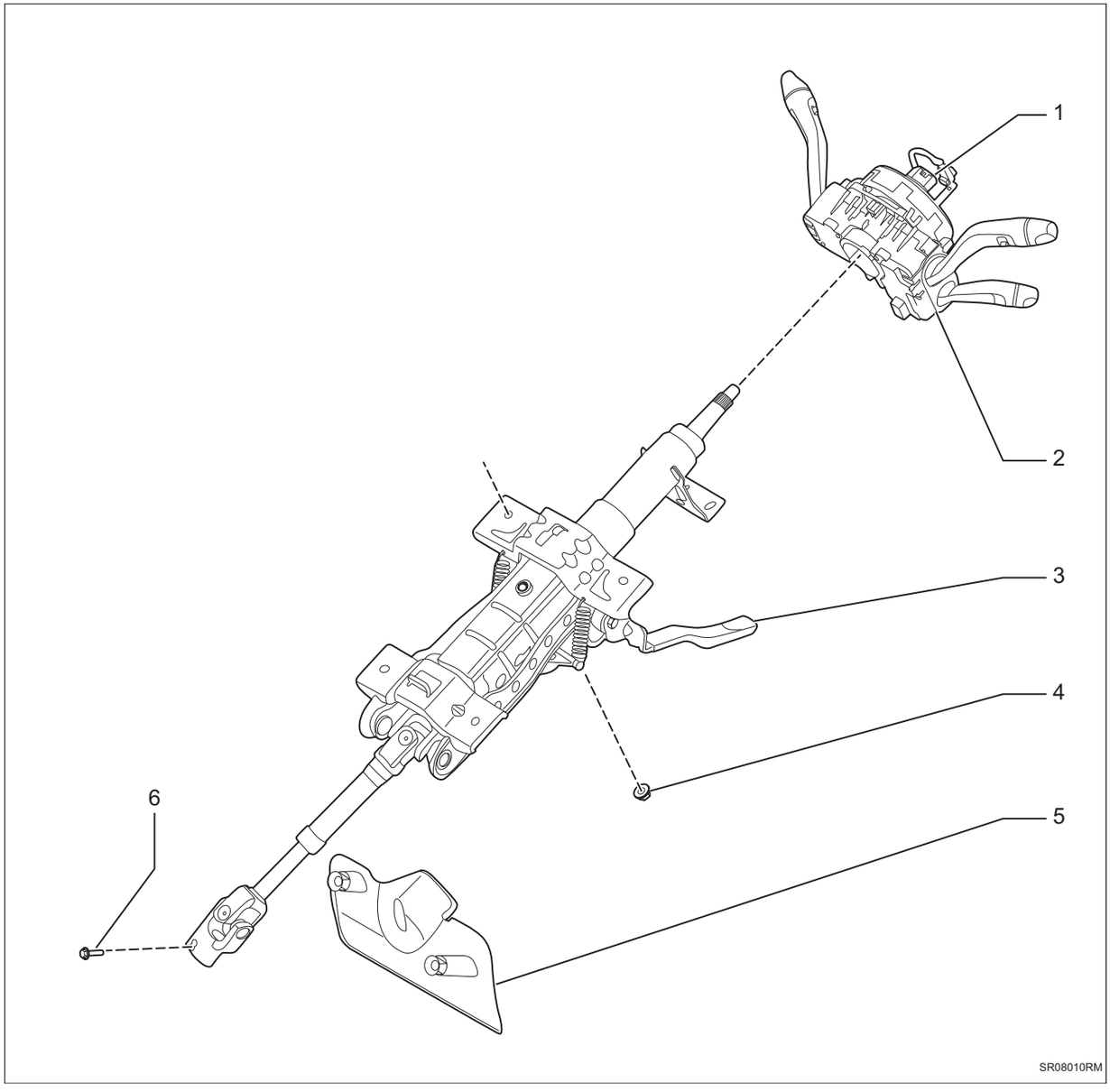
(a) Remove the screws -1-3-, and remove the steering column lower shield -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Steering column assembly

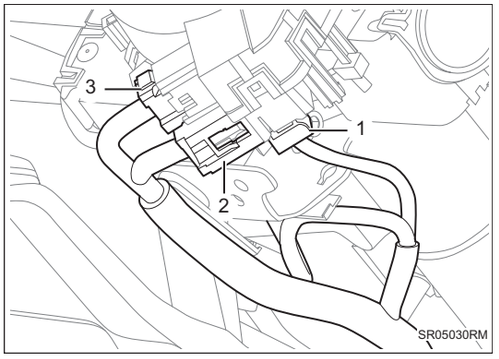
Parts



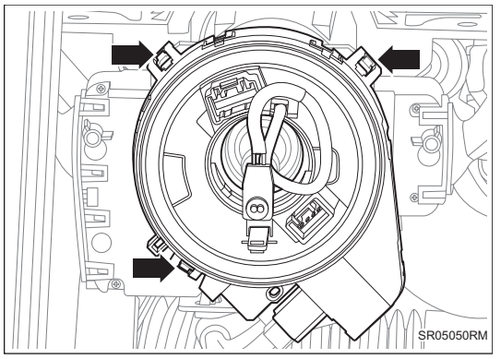
1. **Clock spring assembly**
2. **Combination switch**
3. **Steering column assembly**
4. **Hexagon flange nut**
   - X4
   - Torque: 16~22 N · m
5. **Steering intermediate shaft assembly**
6. **Hexagon flange bolt**
   - Torque: 25~33 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove steering wheel (See page SR-2)**
3. **Remove the steering column shroud (See page SR-4)**
4. **Remove the clock spring**



(a) Disconnect the harness connector -1-3-.

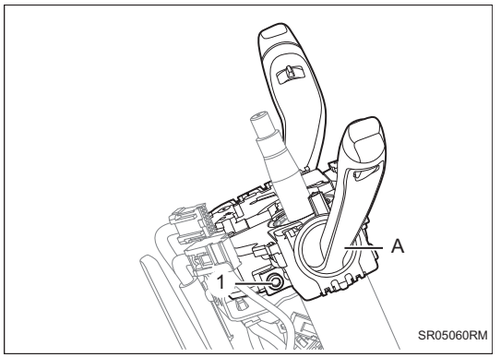


(b) Detach the fixing claw -arrow- and remove the clock spring -A- .

Hint:

Before removing the clock spring, secure the clock spring against movement with adhesive tape.

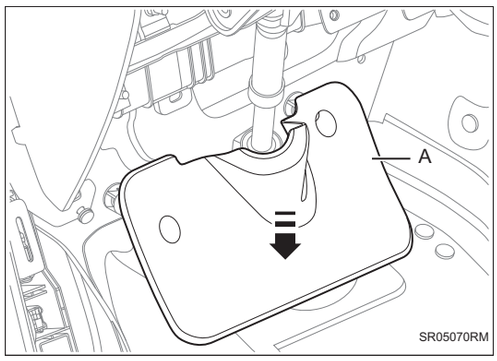
5. **Remove combination switch**



(a) Remove the bolt -1- and remove the combination switch-A-.

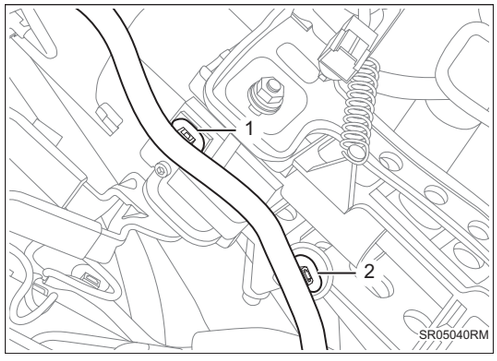
6. **Remove the left lower guard plate (See page IP-5)**
7. **Remove the steering intermediate shaft assembly**

SR

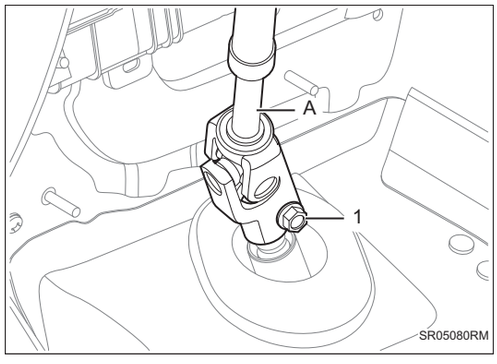


(a) Remove steering intermediate shaft assembly-A- as arrowed.

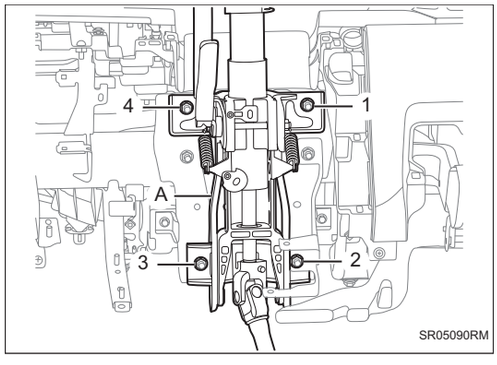
8. Remove steering column assembly



(a) Disconnect the steering column harness fixing clip -1-2-.

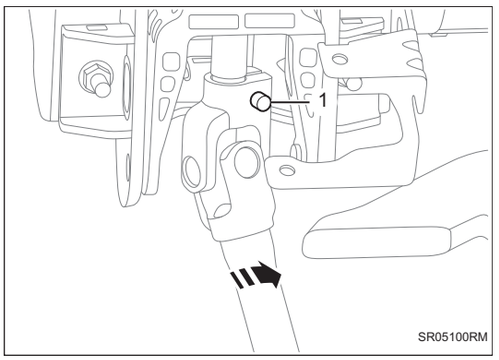


(b) Remove the bolt -1-to separate the steering drive shaft assembly-A- from the steering gear.



(c) Remove the nut -1-4- and remove the steering column assembly-A-.

SR



(d) Adjust it to a proper angle as arrowed, remove the bolt -1-, and remove the steering drive shaft.

Installation

1. **The installation procedure is the reverse of removal procedure.**

T-BOX

T-BOX TB-1
Precautions TB-1
Location of parts TB-2
System diagram TB-5
System description TB-6
Symptom chart TB-7
ECU terminal TB-8
DTC chart TB-9
B14A016 ..... TB-10
B14A017 ..... TB-10
B14A271 ..... TB-13
B14A211 ..... TB-13
B14A245 ..... TB-17
B14A276 ..... TB-17
B14B151 ..... TB-17
B14B252 ..... TB-17
B14C113 ..... TB-17
B14C201 ..... TB-17
B14A401 ..... TB-17
B14A501 ..... TB-17
B14A601 ..... TB-17
B14A264 ..... TB-19
B14C092 ..... TB-23
B14A301 ..... TB-23
U008088 ..... TB-24
U014687 ..... TB-24
U113187 ..... TB-24
U110187 ..... TB-24
U14448A TB-24
U14A28E TB-24
U14918D TB-24
T-Box assembly TB-25
Parts TB-25
Removal TB-27
Installation TB-27

T-BOX

Precautions

1. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

2. Removal and installation of battery terminal

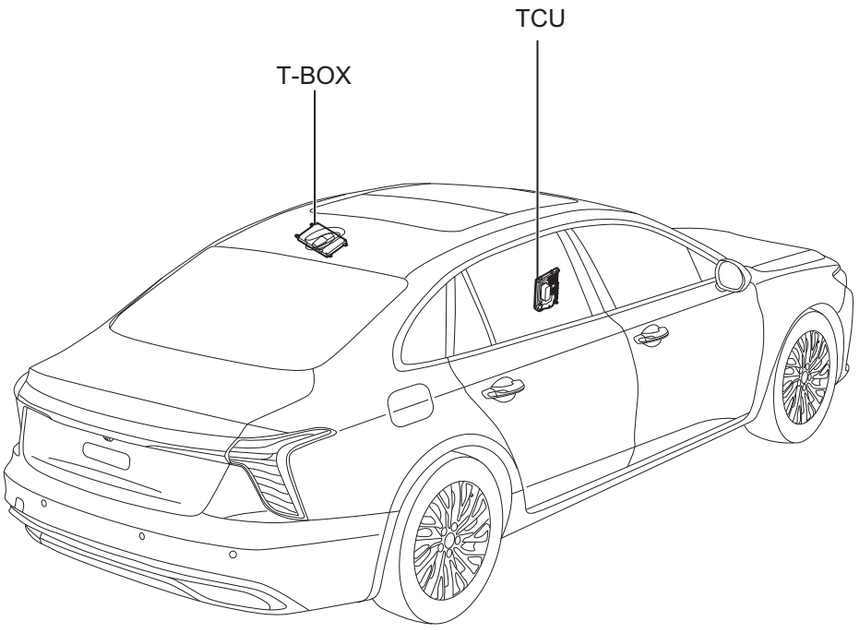
(a) Before removal and repair of electrical components, disconnect the battery negative terminal to prevent the system from short circuit.

(b) Before disconnecting or reconnecting the battery cable terminal, first turn off the power (ignition) switch and lighting switch, and then completely loosen or tighten the battery cable terminal nut.

(c) When reconnecting after disconnecting the battery cable, some systems need to be initialized.

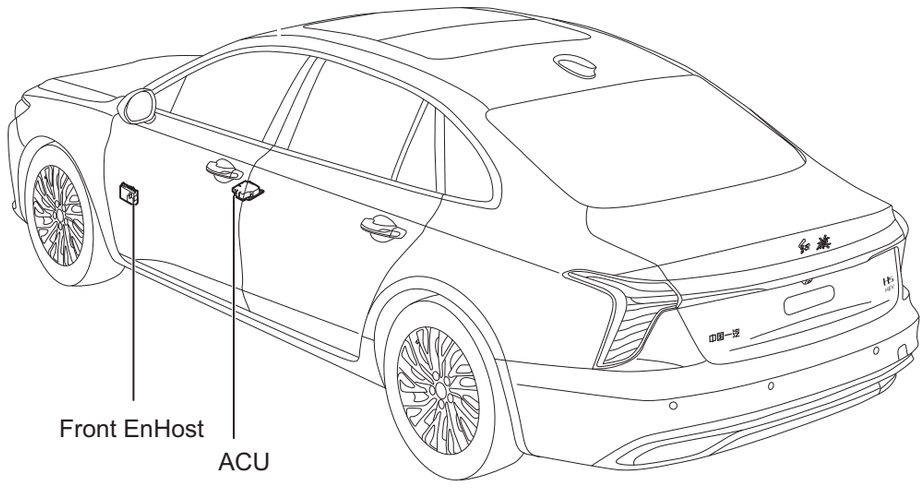
3. After replacing the BCM and IMMO, T-BOX will automatically configure the module. If the automatic configuration fails, it needs to manually configure the module.

Location of parts



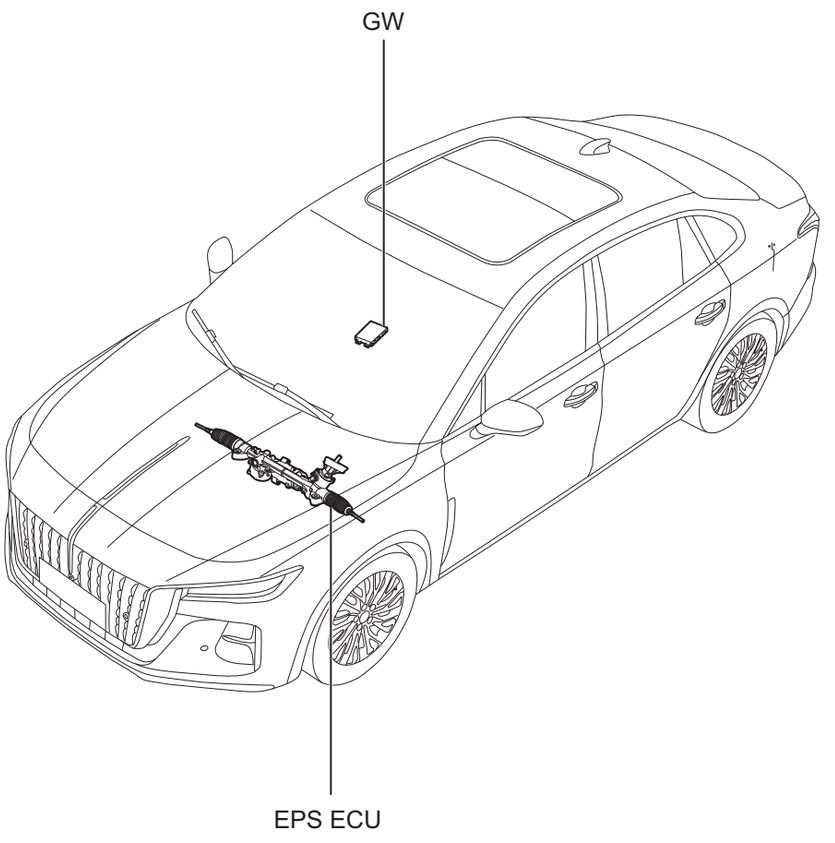
TB00030RM

Location of parts



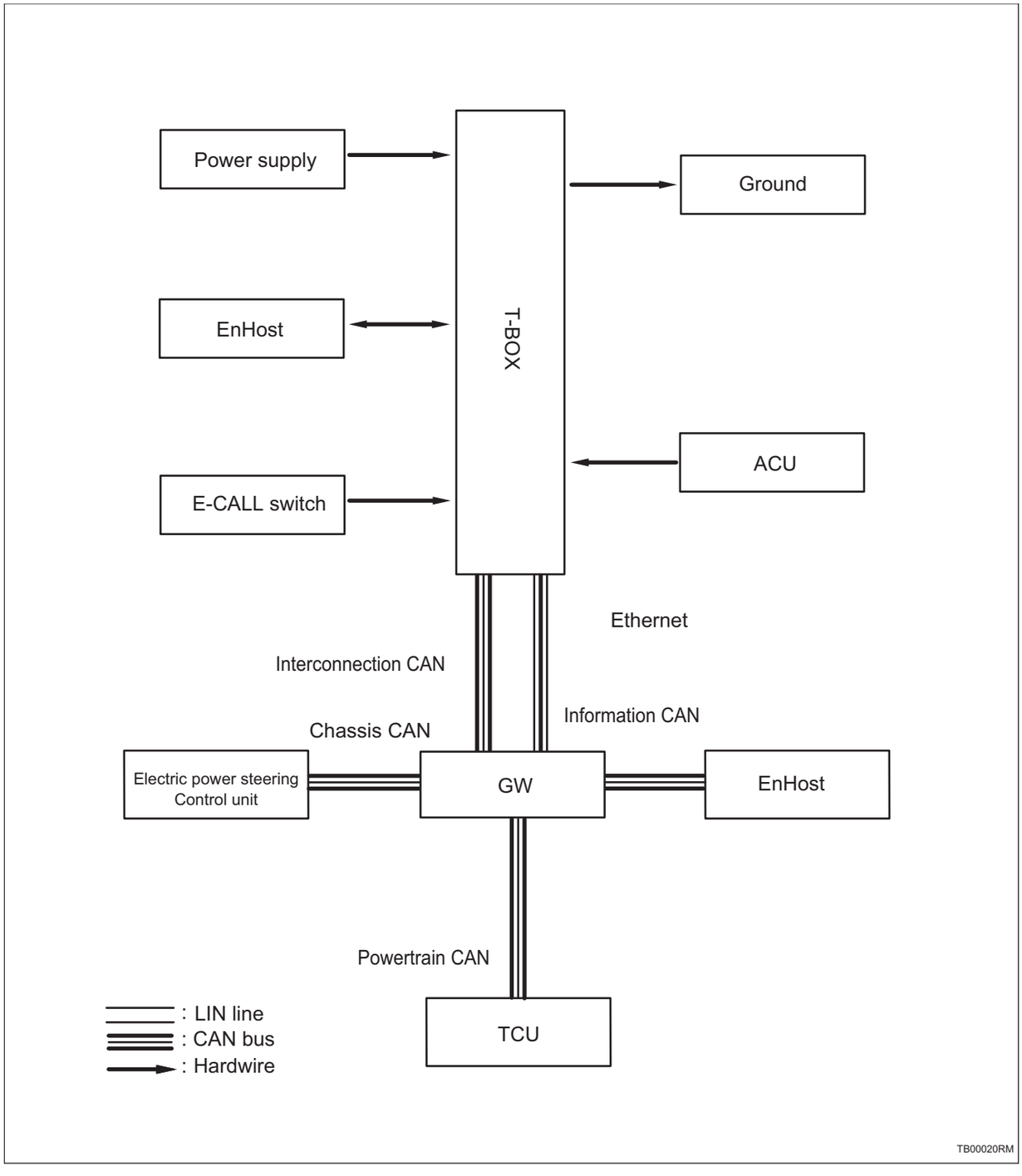
TB00040RM

Location of parts



TB00050RM

System diagram



System description

1. Function brief description

(a) The system can operate additional extended functions such as Baidu CarLife, vehicle roadside assistance, Hongqi background service, Hongqi micro-application, etc.

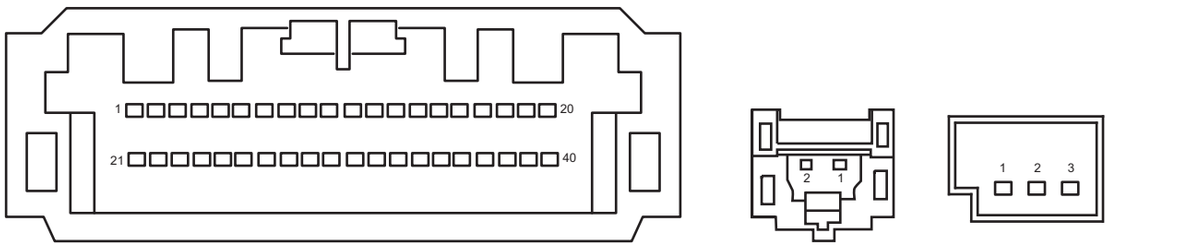
(b) When the vehicle encounters a failure and needs emergency rescue, the user can seek for rescue service through vehicle roadside assistance (B-Call).

(c) When users are driving in unfamiliar areas, navigation services may be available through the Red Flag background service (I-Call).

Symptom chart

Fault	Possible location
System inoperative	• Fuse • Battery • Related harness and connector • T-BOX • GW • Relevant control unit • CAN bus

ECU terminal



T-BOX A (premium/base model) T-BOX B (premium model) T-BOX B (base model)

TB00010RM

T-BOX A premium/base model)			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	—	21	—
2	—	22	—
3	—	23	—
4	—	24	—
5	—	25	T-AUDIO_GND
6	T-AUDIO+	26	SHIELD_GND
7	SHIELD_GND (shield ground connected to AVN)	27	MIC_IN_GND (single-end MIC input ground wire)
8	MIC_IN + (AVN single-end MIC input to T-BOX)	28	—
9	—	29	—
10	—	30	BTN_GND(ECALL button ground wire)
11	SOS CALL BUTTON (ECALL button input)	31	—
12	—	32	—
13	—	33	LED_1 (operating indicator lamp)
14	—	34	MUTE
15	—	35	—
16	—	36	CAN1_L
17	CAN1_H	37	—
18	—	38	IGN
19	SRS (airbag input signal)	39	—
20	BATT (battery +)	40	GND (battery ground wire)

T-BOX B premium model)			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	MDIN (Ethernet data negative)	2	MDIP (Ethernet data positive)

T-BOX B (base model)	
Pin No.	**DEFINITIONS**
1	—
2	MDIP (Ethernet data positive)
3	MDIN (Ethernet data negative)

DTC chart

DTC	Description	Reference page
B14A016	Circuit undervoltage	(See page TB-10)
B14A017	Circuit overvoltage	(See page TB-10)
B14A245	EMMC fault	(See page TB-17)
B14A211	LED fault	(See page TB-13)
B14A276	Built-in SIM card fault	(See page TB-17)
B14A271	CALL button bonding	(See page TB-13)
B14A264	Crash detection fault	(See page TB-19)
B14B151	Tuner communication failure	(See page TB-17)
B14B252	Gsensor communication failure	(See page TB-17)
B14C092	GNSS fault	(See page TB-23)
B14C113	Module communication failure	(See page TB-17)
B14C201	Ethernet module failure	(See page TB-17)
B14A301	Tuner antenna failure	(See page TB-23)
B14A401	UBLOX module failure	(See page TB-17)
B14A501	CODEC module failure	(See page TB-17)
B14A601	WIFI module failure	(See page TB-17)
U008088	Interconnection CAN bus off	(See page TB-24)
U014687	GW node lost	(See page TB-24)
U113187	EPS ECU message lost	(See page TB-24)
U110187	TCU message lost	(See page TB-24)
U14448A	Tbox ETH1 connection failure	(See page TB-24)
U14A28E	IVI1 SOMEIP no response	(See page TB-24)
U14918D	GW PDU message timeout	(See page TB-24)

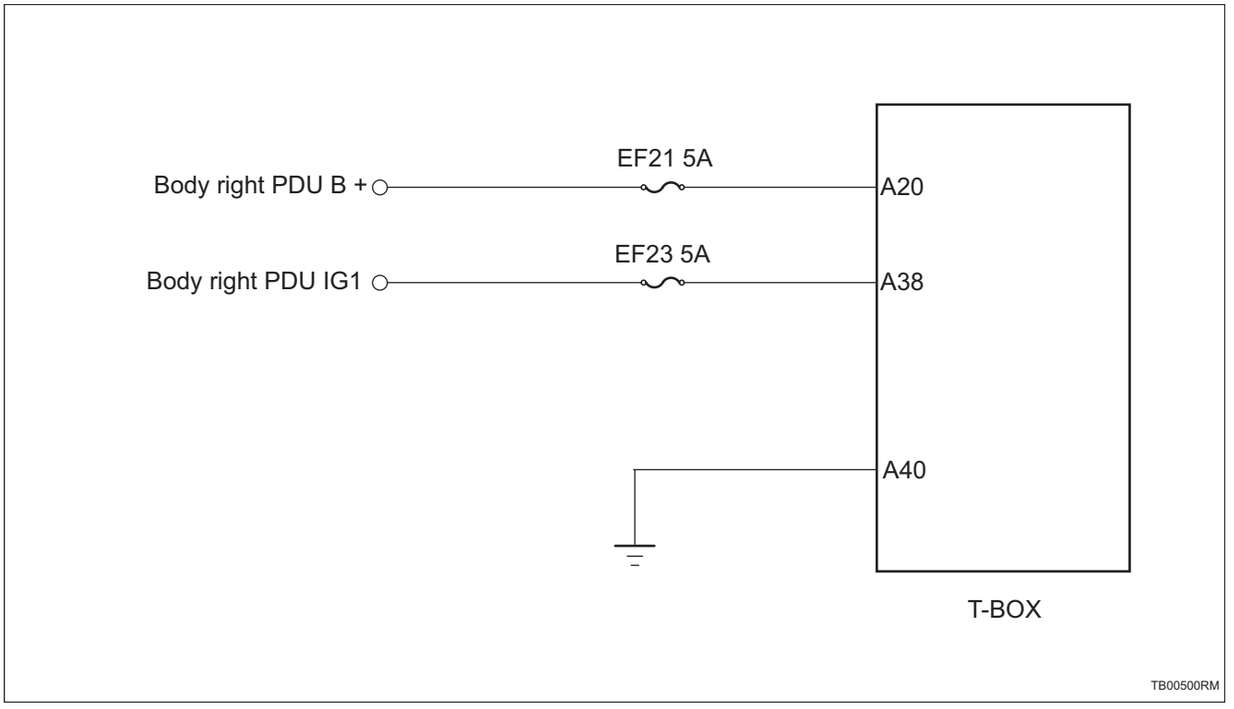
DTC	B14A016	Circuit undervoltage
DTC	B14A017	Circuit overvoltage

Description

When the T-BOX power supply exceeds the normal operating range, T-BOX records the DTC.

DTC	DTC detection conditions	Faulty location
B14A016	(a) Main power supply voltage low.	• T-BOX • Harness and connector • Charging system
B14A017	(a) Main power supply voltage high.	• T-BOX • Harness and connector • Charging system

Circuit diagram



TB

Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery + - battery -	Always connected	About 11 V ~ 14 V

NG	Overhaul the charging system

OK

2	**Check the T-BOX fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the T-BOX fuse.

(d) Measure the resistance according to the values in the table below.

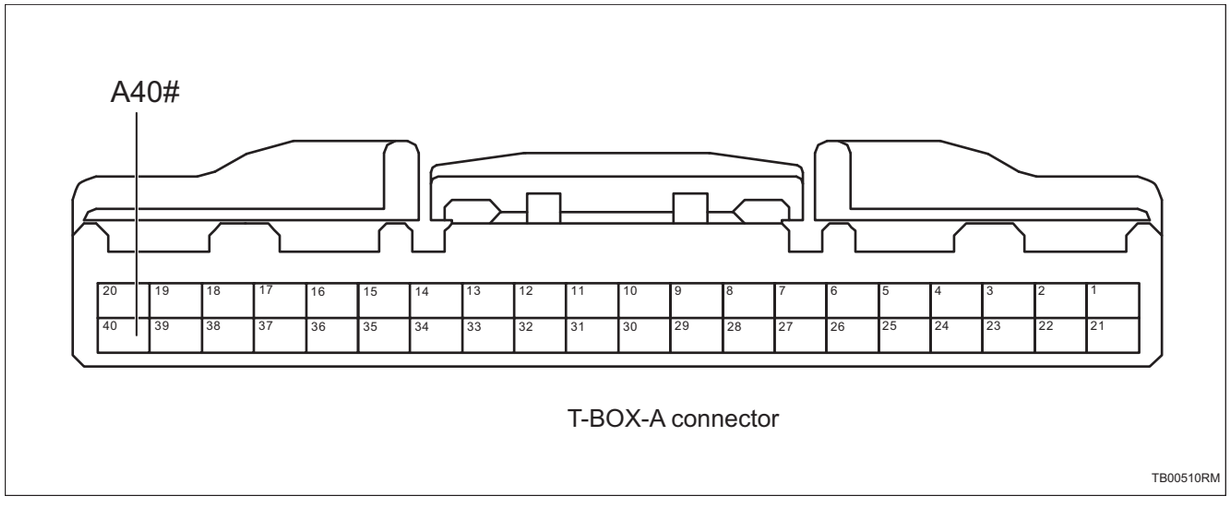
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG **Replace fuse**

OK

3	**Check T-BOX ground**



T-BOX-A connector

TB00510RM

(a) Disconnect the T-BOX connector.

(b) Measure the resistance according to the values in the table below.

Standard value

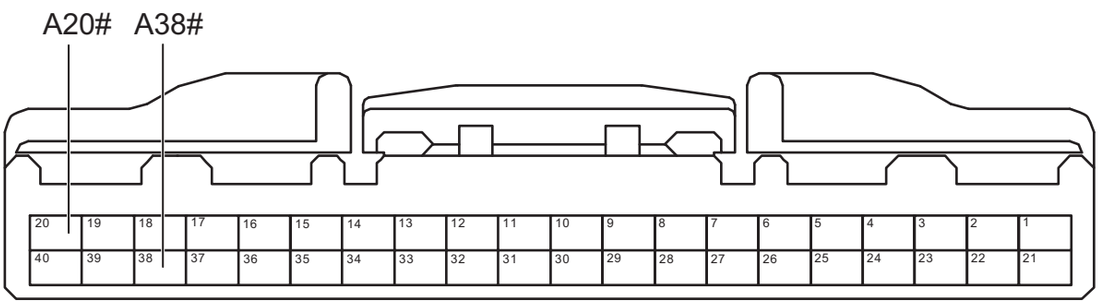
Detector connection	Detection conditions	Specified state
T-BOX connector A40# -body GND	Always connected	Less than 1Ω

TB

NG → **Repair or replace the harness and connector**

OK

4	Check T-BOX power supply



T-BOX-A connector

TB00521RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
T-BOX connector A20# -body GND	Set the ignition switch to "ON"	Battery voltage
T-BOX connector A38# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	Replace T-BOX (See page TB-25)

TB

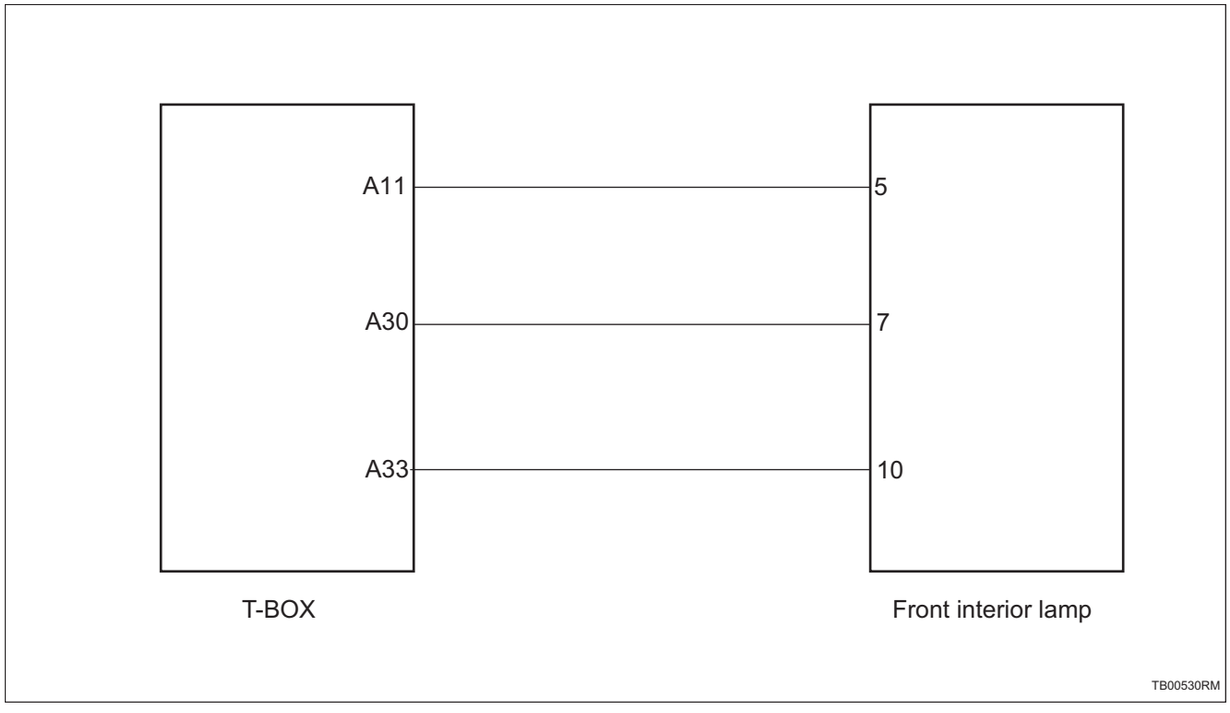
DTC	B14A271	CALL button bonding
DTC	B14A211	LED fault

Description

When the E-CALL button is stuck or LED indicator lamp fails, the T-BOX will record the DTC.

DTC	DTC detection conditions	Faulty location
B14A271	(a) CALL button stuck.	• E-CALL switch (front interior lamp) • Harness and connector • T-BOX
B14A211	(a) LED fault.	• E-CALL switch (front interior lamp) • Harness and connector • T-BOX

Circuit diagram



Inspection procedure

1	Check E-CALL switch

(a) Check the E-CALL switch for foreign matter.

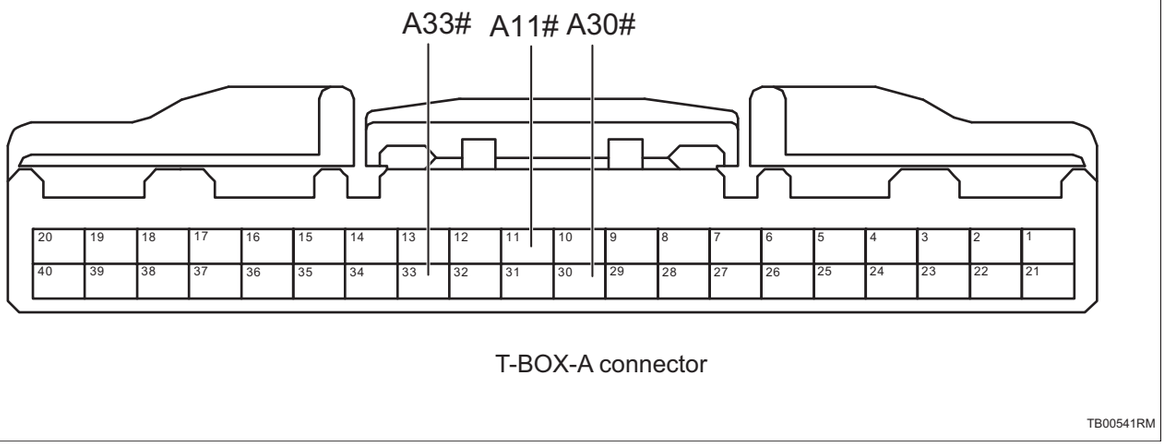
(b) Check the E-CALL switch for seizure.

NG	Repair according to the fault

TB

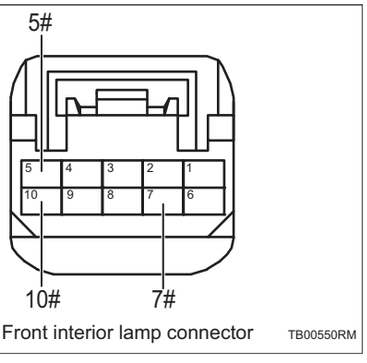
OK

2	**Check E-CALL switch harness and connector for open circuit**



T-BOX-A connector

TB00541RM



Front interior lamp connector TB00550RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the T-BOX connector.

(d) Disconnect the E-CALL switch connector.

(e) Measure the resistance according to the values in the table below.

Standard value

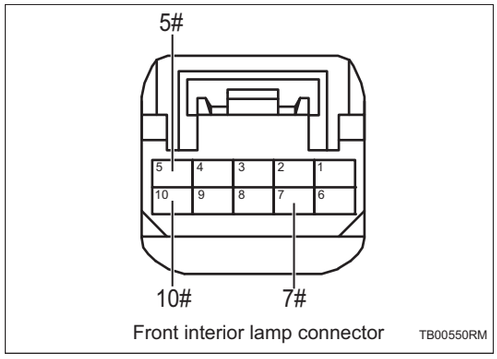
Detector connection	Detection conditions	Specified state
Front interior lamp connector 5# - T-BOX connector A11#	Always connected	Less than 1Ω
Front interior lamp connector 7# - T-BOX connector A30#	Always connected	Less than 1Ω
Front interior lamp connector 10# - T-BOX connector A33#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	**Check E-CALL switch harness and connector for circuit shorted to ground**

TB



(a) Measure the resistance according to the values in the table below.

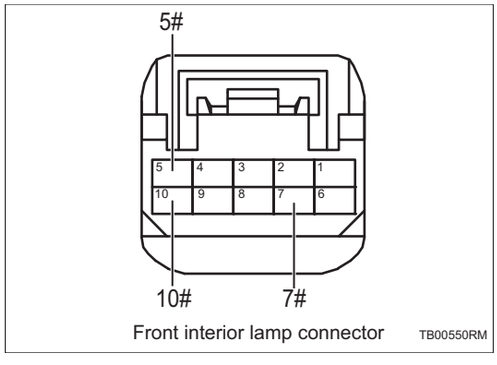
Standard value

Detector connection	Detection conditions	Specified state
E-CALL switch connector 5# - body GND	Always connected	10 KΩ or greater
E-CALL switch connector 7# - body GND	Always connected	10 KΩ or greater
E-CALL switch connector 10# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check E-CALL switch harness and connector for circuit shorted to power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
E-CALL switch connector 5# - body GND	Set the ignition switch to "ON"	Less than 1 V
E-CALL switch connector 7# - body GND	Set the ignition switch to "ON"	Less than 1 V
E-CALL switch connector 10# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Replace E-CALL switch (See page LI-111)

(a) Replace the E-CALL switch.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

TB

Criteria:

No DTC is output.

NG → **Replace T-BOX (See page TB-25)**

OK

6	**End**

DTC	B14A245	EMMC fault
DTC	B14A276	Built-in SIM card fault
DTC	B14B151	Tuner communication failure
DTC	B14B252	Gsensor communication failure
DTC	B14C113	Module communication failure
DTC	B14C201	Ethernet module failure
DTC	B14A401	UBLOX module failure
DTC	B14A501	CODEC module failure
DTC	B14A601	WIFI module failure

Description

When the system function is abnormal due to the internal fault of T-BOX, T-BOX records the DTC.

DTC	DTC detection conditions	Faulty location
B14A245	(a) SEMMC fault.	• T-BOX
B14A276	(a) The built-in SIM card is faulty.	• T-BOX
B14B151	(a) Tuner communication failure.	• T-BOX
B14B252	(a) Gsensor communication failure.	• T-BOX
B14C113	(a) Module communication failure.	• T-BOX
B14C201	(a) Ethernet module failure.	• T-BOX
B14A401	(a) UBLOX module fault.	• T-BOX
B14A501	(a) codec module fault.	• T-BOX
B14A601	(a) WIFI module fault.	• T-BOX

TB

Inspection procedure

1	**Clear DTC**

(a) Restart the T-BOX (disconnect the 12 V battery- and connect the battery- after 10 minutes).

(b) Connect the HQ-VDS.

(c) Clear DTC (clear all system DTCs).

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace T-BOX (See page TB-25)**

OK

2	**End**

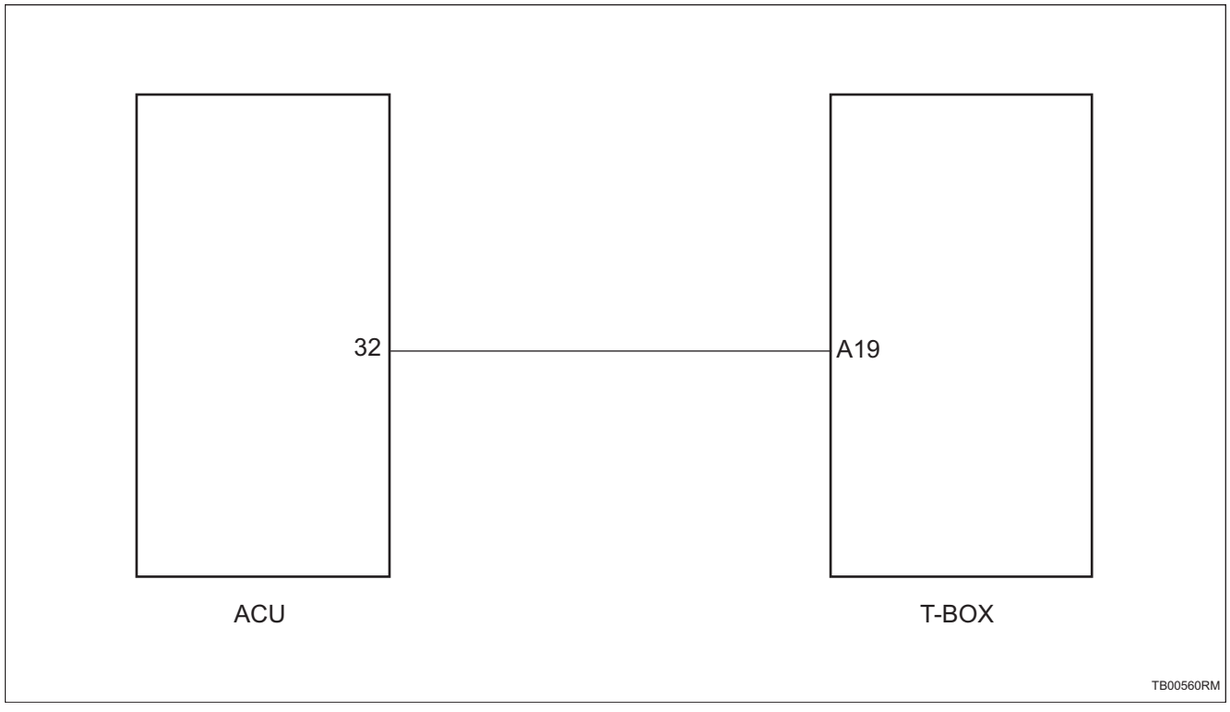
DTC	B14A264	Crash detection fault

Description

When the impact output signal is abnormal, the ACU records DTC.

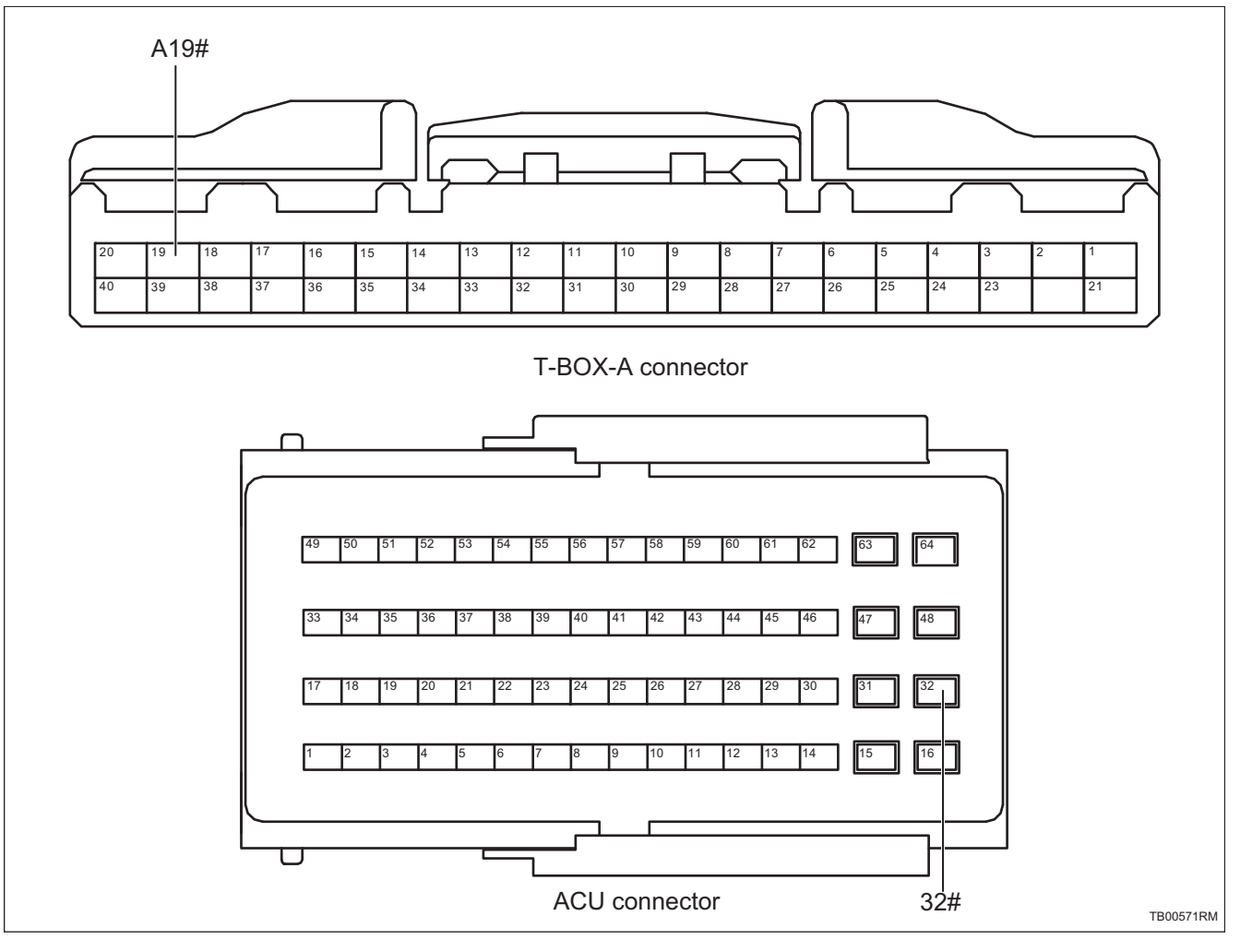
DTC	DTC detection conditions	Faulty location
B14A264	(a) Collision output failure.	• ACU • Harness and connector • T-BOX

Circuit diagram



Inspection procedure

1	Check harness and connector for open circuit (ACU-T-BOX)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the T-BOX connector.

(d) Disconnect the ACU connector.

(e) Measure the resistance according to the values in the table below.

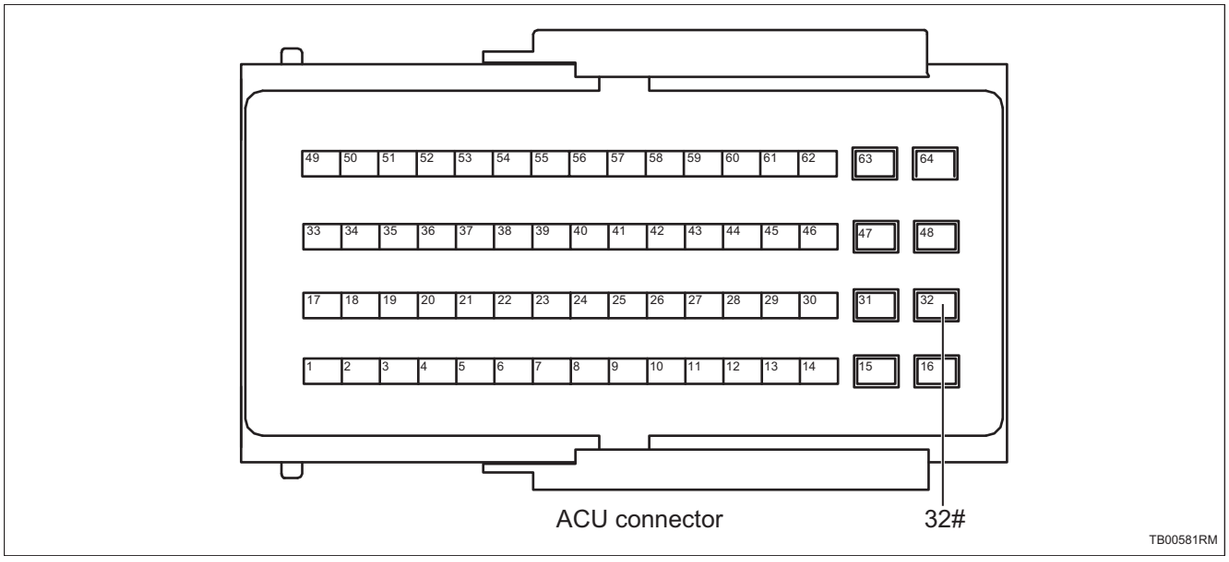
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 32# - T-BOX connector A19#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check ACU harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

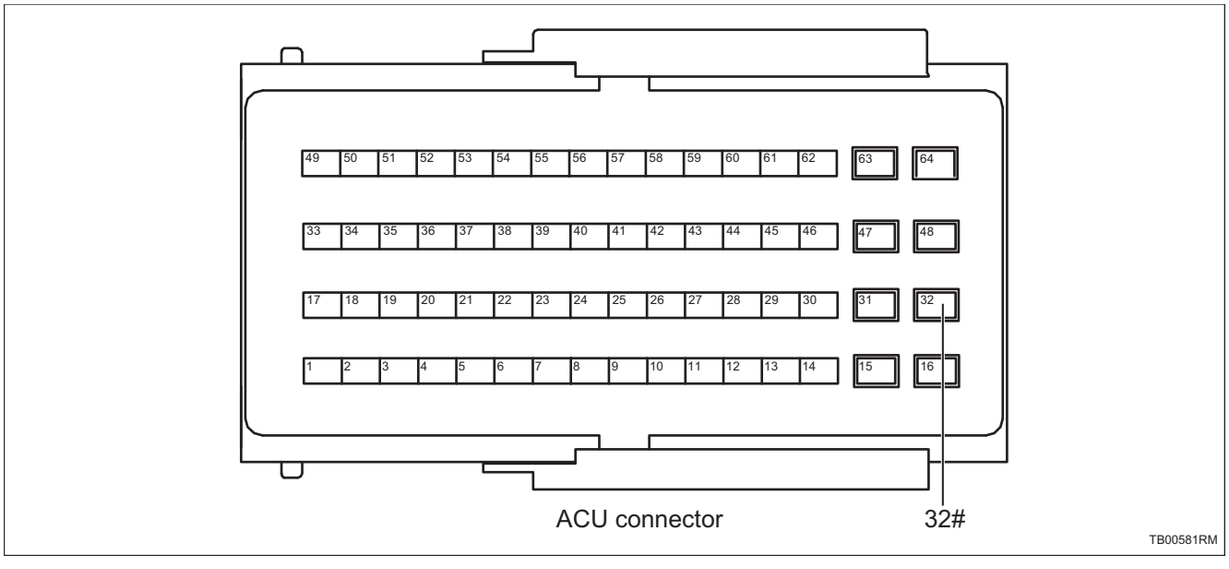
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 32#-body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	Check ACU harness and connector for circuit shorted to power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACU connector 32#-body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace ACU (See page RS-218)**

(a) Replace the ACU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace T-BOX (See page TB-25)**

OK

5	**End**

DTC	B14C092	GNSS fault
DTC	B14A301	Tuner antenna failure

Description

When the antenna inside the T-BOX is short-circuited or open-circuited, the T-BOX would record the DTC.

DTC	DTC detection conditions	Faulty location
B14C092	(a) GNSS fault.	• T-BOX
B14A301	(a) Tuner antenna fault.	• T-BOX

Inspection procedure

1	Clear DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace T-BOX (See page TB-25)**

OK

2	End

DTC	U008088	Interconnection CAN bus off
DTC	U014687	GW node lost
DTC	U113187	EPS ECU message lost
DTC	U110187	TCU message lost
DTC	U14448A	Tbox ETH1 connection failure
DTC	U14A28E	IVI1 SOMEIP no response
DTC	U14918D	GW PDU message timeout

Description

When the communication between the T-BOX and other systems is abnormal or interrupted, the T-BOX would record the DTC.

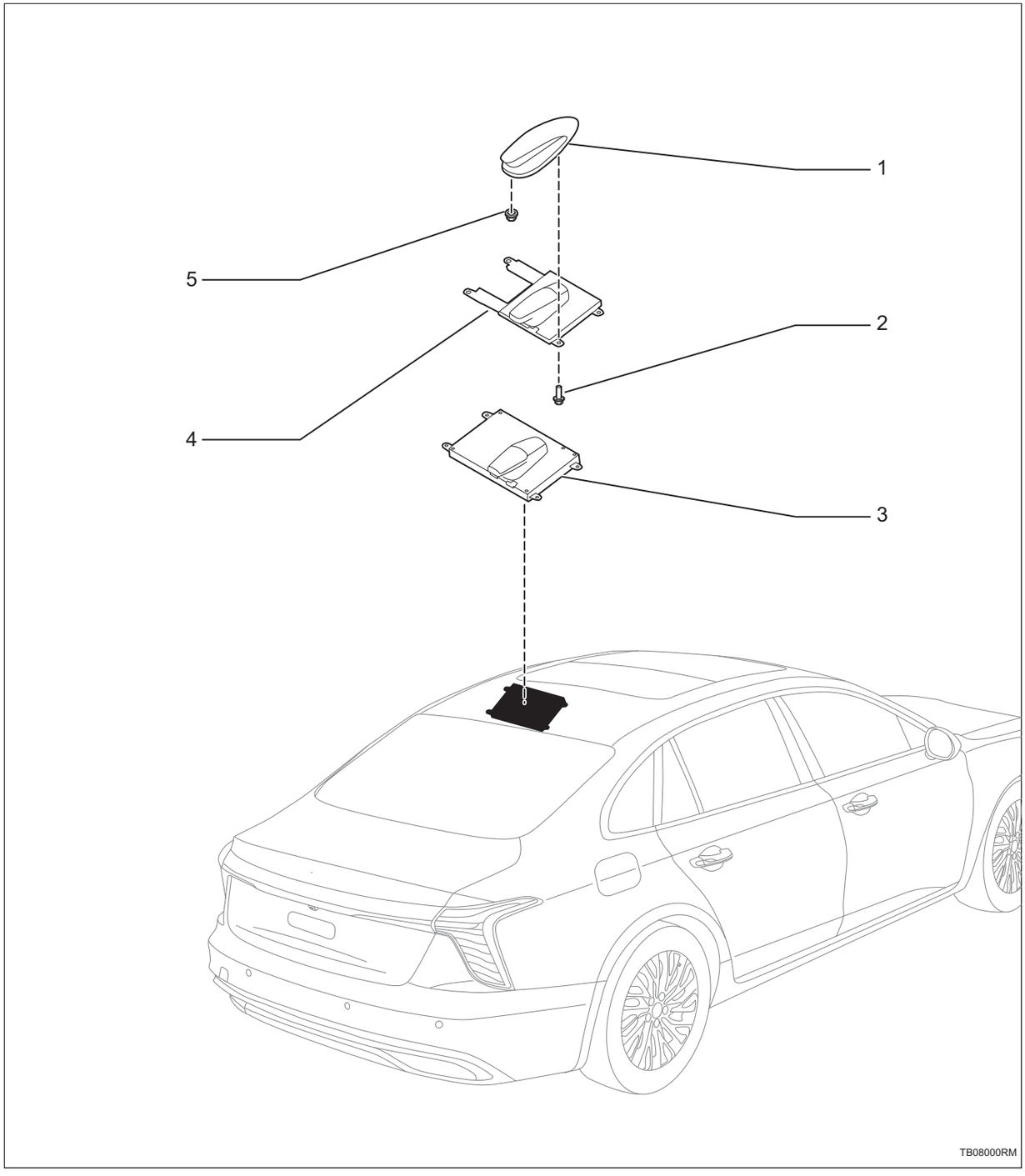
DTC	DTC detection conditions	Faulty location
U008088	(a) Abnormal or interrupted communication.	• Relevant system control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	
U113187	(a) Abnormal or interrupted communication.	
U110187	(a) Abnormal or interrupted communication.	
U14448A	(a) Abnormal or interrupted communication.	
U14A28E	(a) Abnormal or interrupted communication.	
U14918D	(a) Abnormal or interrupted communication.	

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

T-Box assembly

Parts

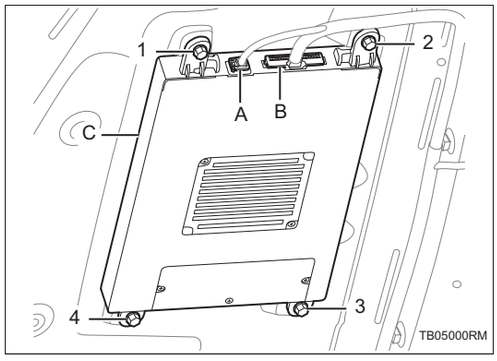


1. **Shark fin antenna housing**
2. **Hexagon flange bolt**
   - X4
   - Torque: 8~12 N · m
3. **T-Box assembly (only for 2.0T model)**

4. **T-Box assembly**
5. **Hexagon flange nut**
   - X3
   - Torque: 1.3~1.9 N · m

Removal

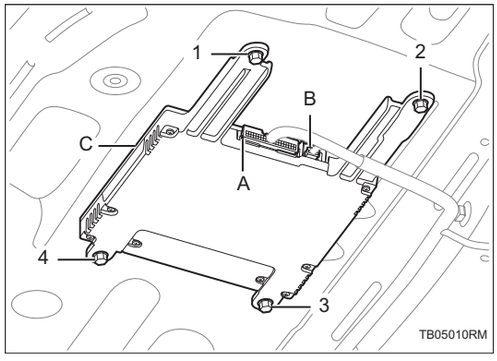
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove roof assembly (See page IR-44)**
3. **Remove T-Box assembly (only for 2.0T model)**



(a) Disconnect the harness connector-A-B-.

(b) Remove the bolt -1-4- and remove the T-Box assembly-C-.

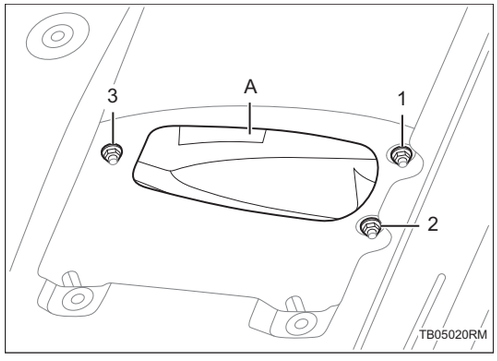
4. **Remove T-Box assembly**



(a) Disconnect the harness connector-A-B-.

(b) Remove the bolt -1-4- and remove the T-Box assembly-C-.

5. **Remove shark fin antenna housing**



(a) Remove nut -1-3- and remove T-Box assembly -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

T-Box - Overseas

T-Box - Overseas TB-1
Precautions TB-1
Location of parts TB-2
System diagram TB-3
System description TB-4
Symptom chart TB-5
ECU terminal TB-6
DTC chart TB-7
B14A016 ..... TB-8
B14A017 ..... TB-8
B14A149 ..... TB-11
B14A14B TB-11
B14A271 ..... TB-12
B14A211 ..... TB-12
B14A245 ..... TB-16
B14A276 ..... TB-16
B14B151 ..... TB-16
B14B252 ..... TB-16
B14C113 ..... TB-16
B14C201 ..... TB-16
B14B152 ..... TB-16
B14A264 ..... TB-17
B14C092 ..... TB-21
B14C393 ..... TB-22
B14C394 ..... TB-26
U008088 ..... TB-30
U014687 ..... TB-30
U14448A TB-30
U14918D TB-30
U14A08E TB-30
U14A68E TB-30
U115187 ..... TB-30

TB

T-Box - Overseas

Precautions

1. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

2. Removal and installation of battery terminal

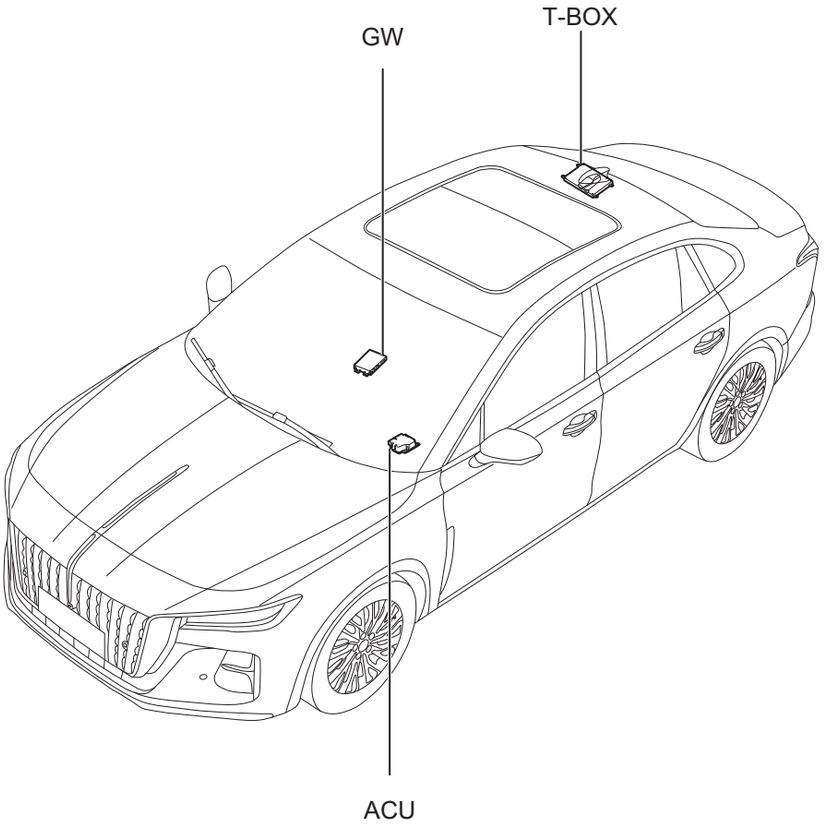
(a) Before removal and repair of electrical components, disconnect the battery negative terminal to prevent the system from short circuit.

(b) Before disconnecting or reconnecting the battery cable terminal, first turn off the power (ignition) switch and lighting switch, and then completely loosen or tighten the battery cable terminal nut.

(c) When reconnecting after disconnecting the battery cable, some systems need to be initialized.

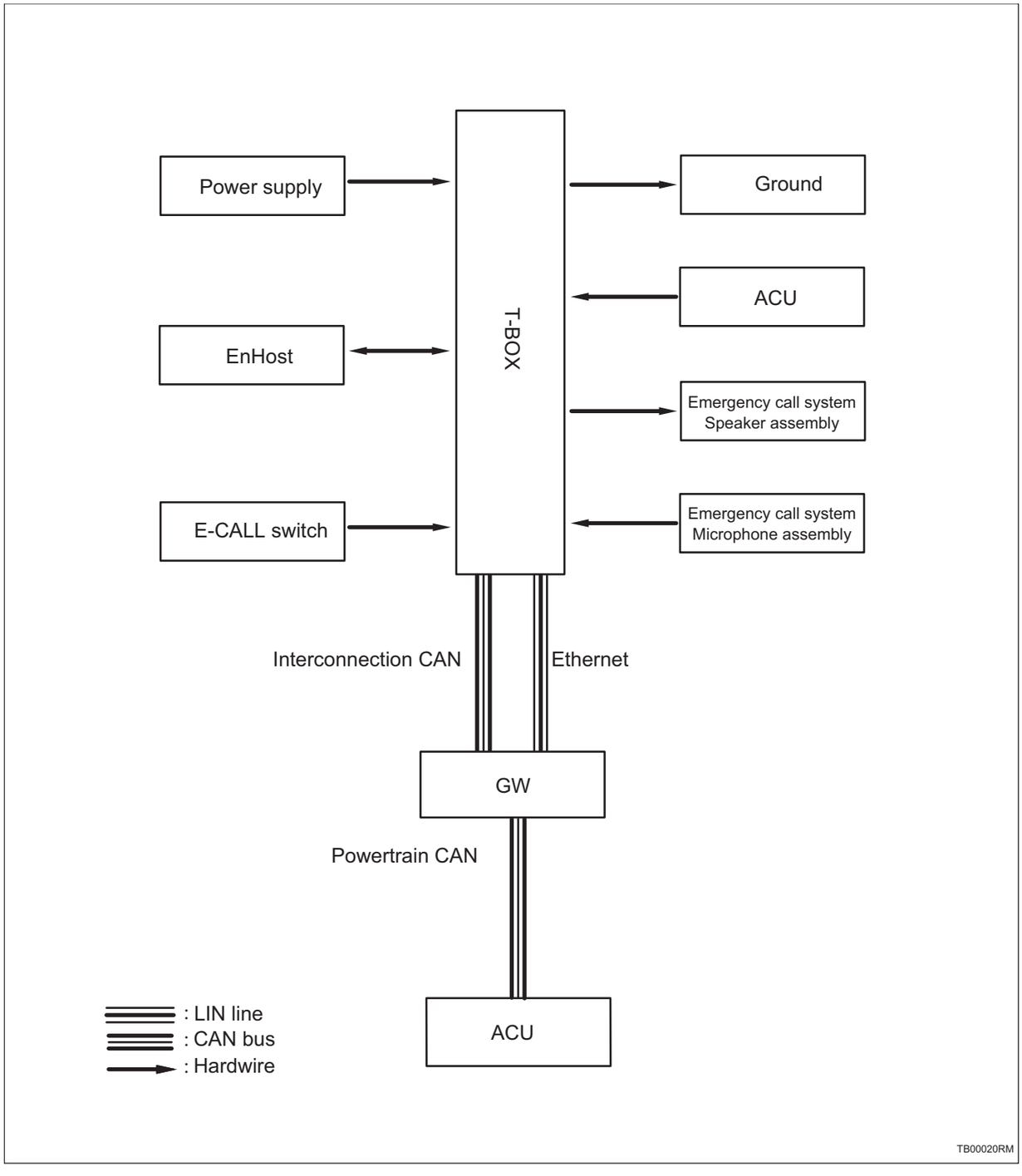
3. After replacing the BCM and IMMO, T-BOX will automatically configure the module. If the automatic configuration fails, it needs to manually configure the module.

Location of parts



TB00050RM

System diagram



System description

1. Function brief description

(a) The system can operate additional extended functions such as Baidu CarLife, vehicle roadside assistance, Hongqi background service, Hongqi micro-application, etc.

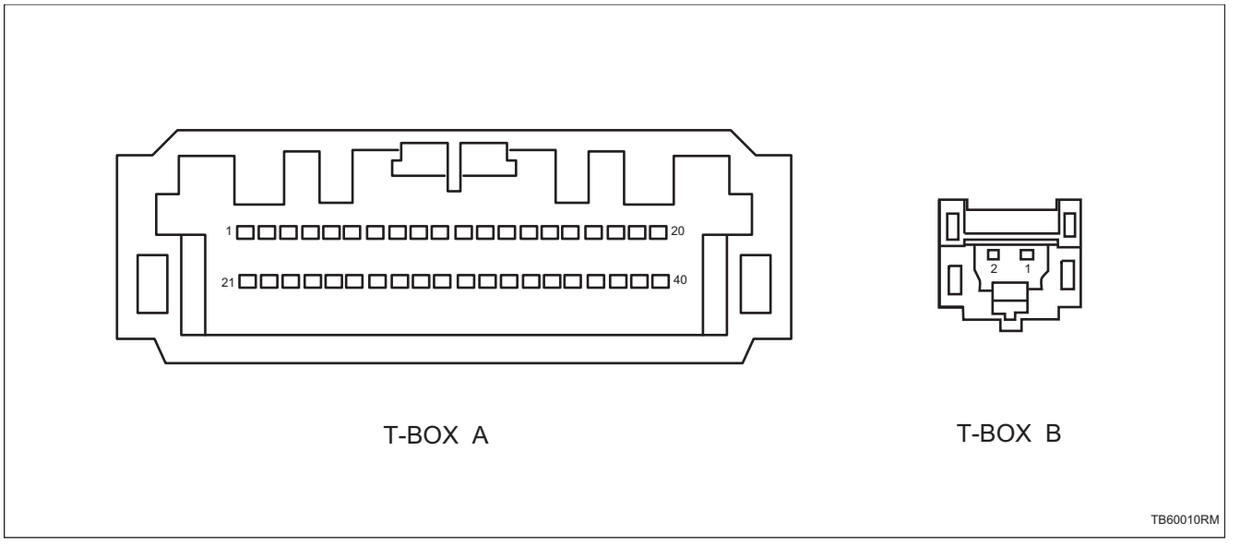
(b) When the vehicle encounters a failure and needs emergency rescue, the user can seek for rescue service through vehicle roadside assistance (B-Call).

(c) When users are driving in unfamiliar areas, navigation services may be available through the Red Flag background service (I-Call).

Symptom chart

Fault	Possible location
System inoperative	• Fuse • Battery • Related harness and connector • T-BOX • GW • Relevant control unit • CAN bus

ECU terminal



T-BOX A (overseas)			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	—	21	—
2	—	22	—
3	—	23	ECALL SPK-(speaker output -)
4	ECALL SPK+ (speaker audio output +)	24	—
5	—	25	T-AUDIO_GND
6	T-AUDIO+	26	SHIELD_GND
7	SHIELD_GND (shield ground connected to AVN)	27	MIC_IN_GND (single-end MIC input ground wire)
8	MIC_IN + (AVN single-end MIC input to T-BOX)	28	—
9	—	29	ECALL_MIC_IN_GND (single-ended MIC input ground)
10	ECALL_MIC_IN+ (Ecall independent single-ended MIC input)	30	BTN_GND(ECALL button ground wire)
11	SOS_CALL_BUTTON	31	—
12	—	32	—
13	—	33	LED_POWER (working indicator lamp power supply)
14	—	34	—
15	—	35	—
16	—	36	CAN1_L (CAN low)
17	CAN1_H (CAN high)	37	—
18	—	38	IGN (ACC ignition signal Input)
19	SRS (airbag input signal)	39	—
20	BATT (battery +)	40	GND (battery ground wire)

T-BOX B (overseas)			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	MDIN (Ethernet data negative)	2	MDIP (Ethernet data positive)

DTC chart

DTC	Description	Reference page
B14A016	Circuit undervoltage	(See page TB-8)
B14A017	Circuit overvoltage	(See page TB-8)
B14A149	Abnormal built-in battery voltage	(See page TB-11)
B14A14B	Abnormal battery temperature	(See page TB-11)
B14A245	EMMC fault	(See page TB-16)
B14A211	LED fault	(See page TB-12)
B14A276	Built-in SIM card fault	(See page TB-16)
B14A271	CALL button bonding	(See page TB-12)
B14A264	Crash detection fault	(See page TB-17)
B14B151	Tuner communication failure	(See page TB-16)
B14B252	Gsensor communication failure	(See page TB-16)
B14C092	GNSS fault	(See page TB-21)
B14C113	Module communication failure	(See page TB-16)
B14C201	Ethernet module failure	(See page TB-16)
B14B152	DAB communication failure	(See page TB-16)
B14C393	MIC fault	(See page TB-22)
B14C394	Speaker fault	(See page TB-26)
U008088	Interconnection CAN bus off	(See page TB-30)
U014687	GW node lost	(See page TB-30)
U14448A	Tbox ETH1 connection failure	(See page TB-30)
U14918D	GW PDU message timeout	(See page TB-30)
U14A08E	Gateway SOMEIP no response	(See page TB-30)
U14A68E	AVM SOMEIP no response	(See page TB-30)
U115187	ACU message lost	(See page TB-30)

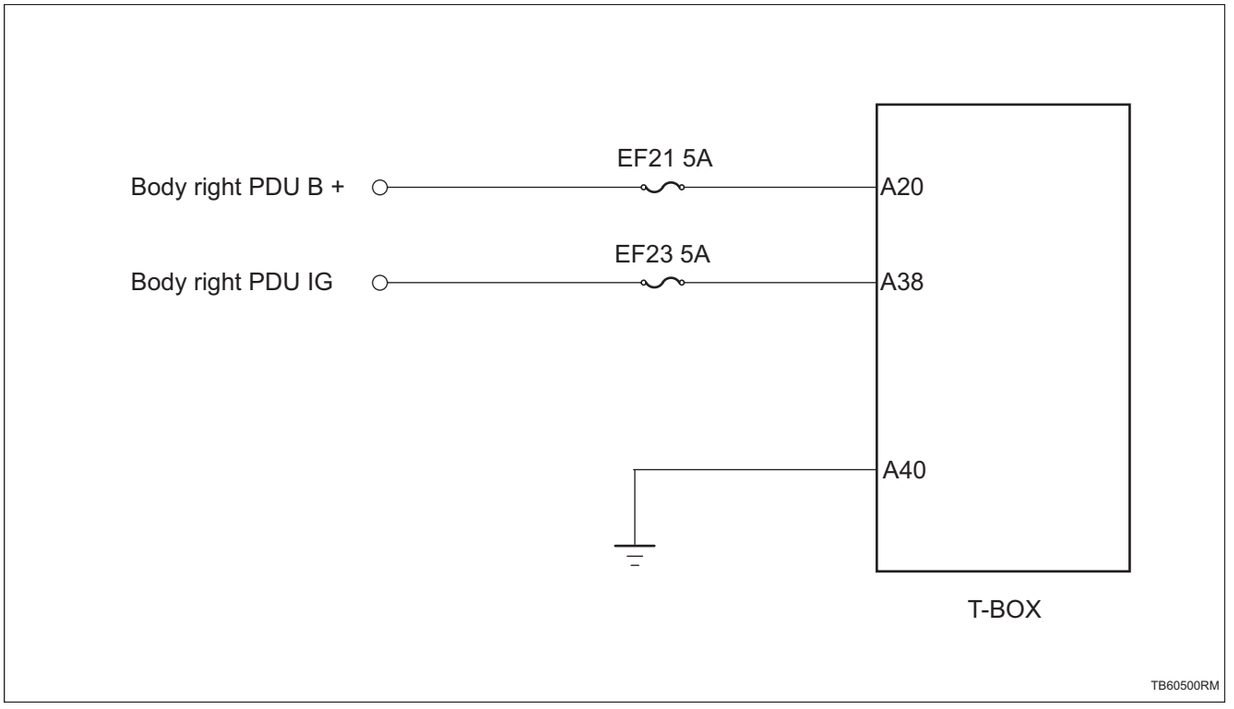
DTC	B14A016	Circuit undervoltage
DTC	B14A017	Circuit overvoltage

Description

When the T-BOX power supply exceeds the normal operating range, T-BOX records the DTC.

DTC	DTC detection conditions	Faulty location
B14A016	(a) Power supply voltage low.	• T-BOX • Harness and connector • Charging system
B14A017	(a) Power supply voltage high.	• T-BOX • Harness and connector • Charging system

Circuit diagram



TB

Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery + - battery -	Always connected	About 11 V ~ 14 V

NG	Overhaul the charging system

OK

2	**Check the T-BOX fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the T-BOX fuse.

(d) Measure the resistance according to the values in the table below.

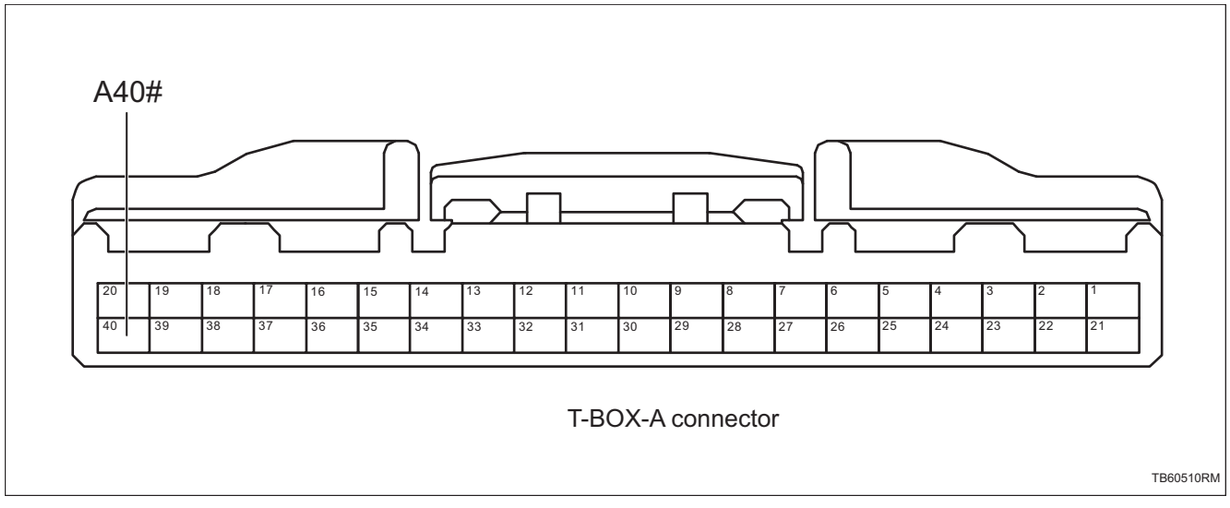
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG **Replace fuse**

OK

3	**Check T-BOX ground**



T-BOX-A connector

TB60510RM

(a) Disconnect the T-BOX connector.

(b) Measure the resistance according to the values in the table below.

Standard value

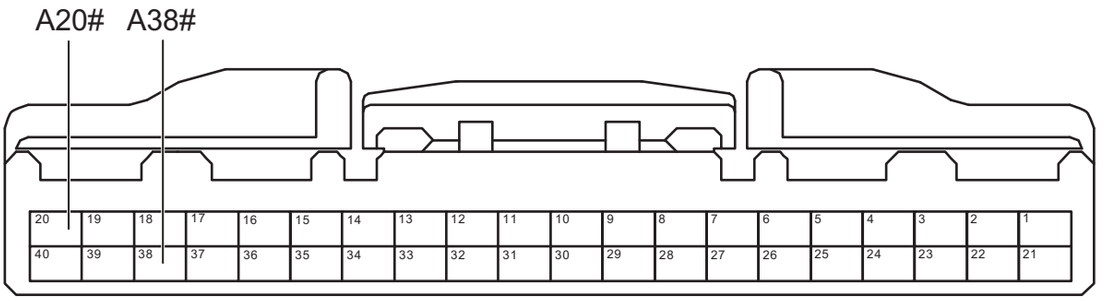
Detector connection	Detection conditions	Specified state
T-BOX connector A40# -body GND	Always connected	Less than 1Ω

TB

NG → **Repair or replace the harness and connector**

OK

4	**Check T-BOX power supply**



T-BOX-A connector

TB60521RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
T-BOX connector A20# -body GND	Set the ignition switch to "ON"	Battery voltage
T-BOX connector A38# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace T-BOX (See page TB-25)**

TB

DTC	B14A149	Abnormal built-in battery voltage
DTC	B14A14B	Abnormal battery temperature

Description

When the system function is abnormal due to the failure of T-BOX internal battery, T-BOX records the DTC.

DTC	DTC detection conditions	Faulty location
B14A149	(a) Abnormal built-in battery voltage.	• T-BOX
B14A14B	(a) Abnormal battery temperature	• T-BOX

Inspection procedure

1	Clear DTC

(a) Connect the HQ-VDS.

(b) Clear the DTC.

(c) Re-read the DTC.

Standard

No DTC output

NG → **Replace T-BOX (See page TB-25)**

OK

2	End

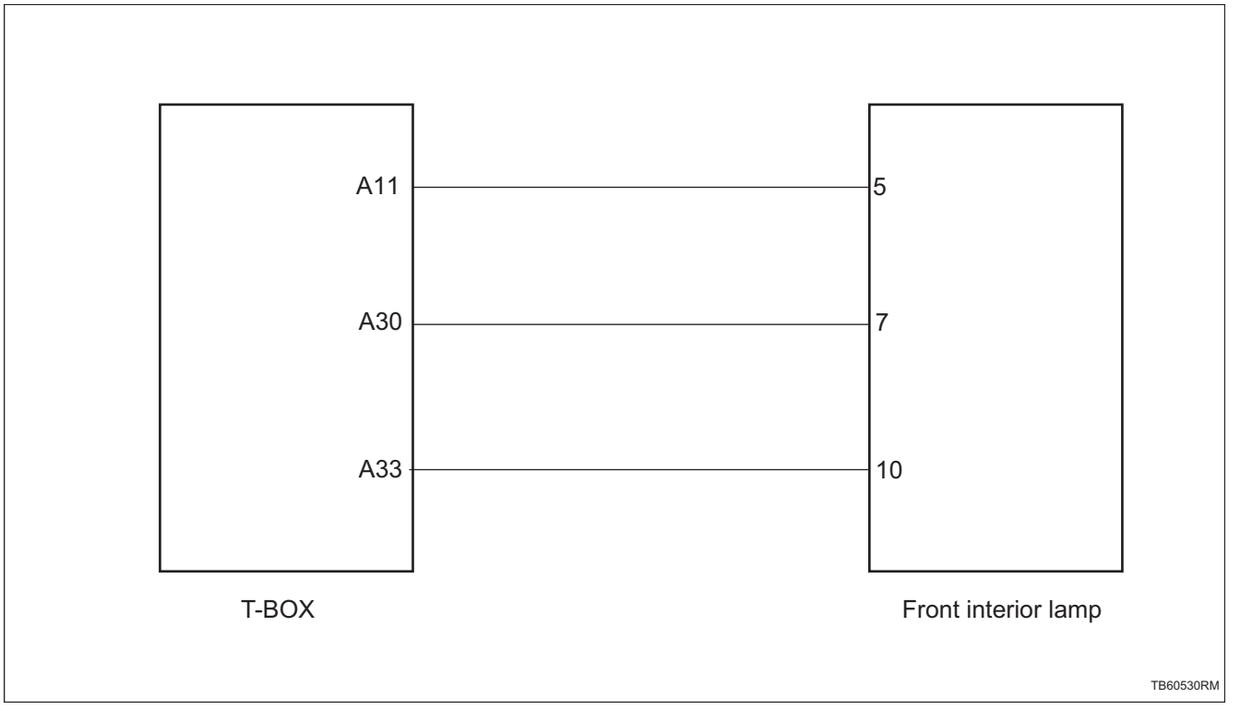
DTC	**B14A271**	**CALL button bonding**
DTC	**B14A211**	**LED fault**

Description

When the E-CALL button is stuck or LED indicator lamp fails, the T-BOX will record the DTC.

DTC	DTC detection conditions	Faulty location
B14A271	(a) CALL button stuck.	• E-CALL switch (front interior lamp) • Harness and connector • T-BOX
B14A211	(a) LED fault.	• E-CALL switch (front interior lamp) • Harness and connector • T-BOX

Circuit diagram



Inspection procedure

1	**Check E-CALL switch**

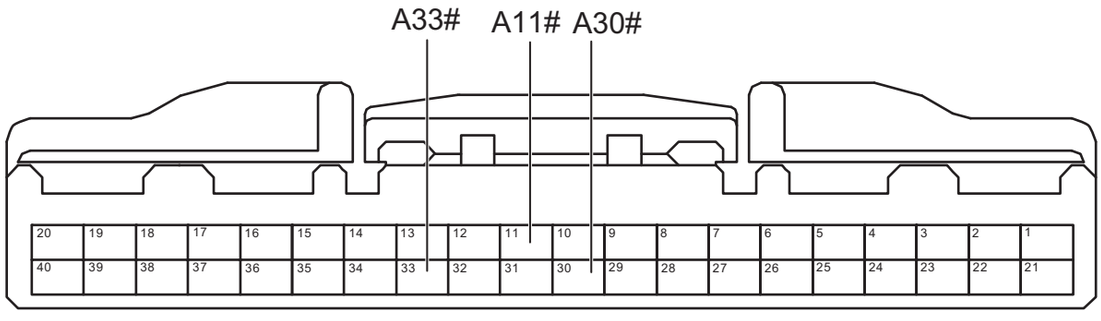
(a) Check the E-CALL switch for foreign matter.

(b) Check the E-CALL switch for seizure.

NG	**Repair according to the fault**

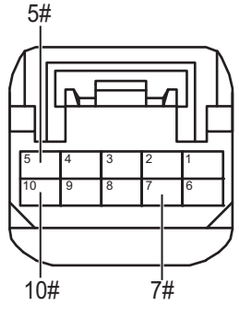
OK

2	Check E-CALL switch harness and connector for open circuit



T-BOX-A connector

TB60541RM



Front interior lamp connector TB60550RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the T-BOX connector.

(d) Disconnect the E-CALL switch connector.

(e) Measure the resistance according to the values in the table below.

Standard value

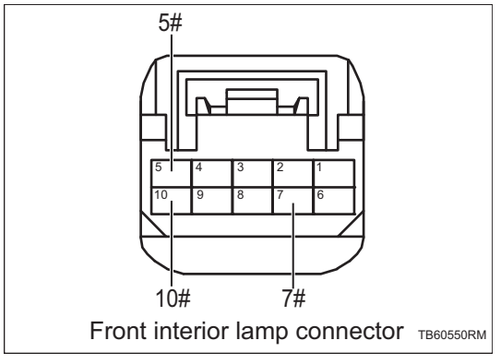
Detector connection	Detection conditions	Specified state
Front interior lamp connector 5# - T-BOX connector A11#	Always connected	Less than 1Ω
Front interior lamp connector 7# - T-BOX connector A30#	Always connected	Less than 1Ω
Front interior lamp connector 10# - T-BOX connector A33#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	Check E-CALL switch harness and connector for circuit shorted to ground

TB



(a) Measure the resistance according to the values in the table below.

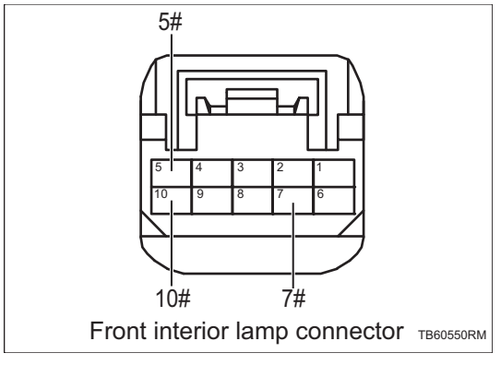
Standard value

Detector connection	Detection conditions	Specified state
E-CALL switch connector 5# - body GND	Always connected	10 KΩ or greater
E-CALL switch connector 7# - body GND	Always connected	10 KΩ or greater
E-CALL switch connector 10# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check E-CALL switch harness and connector for circuit shorted to power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
E-CALL switch connector 5# - body GND	Set the ignition switch to "ON"	Less than 1 V
E-CALL switch connector 7# - body GND	Set the ignition switch to "ON"	Less than 1 V
E-CALL switch connector 10# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Replace E-CALL switch (See page LI-111)

(a) Replace the E-CALL switch.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace T-BOX (See page TB-25)**

OK

6	**End**

DTC	B14A245	EMMC fault
DTC	B14A276	Built-in SIM card fault
DTC	B14B151	Tuner communication failure
DTC	B14B252	Gsensor communication failure
DTC	B14C113	Module communication failure
DTC	B14C201	Ethernet module failure
DTC	B14B152	DAB communication failure

Description

When the system function is abnormal due to the internal fault of T-BOX, T-BOX records the DTC.

DTC	DTC detection conditions	Faulty location
B14A245	(a) EMMC fault.	• T-BOX
B14A276	(a) The built-in SIM card is faulty.	• T-BOX
B14B151	(a) Tuner communication failure.	• T-BOX
B14B252	(a) Gsensor communication failure.	• T-BOX
B14C113	(a) Module communication failure.	• T-BOX
B14C201	(a) Ethernet module failure.	• T-BOX
B14B152	(a) DAB communication failure.	• T-BOX

TB

Inspection procedure

1	**Clear DTC**

(a) Restart the T-BOX (disconnect the 12 V battery- and connect the battery- after 10 minutes).

(b) Connect the HQ-VDS.

(c) Clear DTC (clear all system DTCs).

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace T-BOX (See page TB-25)**

OK

2	**End**

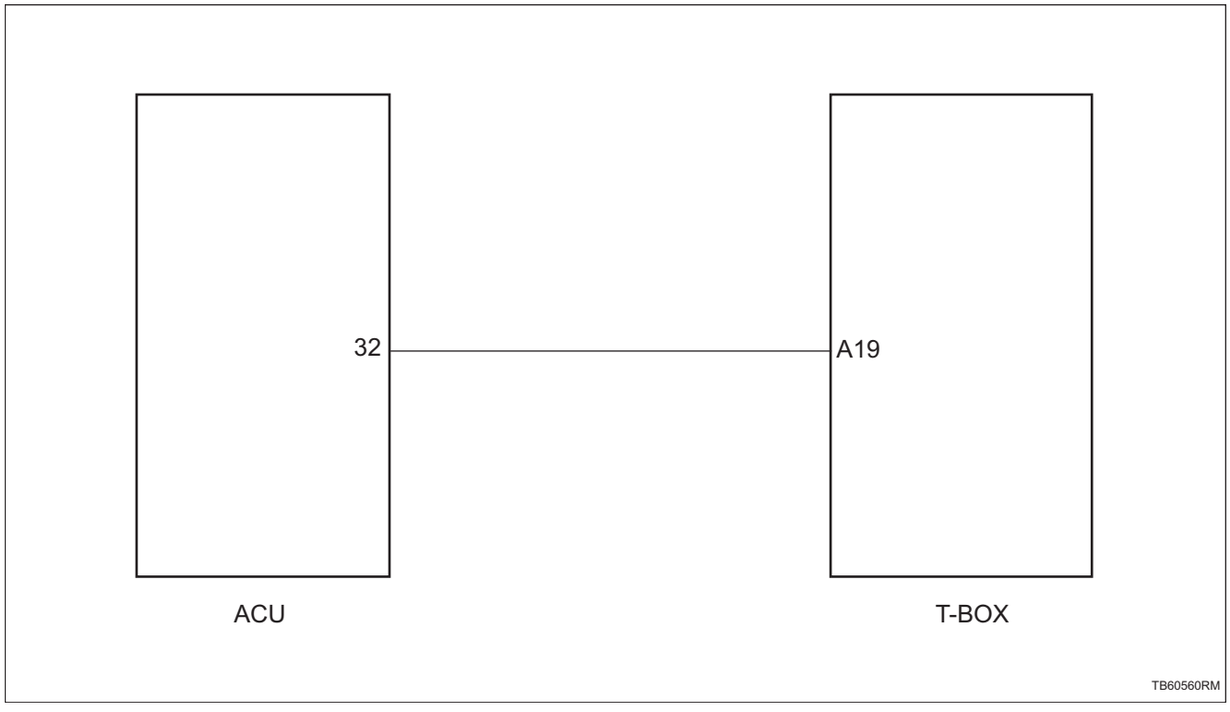
DTC	B14A264	Crash detection fault

Description

When the impact output signal is abnormal, the ACU records DTC.

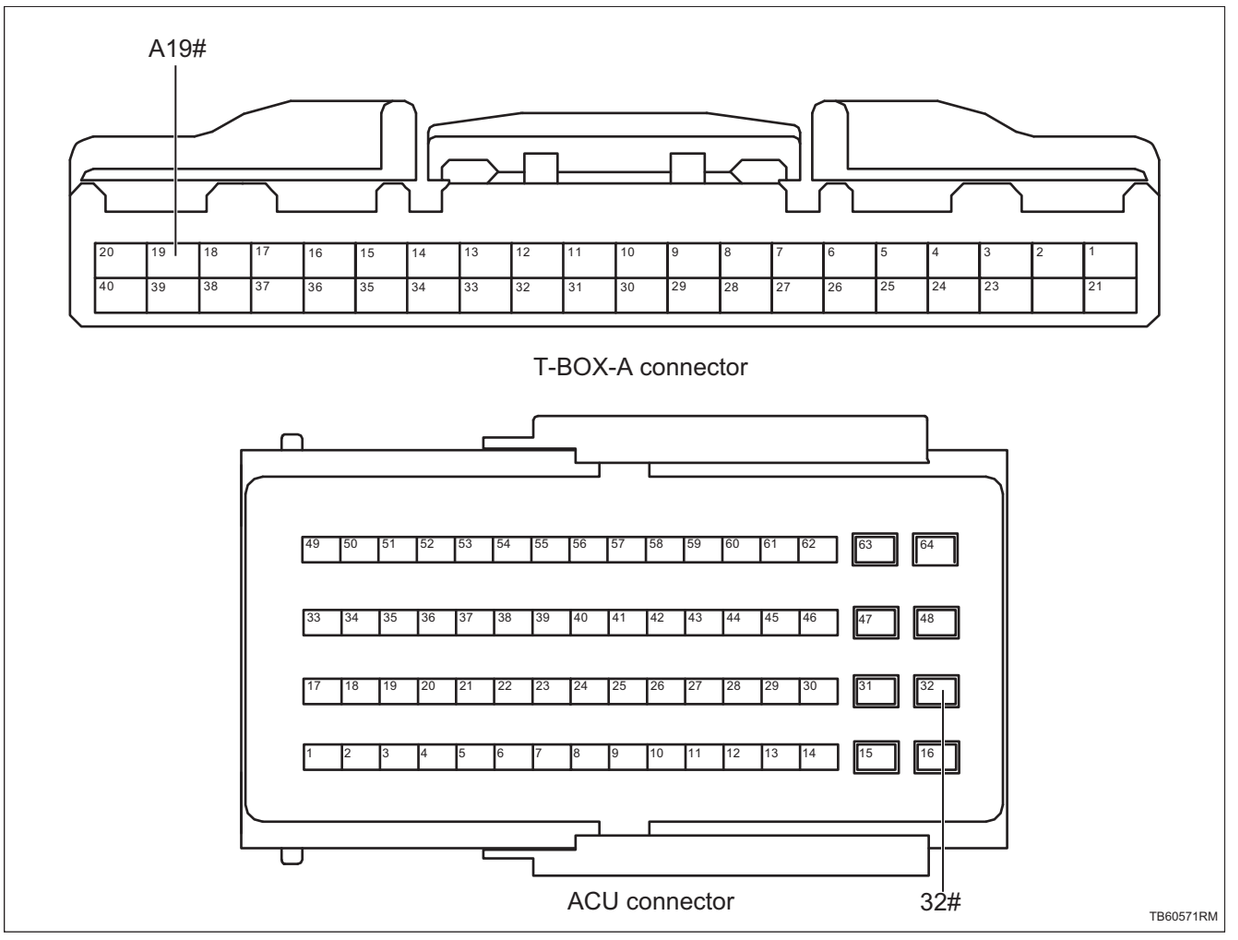
DTC	DTC detection conditions	Faulty location
B14A264	(a) Collision output failure.	• ACU • Harness and connector • T-BOX

Circuit diagram



Inspection procedure

1	**Check harness and connector for open circuit (ACU-T-BOX)**



TB

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the T-BOX connector.

(d) Disconnect the ACU connector.

(e) Measure the resistance according to the values in the table below.

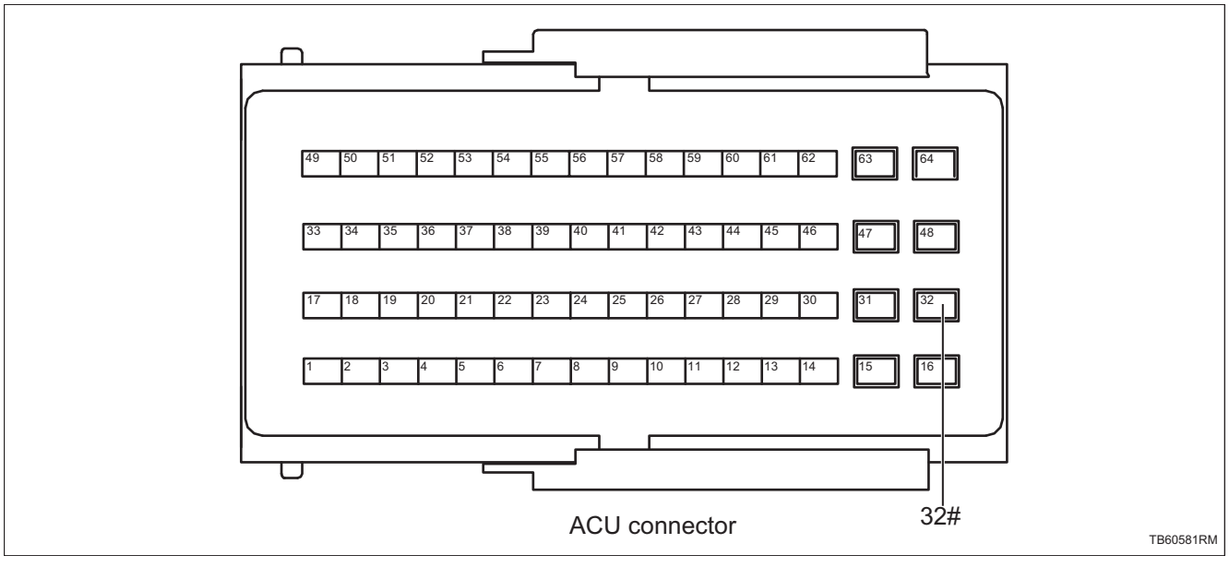
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 32# - T-BOX connector A19#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check ACU harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

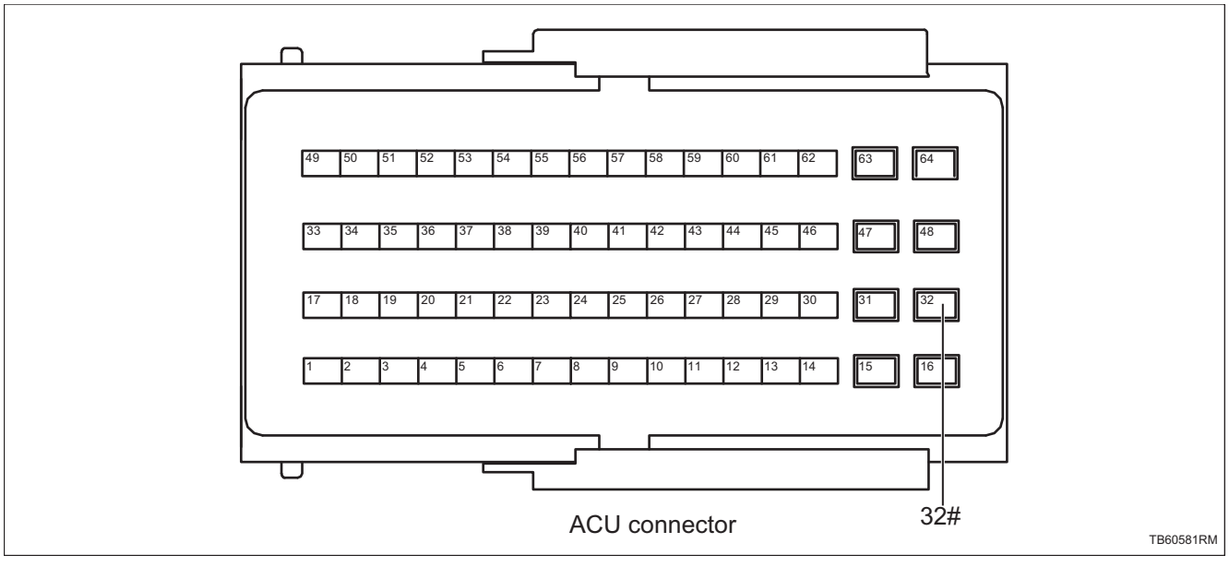
Detector connection	Detection conditions	Specified state
ACU connector 32#-body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

TB

OK

3	Check ACU harness and connector for circuit shorted to power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACU connector 32#-body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace ACU (See page RS-218)**

(a) Replace the ACU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace T-BOX (See page TB-25)**

TB

OK

5	**End**

DTC	B14C092	GNSS fault

Description

When the antenna inside the T-BOX is short-circuited or open-circuited, the T-BOX would record the DTC.

DTC	DTC detection conditions	Faulty location
B14C092	(a) GNSS fault.	• T-BOX

Inspection procedure

1	Clear DTC

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace T-BOX (See page TB-25)**

OK

2	End

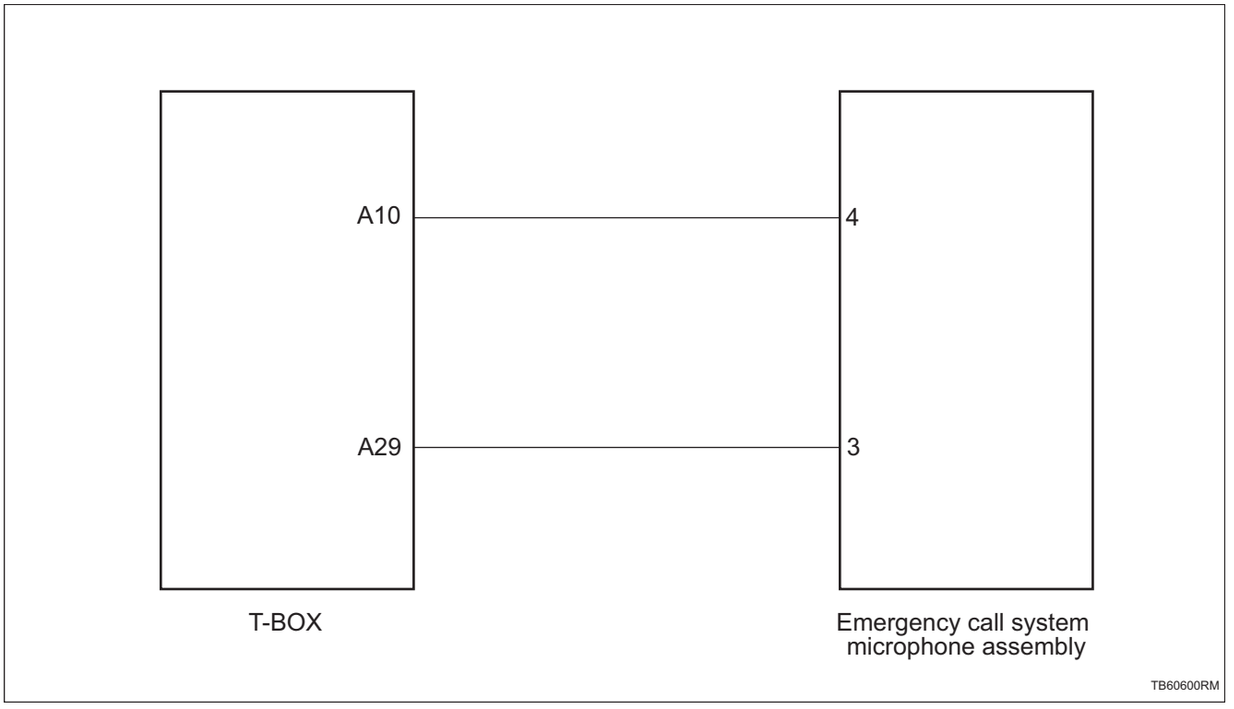
DTC	B14C393	MIC fault

Description

When the emergency call system microphone fails, the T-BOX will record the DTC.

DTC	DTC detection conditions	Faulty location
B14C393	(a) MIC fault.	• T-BOX • Harness and connector • Emergency call system microphone assembly

Circuit diagram



Inspection procedure

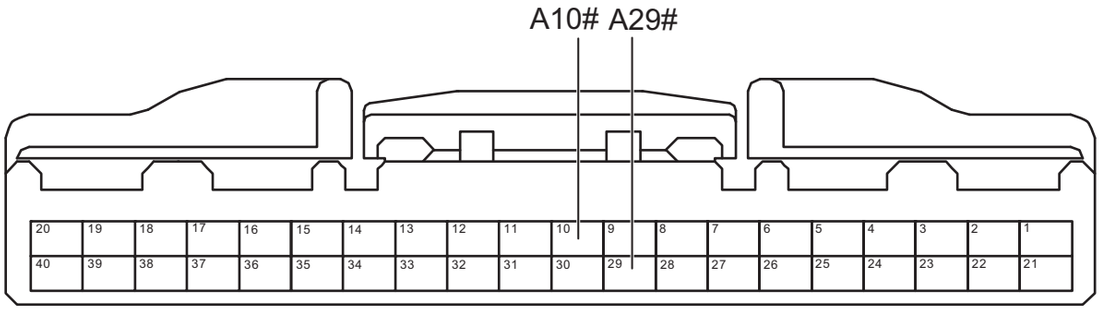
1	Check emergency call system microphone assembly connector

(a) Check if the emergency call system microphone assembly connector is correct.

NG → **Repair according to the fault**

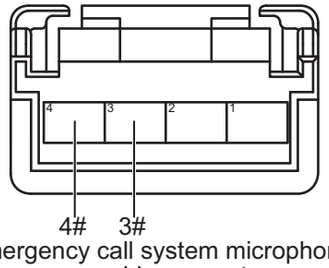
OK

2	Check emergency call system microphone assembly harness and connector for open circuit



T-BOX-A connector

TB60611RM



Emergency call system microphone assembly connector

TB60620RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the T-BOX connector.

(d) Disconnect the emergency call system microphone assembly connector.

(e) Measure the resistance according to the values in the table below.

Standard value

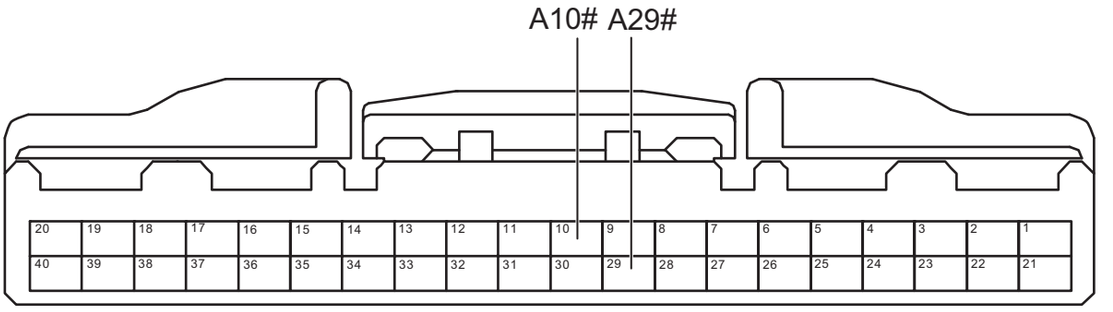
Detector connection	Detection conditions	Specified state
T-BOX connector A10# - emergency call system microphone assembly connector 4#	Always connected	Less than 1Ω
T-BOX connector A29# - emergency call system microphone assembly connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check emergency call system microphone assembly harness and connector for circuit shorted to ground**

TB



T-BOX-A connector

TB60611RM

(a) Measure the resistance according to the values in the table below.

Standard value

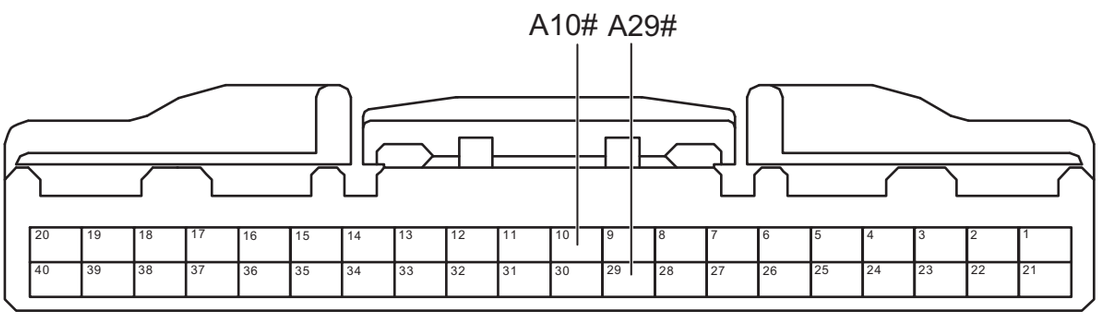
Detector connection	Detection conditions	Specified state
T-BOX connector A10# -body GND	Always connected	10 KΩ or greater
T-BOX connector A29# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

TB

OK

4	**Check emergency call system microphone assembly harness and connector for circuit shorted to power supply**



T-BOX-A connector

TB60611RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
T-BOX connector A10# -body GND	The ignition switch is set to "ON"	Less than 1 V
T-BOX connector A29# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace emergency call system microphone assembly**

(a) Replace the emergency call system microphone assembly.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace T-BOX (See page TB-25)**

OK

6	**End**

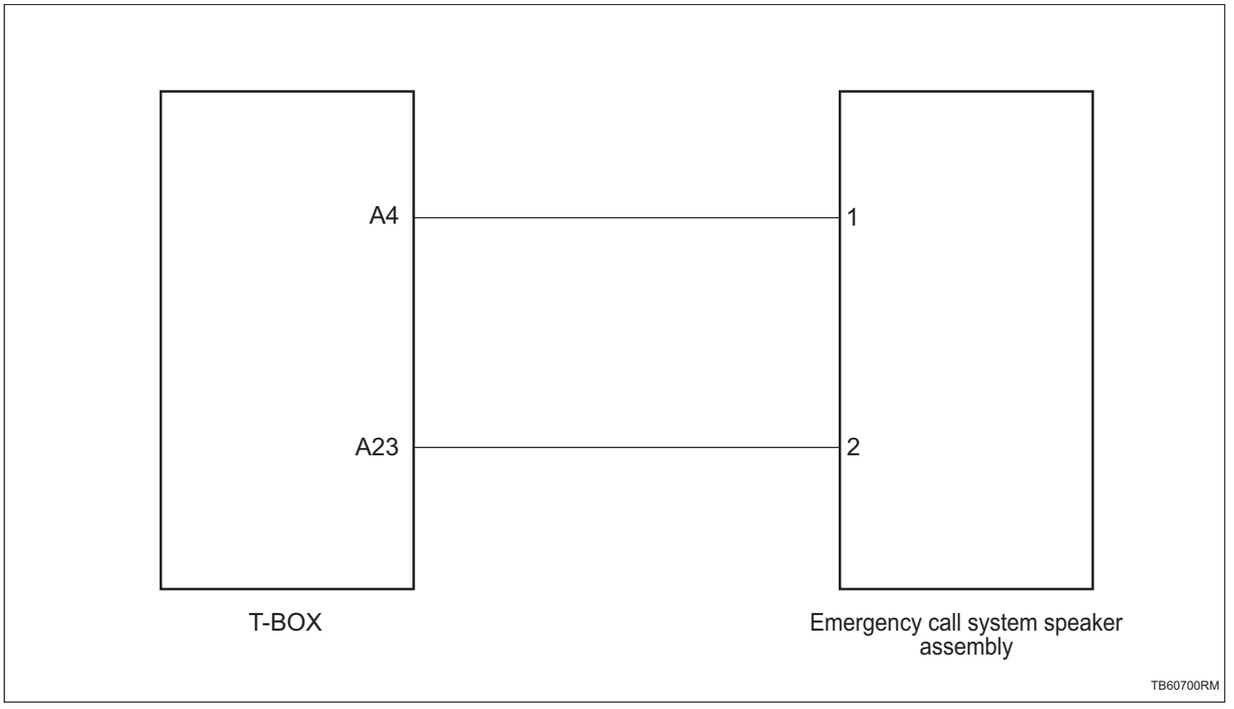
DTC	B14C394	Speaker fault

Description

When the emergency call system speaker assembly fails, T-BOX records the DTC.

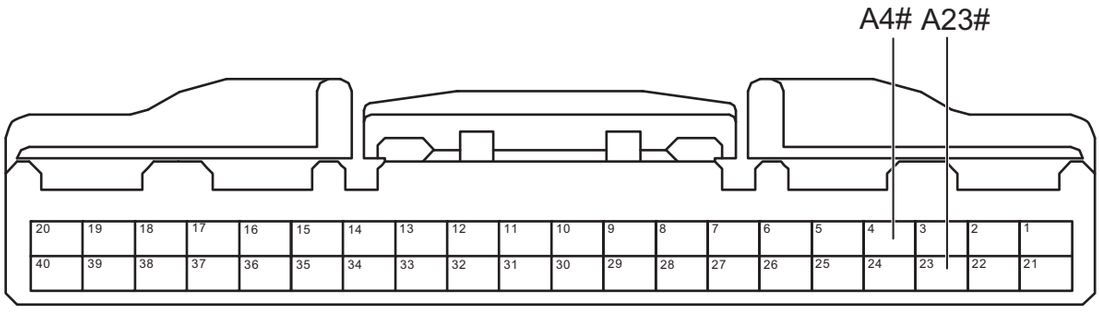
DTC	DTC detection conditions	Faulty location
B14C394	(a) Speaker fault.	• T-BOX • Harness and connector • Emergency call system speaker assembly

Circuit diagram



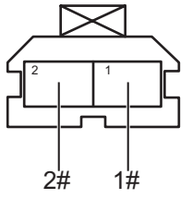
Inspection procedure

1	**Check emergency call system speaker assembly harness and connector for open circuit**



T-BOX-A connector

TB60711RM



Emergency call system speaker assembly connector

TB60720RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the T-BOX connector.

(d) Disconnect the emergency call system speaker assembly connector.

(e) Measure the resistance according to the values in the table below.

Standard value

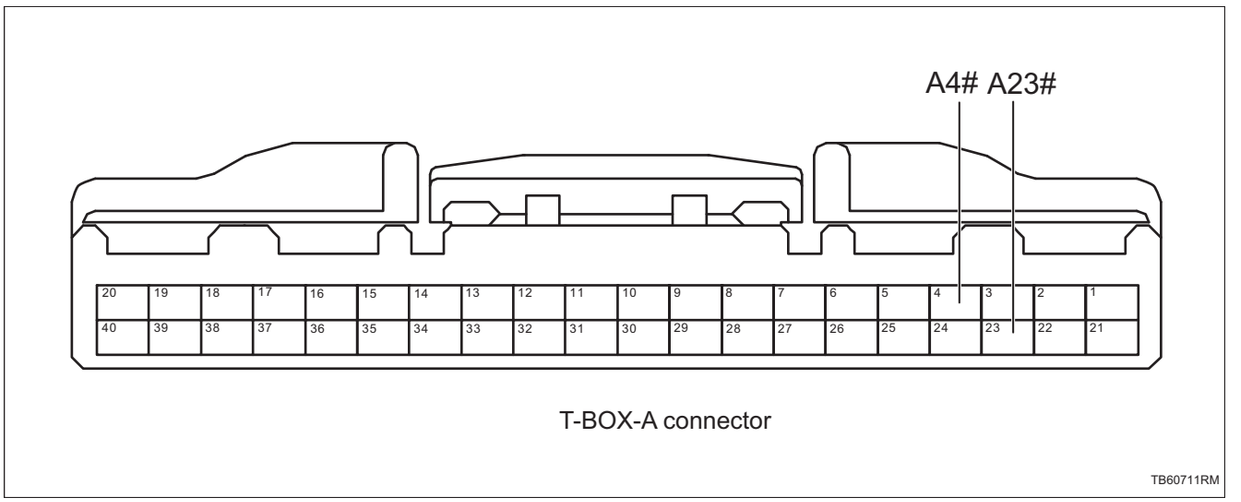
Detector connection	Detection conditions	Specified state
T-BOX connector A4# -emergency call system speaker assembly connector 1#	Always connected	Less than 1Ω
T-BOX connector A23# -emergency call system speaker assembly connector 2#	Always connected	Less than 1Ω

TB

NG → **Repair or replace the harness and connector**

OK

2	**Check emergency call system speaker assembly harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

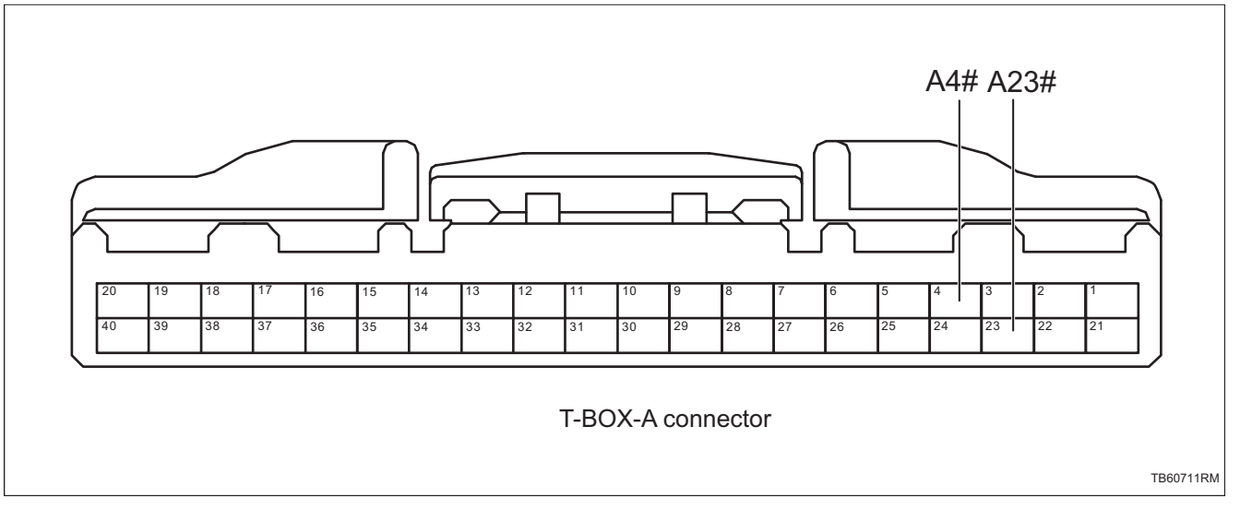
Standard value

Detector connection	Detection conditions	Specified state
T-BOX connector A4# -body GND	Always connected	4 KΩ or greater
T-BOX connector A23# -body GND	Always connected	4 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check emergency call system speaker assembly harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
T-BOX connector A4# -body GND	The ignition switch is set to "ON"	Less than 1 V
T-BOX connector A23# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace emergency call system speaker assembly**

(a) Replace the emergency call system speaker assembly.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace T-BOX (See page TB-25)**

OK

5	**End**

DTC	**U008088**	**Interconnection CAN bus off**
DTC	**U014687**	**GW node lost**
DTC	**U14448A**	**Tbox ETH1 connection failure**
DTC	**U14918D**	**GW PDU message timeout**
DTC	**U14A08E**	**Gateway SOMEIP no response**
DTC	**U14A68E**	**AVM SOMEIP no response**
DTC	**U115187**	**ACU message lost**

Description

When the communication between the T-BOX and other systems is abnormal or interrupted, the T-BOX would record the DTC.

DTC	DTC detection conditions	Faulty location
U008088	(a) Abnormal or interrupted communication.	• Relevant system control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	
U14448A	(a) Abnormal or interrupted communication.	
U14918D	(a) Abnormal or interrupted communication.	
U14A08E	(a) Abnormal or interrupted communication.	
U14A68E	(a) Abnormal or interrupted communication.	
U115187	(a) Abnormal or interrupted communication.	

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

ETC system

ETC TC-1
Precautions TC-1
Location of parts TC-2
System diagram TC-5
System description TC-5
Symptom chart TC-7
ECU terminal TC-8
DTC chart TC-8
B187049 ..... TC-9
B187149 ..... TC-9
B187249 ..... TC-9
B187344 ..... TC-9
B187400 ..... TC-10
U008288 ..... TC-12
U014687 ..... TC-12
U019887 ..... TC-12
U112187 ..... TC-12
U124587 ..... TC-12
U115587 ..... TC-12
U114687 ..... TC-12
U300317 ..... TC-13
U300316 ..... TC-13
ETC TC-16
Parts TC-16
Removal TC-17
Installation TC-17

TC

ETC

Precautions

1. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

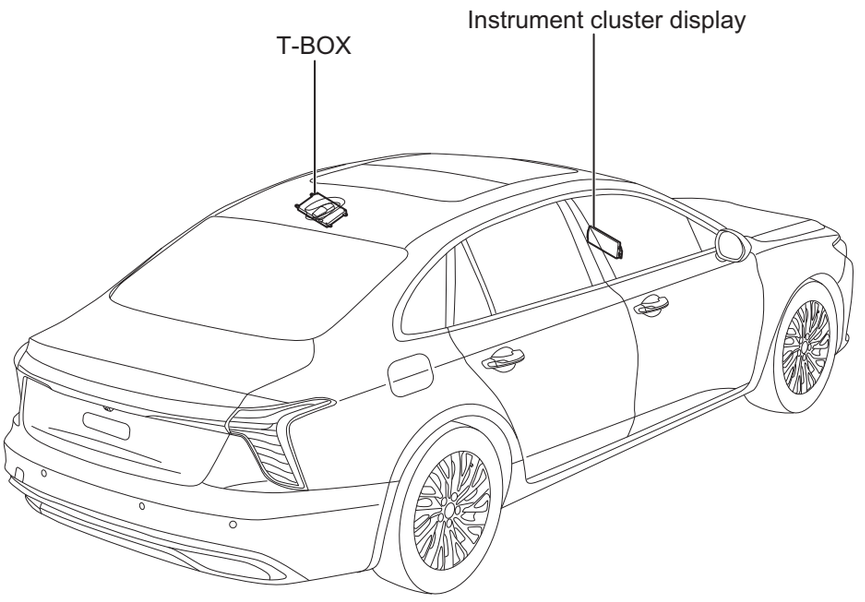
2. Some systems require initialization when reconnecting after disconnecting the battery cable.

3. General repair instructions

(a) When the part needs to be replaced or the connector needs to be disconnected during maintenance of ETC, disconnect the battery negative cable.

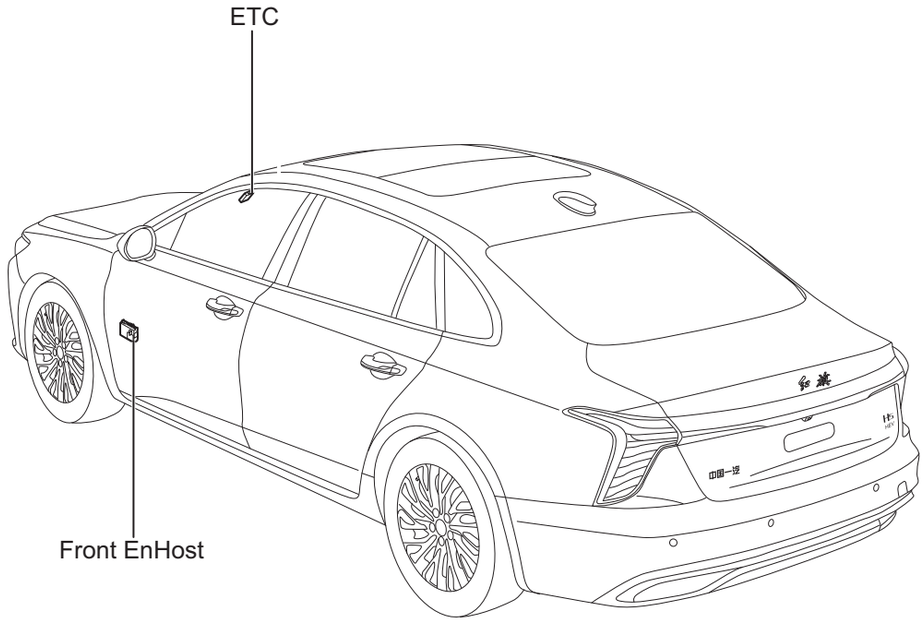
(b) The door control system needs to be initialized after reconnecting the battery. And use the HQ-VDS to "clear the DTC" for all electronic control systems.

Location of parts



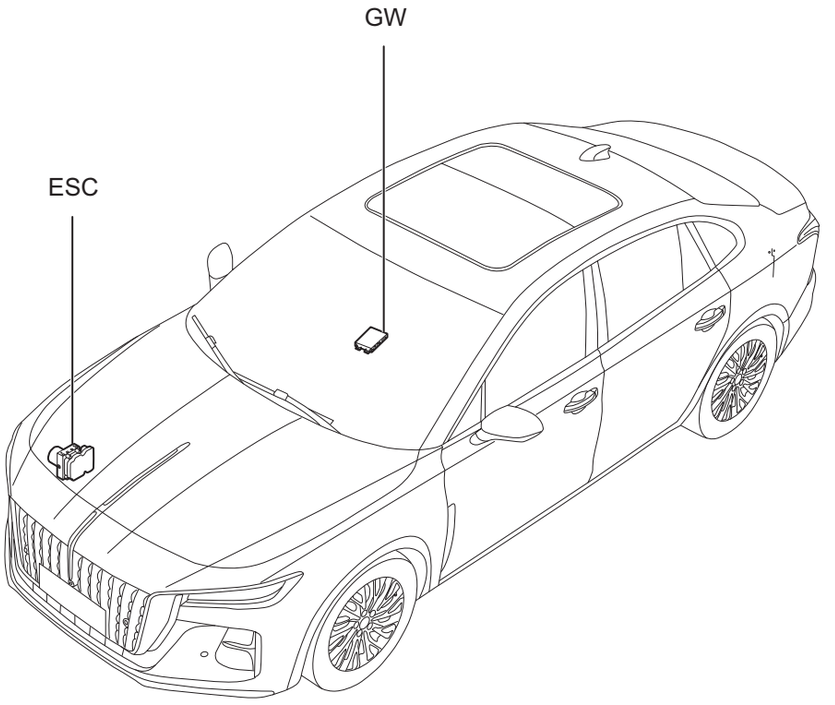
TC00030RM

Location of parts



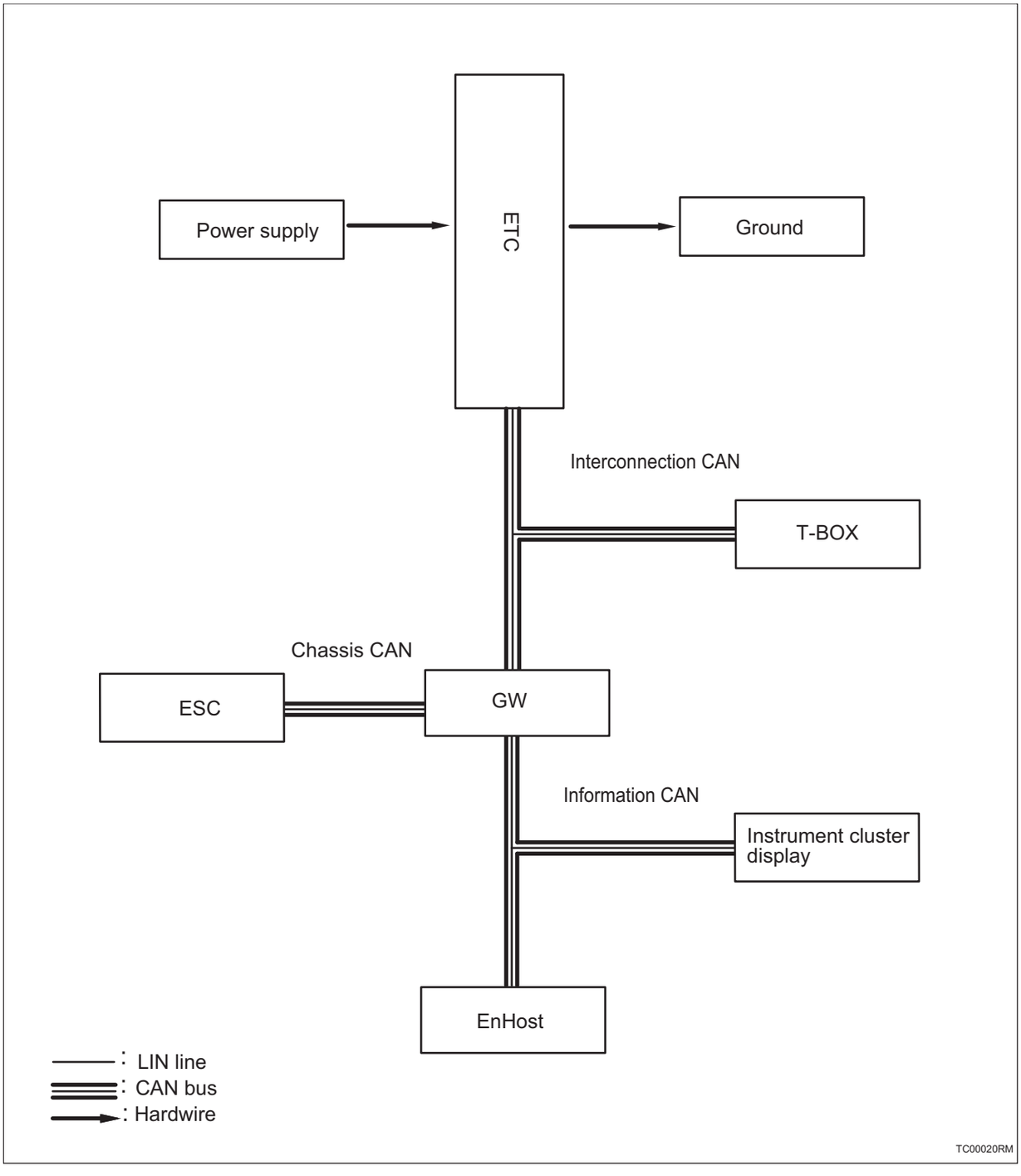
TC00040RM

Location of parts



TC00050RM

System diagram



System description

1. Function brief description

(a) ETC has a diagnostic function. When the system fails, the warning lamp in the instrument cluster will light up to indicate that the system has failed.

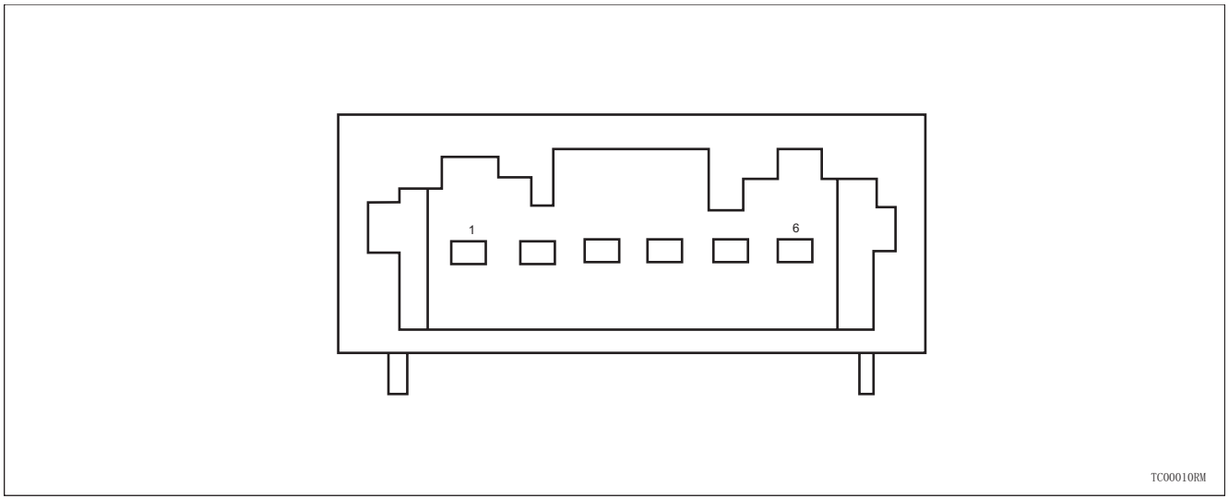
2. System settings

(a) Touch the button "Service" in the main menu interface to enter the service function interface, where you can activate and view the ETC payment record and validity period.

Symptom chart

Fault	Possible location
ETC unavailable	• ETC • Fuse • Battery • Related harness and connector

ECU terminal



ETC			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	CAN_L	4	-
2	CAN_H	5	K15
3	GND	6	K30

DTC chart

DTC	Description	Reference page
U300317	System power supply overvoltage	(See page TC-13)
U300316	System power supply undervoltage	(See page TC-13)
B187049	ESAM fault	(See page TC-9)
B187149	RF module failure	(See page TC-9)
B187249	Bluetooth fault	(See page TC-9)
B187344	Memory data error	(See page TC-9)
B187400	Tamper authentication failure	(See page TC-10)
U008288	T-box CAN bus off	(See page TC-12)
U014687	GW node lost	(See page TC-12)
U019887	T-BOX node lost	(See page TC-12)
U112187	ESP message lost	(See page TC-12)
U124587	EnHost/IVI message lost	(See page TC-12)
U115587	Instrument cluster control unit message lost	(See page TC-12)
U114687	GW message lost	(See page TC-12)

DTC	B187049	ESAM fault
DTC	B187149	RF module failure
DTC	B187249	Bluetooth fault
DTC	B187344	Memory data error

Description

When the system function is abnormal due to the internal fault of ETC, ETC records the DTC.

DTC	DTC detection conditions	Faulty location
B187049	(a) ESAM fault.	• ETC
B187149	(a) RF module failure.	• ETC
B187249	(a) Bluetooth failure.	• ETC
B187344	(a) Memory data error.	• ETC

Inspection procedure

1	**Clear DTC**

(a) Connect the HQ-VDS.

(b) Clear the DTC.

(c) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace ETC (See page TC-16)**

TC

OK

2	**End**

DTC	B187400	Tamper authentication failure

Description

When tamper authentication failure occurs, the ETC records DTC.

DTC	DTC detection conditions	Faulty location
B187400	(a) Tamper authentication failure.	• ETC • T-BOX

Inspection procedure

1	Check T-BOX system

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Check whether the T-BOX system has DTC.

Standard

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

NG → **Repair according to the DTC**

OK

2	Check ETC

(a) Confirm whether the ETC has been replaced.

NG → **Repair according to the situation**

OK

3	Check T-BOX harness and connector

(a) Check whether the T-BOX harness and connector are well connected.

(b) Check the T-BOX harness and connector for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

TC

OK

4	**Check ETC harness and connector**

(a) Check whether the ETC harness and connector are well connected.

(b) Check the ETC harness and connector for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

5	**Replace ETC (See page TC-16)(perform IMMO matching between ETC and T-BOX after replacement)**

DTC	U008288	T-box CAN bus off
DTC	U014687	GW node lost
DTC	U019887	T-BOX node lost
DTC	U112187	ESP message lost
DTC	U124587	EnHost/IVI message lost
DTC	U115587	Instrument cluster control unit message lost
DTC	U114687	GW message lost

Description

When the communication between ETC and other control units is abnormal or interrupted, ETC records DTC.

DTC	DTC detection conditions	Faulty location
U008288	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U014687	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U019887	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U112187	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U124587	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U115587	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U114687	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit

TC

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

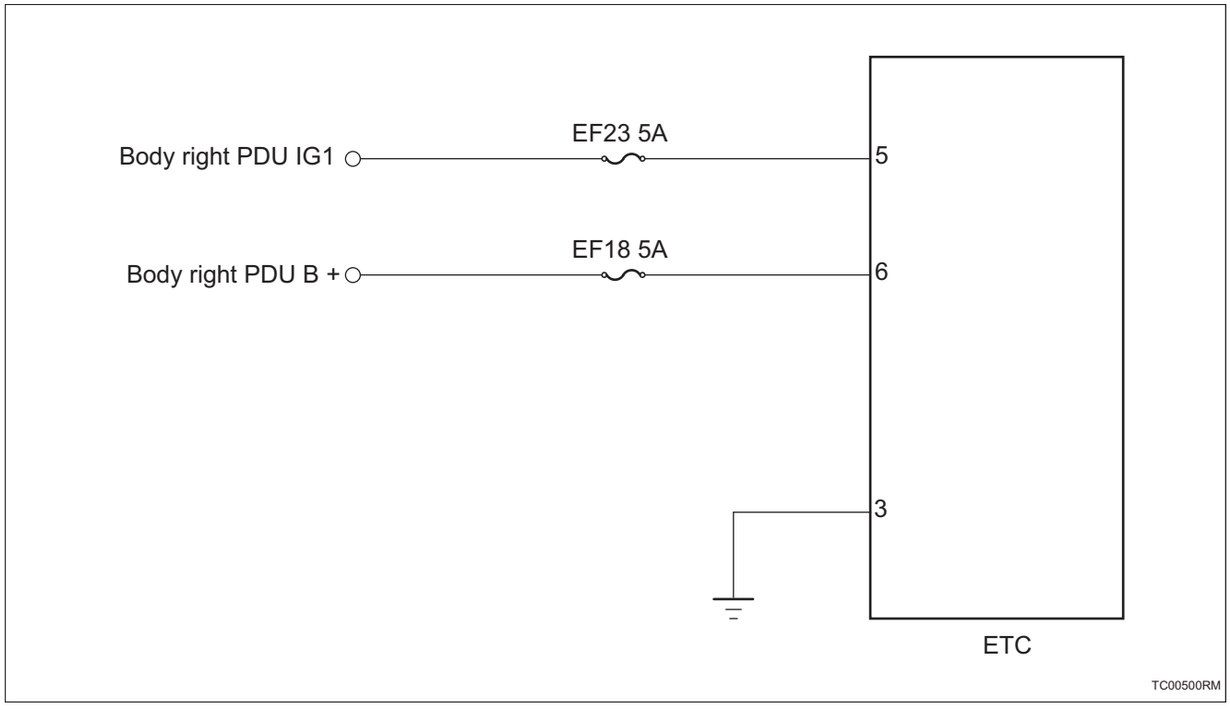
DTC	U300317	System power supply overvoltage
DTC	U300316	System power supply undervoltage

Description

When the ETC input voltage is too high or too low, ETC records the DTC.

DTC	DTC detection conditions	Faulty location
U300317	(a) System overvoltage.	• ETC • Harness and connector • Battery/charging system
U300316	(a) System undervoltage.	• ETC • Fuse • Harness and connector • Battery/charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery + - battery -	Always connected	About 11~14 V

TC

NG → **Overhaul the charging system**

OK

2	**Check the ETC fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the ETC fuse.

(d) Measure the resistance according to the values in the table below.

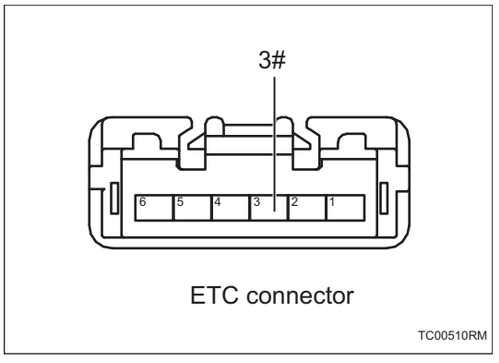
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3	**Check ETC ground**



(a) Disconnect the ETC connector.

(b) Measure the resistance according to the values in the table below.

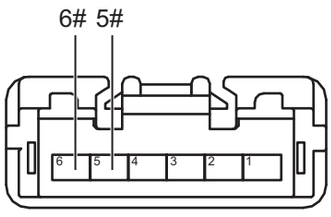
Standard value

Detector connection	Detection conditions	Specified state
ETC connector 3# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check ETC power supply**



ETC connector

TC00521RM

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ETC connector 5# -body GND	The ignition switch is set to "ON"	Battery voltage
ETC connector 6# -body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

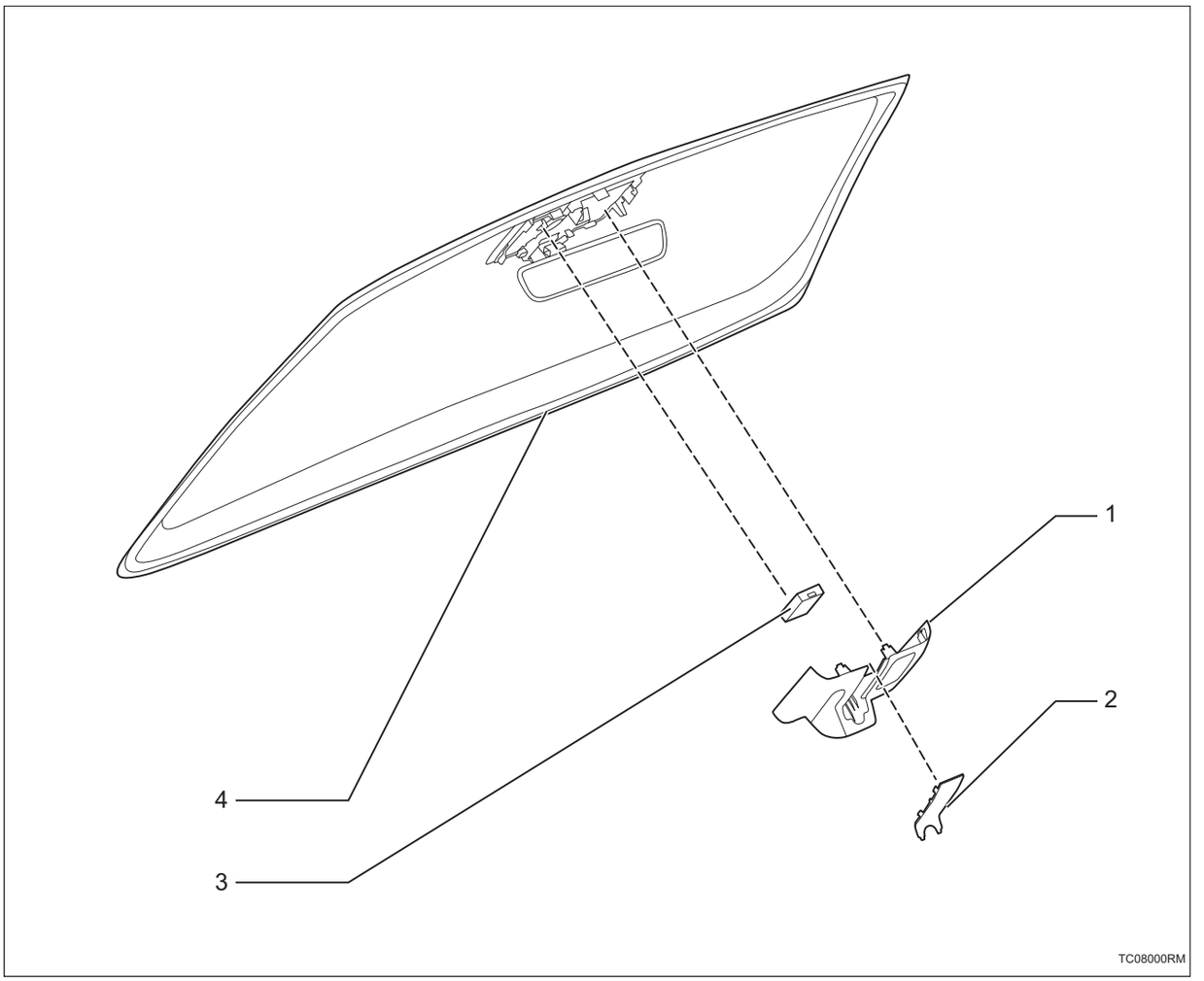
OK

5	**Replace ETC (See page TC-16)**

TC

ETC

Parts

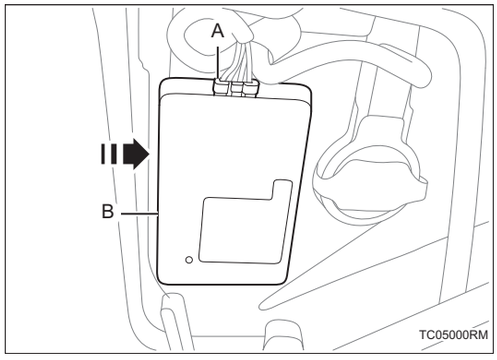


1. **Interior rearview mirror trim cover I**
2. **Interior rearview mirror trim cover II**
3. **ETC**
4. **Front windshield assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove interior rearview mirror trim cover II (See page IM-2)**
3. **Remove interior rearview mirror trim cover I (See page IM-2)**
4. **Removal ETC**

   (a) Disconnect the harness connector -A-, insert a plastic lever as arrowed and remove the ETC -B-.



Installation

1. **The installation procedure is the reverse of removal procedure.**

Mobile phone wireless charging control system

WCM WM-1
Precautions WM-1
Location of parts WM-2
System diagram WM-4
System description WM-4
Symptom chart WM-6
ECU terminal WM-7
DTC chart WM-7
B17D04B WM-8
B17D176 ..... WM-8
U004688 ..... WM-9
U014687 ..... WM-9
U024587 ..... WM-9
U015587 ..... WM-9
U112187 ..... WM-9
U114087 ..... WM-9
U114687 ..... WM-9
U119987 ..... WM-9
U300316 ..... WM-10
U300317 ..... WM-10

WCM

Precautions

1. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

2. Some systems require initialization when reconnecting after disconnecting the battery cable.

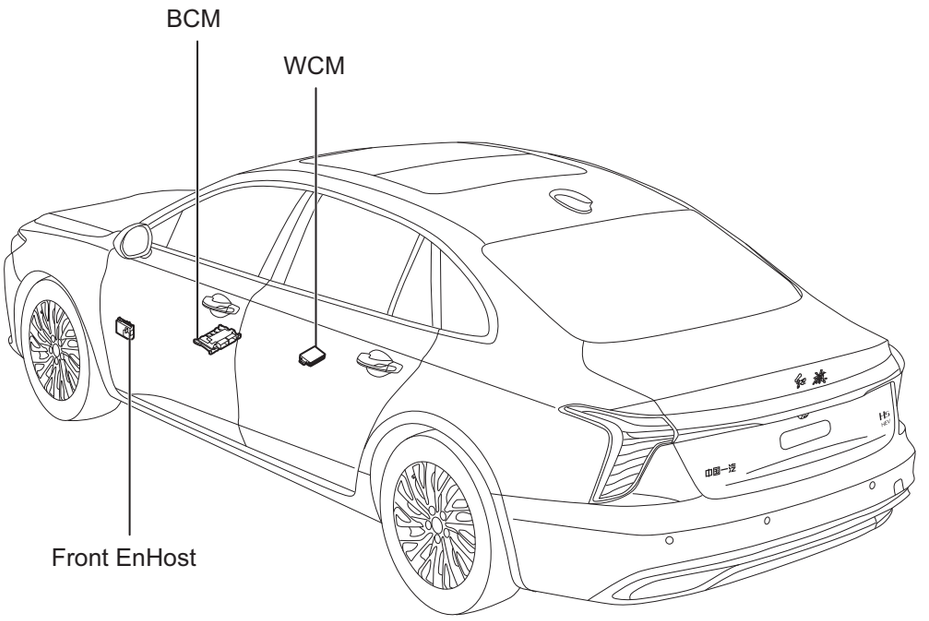
3. General repair instructions

(a) When the part needs to be replaced or the connector needs to be disconnected during maintenance of WCM, disconnect the battery negative cable.

(b) The door control system needs to be initialized after reconnecting the battery. And use the HQ-VDS to "clear the DTC" for all electronic control systems.

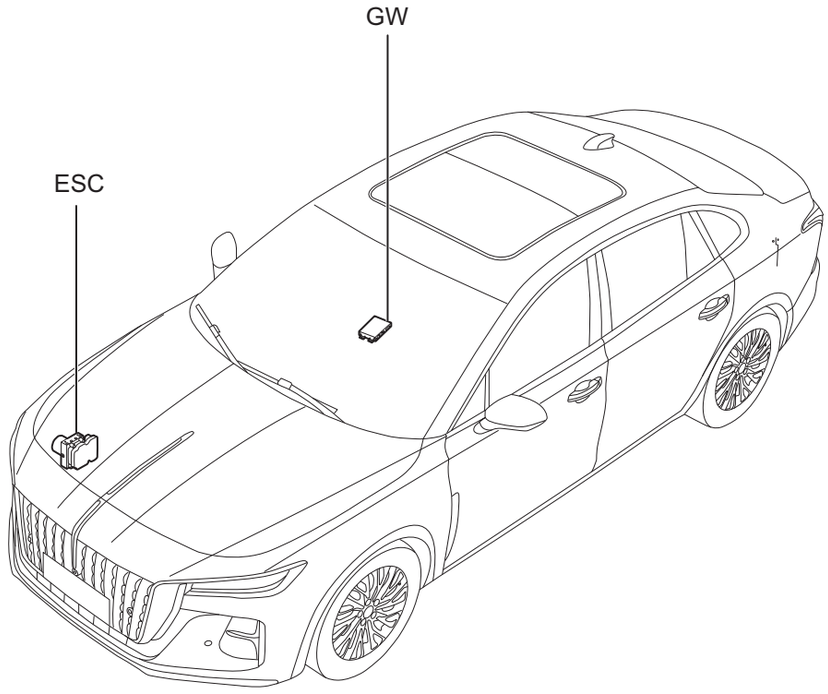
(c) During mobile phone wireless charging, if a metal object (such as a coin, key, ring or paper clip) is found between the mobile phone and the charging panel, do not immediately remove the foreign object by hand to avoid scalding the fingers. Please remove the phone first, wait for the metal items to cool down, and then move the phone away from the charging plate.

Location of parts



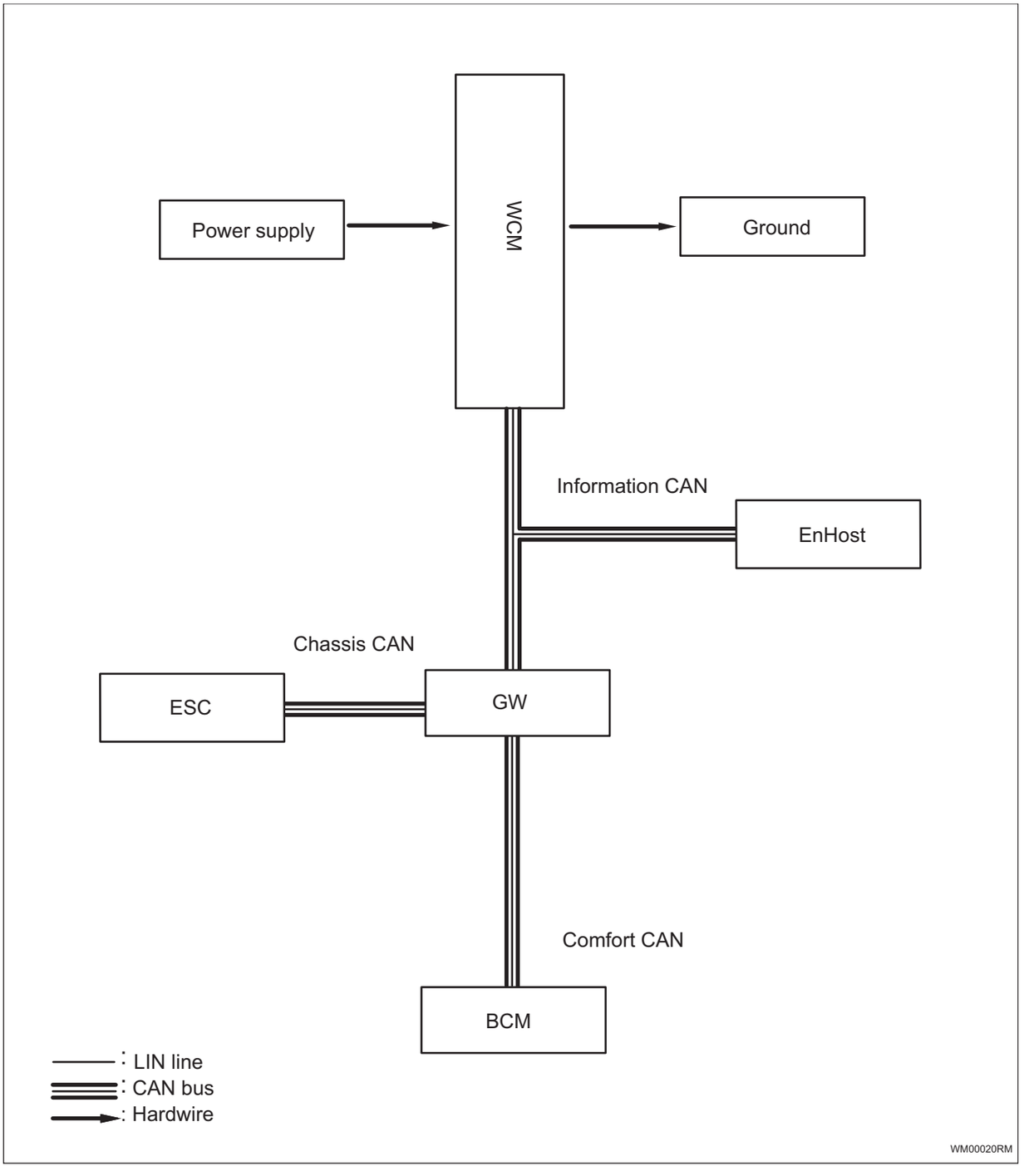
WM00030RM

Location of parts



WM00040RM

System diagram



System description

1. Function brief description

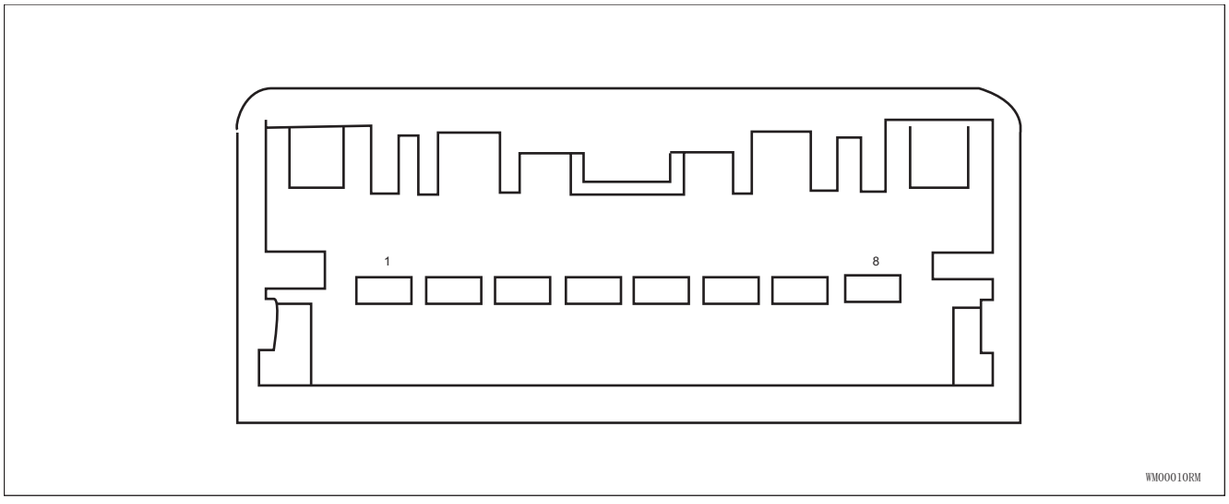
(a) Mobile phones supporting Qi standard wireless charging can be directly placed in the wireless charging area for charging.

(b) Mobile phones that do not support Qi standard wireless charging need to be charged with a receiver.

Symptom chart

Fault	Possible location
Abnormal charging	• WCM • Fuse • Battery • Related harness and connector • There are metal foreign matters in the WCM • Foreign matter between WCM and mobile phone

ECU terminal



WCM			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	B+	5	CAN_H
2	-	6	CAN_L
3	PEPS	7	-
4	GND	8	-

DTC chart

DTC	Description	Reference page
U300316	Power supply voltage low	(See page WM-10)
U300317	Power supply voltage high	(See page WM-10)
B17D04B	Wireless charging overtemperature	(See page WM-8)
B17D176	Metal foreign objects during charging	(See page WM-8)
U004688	Information CAN bus off	(See page WM-9)
U014687	GW node lost	(See page WM-9)
U024587	IVI node lost	(See page WM-9)
U015587	IVI node lost	(See page WM-9)
U112187	ESP message lost	(See page WM-9)
U114087	BCM 1 message lost 1	(See page WM-9)
U114687	GW message lost	(See page WM-9)
U119987	Driver door module message lost	(See page WM-9)

DTC	B17D04B	Wireless charging overtemperature
DTC	B17D176	Metal foreign objects during charging

Description

When the system functions show anomalies due to internal failure of the WCM, WCM records DTC.

DTC	DTC detection conditions	Faulty location
B17D04B	(a) Wireless charging overtemperature.	• WCM
B17D176	(a) There are metal foreign objects during charging.	• WCM

Inspection procedure

1	Check the WCM

(a) Check whether there is any metal foreign matter on the WCM.

(b) Check whether there is foreign matter between the WCM and the mobile phone.

(c) Check whether the WCM is damaged.

NG → **Repair according to the fault**

OK

2	Replace the WCM (See page CH-14)

DTC	U004688	Information CAN bus off
DTC	U014687	GW node lost
DTC	U024587	IVI node lost
DTC	U015587	IVI node lost
DTC	U112187	ESP message lost
DTC	U114087	BCM 1 message lost 1
DTC	U114687	GW message lost
DTC	U119987	Driver door module message lost

Description

When the communication between the WCM and other control units is abnormal or interrupted, the WCM records DTC.

DTC	DTC detection conditions	Faulty location
U008288	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U014687	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U019887	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U112187	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U124587	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U115587	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U114687	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U119987	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

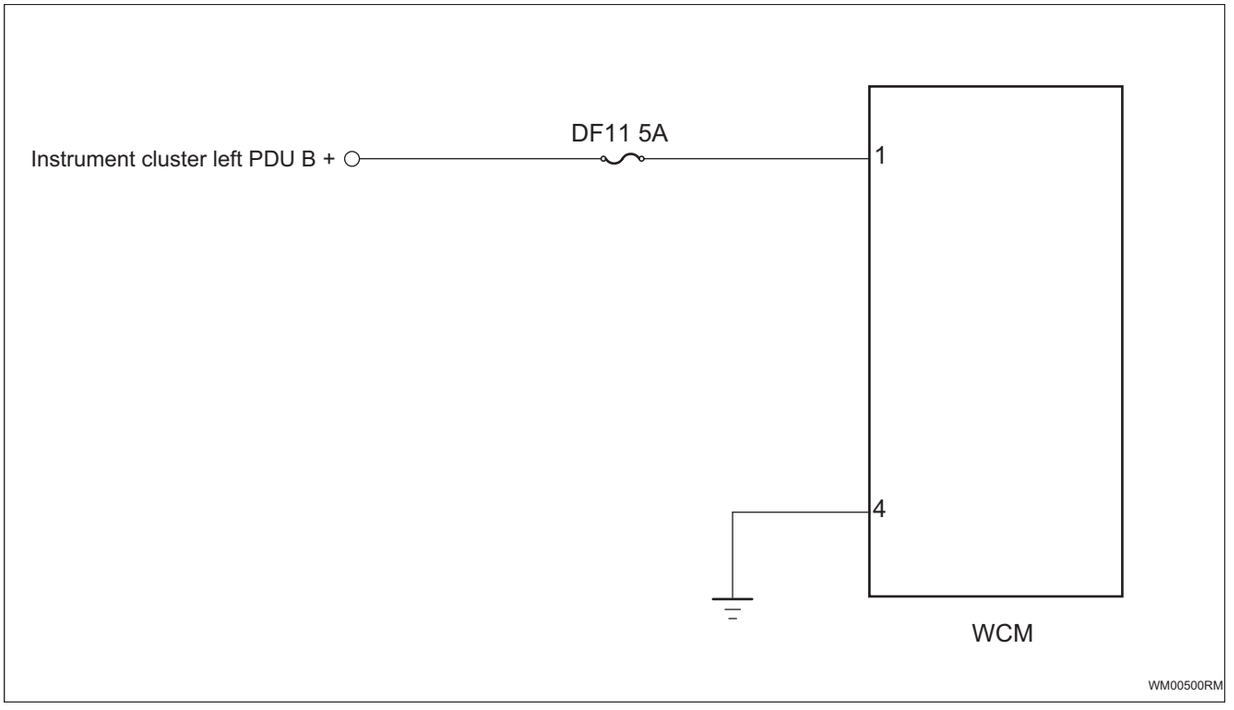
DTC	U300316	Power supply voltage low
DTC	U300317	Power supply voltage high

Description

When the WCM input voltage is too high or too low, WCM records the DTC.

DTC	DTC detection conditions	Faulty location
U300316	(a) System undervoltage.	• WCM • Harness and connector • Battery/charging system
U300317	(a) System overvoltage.	• WCM • Fuse • Harness and connector • Battery/charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery + - battery -	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2	Check the WCM fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the WCM fuse.

(d) Measure the resistance according to the values in the table below.

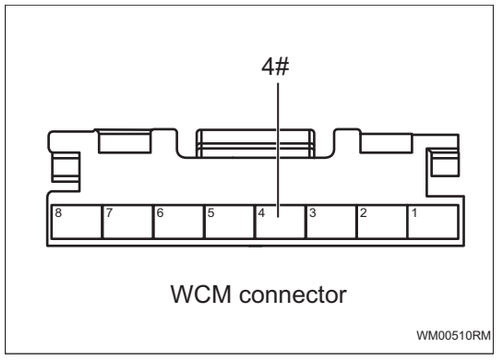
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3	Check WCM ground



(a) Disconnect the WCM connector.

(b) Measure the resistance according to the values in the table below.

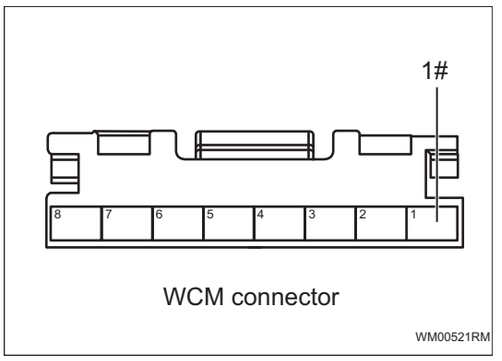
Standard value

Detector connection	Detection conditions	Specified state
WCM connector 4# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	Check the WCM power supply



WCM connector

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
WCM connector 1# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace the WCM (See page CH-14)**

BCM

BCM BM-1
Precautions BM-1
Location of parts BM-3
System diagram BM-9
Symptom chart BM-14
ECU terminal BM-15
DTC chart BM-18
B100016 ..... BM-21
B100017 ..... BM-21
B100215 ..... BM-24
B100219 ..... BM-24
B100315 ..... BM-28
B100319 ..... BM-28
B105012 ..... BM-28
B105113 ..... BM-28
B100514 ..... BM-33
B100614 ..... BM-33
B100714 ..... BM-33
B100A14 ..... BM-33
B100814 ..... BM-33
B100914 ..... BM-33
B100D11 ..... BM-38
B100F11 ..... BM-43
B101314 ..... BM-47
B101414 ..... BM-47
B101514 ..... BM-47
B101614 ..... BM-47
B101823 ..... BM-51
B102E11 ..... BM-51
B101923 ..... BM-56
B101A23 ..... BM-60
B101C23 ..... BM-63
B102A12 ..... BM-67
B102C11 ..... BM-69
B102F12 ..... BM-73
B103012 ..... BM-73
B103613 ..... BM-73
B103324 ..... BM-75
B103524 ..... BM-75

B103424 ..... BM-75
B103B14 ..... BM-80
B103C87 ..... BM-84
B103D87 ..... BM-85
B103E11 ..... BM-86
B103F29 ..... BM-90
B104029 ..... BM-90
B104129 ..... BM-90
B104587 ..... BM-91
B104616 ..... BM-91
B104787 ..... BM-91
B104816 ..... BM-91
B104987 ..... BM-91
B104A16 ..... BM-91
B104B87 ..... BM-91
B104C16 ..... BM-91
U002888 ..... BM-93
U014687 ..... BM-93
U02E387 ..... BM-93
U020887 ..... BM-93
U024687 ..... BM-93
U019987 ..... BM-93
U020087 ..... BM-93
U020187 ..... BM-93
U020287 ..... BM-93
U016487 ..... BM-93
U112187 ..... BM-93
U129187 ..... BM-93
U115187 ..... BM-93
U12E187 ..... BM-93
U124387 ..... BM-93
U110087 ..... BM-93
U115887 ..... BM-93
U124587 ..... BM-93
U115587 ..... BM-93
U123587 ..... BM-93
U123287 ..... BM-93
U113187 ..... BM-93
U114687 ..... BM-93
U110187 ..... BM-93
U129387 ..... BM-93
U100A88 ..... BM-96
U133486 ..... BM-96

U011B87 ..... BM-96
U134586 ..... BM-96
U013087 ..... BM-96
U100B88 ..... BM-101
U130086 ..... BM-101
U130886 ..... BM-101
U130186 ..... BM-101
U130786 ..... BM-101
U023187 ..... BM-101
U02FF87 ..... BM-101
U016987 ..... BM-101
U020787 ..... BM-101
U100C88 ..... BM-106
B103112 ..... BM-106
U100D88 ..... BM-108
U020987 ..... BM-108
B104D16 ..... BM-112
B105787 ..... BM-113
BCM assembly BM-114
Parts BM-114
Removal BM-115
Installation BM-115

BCM

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Warning:

Before repairing the high voltage system or adjacent high voltage system components, be sure to carefully read the "Instructions and precautions for maintenance work" in the introduction carefully!

2. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

3. when the battery cable is disconnected and reconnected, some systems require initialization.

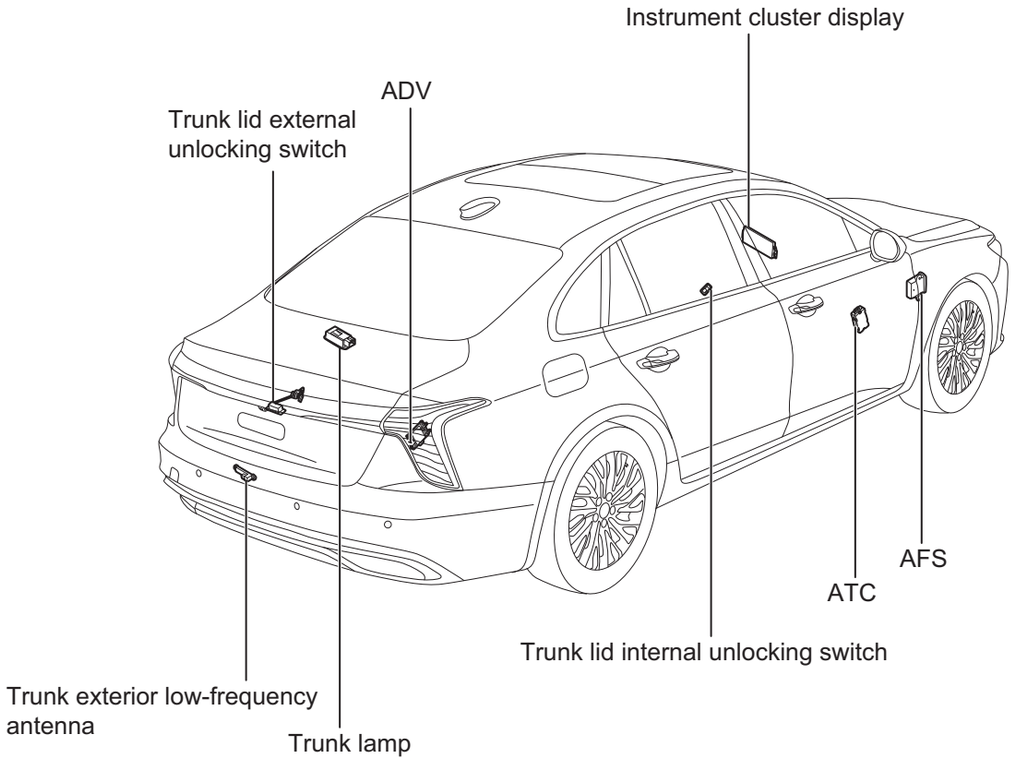
4. General repair instructions

(a) When checking the BCM system, the operation of the airbag may be affected. Therefore, before carrying out maintenance work, be sure to carefully read and confirm the "precautions" for airbag.

(b) When the part needs to be replaced or the connector needs to be disconnected during maintenance of BCM, disconnect the battery negative cable.

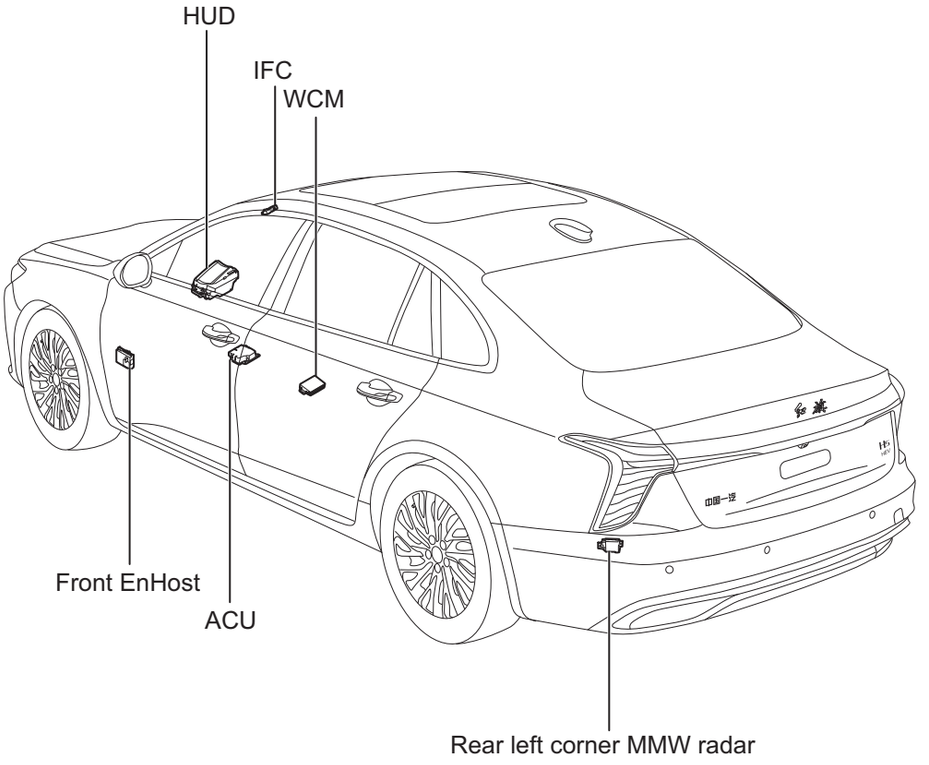
(c) The door control system needs to be initialized after reconnecting the battery. And use the HQ-VDS to "clear the DTC" for all electronic control systems.

Location of parts



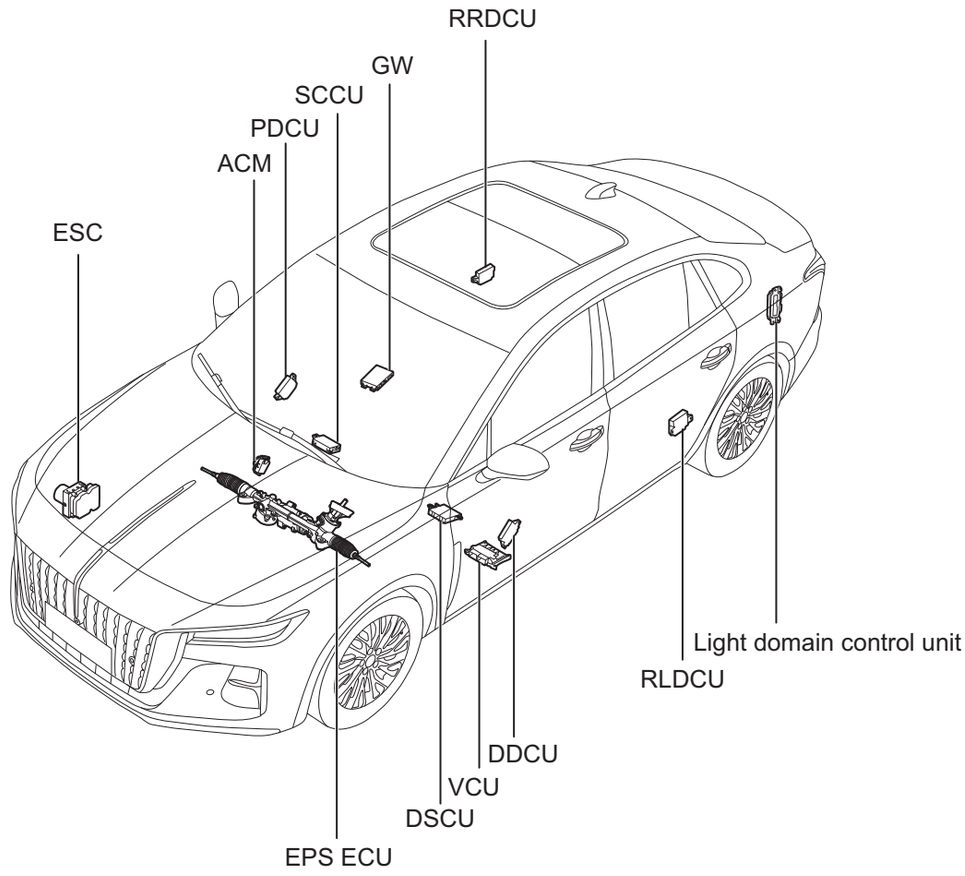
BM00100RM

Location of parts



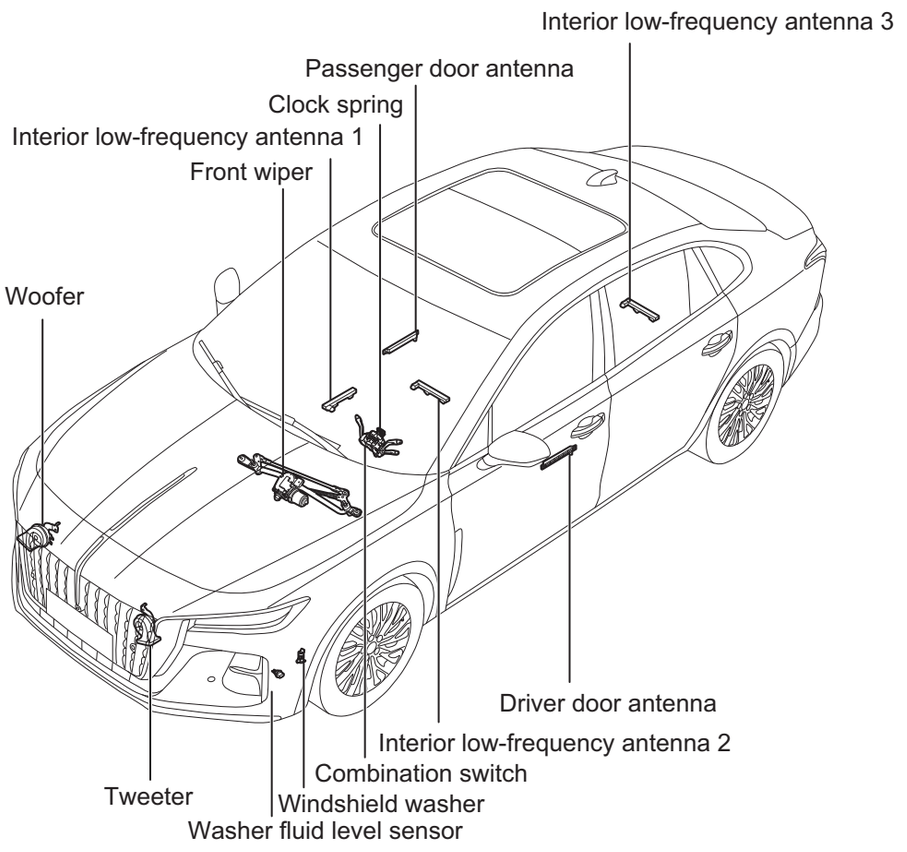
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Location of parts



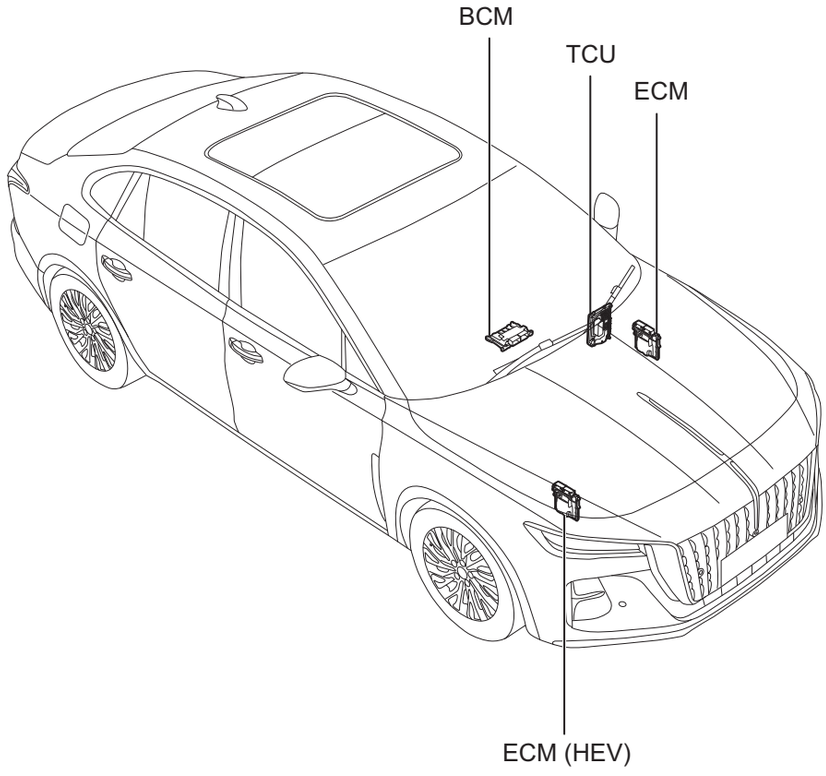
BM00120RM

Location of parts



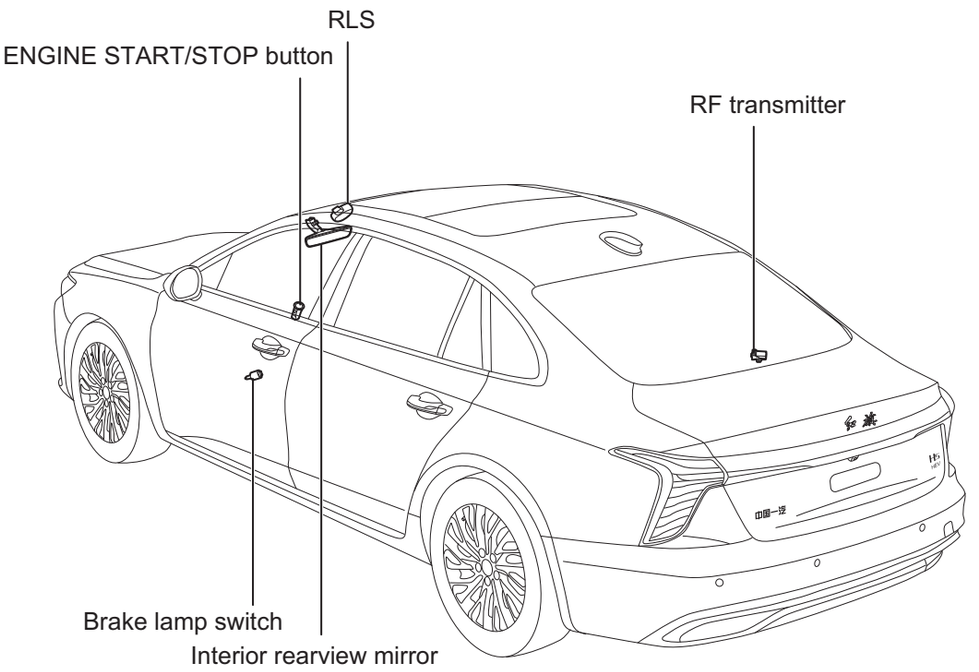
BM00130RM

Location of parts



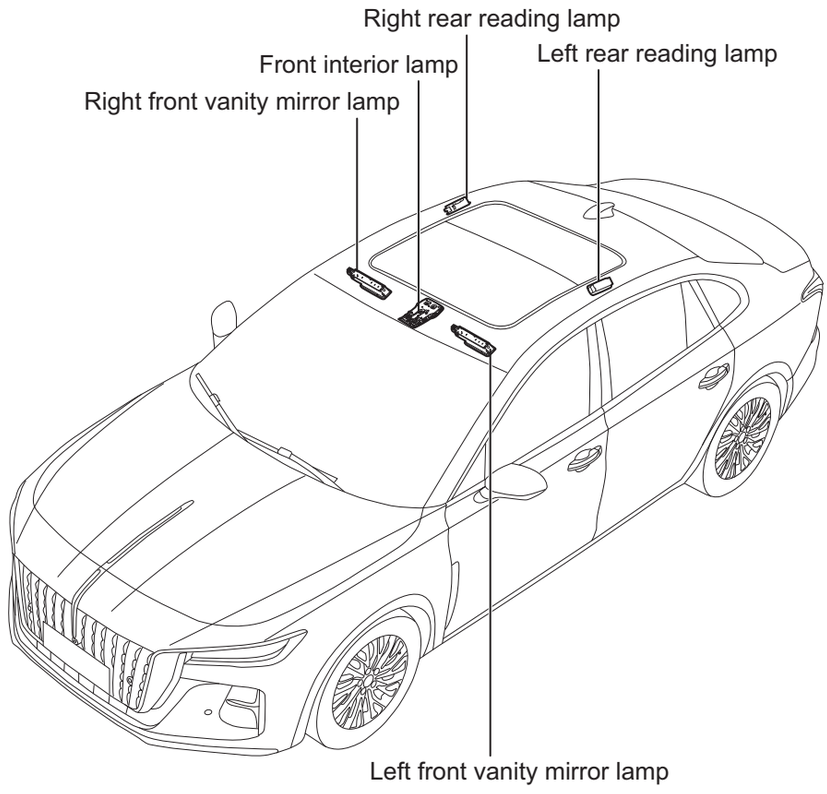
BM00140RM

Location of parts



BM00150RM

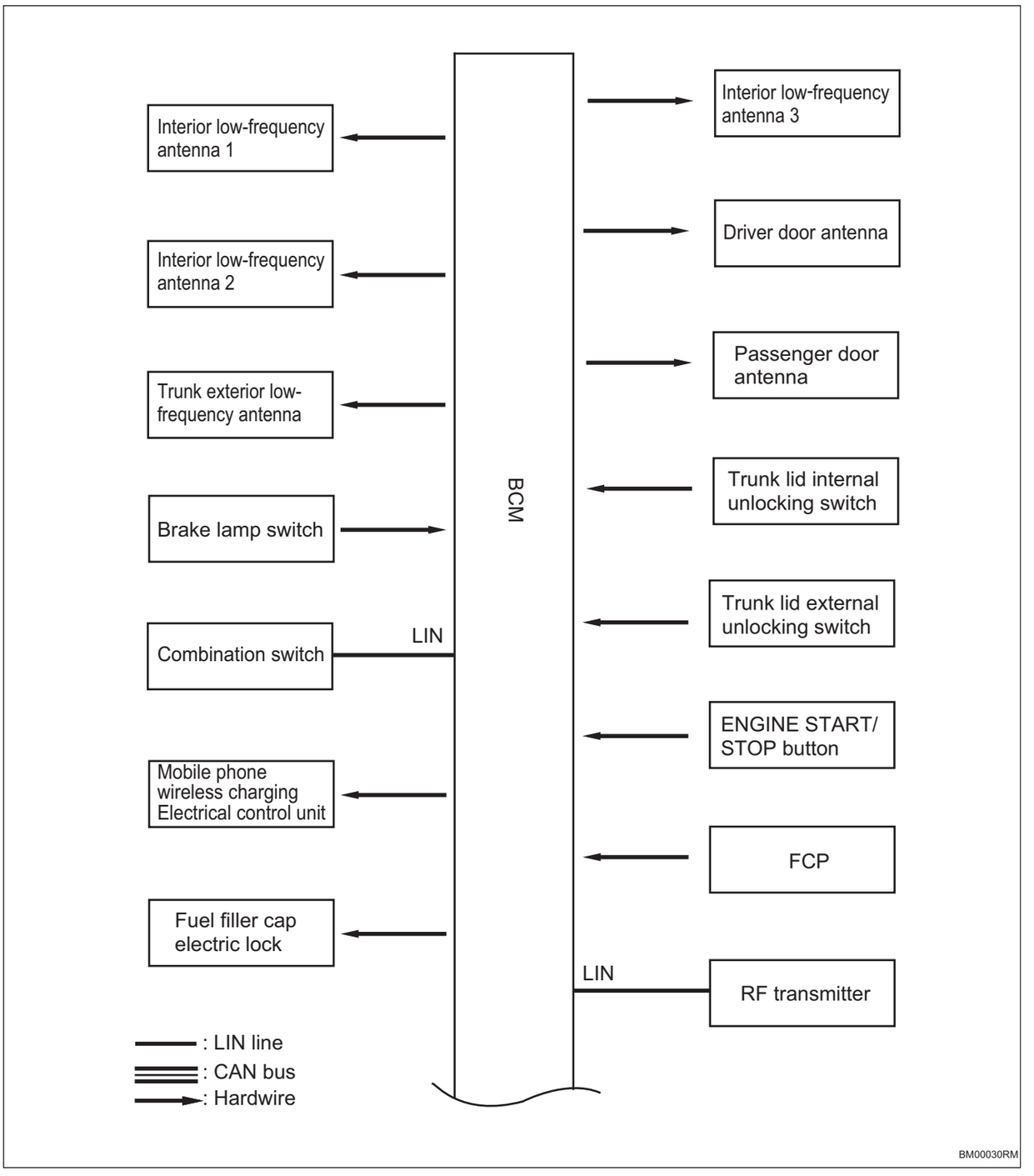
Location of parts

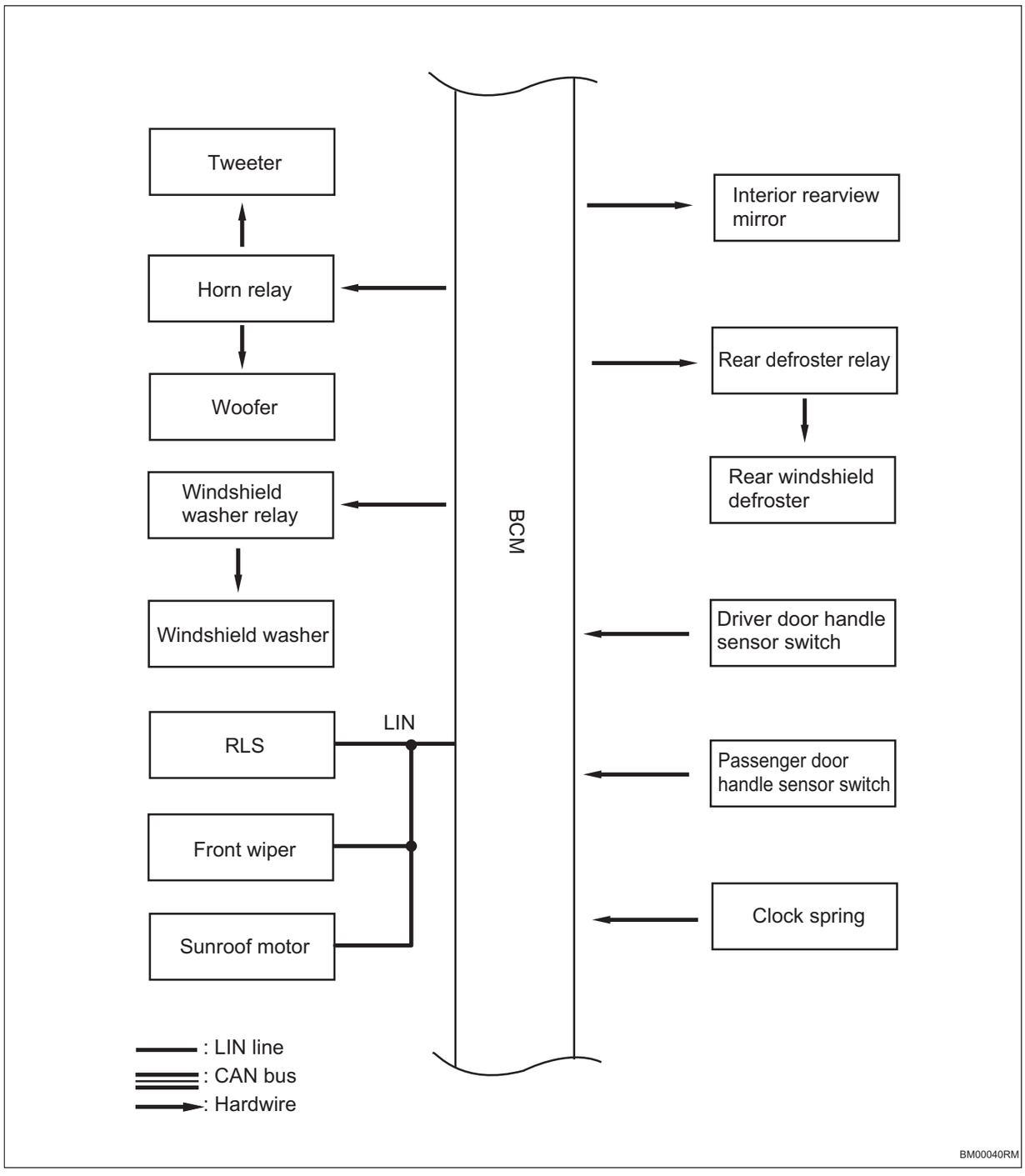


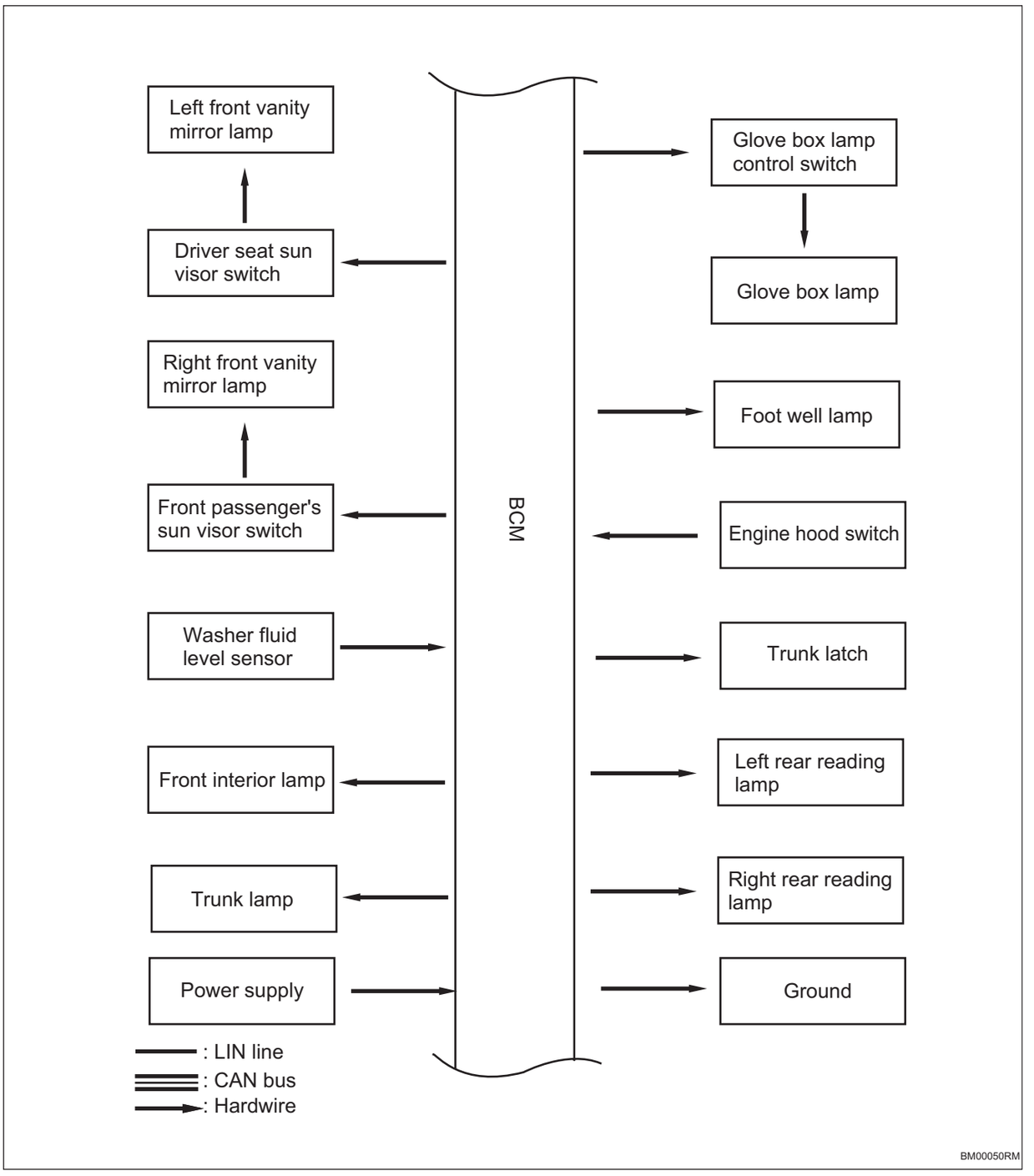
BM00160RM

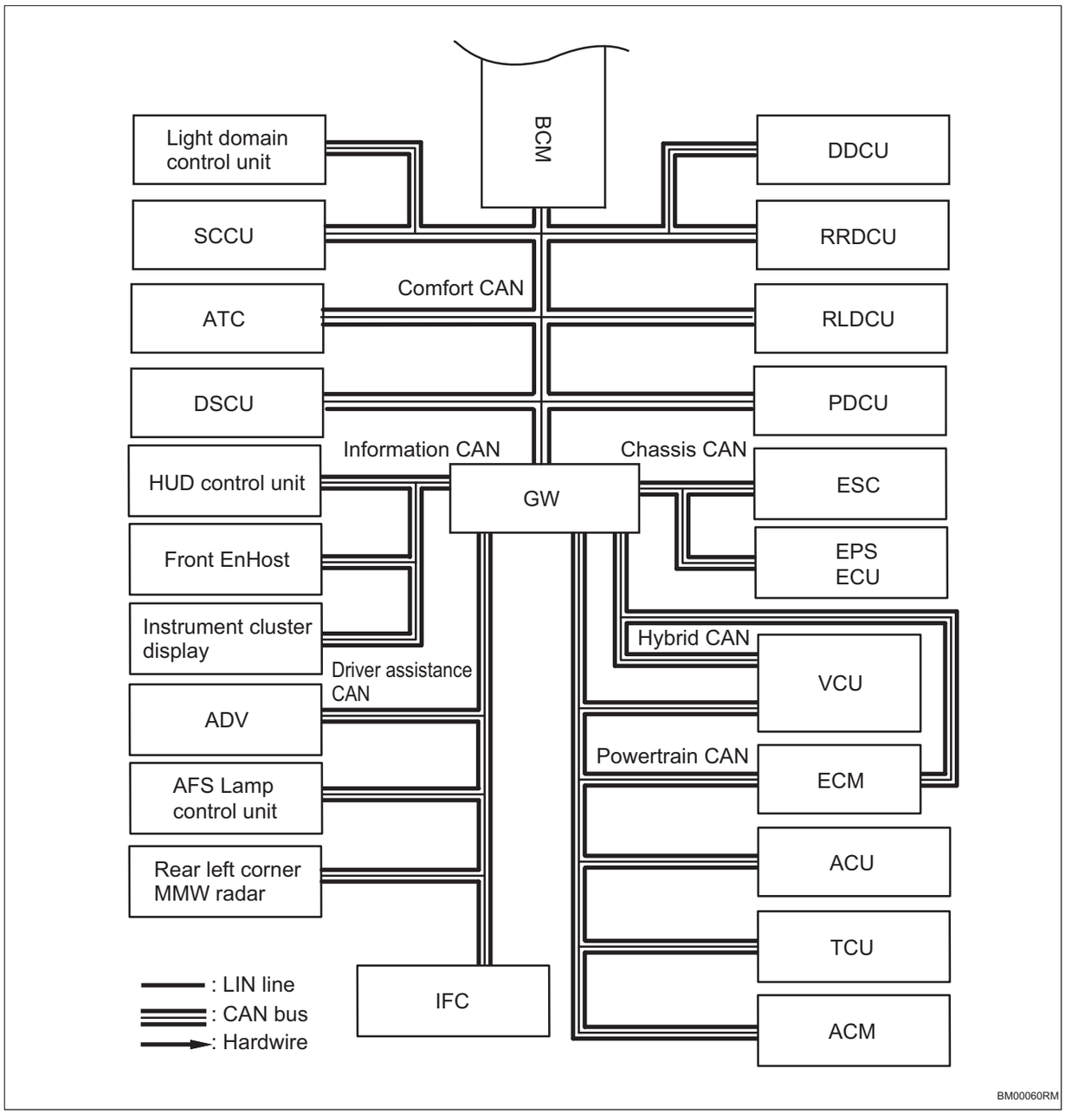
System diagram

BCM


Interior low-frequency antenna 1
Interior low-frequency antenna 2
Trunk exterior low-frequency antenna
Brake lamp switch
Combination switch
LIN
Mobile phone wireless charging Electrical control unit
Fuel filler cap electric lock
BCM
Interior low-frequency antenna 3
Driver door antenna
Passenger door antenna
Trunk lid internal unlocking switch
Trunk lid external unlocking switch
ENGINE START/ STOP button
FCP
LIN
RF transmitter
: LIN line
: CAN bus
: Hardwire
BM00030RM


Tweeter
Horn relay
Woofer
Windshield washer relay
Windshield washer
RLS
Front wiper
Sunroof motor
LIN
BCM
Interior rearview mirror
Rear defroster relay
Rear windshield defroster
Driver door handle sensor switch
Passenger door handle sensor switch
Clock spring
: LIN line
: CAN bus
: Hardwire
BM00040RM


Left front vanity mirror lamp
Driver seat sun visor switch
Right front vanity mirror lamp
Front passenger's sun visor switch
Washer fluid level sensor
Front interior lamp
Trunk lamp
Power supply
BCM
Glove box lamp control switch
Glove box lamp
Foot well lamp
Engine hood switch
Trunk latch
Left rear reading lamp
Right rear reading lamp
Ground
: LIN line
: CAN bus
: Hardwire
BM00050RM


BCM
Light domain control unit
SCCU
ATC
DSCU
HUD control unit
Front EnHost
Instrument cluster display
ADV
AFS Lamp control unit
Rear left corner MMW radar
Comfort CAN
Information CAN
Chassis CAN
GW
Driver assistance CAN
IFC
DDCU
RRDCU
RLDCU
PDCU
ESC
EPS ECU
Hybrid CAN
VCU
Powertrain CAN
ECM
ACU
TCU
ACM
: LIN line
: CAN bus
: Hardwire
BM00060RM

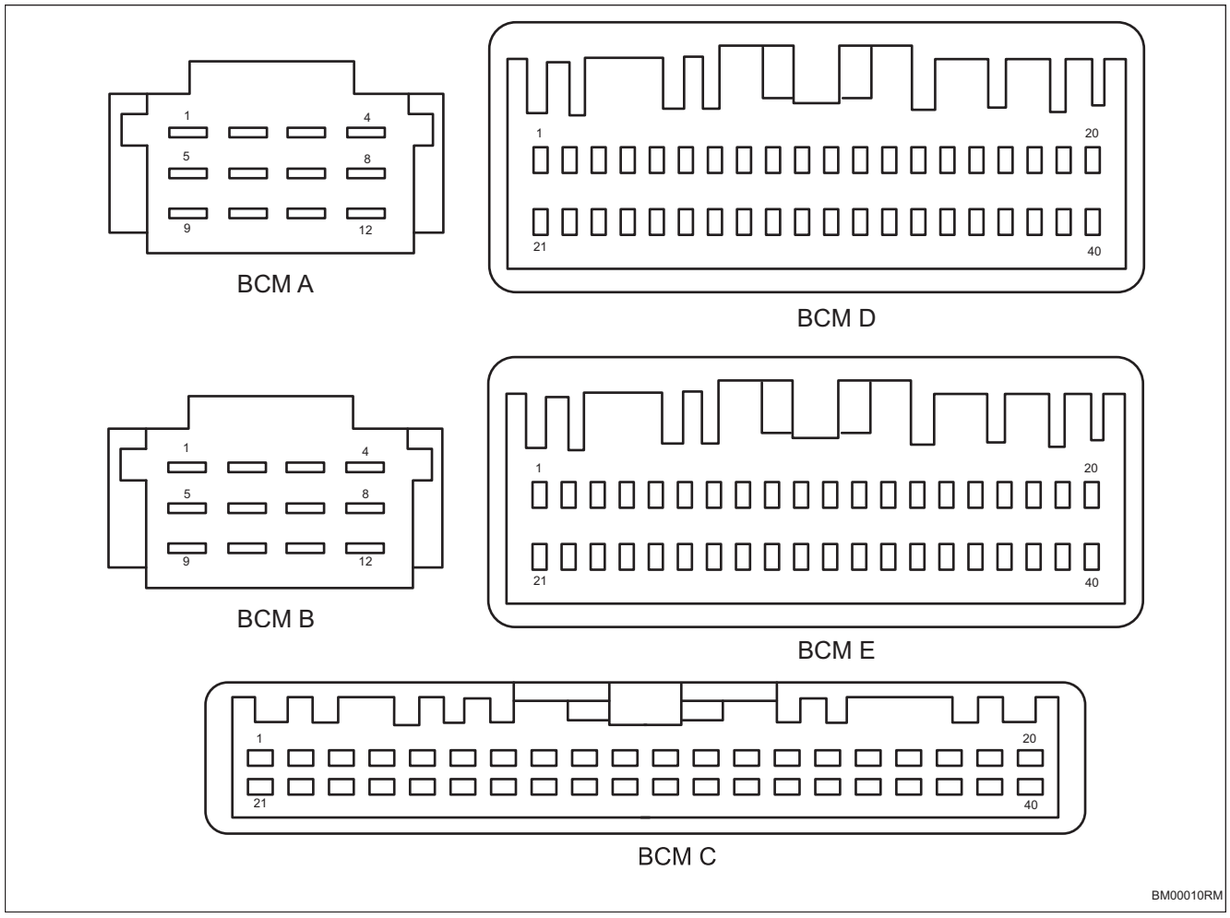
Symptom chart

BCM

Fault	Possible location
Front wiper inoperative	• Front wiper motor • Harness and connector • BCM • Rain sensor • Fuse • LIN communication system
Windshield washer pump inoperative	• Windshield washer • Harness and connector • BCM • Windshield washer relay
Interior lamp not light up	• Interior lamp • Harness and connector • BCM
Horn inoperative	• Clock spring • Harness and connector • BCM • Horn relay • Tweeter • Woofer

ECU terminal

BCM



BCM A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	-	7	Interior lamp power supply
2	-	8	-
3	-	9	Charging/fuel filler lock power supply
4	Interior lamp power supply (including interior lamp, front and rear reading lamps, foot well lamp, glove box lamp, vanity mirror lamp)	10	Charging/fuel filler cap unlocking-
5	Charging/fuel filler cap unlocking +	11	-
6	-	12	-

BCM B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Power supply 1 + (control unit power supply)	7	-
2	Power GND	8	-
3	-	9	-

BCM B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
4	-	10	-
5	Power supply 2 + (control unit power supply)	11	-
6	-	12	-

BCM C			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Front/rear windshield heater (external relay)	21	Trunk lamp drive
2	Washer fluid level switch GND control	22	-
3	Anti-theft horn (HSD, external relay)	23	Front washer pump motor (external relay)
4	Normally-closed brake switch	24	-
5	-	25	-
6	Trunk lid external unlocking switch	26	-
7	ENGINE START/STOP button ground	27	Normally open brake switch
8	ENGINE START/STOP button backlight control	28	-
9	-	29	-
10	-	30	Wireless charging disable
11	-	31	-
12	-	32	ENGINE START/STOP button backlight power supply
13	-	33	Trunk latch motor (external relay)
14	-	34	-
15	-	35	IG1 enable (external relay)
16	-	36	-
17	-	37	-
18	-	38	-
19	-	39	-
20	-	40	-

BCM D			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	LIN1(RLS WMM SMA SSM)	21	LIN(ALU)
2	LIN0(Column Switch)	22	CAN0_H
3	Rearview mirror reverse gear output	23	CAN0_L
4	Hazard warning indicator lamp	24	-
5	-	25	-
6	-	26	Engine hood status switch
7	-	27	-

BCM D			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
8	-	28	Hazard warning switch
9	-	29	Horn switch
10	-	30	-
11	Washer fluid level switch	31	-
12	Trunk latch status switch	32	Ambient lamp control unit
13	-	33	Foot well lamp control
14	-	34	-
15	Trunk internal unlocking switch	35	-
16	-	36	Interior lamp control
17	-	37	-
18	-	38	-
19	Capacitor switch 2 power supply (right front)	39	-
20	Capacitor switch 1 power supply (left front)	40	-

BCM E			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	IG1 feedback	21	ENGINE START/STOP button 2
2	-	22	-
3	-	23	-
4	-	24	LIN3 RF transmitter
5	ENGINE START/STOP button 1	25	Capacitor switch ground 2 (right front)
6	-	26	-
7	-	27	-
8	-	28	-
9	Capacitor switch 1 unlocking (left front)	29	Capacitor switch 2 unlocking (right front)
10	-	30	Capacitor switch ground 1 (left front)
11	-	31	-
12	-	32	-
13	Capacitor switch 2 locking (right front)	33	-
14	Capacitor switch 1 locking (left front)	34	-
15	Driver door panel exterior antenna -	35	Console interior antenna -
16	Driver door panel exterior antenna +	36	Console interior antenna +
17	Passenger door panel exterior antenna +	37	Interior antenna 2-
18	Passenger door panel exterior antenna -	38	Interior antenna 2+
19	Trunk exterior antenna -	39	Trunk interior antenna -
20	Trunk exterior antenna +	40	Trunk interior antenna +

DTC chart

DTC	Description	Reference page
B100016	System undervoltage	(See page BM-21)
B100017	System overvoltage	(See page BM-21)
B100215	Trunk latch relay open circuit or circuit shorted to power supply	(See page BM-24)
B100219	Trunk latch relay overcurrent	(See page BM-24)
B100315	IG1 relay 1 circuit open or shorted to power supply	(See page BM-28)
B100319	IG1 relay 1 overcurrent	(See page BM-28)
B100514	Interior antenna 1 fault	(See page BM-33)
B100614	Interior antenna 2 fault	(See page BM-33)
B100714	Trunk interior antenna	(See page BM-33)
B100814	Left door antenna failure	(See page BM-33)
B100914	Right door antenna failure	(See page BM-33)
B100A14	Trunk exterior antenna failure	(See page BM-33)
B100D11	ENGINE START/STOP button power supply failure	(See page BM-38)
B100F11	Wireless charging disable output failure	(See page BM-43)
B101314	Capacitor switch unlocking 1 stuck	(See page BM-47)
B101414	Capacitor switch locking 1 stuck	(See page BM-47)
B101514	Capacitor switch unlocking 2 stuck	(See page BM-47)
B101614	Capacitor switch locking 2 stuck	(See page BM-47)
B101823	Hazard warning switch failure	(See page BM-51)
B101923	Trunk lid interior switch failure	(See page BM-56)
B101C23	Trunk lid exterior switch failure	(See page BM-63)
B101A23	Horn switch failure	(See page BM-60)
B102A12	Trunk lamp output circuit shorted to ground	(See page BM-67)
B102C11	Anti-theft horn relay output failure	(See page BM-69)
B102E11	Hazard warning indicator lamp fault	(See page BM-51)
B102F12	Interior lamp failure	(See page BM-73)
B103012	Foot well lamp grounding failure	(See page BM-73)
B103112	Ambient lamp grounding failure	(See page BM-106)
B103324	Fuel filler cap output + relay failure	(See page BM-75)
B103424	Fuel filler cap power supply failure	(See page BM-75)
B103524	Fuel filler cap output - relay failure	(See page BM-75)
B103613	Interior lamp power supply open circuit	(See page BM-73)
B103B14	Front/rear windshield heater failure	(See page BM-80)
B103C87	Gear shifting authentication failure	(See page BM-84)
B103D87	EMS authentication failure	(See page BM-85)
B103E11	Capacitor switch power supply output failure	(See page BM-86)

DTC	Description	Reference page
B103F29	Invalid TPMS ID	(See page BM-90)
B104029	Front TPMS low pressure alarm threshold invalid	(See page BM-90)
B104129	Rear TPMS low pressure alarm threshold invalid	(See page BM-90)
B104587	Left front TPMS failure	(See page BM-91)
B104616	Left front TPMS voltage low	(See page BM-91)
B104787	Right front TPMS failure	(See page BM-91)
B104816	Right front TPMS low voltage	(See page BM-91)
B104987	Left rear TPMS failure	(See page BM-91)
B104A16	Left rear TPMS low voltage	(See page BM-91)
B104B87	Right rear TPMS failure	(See page BM-91)
B104C16	Right rear TPMS low voltage	(See page BM-91)
B104D16	Smart key low voltage	(See page BM-112)
B105012	IG1 relay 1 feedback circuit shorted to power supply	(See page BM-28)
B105113	IG1 relay 1 feedback open circuit	(See page BM-28)
B105787	RLS configuration writing failure	(See page BM-113)
U002888	Body/comfort CAN bus off	(See page BM-93)
U014687	GW node lost	(See page BM-93)
U02E387	Headlamp control unit node lost	(See page BM-93)
U020887	Driver seat control unit node lost	(See page BM-93)
U024687	SCCU node lost	(See page BM-93)
U019987	Driver door module node lost	(See page BM-93)
U020087	Passenger door module node lost	(See page BM-93)
U020187	Rear left door module node lost	(See page BM-93)
U020287	Rear right door module node lost	(See page BM-93)
U016487	A/C control unit 1 node lost	(See page BM-93)
U112187	ESP message lost	(See page BM-93)
U129187	ACM message lost	(See page BM-93)
U115187	ACU message lost	(See page BM-93)
U12E187	IHC message lost	(See page BM-93)
U124387	ADV message lost	(See page BM-93)
U110087	ECM message lost	(See page BM-93)
U115887	HUD message lost	(See page BM-93)
U124587	EnHost/IVI message lost	(See page BM-93)
U115587	Instrument cluster control unit message lost	(See page BM-93)
U123587	IFC message lost	(See page BM-93)
U123287	Left lane change assist control unit message lost	(See page BM-93)
U113187	EPS ECU message lost	(See page BM-93)

DTC	Description	Reference page
U114687	GW message lost	(See page BM-93)
U129387	HCU message lost	(See page BM-93)
U110187	TCU message lost	(See page BM-93)
U100A88	LIN1 physical bus error	(See page BM-96)
U100B88	LIN2 physical bus error	(See page BM-101)
U100C88	LIN3 physical bus error	(See page BM-106)
U100D88	LIN4 physical bus error	(See page BM-108)
U133486	Combination switch LIN communication error	(See page BM-96)
U134586	Fragrance diffuser control unit LIN communication error.	(See page BM-96)
U130086	RLS LIN communication error	(See page BM-101)
U130886	Electronic wiper module LIN communication error	(See page BM-101)
U130186	Sunroof LIN communication error	(See page BM-101)
U130786	Power sunshade module LIN communication error	(See page BM-96)
U011B87	Combination switch node lost	(See page BM-96)
U013087	Fragrance diffuser node lost	(See page BM-96)
U023187	RLS node lost	(See page BM-101)
U02FF87	Electric wiper module node lost	(See page BM-101)
U016987	Sunroof control unit node lost	(See page BM-101)
U020787	Electric sunshade node lost	(See page BM-101)
U020987	RFR node lost	(See page BM-108)

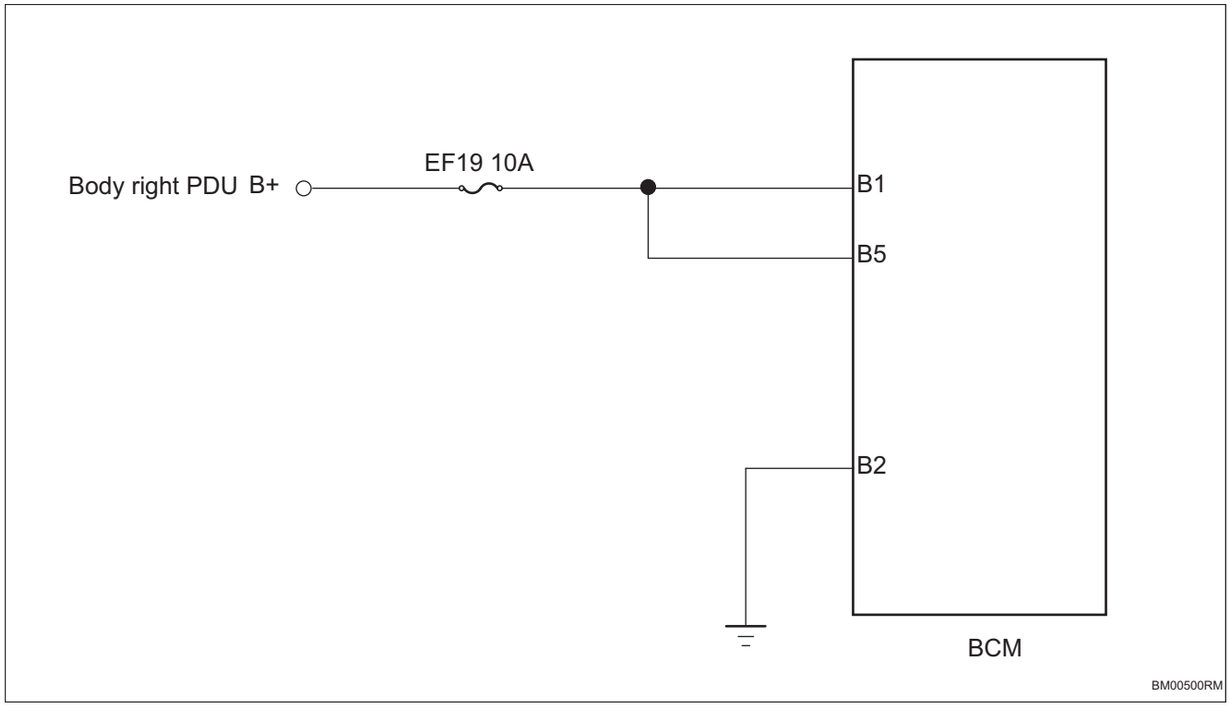
DTC	B100016	System undervoltage
DTC	B100017	System overvoltage

Description

When the BCM power supply voltage exceeds the normal operating range, the BCM records the DTC.

DTC	DTC detection conditions	Faulty location
B100016	(a) System undervoltage.	• BCM • Harness and connector • Fuse • Charging system
B100017	(a) System overvoltage.	• BCM • Harness and connector • Charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2	Check BCM fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the BCM fuse.

(d) Measure the resistance according to the values in the table below.

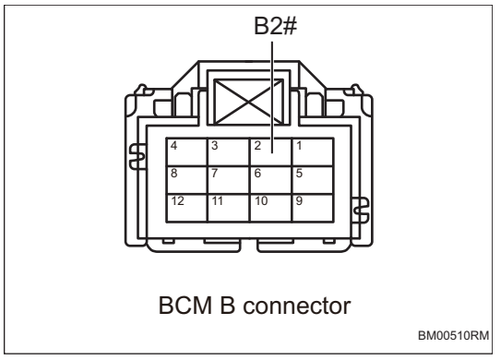
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3	Check BCM ground



BCM B connector

(a) Disconnect the BCM connector.

(b) Measure the resistance according to the values in the table below.

Standard value

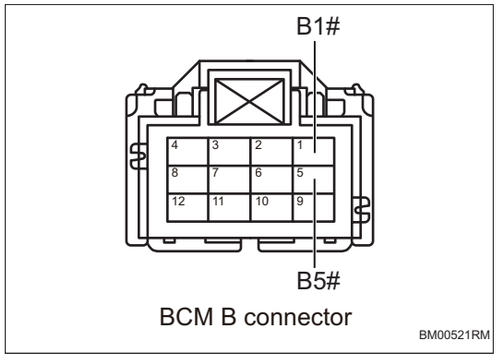
Detector connection	Detection conditions	Specified state
BCM connector B2# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	Check BCM power supply

BM



BCM B connector

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BCM connector B1# -body GND	The ignition switch is set to "ON"	Battery voltage
BCM connector B5# -body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace the BCM (See page BM-114)**

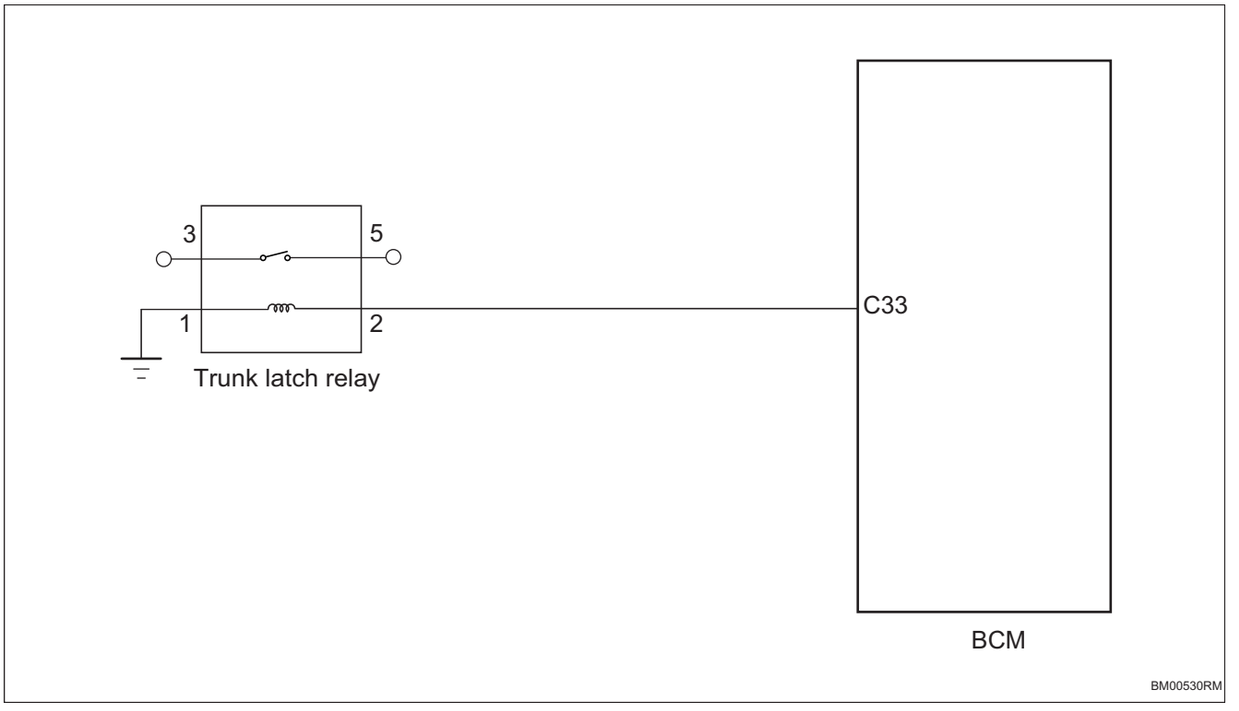
DTC	B100215	Trunk latch relay open circuit or circuit shorted to power supply
DTC	B100219	Trunk latch relay overcurrent

Description

When the trunk latch relay circuit is shorted or open, the BCM will record DTC.

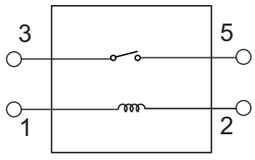
DTC	DTC detection conditions	Faulty location
B100215	(a) Trunk latch relay open circuit or circuit shorted to power supply.	• BCM • Harness and connector • Trunk latch relay
B100219	(a) Trunk latch relay overcurrent.	• BCM • Harness and connector • Trunk latch relay

Circuit diagram



Inspection procedure

1	Check the trunk latch relay



Trunk latch relay

BM00540RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the trunk latch relay.

(d) Measure the resistance according to the values in the table below.

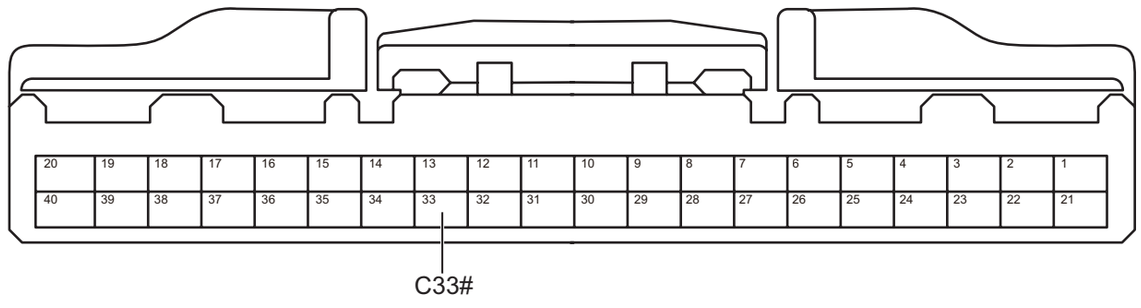
Standard value

Detector connection	Detection conditions	Specified state
Trunk latch relay 3# -trunk latch relay 5#	Apply battery voltage between 1# and 2#	Less than 1Ω
Trunk latch relay 3# -trunk latch relay 5#	No battery voltage is applied between 1# and 2#	10 KΩ or greater

NG **Replace trunk latch relay**

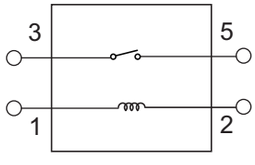
OK

2	Check trunk latch relay harness and connector for open circuit



BCM C connector

BM00550RM



Trunk latch relay connector

BM00561RM

(a) Disconnect the BCM connector.

(b) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Trunk latch relay connector 2# -BCM connector C33#	Always connected	Less than 1Ω

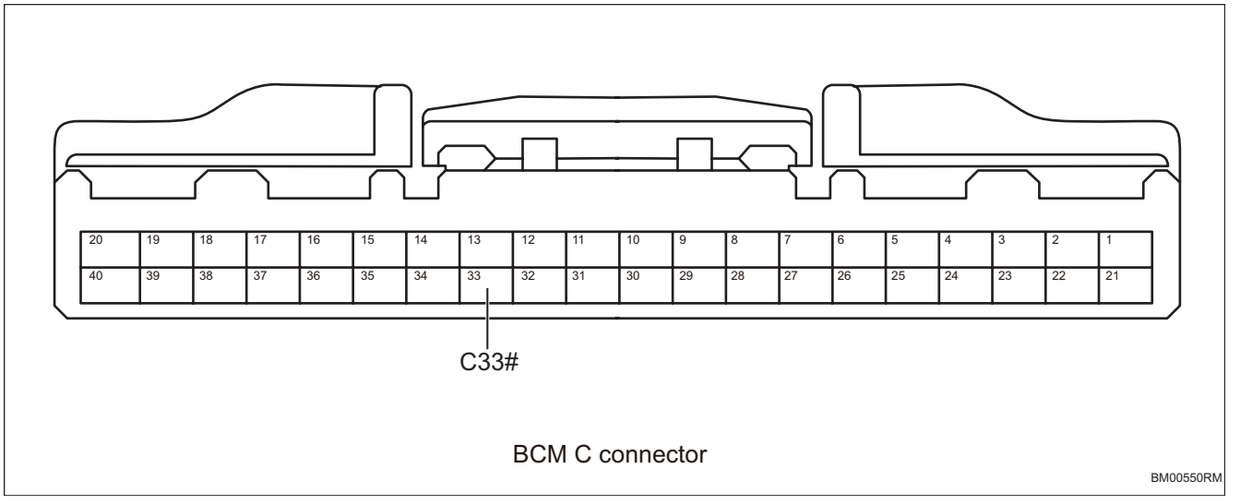
BM

Detector connection	Detection conditions	Specified state
Trunk latch relay connector 1# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check trunk latch relay harness and connector for circuit shorted to ground



BCM C connector

BM00550RM

(a) Measure the resistance according to the values in the table below.

Standard value

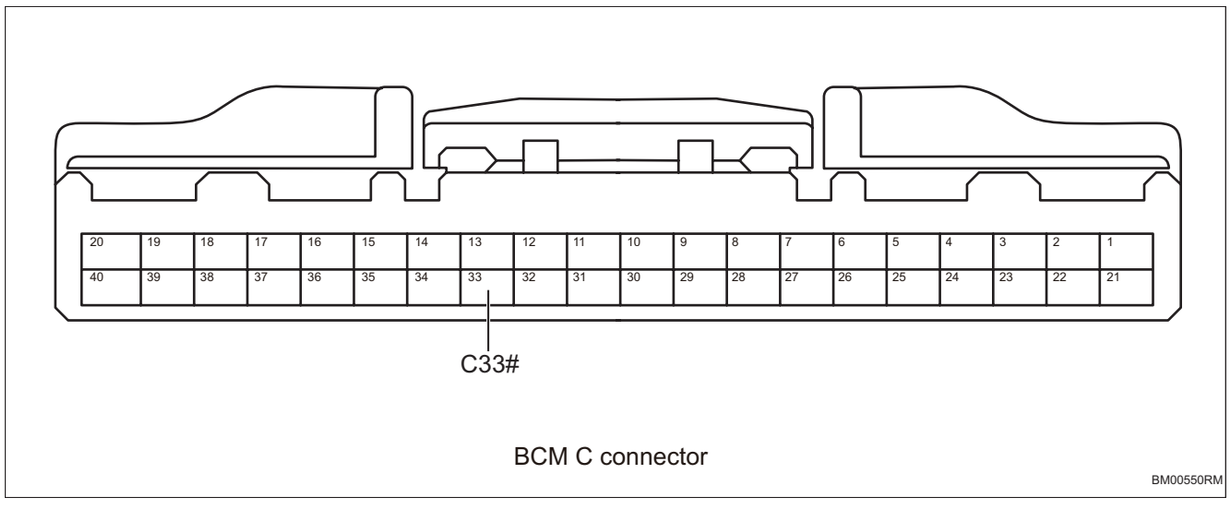
Detector connection	Detection conditions	Specified state
BCM connector C33# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check trunk latch relay harness and connector for circuit shorted to power supply

BM



BCM C connector

BM00550RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BCM connector C33# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG **Repair or replace the harness and connector**

OK

5	**Replace the BCM (See page BM-114)**

BM

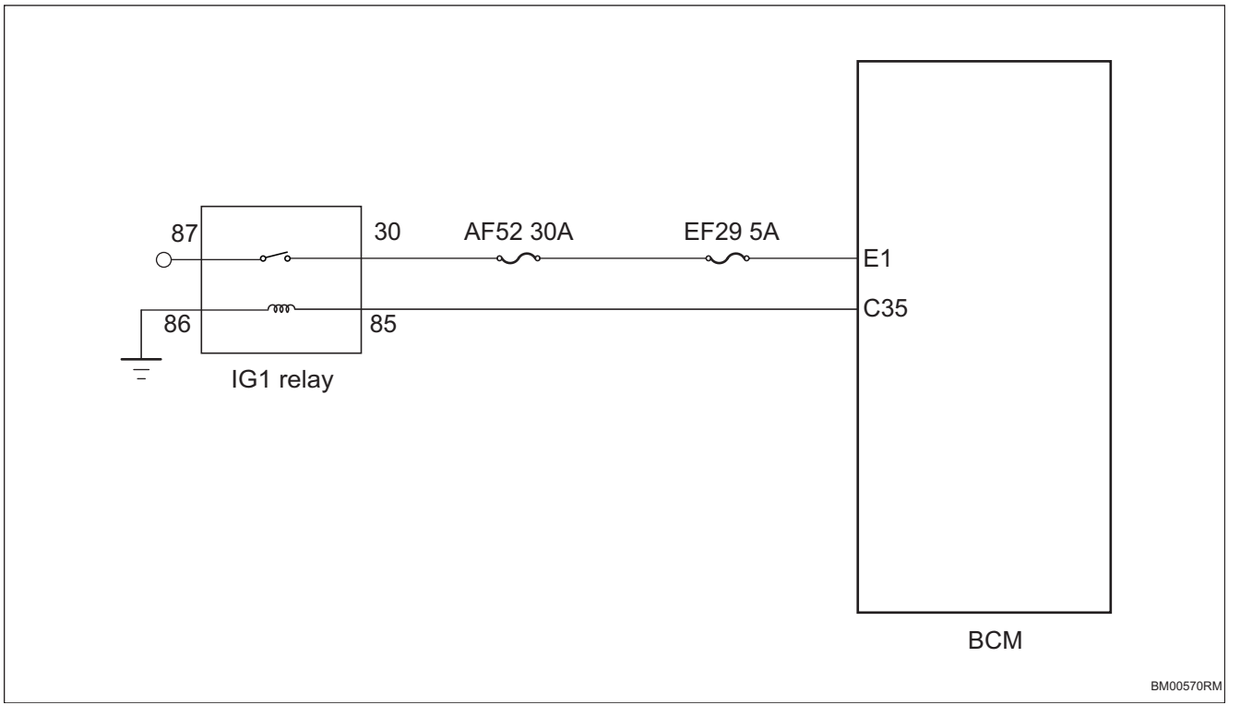
DTC	B100315	IG1 relay 1 circuit open or shorted to power supply
DTC	B100319	IG1 relay 1 overcurrent
DTC	B105012	IG1 relay 1 feedback circuit shorted to power supply
DTC	B105113	IG1 relay 1 feedback open circuit

Description

When IG1 relay circuit is shorted or open, the BCM will record DTC.

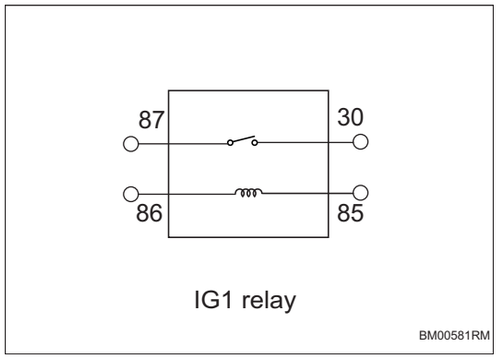
DTC	DTC detection conditions	Faulty location
B100315	(a) IG1 relay open circuit or circuit shorted to power supply.	• BCM • Harness and connector • IG1 relay
B100319	(a) IG1 relay overcurrent.	• BCM • Harness and connector • IG1 relay
B105012	(a) IG1 relay feedback circuit shorted to power supply.	• BCM • Harness and connector • IG1 relay
B105113	(a) IG1 relay feedback open circuit.	• BCM • Harness and connector • IG1 relay

Circuit diagram



Inspection procedure

1	**Check IG1 relay**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the IG1 relay.

(d) Measure the resistance according to the values in the table below.

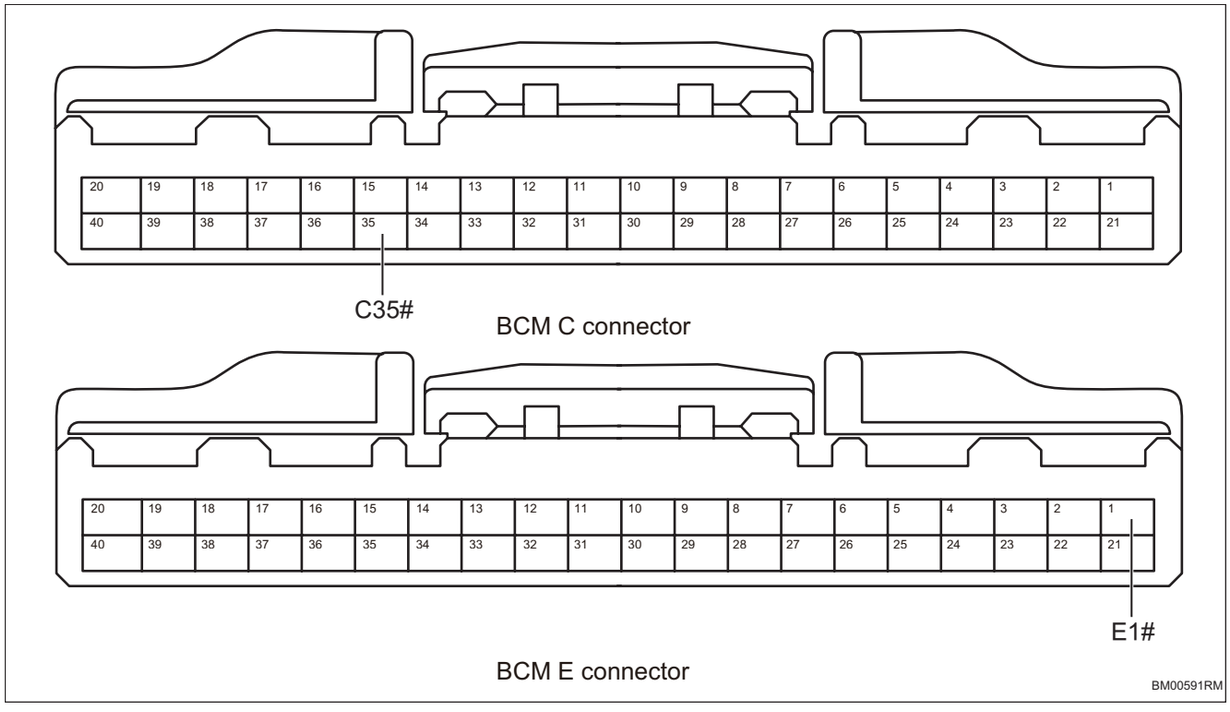
Standard value

Detector connection	Detection conditions	Specified state
IG1 relay 30# - IG1 relay 87#	Apply battery voltage between 86# and 85#	Less than 1Ω
IG1 relay 30# - IG1 relay 87#	No battery voltage is applied between 86# and 85#	10 KΩ or greater

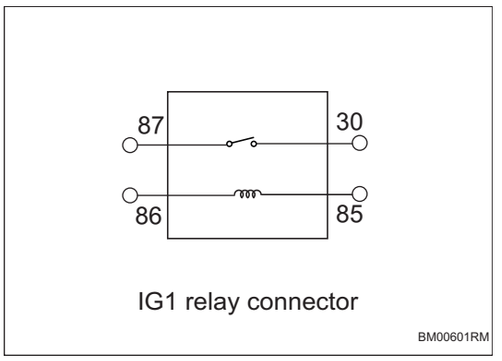
NG → **Replace IG1 relay**

OK

2	**Check IG1 relay harness and connector for open circuit**



BM



(a) Disconnect the BCM connector.

(b) Measure the resistance according to the values in the table below.

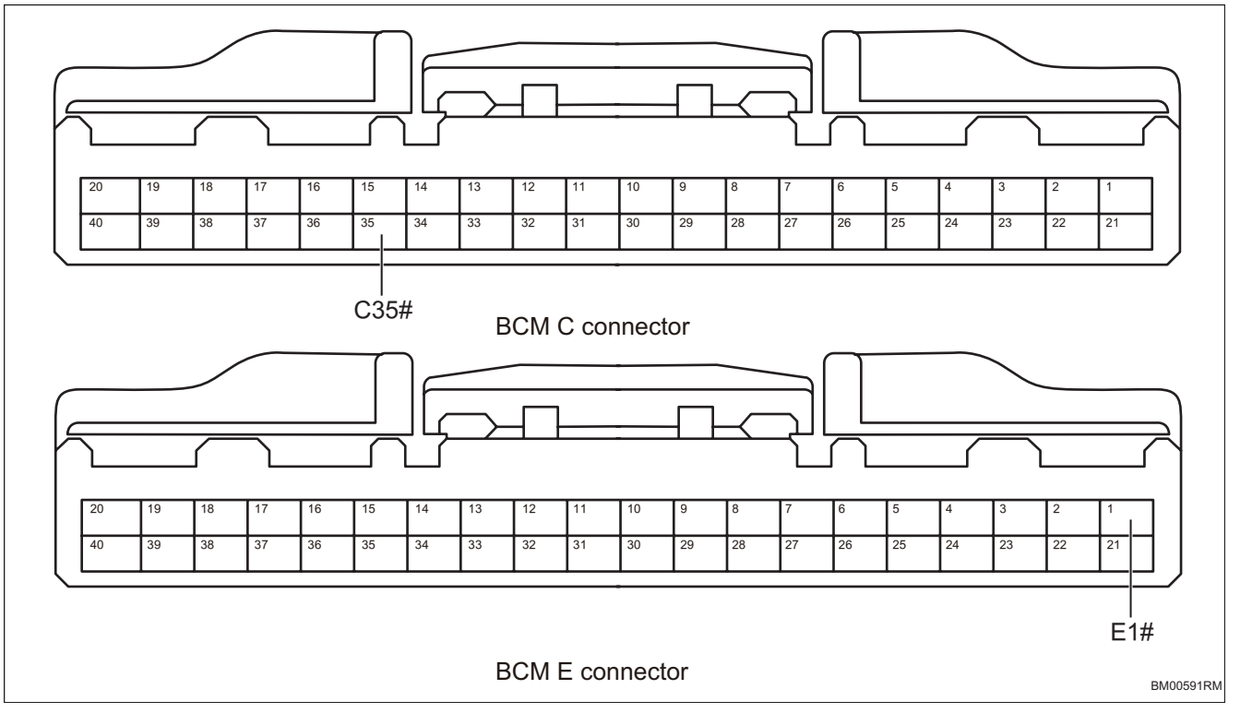
Standard value

Detector connection	Detection conditions	Specified state
IG1 relay connector 85# -BCM connector C35#	Always connected	Less than 1Ω
IG1 relay connector 30# -BCM connector E1#	Always connected	Less than 1Ω
IG1 relay connector 86# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace harness and connector and fuse**

OK

3 Check IG1 relay harness and connector for circuit shorted to ground



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BCM connector C35# - body GND	Always connected	10 KΩ or greater

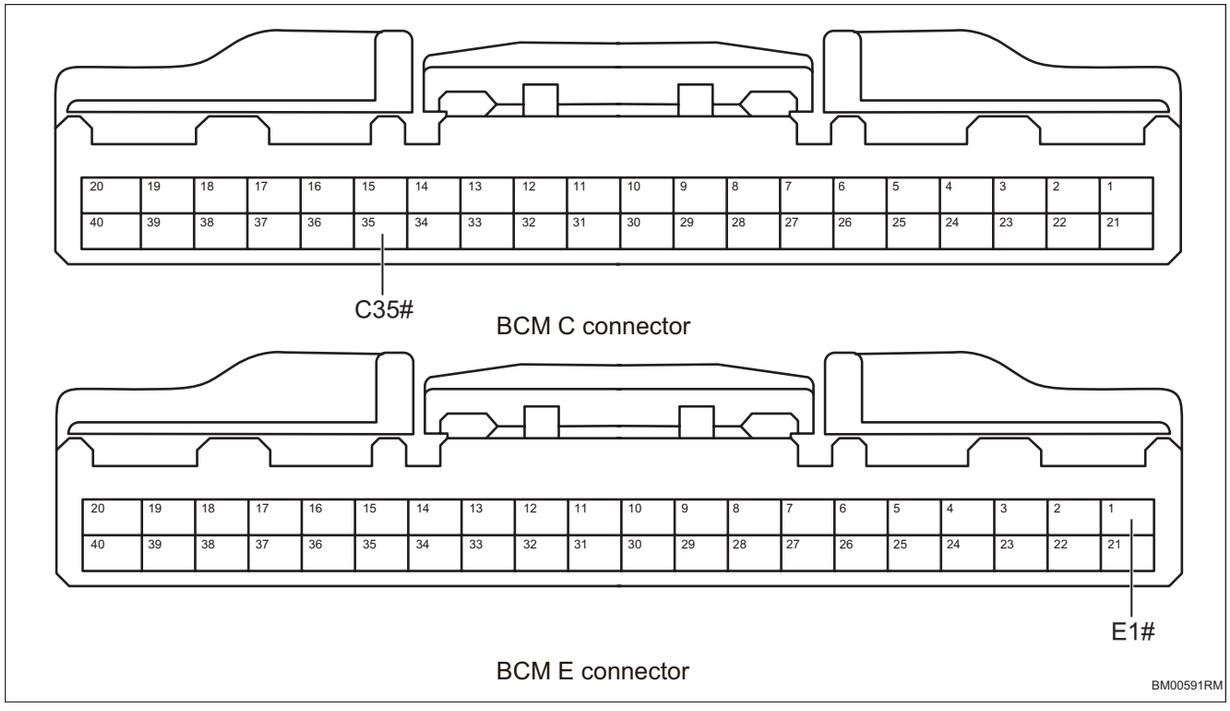
BM

Detector connection	Detection conditions	Specified state
BCM connector E1# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4 **Check IG1 relay harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BCM connector C35# - body GND	The ignition switch is set to "ON"	Less than 1 V
BCM connector E1# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Replace the BCM (See page BM-114)

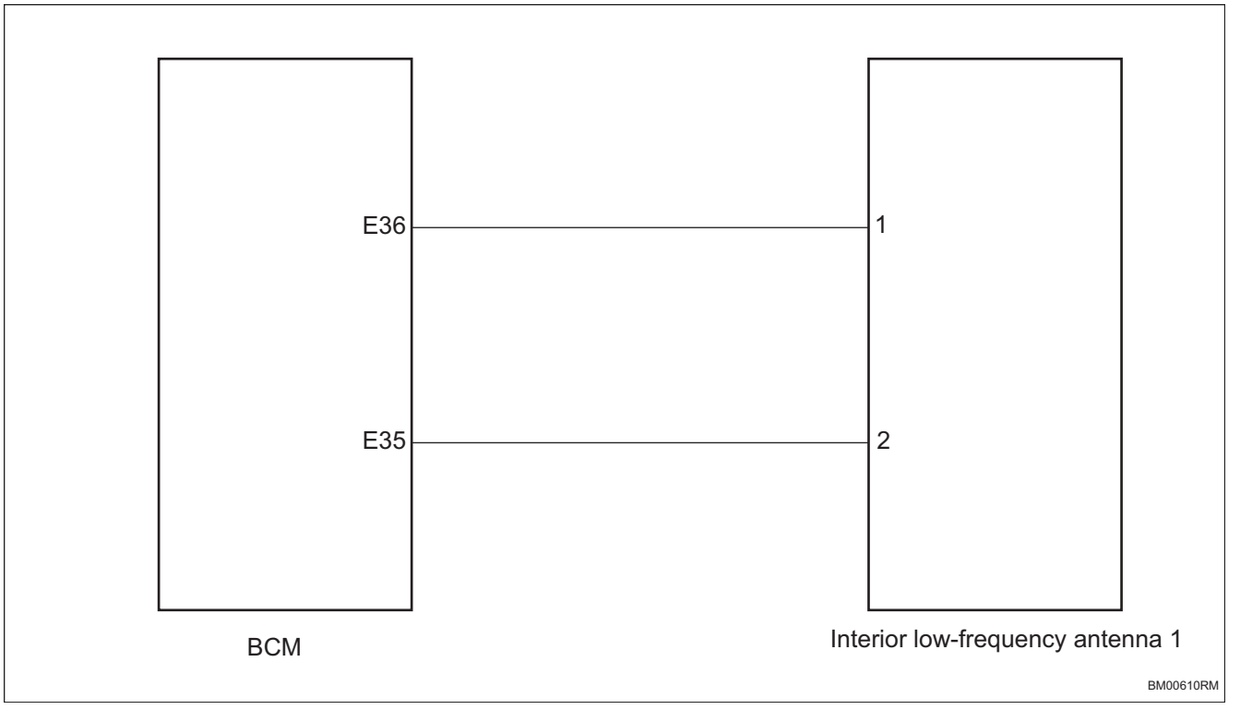
DTC	**B100514**	**Interior antenna 1 fault**
DTC	**B100614**	**Interior antenna 2 fault**
DTC	**B100714**	**Trunk interior antenna**
DTC	**B100A14**	**Trunk exterior antenna failure**
DTC	**B100814**	**Left door antenna failure**
DTC	**B100914**	**Right door antenna failure**

Description

When the interior low-frequency antenna 1, 2 or 3, the trunk exterior low-frequency antenna, or the driver door/passenger door antenna is faulty, BCM records the DTC.

DTC	DTC detection conditions	Faulty location
B100514	(a) Interior antenna 1 fault.	• BCM • Harness and connector • Interior low-frequency antenna 1
B100614	(a) Interior antenna 2 fault.	• BCM • Harness and connector • Interior low-frequency antenna 2
B100714	(a) Trunk interior antenna.	• BCM • Harness and connector • Interior low-frequency antenna 3
B100A14	(a) Trunk exterior antenna failure.	• BCM • Harness and connector • Trunk exterior low-frequency antenna
B100814	(a) Left door antenna failure.	• BCM • Harness and connector • Driver door antenna
B100914	(a) Right door antenna failure.	• BCM • Harness and connector • Passenger door antenna

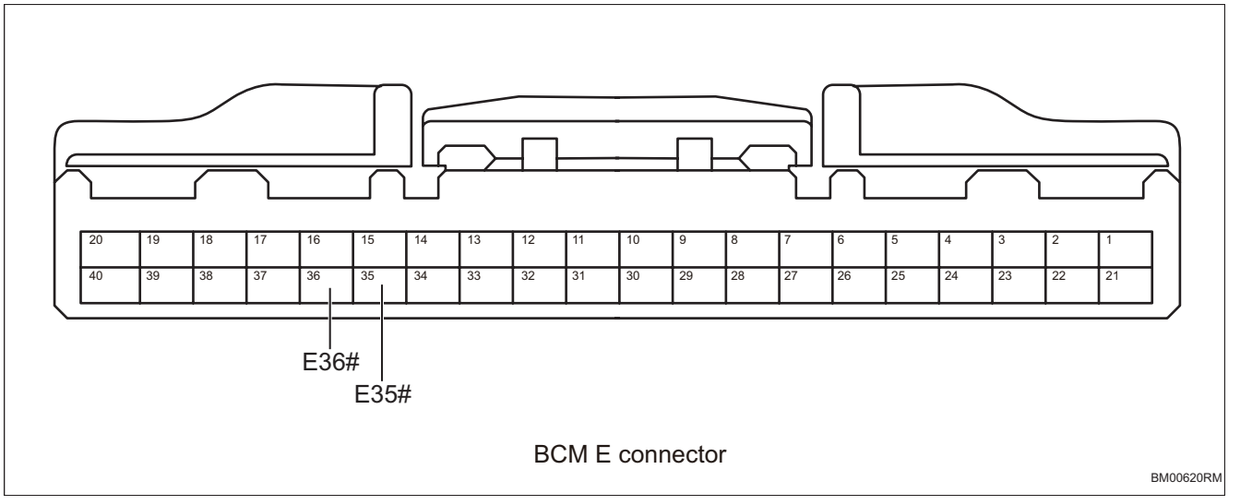
Circuit diagram

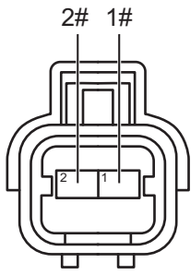


Inspection procedure

Note: The fault analysis procedure of interior low-frequency antenna 1 is described here, which is similar to that of interior low-frequency antenna 2, interior low-frequency antenna 3, trunk exterior low-frequency antenna, driver door and passenger door low-frequency antennas.

1	**Check interior low-frequency antenna 1 harness and connector for open circuit**





Interior low-frequency antenna 1 connector
BM00630RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the BCM connector.

(d) Disconnect interior low-frequency antenna 1 connector.

(e) Measure the resistance according to the values in the table below.

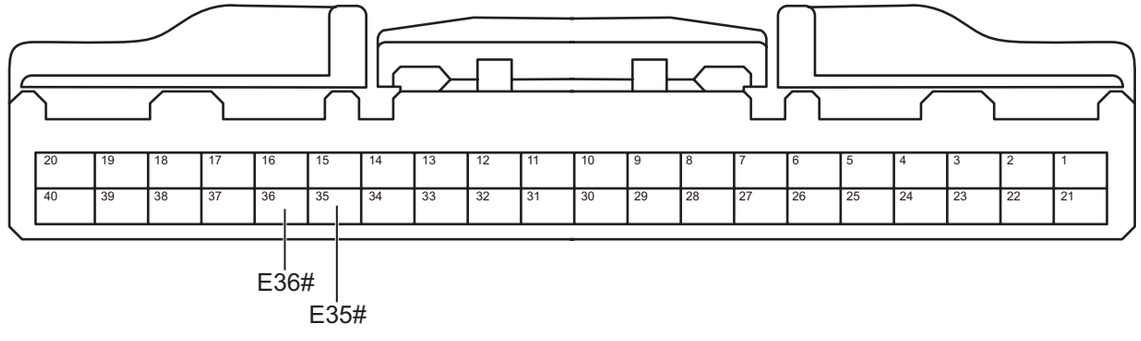
Standard value

Detector connection	Detection conditions	Specified state
BCM connector E36# - interior low-frequency antenna 1 connector 1#	Always connected	Less than 1Ω
BCM connector E35 - interior low-frequency antenna 1 connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check interior low-frequency antenna 1 harness and connector for circuit shorted to ground**



BCM E connector
BM00620RM

(a) Measure the resistance according to the values in the table below.

Standard value

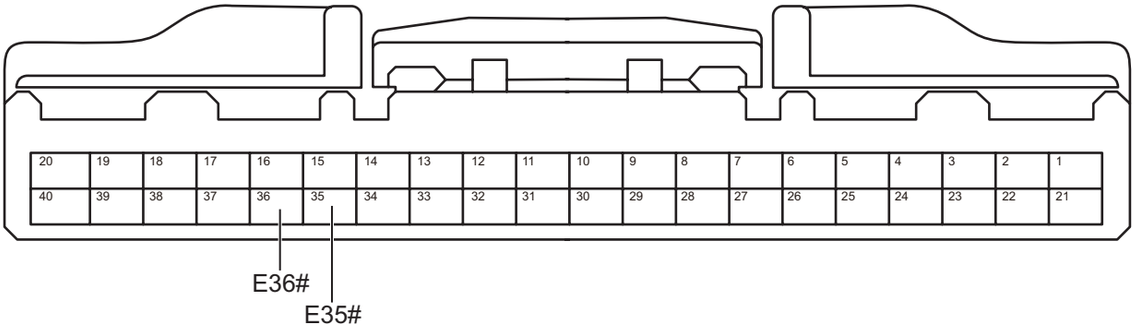
Detector connection	Detection conditions	Specified state
BCM connector E36# - body GND	Always connected	10 KΩ or greater
BCM connector E35# - body GND	Always connected	10 KΩ or greater

BM

NG → **Repair or replace the harness and connector**

OK

3	**Check interior low-frequency antenna 1 harness and connector for circuit shorted to power supply**



BCM E connector

BM00620RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BCM connector E36# - body GND	The ignition switch is set to "ON"	Less than 1 V
BCM connector E35# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace interior low-frequency antenna 1 (See page TD-1)**

(a) Replace the interior low-frequency antenna 1.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

BM

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the BCM (See page BM-114)**

OK

5	**End**

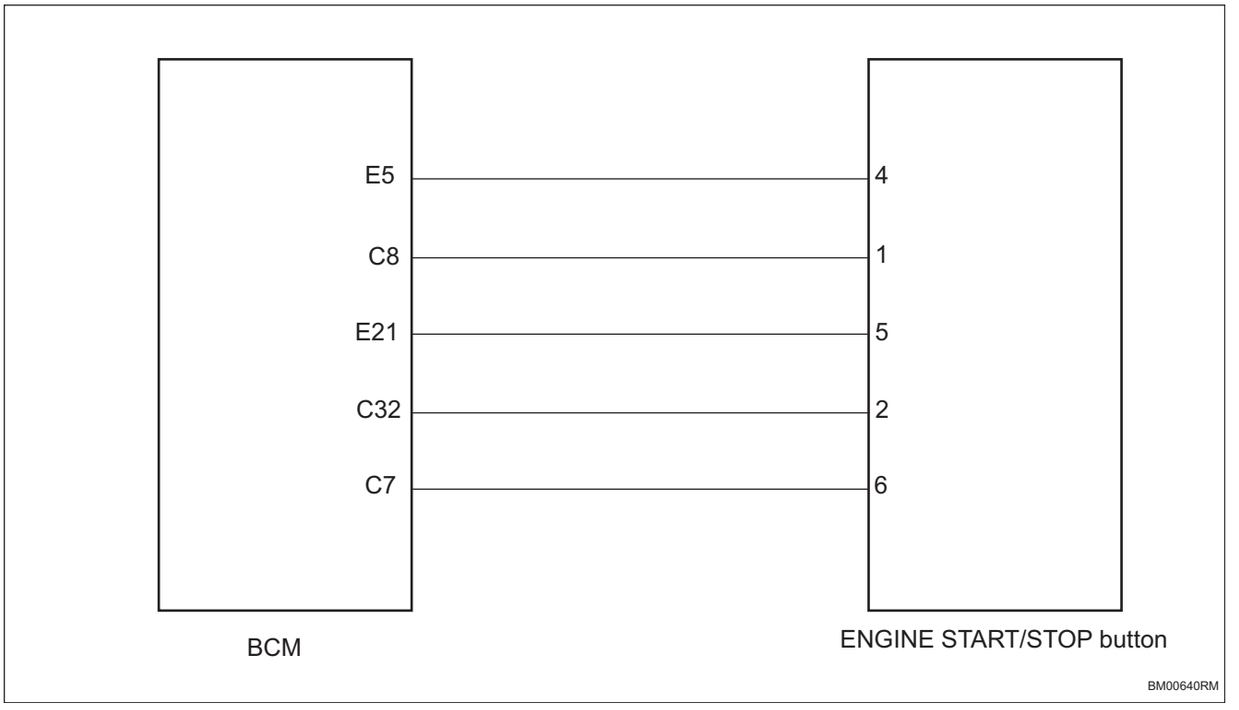
DTC	B100D11	ENGINE START/STOP button power supply failure

Description

When the ENGINE START/STOP button power supply is abnormal, the BCM recordes the DTC.

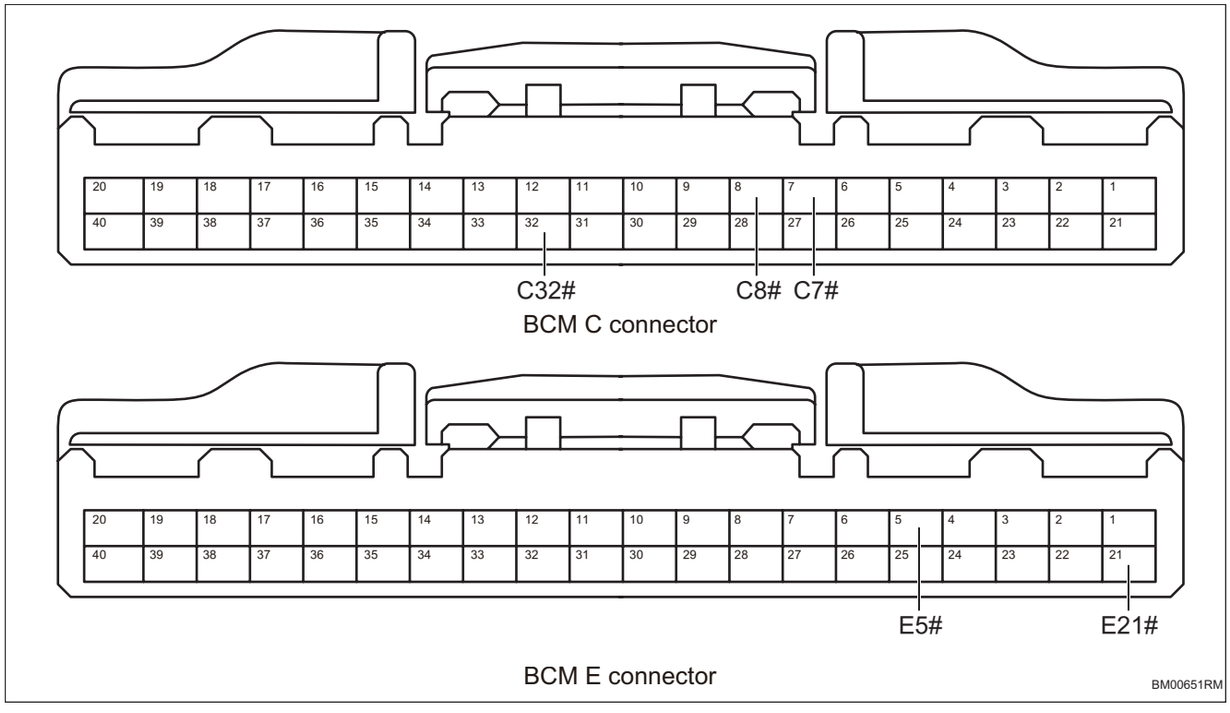
DTC	DTC detection conditions	Faulty location
B100D11	(a) ENGINE START/STOP button power supply failure.	• BCM • Harness and connector • ENGINE START/STOP button

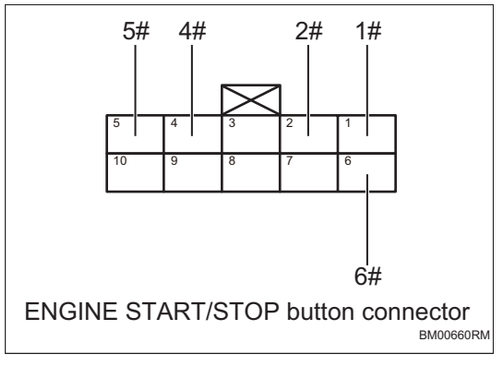
Circuit diagram



Inspection procedure

1	Check ENGINE START/STOP button harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the BCM connector.

(d) Disconnect the ENGINE START/STOP button connector.

(e) Measure the resistance according to the values in the table below.

Standard value

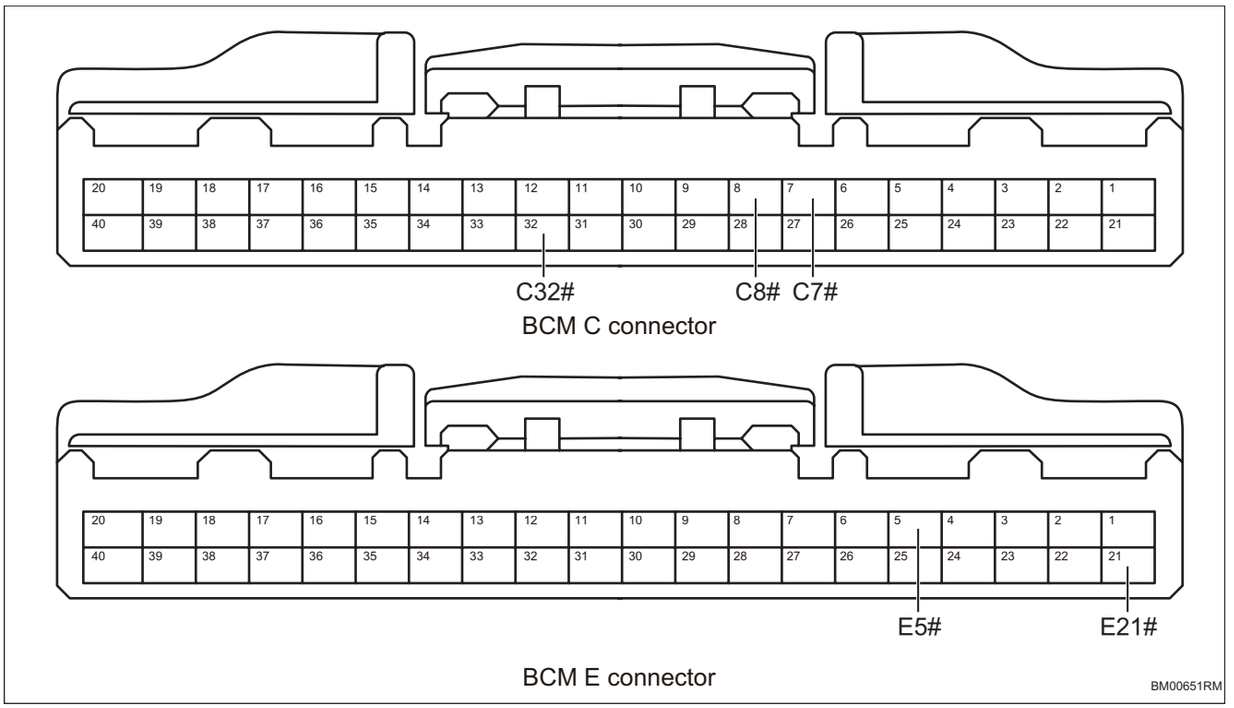
Detector connection	Detection conditions	Specified state
BCM connector E5# - ENGINE START/STOP button connector 4#	Always connected	Less than 1Ω
BCM connector E21# - ENGINE START/STOP button connector 5#	Always connected	Less than 1Ω
BCM connector C7# - ENGINE START/STOP button connector 6#	Always connected	Less than 1Ω
BCM connector C8# - ENGINE START/STOP button connector 1#	Always connected	Less than 1Ω
BCM connector C32# - ENGINE START/STOP button connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

BM

OK

2	**Check ENGINE START/STOP button harness andconnector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

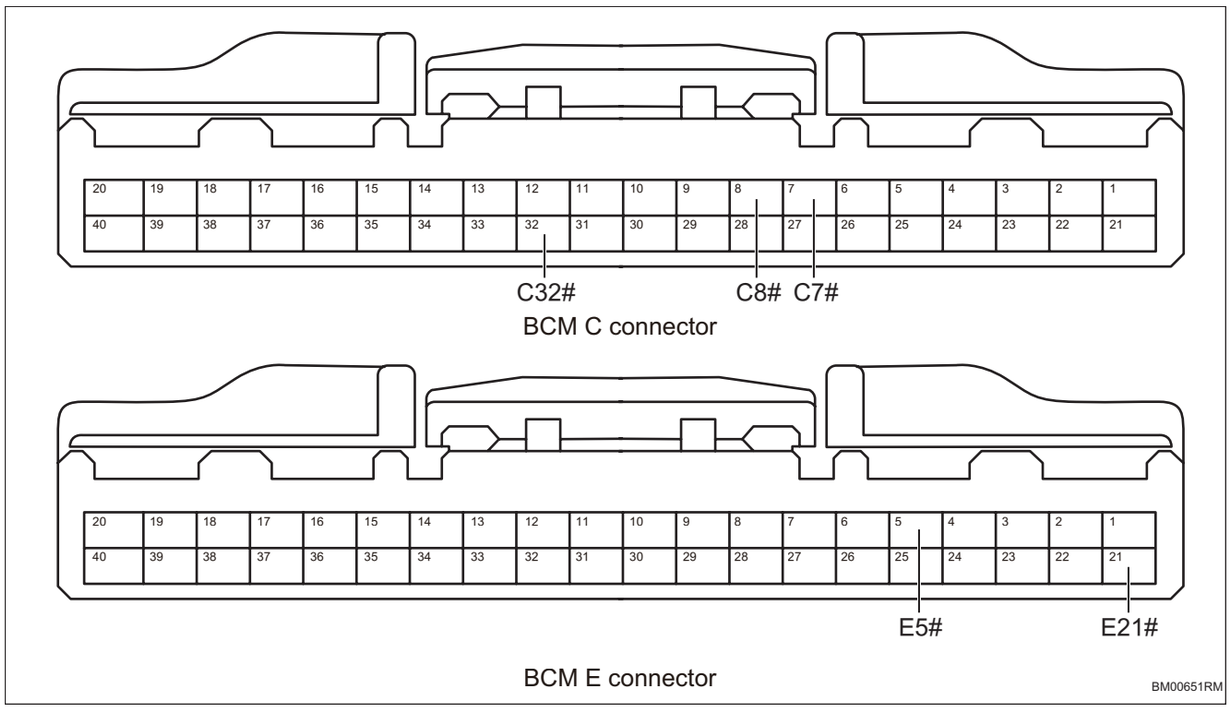
Detector connection	Detection conditions	Specified state
BCM connector E5# - body GND	Always connected	10 KΩ or greater
BCM connector C8# - body GND	Always connected	10 KΩ or greater
BCM connector E21# - body GND	Always connected	10 KΩ or greater
BCM connector C32# - body GND	Always connected	10 KΩ or greater
BCM connector C7# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

3	**Check ENGINE START/STOP button harness and connector for circuit shorted to power supply**

BM



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BCM connector E5# - body GND	The ignition switch is set to "ON"	Less than 1 V
BCM connector C8# - body GND	The ignition switch is set to "ON"	Less than 1 V
BCM connector E21# - body GND	The ignition switch is set to "ON"	Less than 1 V
BCM connector C32# - body GND	The ignition switch is set to "ON"	Less than 1 V
BCM connector C7# - body GND	The ignition switch is set to "ON"	Less than 1 V

BM

NG → **Repair or replace the harness and connector**

OK

4	**Replace ENGINE START/STOP button (See page TD-10)**

(a) Replace the ENGINE START/STOP button.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the BCM (See page BM-114)**

OK

5	**End**

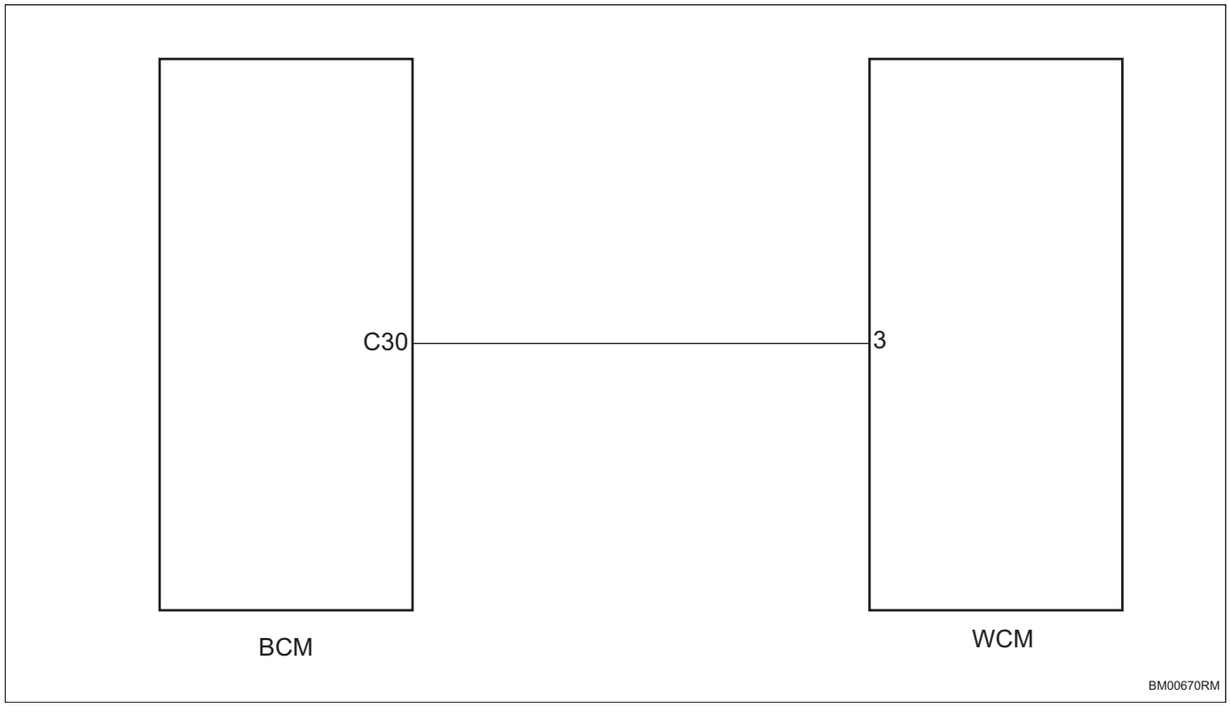
DTC	B100F11	Wireless charging disable output failure

Description

When the WCM fails, BCM records the DTC.

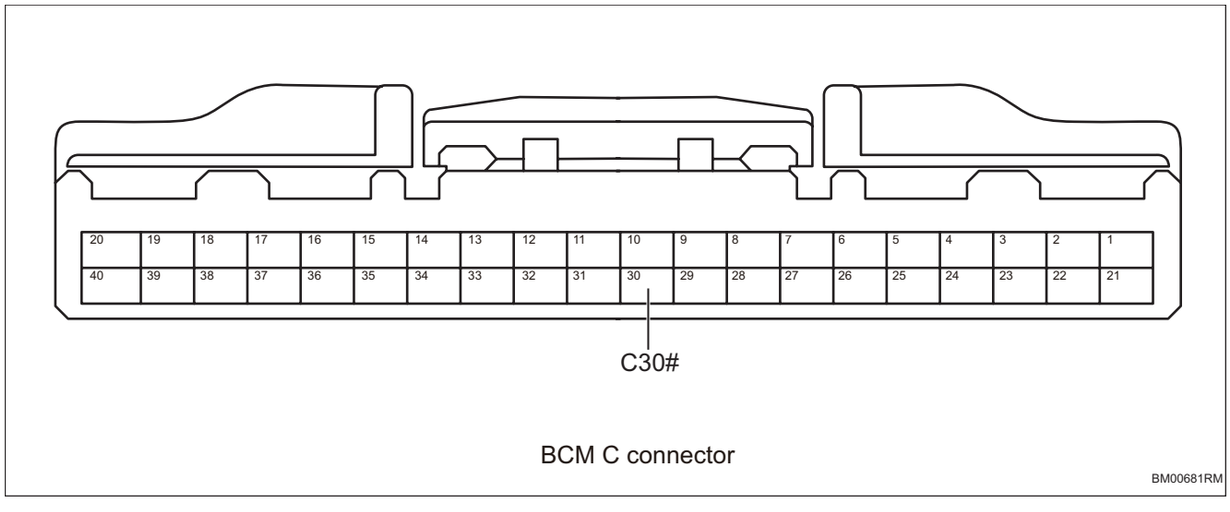
DTC	DTC detection conditions	Faulty location
B100F11	(a) Wireless charging disable output failure.	• BCM • Harness and connector • WCM

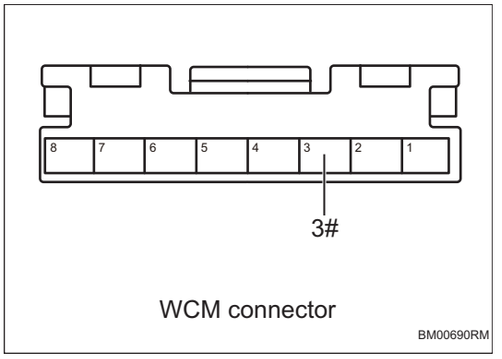
Circuit diagram



Inspection procedure

1	Check WCM harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the BCM connector.

(d) Disconnect the WCM connector.

(e) Measure the resistance according to the values in the table below.

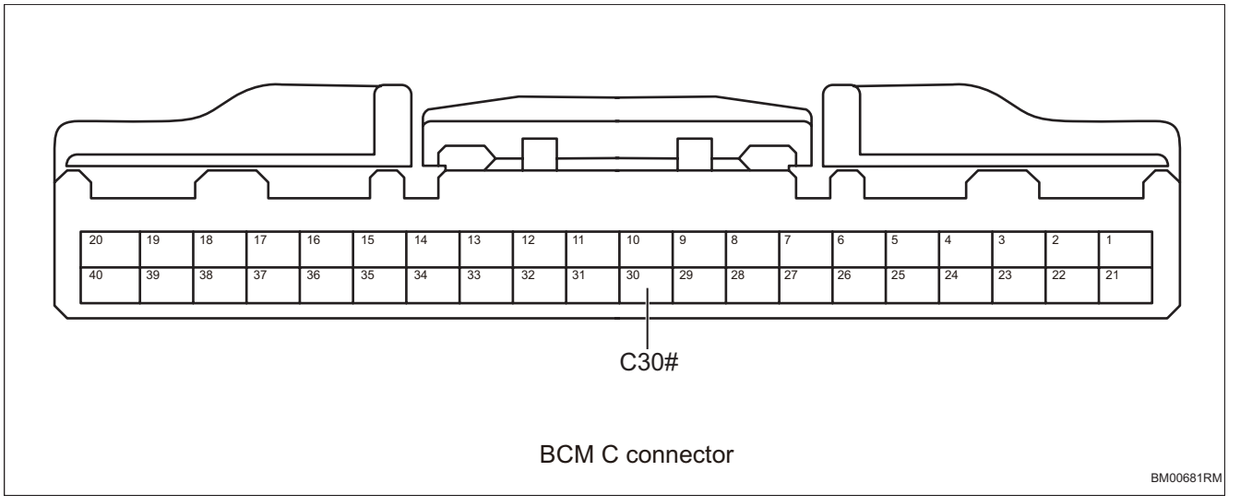
Standard value

Detector connection	Detection conditions	Specified state
BCM connector C30# - WCM connector 3#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

2 Check WCM harness and connector for circuit shorted to ground



(a) Measure the resistance according to the values in the table below.

Standard value

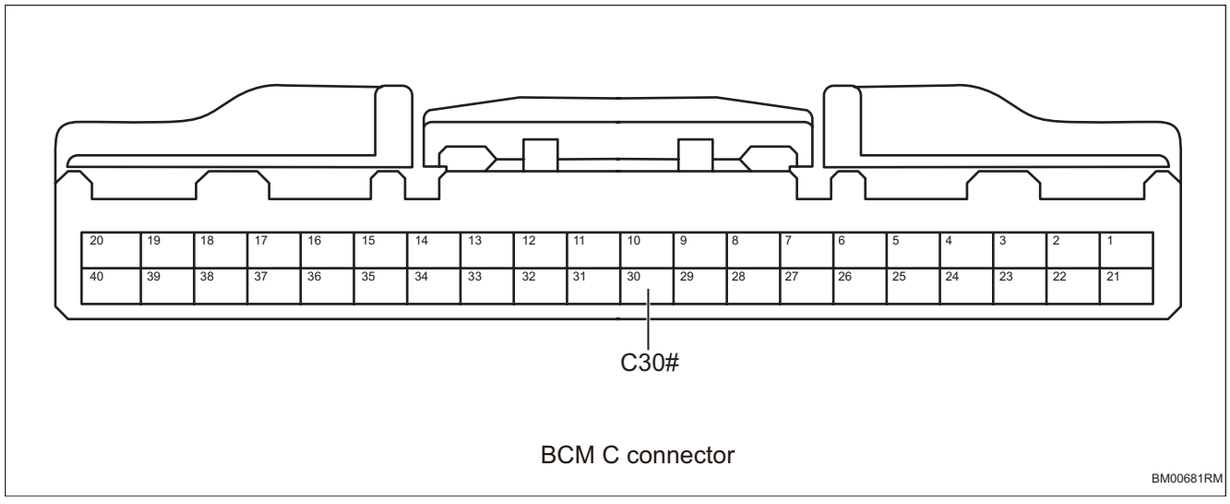
Detector connection	Detection conditions	Specified state
BCM connector C30# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

BM

OK

3	Check WCM harness and connector for circuit shorted to power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BCM connector C30# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

BM

OK

4	Replace the WCM (See page CH-14)

(a) Replace the WCM.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the BCM (See page BM-114)**

OK

5	End

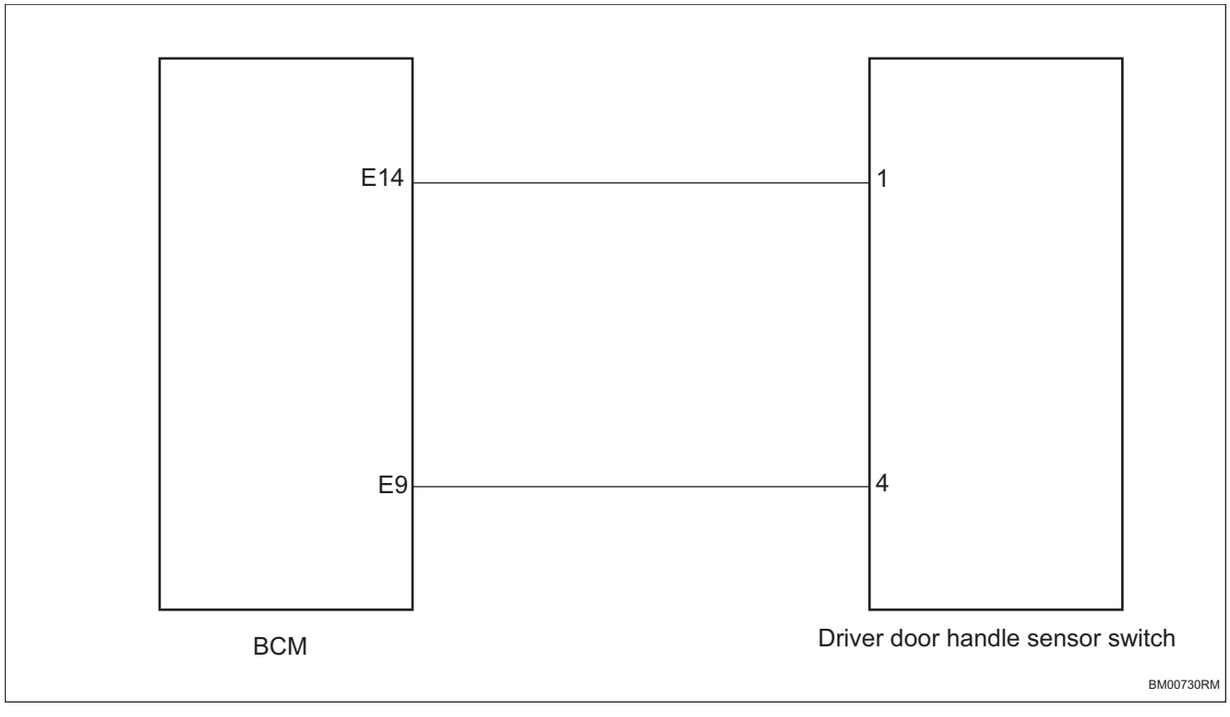
DTC	**B101314**	**Capacitor switch unlocking 1 stuck**
DTC	**B101414**	**Capacitor switch locking 1 stuck**
DTC	**B101514**	**Capacitor switch unlocking 2 stuck**
DTC	**B101614**	**Capacitor switch locking 2 stuck**

Description

When the driver door handle sensor switch and passenger door handle sensor switch fail, BCM will record the DTC.

DTC	DTC detection conditions	Faulty location
B101314	(a) Capacitor switch unlocking 1 stuck.	• BCM • Harness and connector • Driver door handle sensor switch
B101414	(a) Capacitor switch locking 1 stuck.	• BCM • Harness and connector • Driver door handle sensor switch
B101514	(a) Capacitor switch unlocking 2 stuck.	• BCM • Harness and connector • Passenger door handle sensor switch
B101614	(a) Capacitor switch locking 2 stuck.	• BCM • Harness and connector • Passenger door handle sensor switch

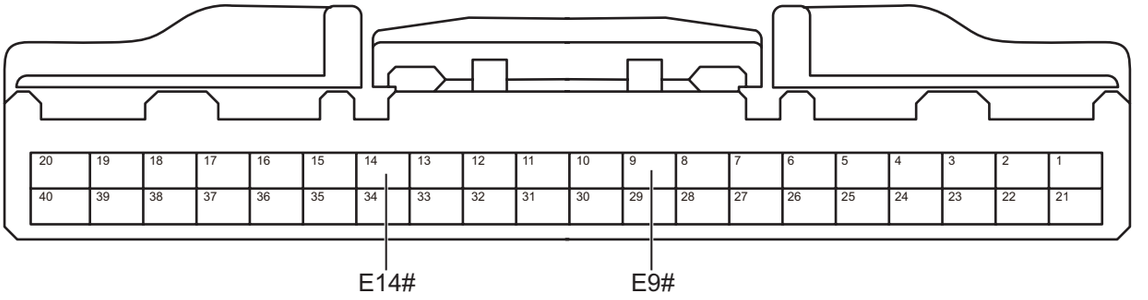
Circuit diagram



Inspection procedure

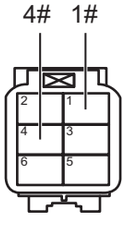
Note: The fault analysis procedure of driver door handle sensor switch is described here, which is similar to that of the passenger door handle sensor switch.

1	**Check driver door handle sensor switch harness and connector for open circuit**



BCM E connector

BM00741RM



Driver door handle sensor switch connector

BM00751RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the BCM connector.

(d) Disconnect the driver door handle sensor switch connector.

(e) Measure the resistance according to the values in the table below.

Standard value

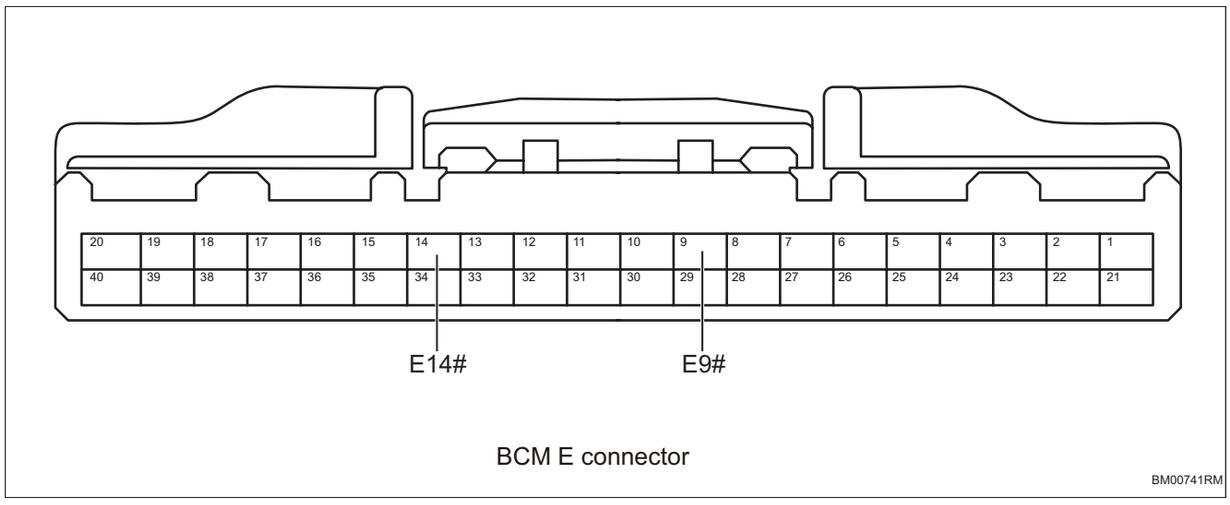
Detector connection	Detection conditions	Specified state
BCM connector E14# - driver door handle sensor switch connector 1#	Always connected	Less than 1Ω
BCM connector E9# - driver door handle sensor switch connector 4#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check driver door handle sensor switch harness and connector for circuit shorted to ground**

BM



BCM E connector

BM00741RM

(a) Measure the resistance according to the values in the table below.

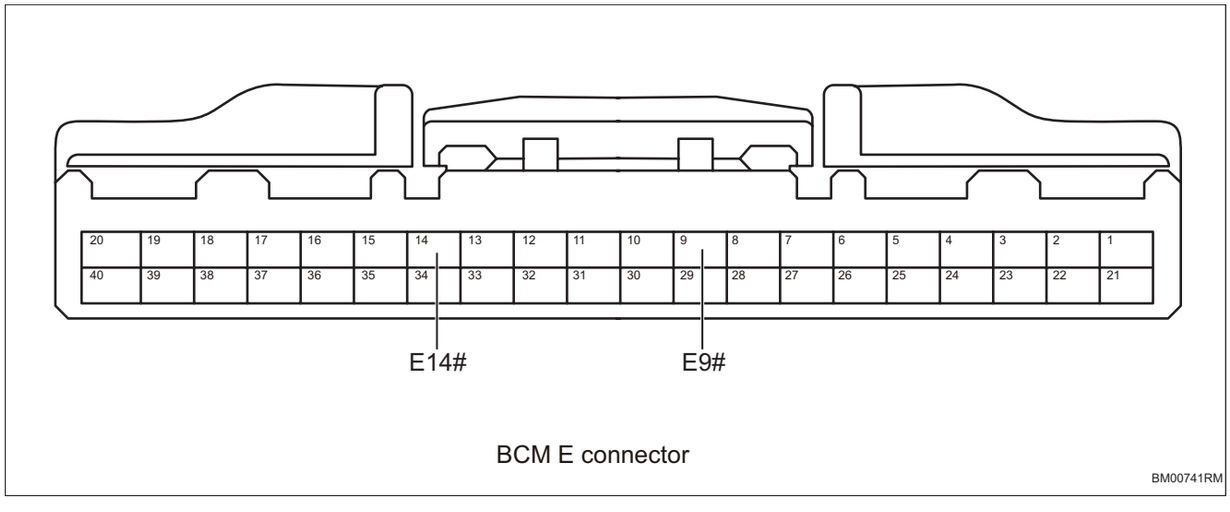
Standard value

Detector connection	Detection conditions	Specified state
BCM connector E14# - body GND	Always connected	10 KΩ or greater
BCM connector E9# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check driver door handle sensor switch harness and connector for circuit shorted to power supply**



BCM E connector

BM00741RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BCM connector E14# - body GND	The ignition switch is set to "ON"	Less than 1 V
BCM connector E9# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the driver door handle sensor switch (See page DL-6)**

(a) Replace the driver door handle sensor switch.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the BCM (See page BM-114)**

OK

5	**End**

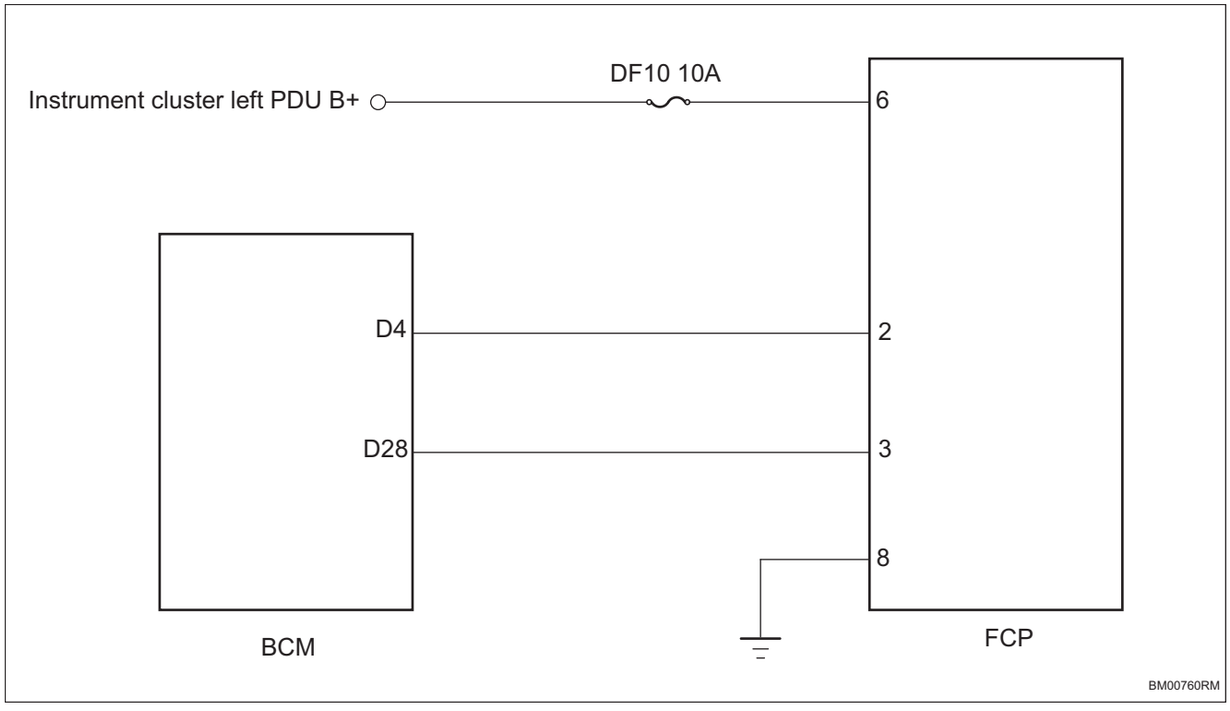
DTC	B101823	Hazard warning switch failure
DTC	B102E11	Hazard warning indicator lamp fault

Description

When the FCP (hazard warning switch) fails, BCM will record the DTC.

DTC	DTC detection conditions	Faulty location
B101823	(a) Hazard warning switch failure.	• BCM • Harness and connector • FCP
B102E11	(a) Hazard warning indicator lamp fault.	• BCM • Harness and connector • FCP

Circuit diagram



Inspection procedure

1	**Check the FCP**

(a) Check the FCP for foreign matter.

(b) Check whether the FCP is stuck.

NG	**Repair according to the fault**

BM

OK

2	Check the FCP fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the FCP fuse.

(d) Measure the resistance according to the values in the table below.

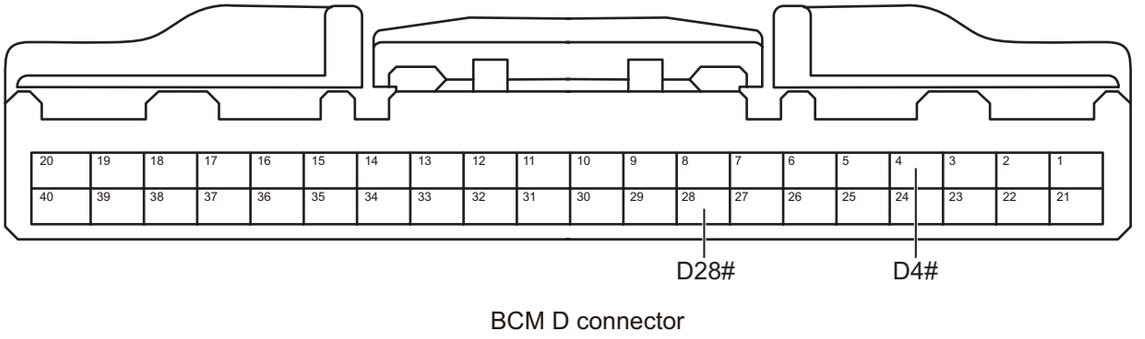
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG **Replace fuse**

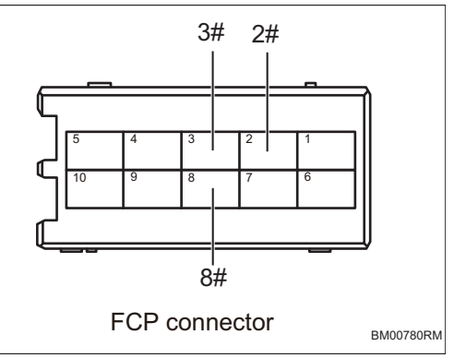
OK

3	Check FCP harness and connector for open circuit



BCM D connector

BM00771RM



FCP connector

BM00780RM

(a) Disconnect the BCM connector.

(b) Disconnect the FCP connector.

(c) Measure the resistance according to the values in the table below.

Standard value

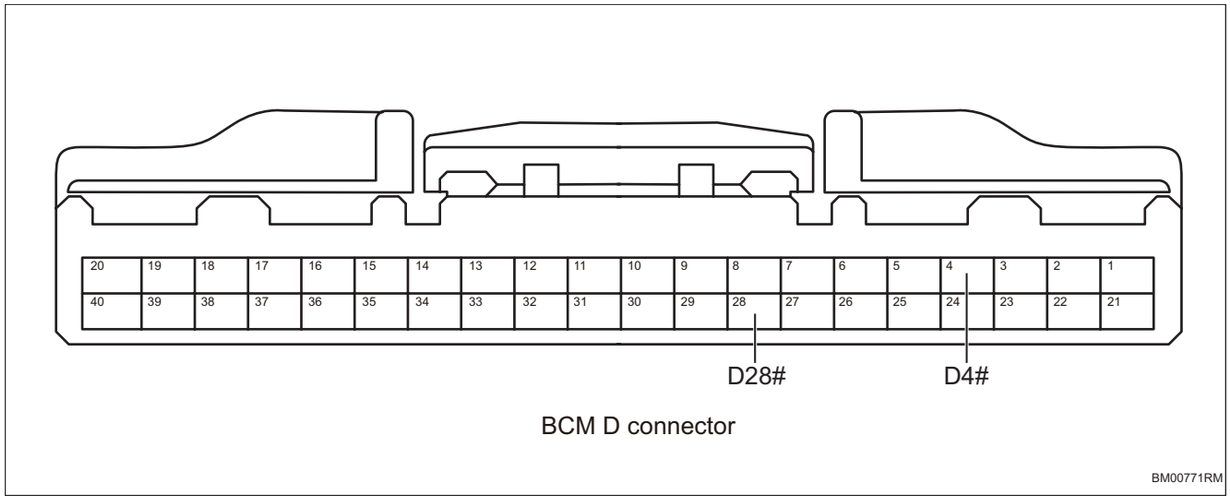
Detector connection	Detection conditions	Specified state
BCM connector D4# - FCP connector 2#	Always connected	Less than 1Ω

Detector connection	Detection conditions	Specified state
BCM connector D28# - FCP connector 3#	Always connected	Less than 1Ω
FCP connector 8# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	Check FCP harness and connector for circuit shorted to ground



BCM D connector

BM00771RM

(a) Measure the resistance according to the values in the table below.

Standard value

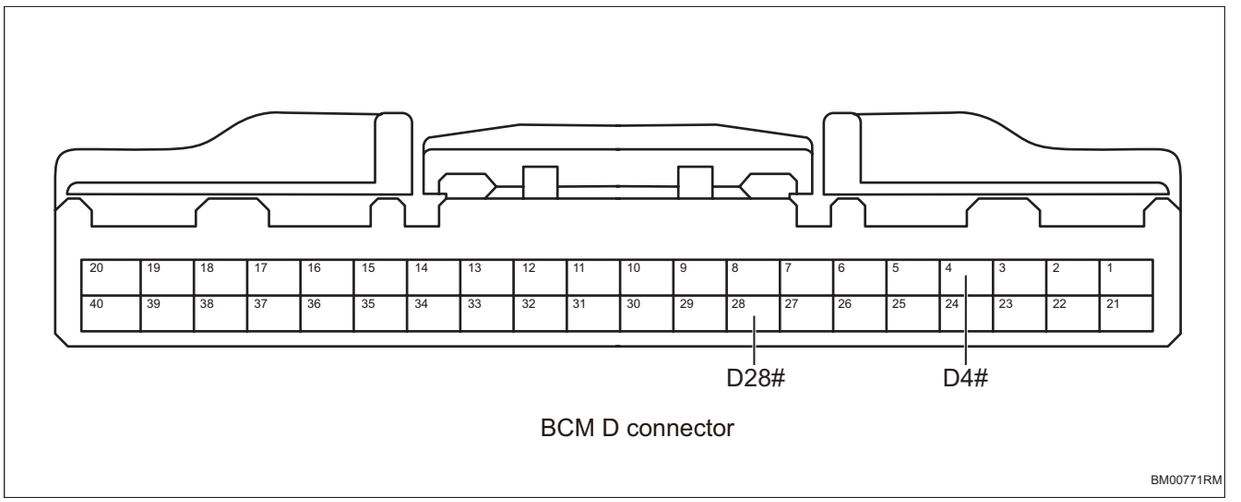
Detector connection	Detection conditions	Specified state
BCM connector D4# - body GND	Always connected	10 KΩ or greater
BCM connector D28# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	Check FCP harness and connector for circuit shorted to power supply

BM



BCM D connector

BM00771RM

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

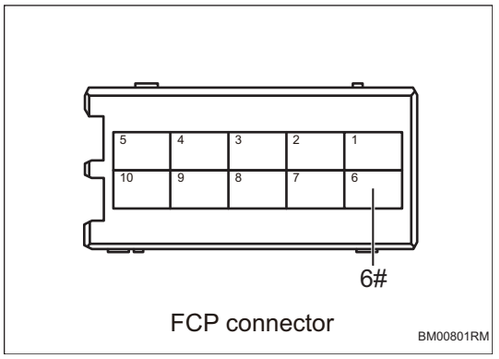
Detector connection	Detection conditions	Specified state
BCM connector D4# - body GND	The ignition switch is set to "ON"	Less than 1 V
BCM connector D28# - body GND	The ignition switch is set to "ON"	Less than 1 V

BM

NG **Repair or replace the harness and connector**

OK

6	**Check the FCP power supply**



FCP connector

BM00801RM

(a) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
FCP connector 6# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

7	**Replace the FCP (See page IP-15)**

(a) Replace the FCP.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the BCM (See page BM-114)**

OK

8	**End**

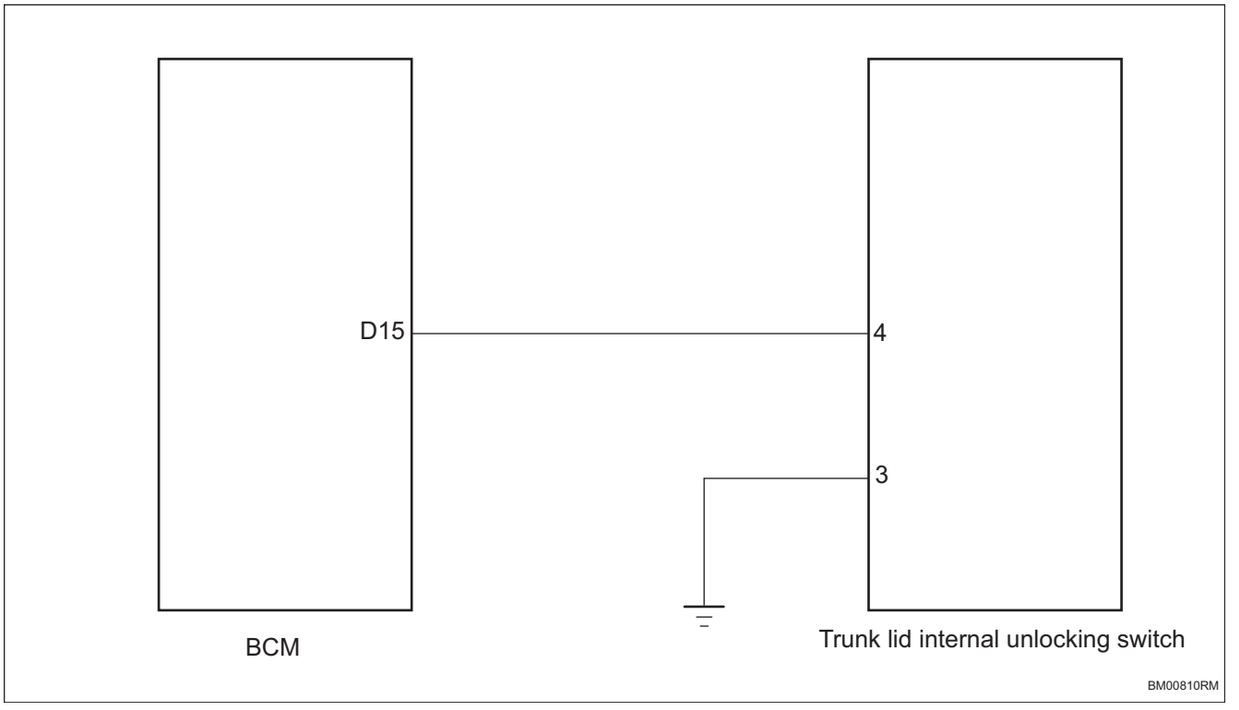
DTC	B101923	Trunk lid interior switch failure

Description

When the trunk lid internal switch fails, BCM records the DTC.

DTC	DTC detection conditions	Faulty location
B101923	(a) Trunk indoor switch failure.	• BCM • Harness and connector • Trunk lid internal unlocking switch

Circuit diagram



BM

Inspection procedure

1	Check trunk lid internal unlocking switch

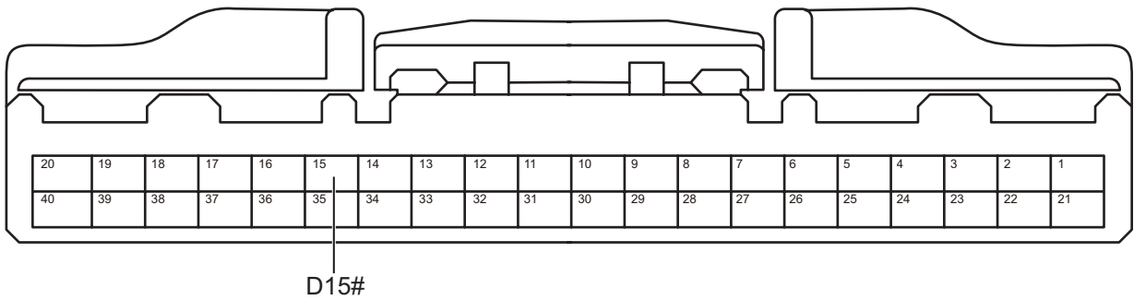
(a) Check the trunk lid internal unlocking switch for foreign matter.

(b) Check whether the trunk lid internal unlocking switch is stuck.

NG → **Repair according to the fault**

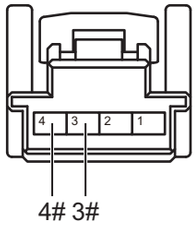
OK

2	Check trunk lid internal unlocking switch harness and connector for open circuit



BCM D connector

BM00820RM



Trunk lid internal unlocking switch connector

BM00830RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the trunk lid internal unlocking switch connector.

(d) Disconnect the BCM connector.

(e) Measure the resistance according to the values in the table below.

Standard value

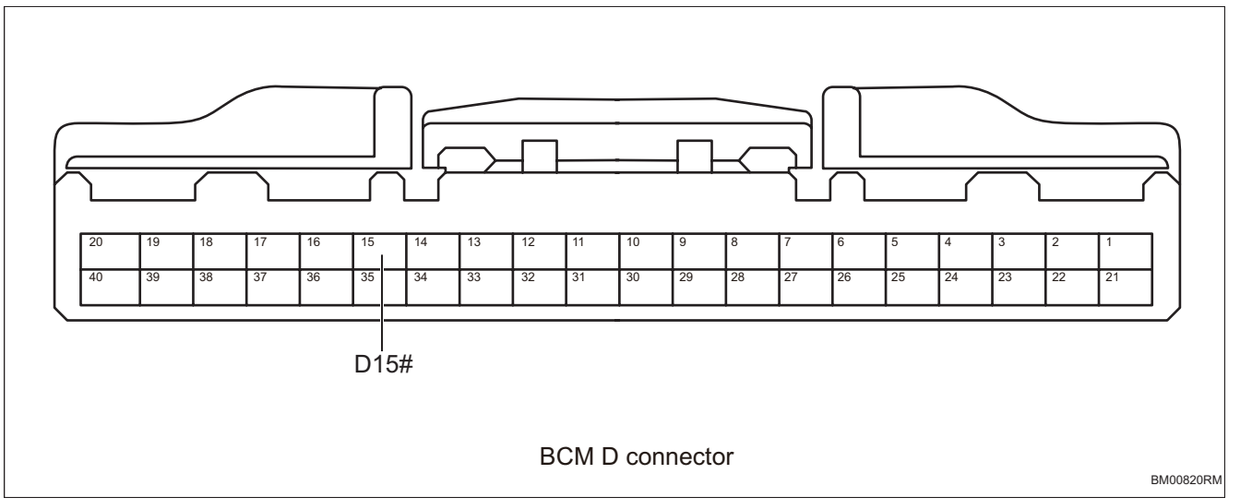
Detector connection	Detection conditions	Specified state
Trunk lid internal unlocking switch connector 4# -BCM connector D15#	Always connected	Less than 1Ω
Trunk lid internal unlocking switch connector 3# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check trunk lid internal unlocking switch harness and connector for circuit shorted to ground**

BM



BCM D connector

BM00820RM

(a) Measure the resistance according to the values in the table below.

Standard value

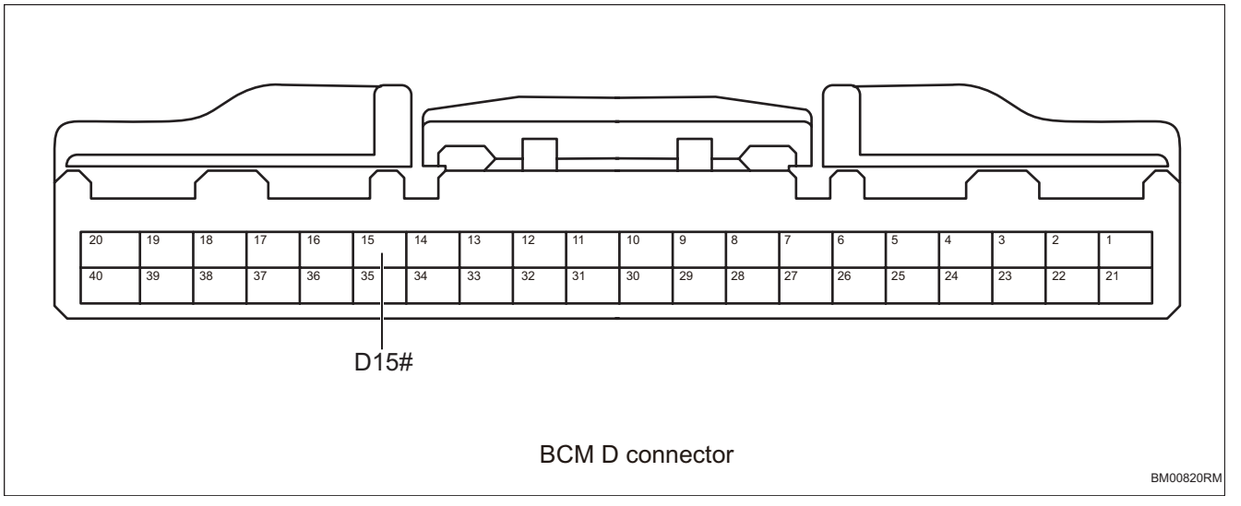
Detector connection	Detection conditions	Specified state
BCM connector D15# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

4	**Check trunk lid internal unlocking switch harness and connector for circuit shorted to power supply**

BM



BCM D connector

BM00820RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BCM connector D15# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the trunk lid internal unlocking switch (See page ED-24)**

(a) Replace the trunk lid internal unlocking switch.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the BCM (See page BM-114)**

OK

6	**End**

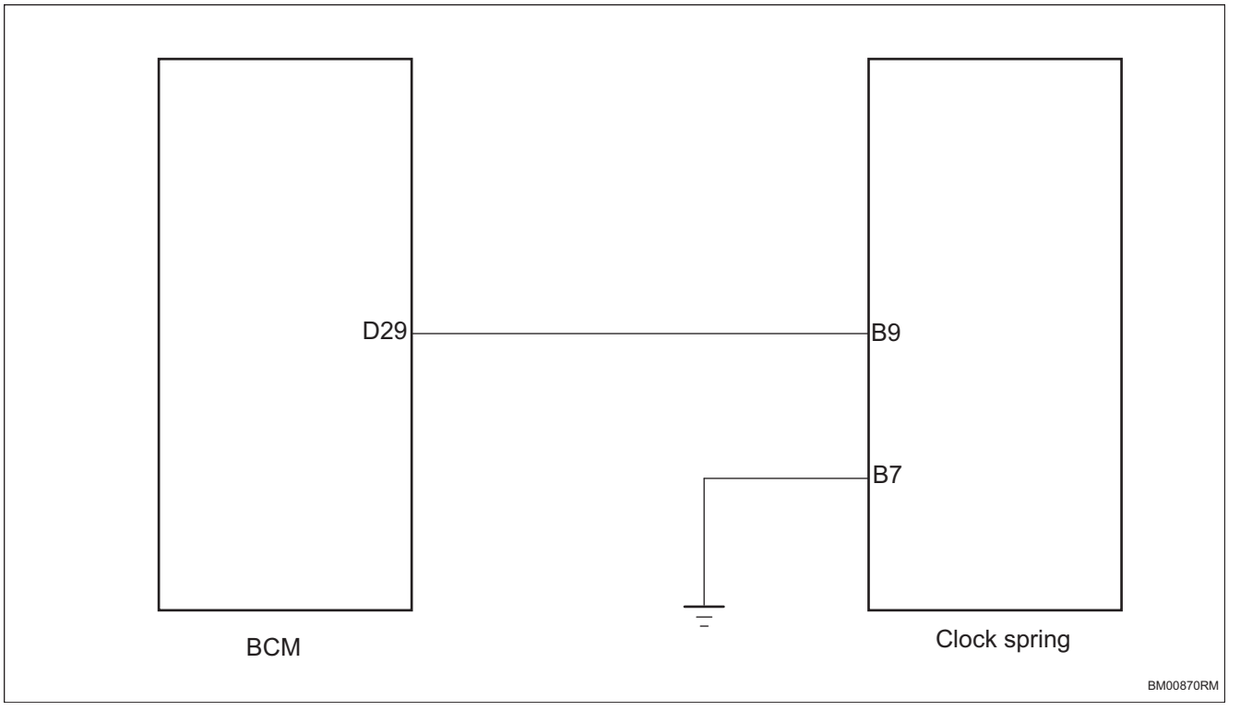
DTC	B101A23	Horn switch failure

Description

When the horn switch fails, BCM records the DTC.

DTC	DTC detection conditions	Faulty location
B101A23	(a) Horn switch failure.	• BCM • Harness and connector • Clock spring (horn switch)

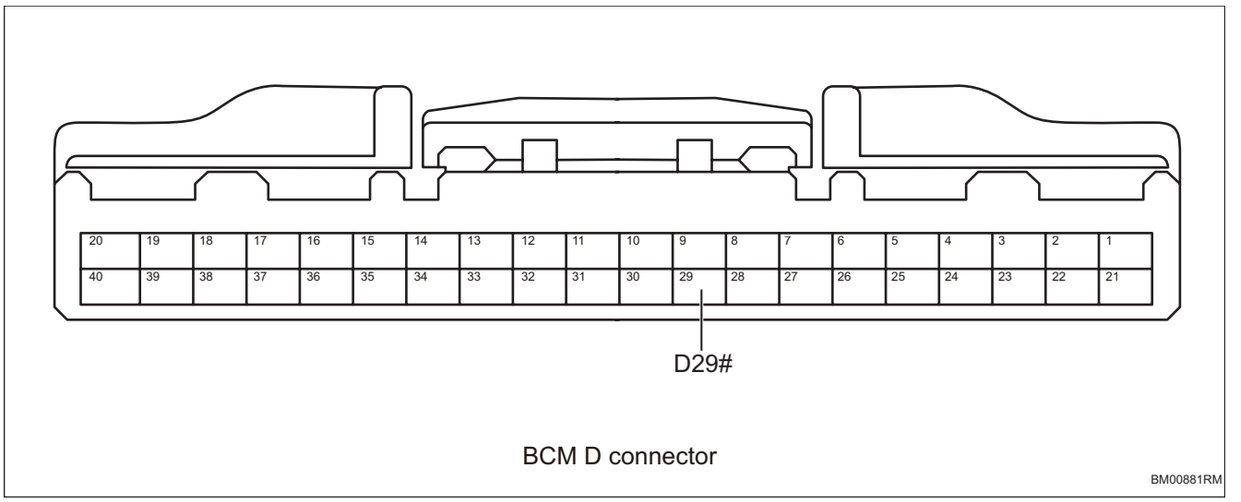
Circuit diagram

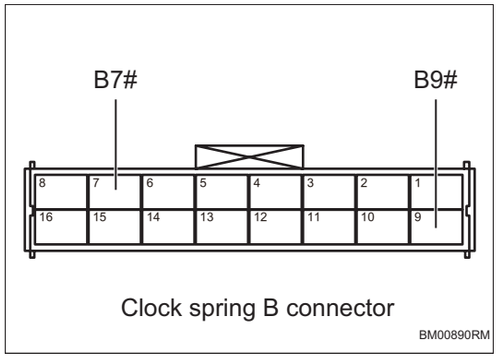


BM

Inspection procedure

1	Check clock spring harness and connector for open circuit





Clock spring B connector

BM00890RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the clock spring connector.

(d) Disconnect the BCM connector.

(e) Measure the resistance according to the values in the table below.

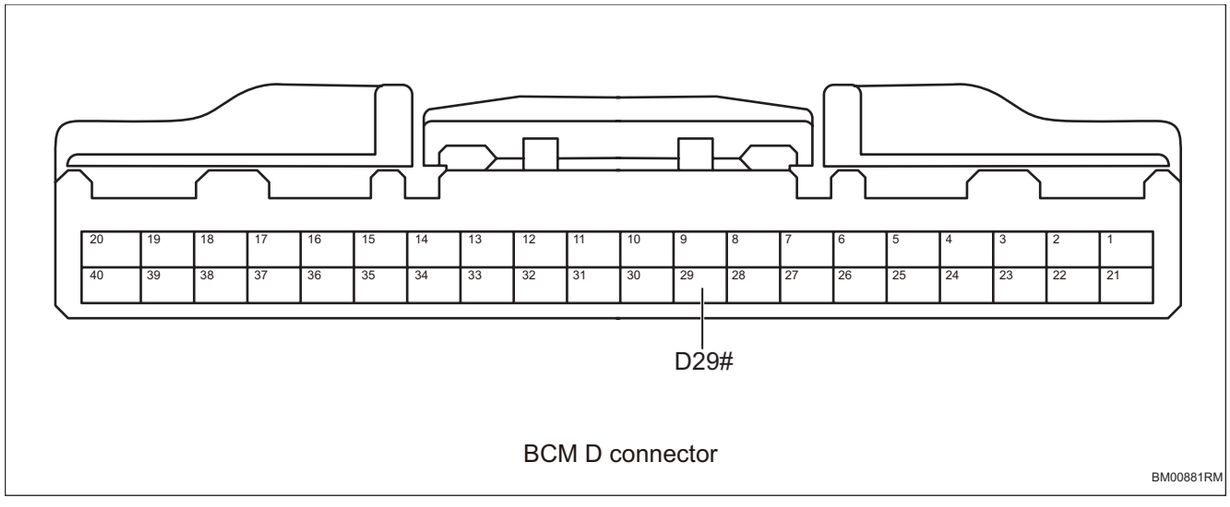
Standard value

Detector connection	Detection conditions	Specified state
Clock spring connector B9# -BCM connector D29#	Always connected	Less than 1Ω
Clock spring connector B7# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2 **Check clock spring harness and connector for circuit shorted to ground**



BCM D connector

BM00881RM

(a) Measure the resistance according to the values in the table below.

Standard value

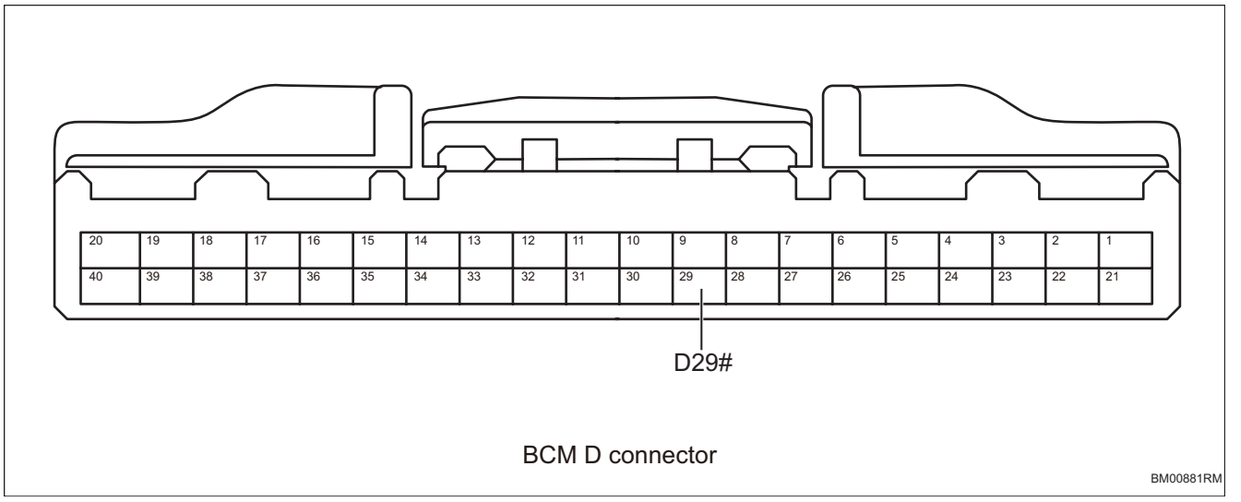
Detector connection	Detection conditions	Specified state
BCM connector D29# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

BM

OK

3	Check clock spring harness and connector for circuit shorted to power supply



BCM D connector

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BCM connector D29# - body GND	The ignition switch is set to "ON"	Less than 1 V

BM

NG **Repair or replace the harness and connector**

OK

4	Replace the clock spring (See page SR-5)

(a) Replace the clock spring.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG **Replace the BCM (See page BM-114)**

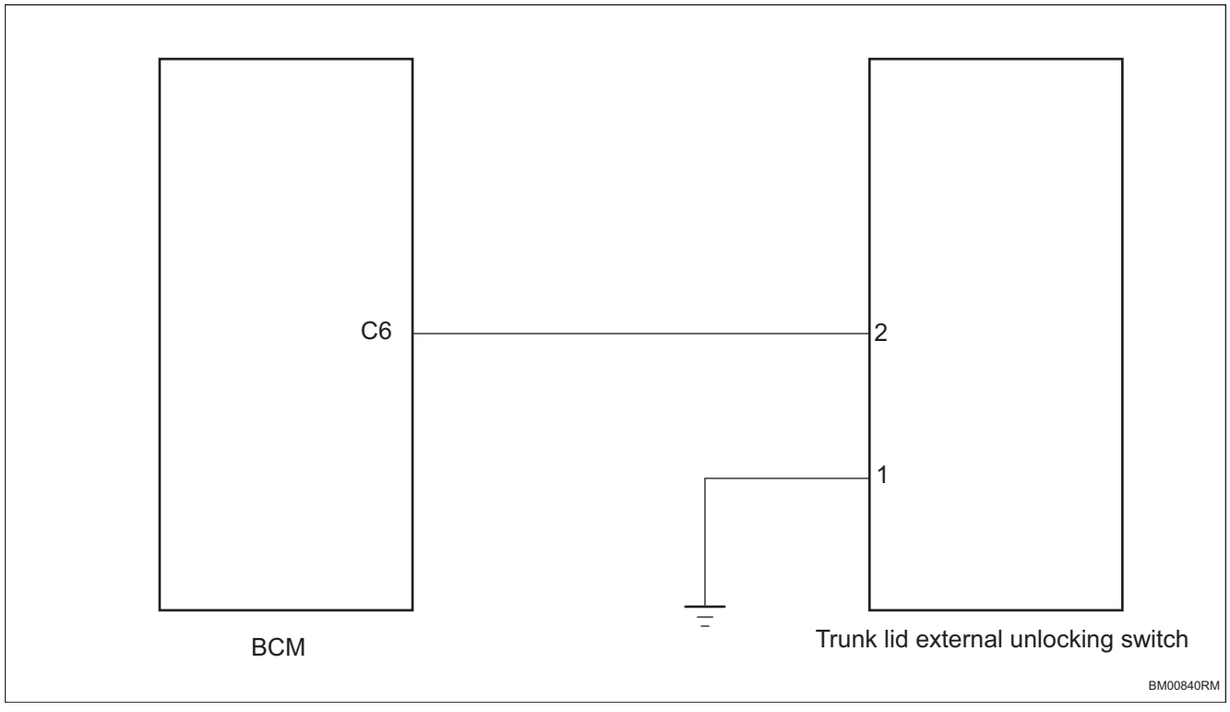
DTC	B101C23	Trunk lid exterior switch failure

Description

When the trunk lid external switch fails, BCM records the DTC.

DTC	DTC detection conditions	Faulty location
B101C23	(a) Trunk outdoor switch failure.	• BCM • Harness and connector • Trunk lid external unlocking switch

Circuit diagram



Inspection procedure

1	Check trunk lid external unlocking switch

(a) Check the trunk lid external unlocking switch for foreign matter.

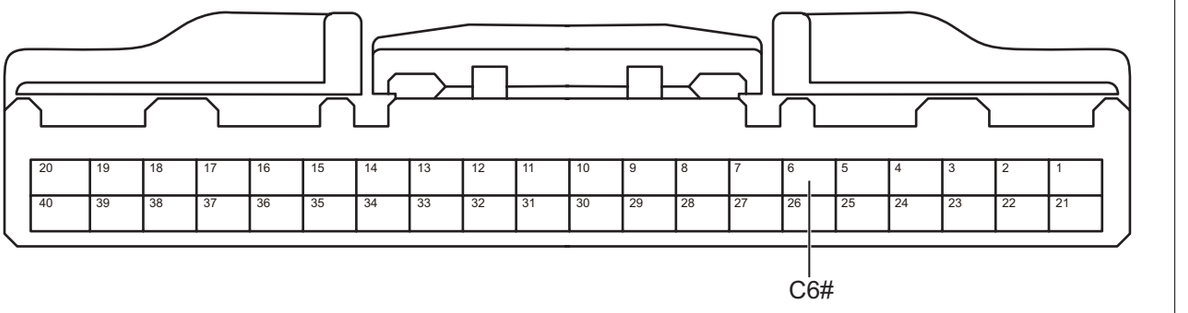
(b) Check whether the trunk lid external unlocking switch is stuck.

NG → **Repair according to the fault**

OK

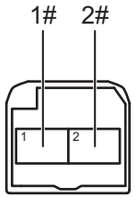
2	Check trunk lid external unlocking switch harness and connector for open circuit

BM



BCM C connector

BM00851RM



Trunk lid external unlocking switch connector

BM00860RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the trunk lid external unlocking switch connector.

(d) Disconnect the BCM connector.

(e) Measure the resistance according to the values in the table below.

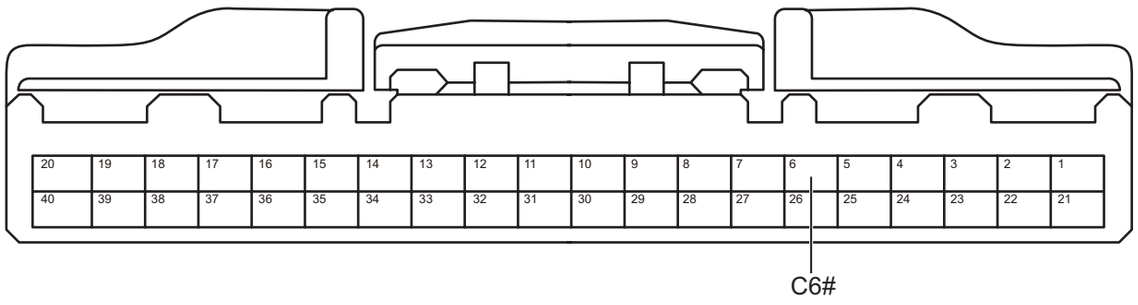
Standard value

Detector connection	Detection conditions	Specified state
Trunk lid external unlocking switch connector 2# -BCM connector C6#	Always connected	Less than 1Ω
Trunk lid external unlocking switch connector 1# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check trunk lid external unlocking switch harness and connector for circuit shorted to ground**



BCM C connector

BM00851RM

(a) Measure the resistance according to the values in the table below.

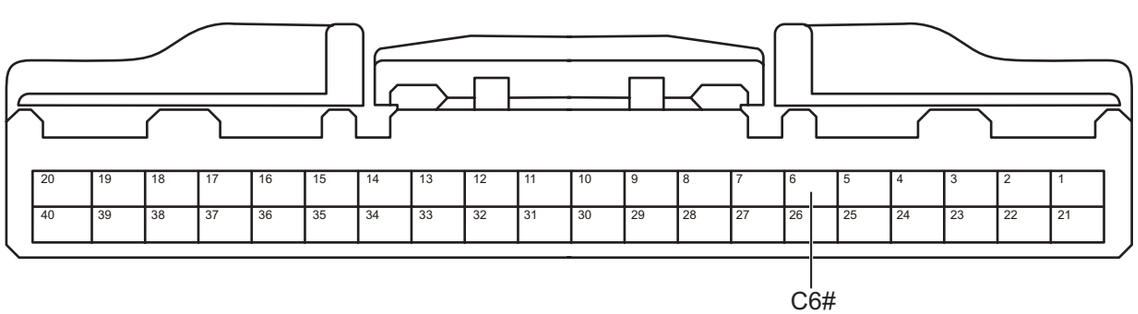
Standard value

Detector connection	Detection conditions	Specified state
BCM connector C6# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

4	**Check trunk lid external unlocking switch harness and connector for circuit shorted to power supply**



BCM C connector

BM00851RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BCM connector C6# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the trunk lid external unlocking switch (See page ED-26)**

(a) Replace the trunk lid external unlocking switch.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the BCM (See page BM-114)**

OK

6	**End**

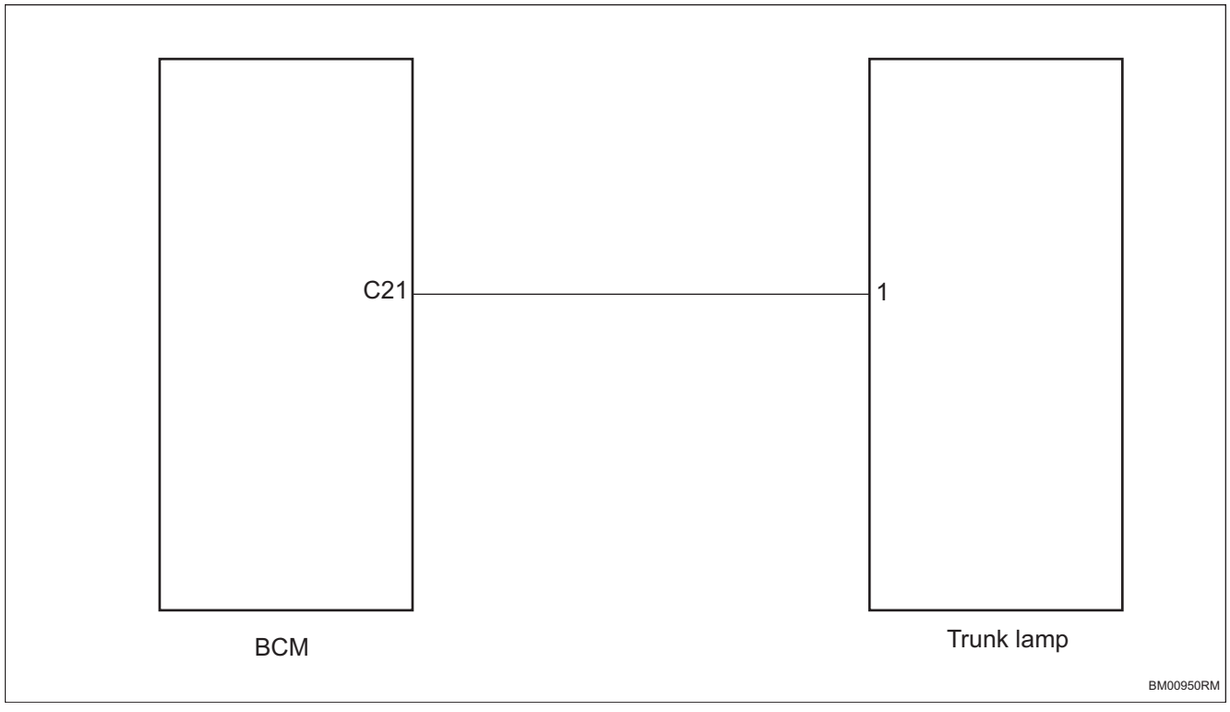
DTC	B102A12	Trunk lamp output circuit shorted to ground

Description

When the trunk lamp circuit is shorted to ground, the BCM records the DTC.

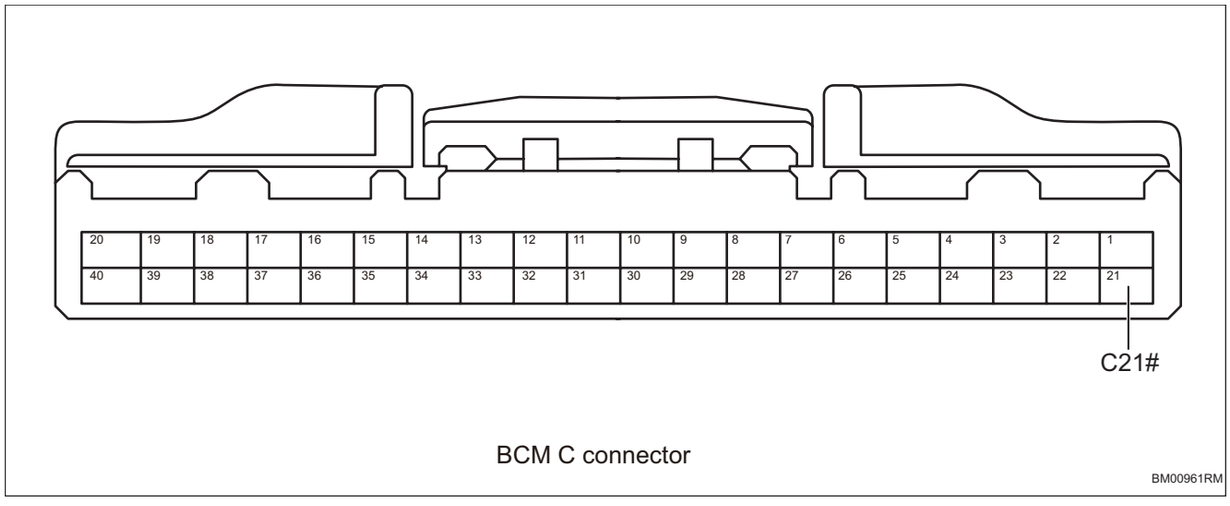
DTC	DTC detection conditions	Faulty location
B102A12	(a) Trunk lamp output circuit shorted to ground.	• BCM • Harness and connector • Trunk lamp

Circuit diagram



Inspection procedure

1	Check trunk lamp harness and connector for circuit shorted to ground



BM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the BCM connector.

(d) Disconnect the trunk lamp connector.

(e) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BCM connector C21# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

2	**Replace the trunk lamp (See page LI-128)**

(a) Replace the trunk lamp.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the BCM (See page BM-114)**

BM

OK

3	**End**

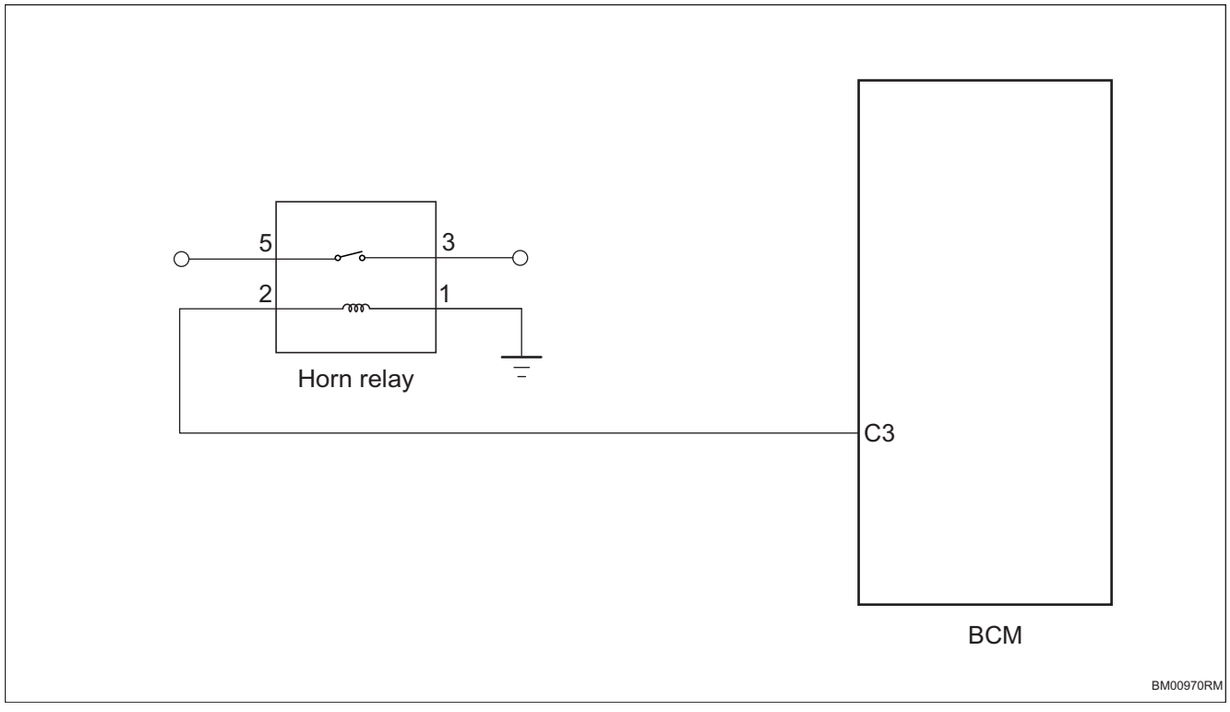
DTC	B102C11	Anti-theft horn relay output failure

Description

When the horn relay output fails, the BCM records the DTC.

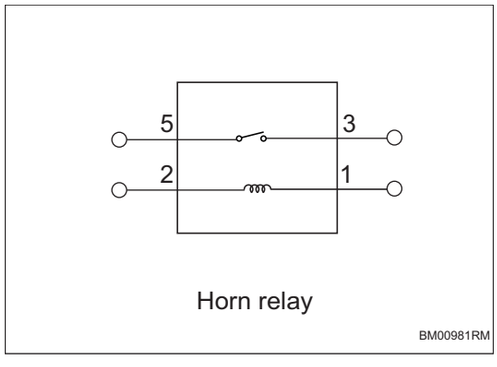
DTC	DTC detection conditions	Faulty location
B102C11	(a) Anti-theft horn relay output failure.	• BCM • Harness and connector • Horn relay

Circuit diagram



Inspection procedure

1	Check the horn relay



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the horn relay.

(d) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Horn relay 3# -horn relay 5#	Apply battery voltage between 1# and 2#	Less than 1Ω

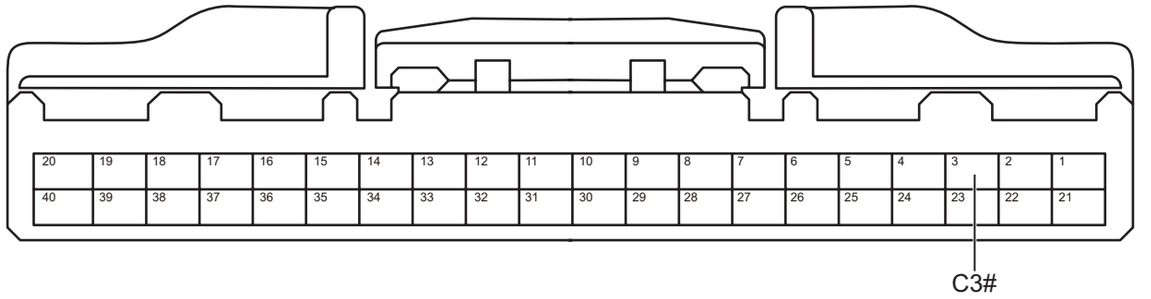
BM

Detector connection	Detection conditions	Specified state
Horn relay 3# -horn relay 5#	No battery voltage is applied between 1# and 2#	10 KΩ or greater

NG → **Replace horn relay**

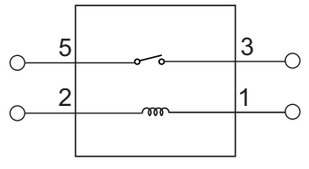
OK

2 Check horn relay harness and connector for open circuit



BCM C connector

BM00991RM



Horn relay connector

BM01001RM

(a) Disconnect the BCM connector.

(b) Measure the resistance according to the values in the table below.

Standard value

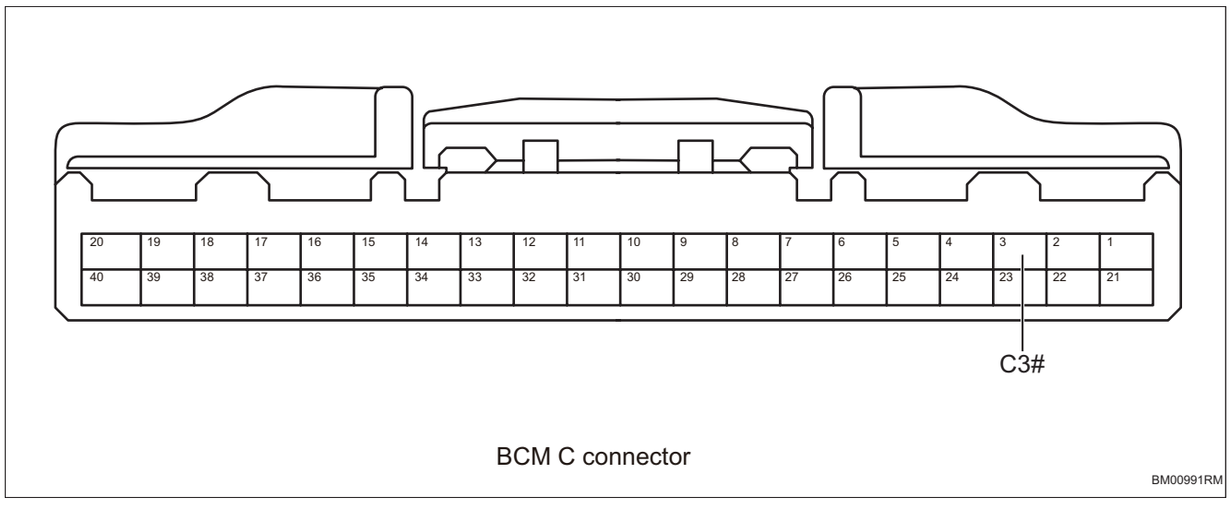
Detector connection	Detection conditions	Specified state
Horn relay connector 2# -BCM connector C3#	Always connected	Less than 1Ω
Horn relay connector 1# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3 Check horn relay harness and connector for circuit shorted to ground

BM



BCM C connector

BM00991RM

(a) Measure the resistance according to the values in the table below.

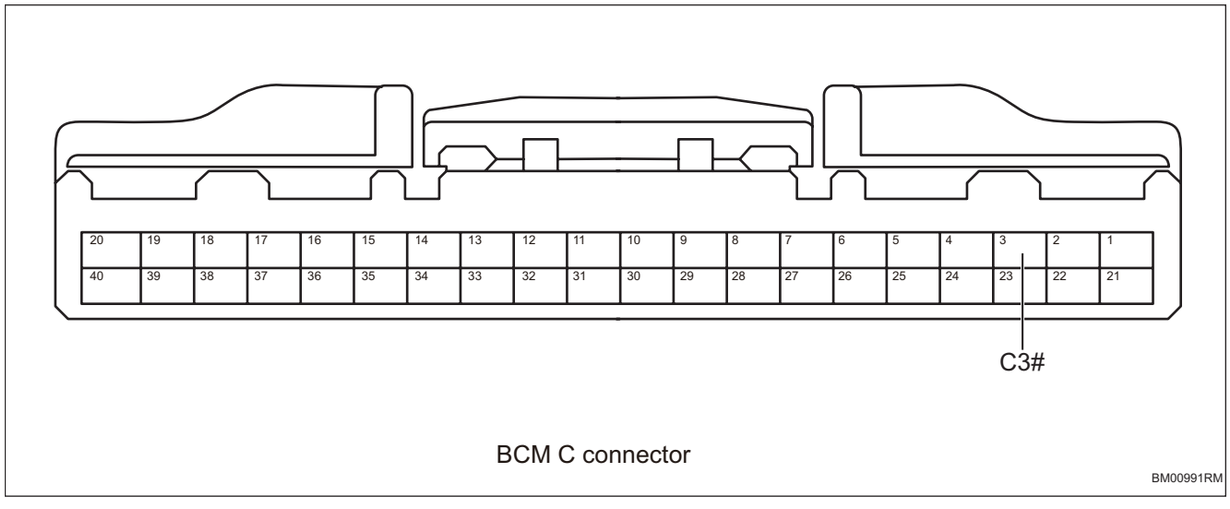
Standard value

Detector connection	Detection conditions	Specified state
BCM connector C3# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

4	Check horn relay harness and connector for circuit shorted to power supply



BCM C connector

BM00991RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

BM

Standard value

Detector connection	Detection conditions	Specified state
BCM connector C3# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the BCM (See page BM-114)**

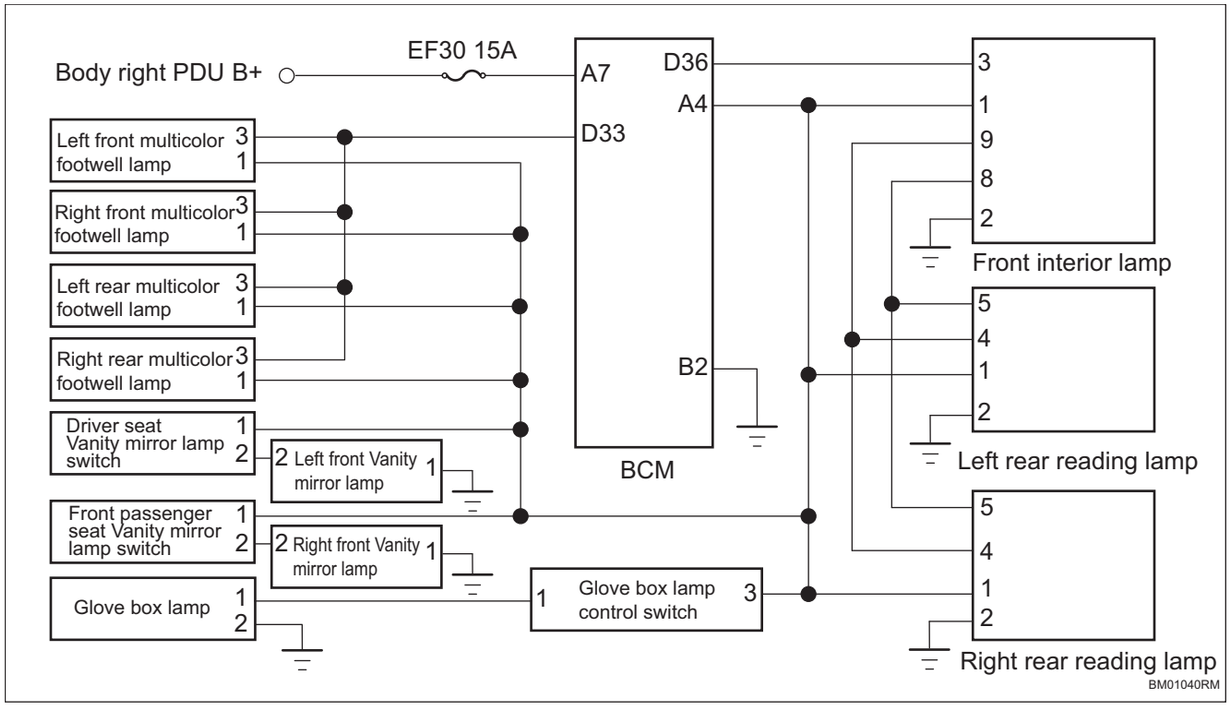
DTC	B102F12	Interior lamp failure
DTC	B103012	Foot well lamp grounding failure
DTC	B103613	Interior lamp power supply open circuit

Description

When the interior lamp or foot well lamp circuit fails, BCM records the DTC.

DTC	DTC detection conditions	Faulty location
B102F12	(a) Interior lamp failure.	• BCM • Harness and connector • Interior lamp
B103012	(a) Foot well lamp grounding failure	• BCM • Harness and connector • Foot well lamp
B103613	(a) Interior lamp power supply open circuit.	• BCM • Harness and connector

Circuit diagram



Inspection procedure

1	**Check BCM power supply and ground**

(a) Check BCM power supply and ground harness and connector for short circuit and open circuit.

NG	**Repair or replace harness and connector and fuse**

OK

2	**Check interior lamp and footwell lamp**

(a) Check whether the interior lamp and foot well lamp holder are ablated.

(b) Check whether the interior lamp and foot well lamp bulbs are damaged.

NG → **Repair according to the fault**

OK

3	**Check interior lamp and foot well lamp harness and connector**

(a) Check whether the connectors of interior lamp and foot well lamp are well connected.

(b) Check the interior lamp and foot well lamp harness and connector for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

4	**Replace the BCM (See page BM-114)**

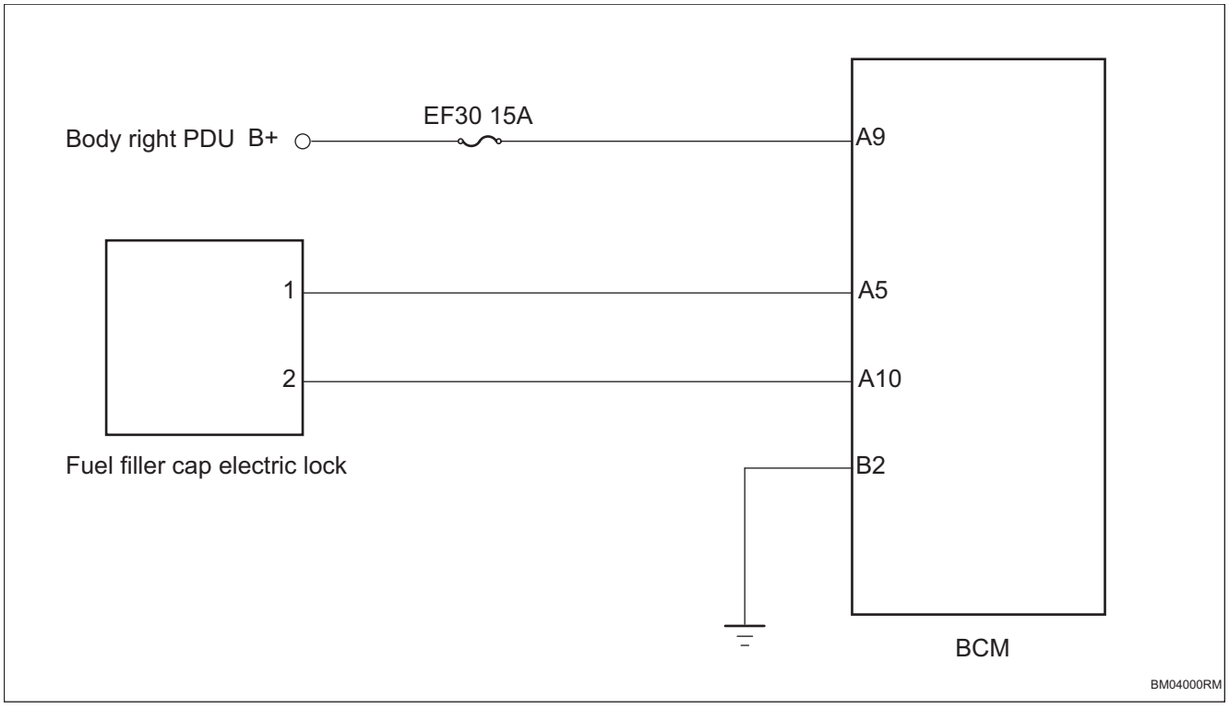
DTC	B103324	Fuel filler cap output + relay failure
DTC	B103524	Fuel filler cap output - relay failure
DTC	B103424	Fuel filler cap power supply failure

Description

When the fuel filler cap electric lock works abnormally, BCM records the DTC.

DTC	DTC detection conditions	Faulty location
B103324	(a) Fuel filler cap output + relay failure.	• BCM • Harness and connector • Fuel filler cap electric lock
B103524	(a) Fuel filler cap output - relay failure.	• BCM • Harness and connector • Fuel filler cap electric lock
B103424	(a) Fuel filler cap power supply failure.	• BCM • Harness and connector • Charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2 Check BCM fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the BCM fuse.

(d) Measure the resistance according to the values in the table below.

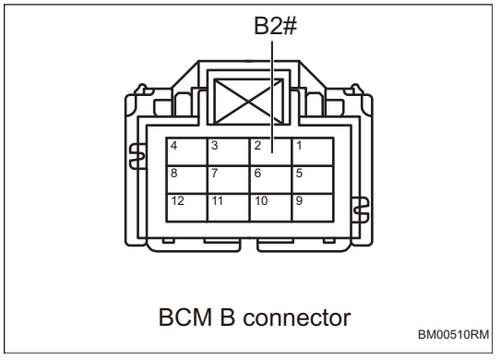
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3 Check BCM ground



BCM B connector

(a) Disconnect the BCM connector.

(b) Measure the resistance according to the values in the table below.

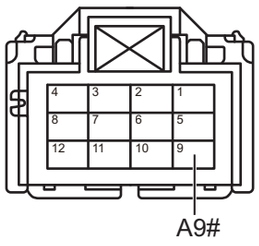
Standard value

Detector connection	Detection conditions	Specified state
BCM connector B2# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4 Check BCM power supply



BCM A connector
BM04011RM

(a) Install the fuse.
(b) Connection the battery negative terminal.
(c) Set the ignition switch to "ON".
(d) Measure the voltage according to the values in the table below.

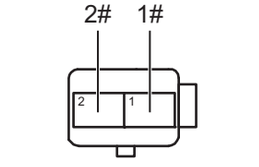
Standard value

Detector connection	Detection conditions	Specified state
BCM connector A9# - body GND	The ignition switch is set to "ON"	Battery voltage

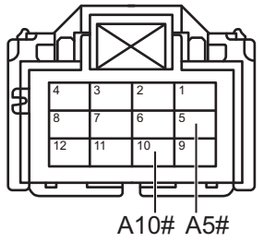
NG → **Repair or replace the harness and connector**

OK

5 **Check fuel filler cap electric lock harness and connector for open circuit**



Fuel filler cap electric lock connector



BCM A connector
BM04020RM

(a) Disconnect the fuel filler cap electric lock connector.
(b) Measure the resistance according to the values in the table below.

Standard value

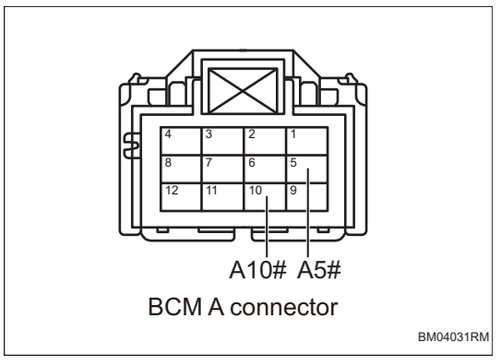
Detector connection	Detection conditions	Specified state
BCM connector A5# - fuel filler cap electric lock connector 1#	Always connected	Less than 1Ω
BCM connector A10# - fuel filler cap electric lock connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

6 **Check fuel filler cap electric lock harness and connector for circuit shorted to ground**

BM



(a) Measure the resistance according to the values in the table below.

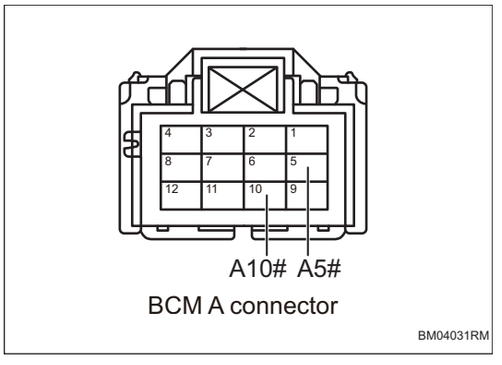
Standard value

Detector connection	Detection conditions	Specified state
BCM connector A5# -body GND	Always connected	10 KΩ or greater
BCM connector A10# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

7	Check fuel filler cap electric lock harness and connector for circuit shorted to power supply



(a) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BCM connector A5# -body GND	The ignition switch is set to "ON"	Less than 1 V
BCM connector A10# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

8	Replace fuel filler cap electric lock (See page ET-12)

(a) Replace the fuel filler cap electric lock.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the BCM (See page BM-114)**

BM

OK

9	**End**

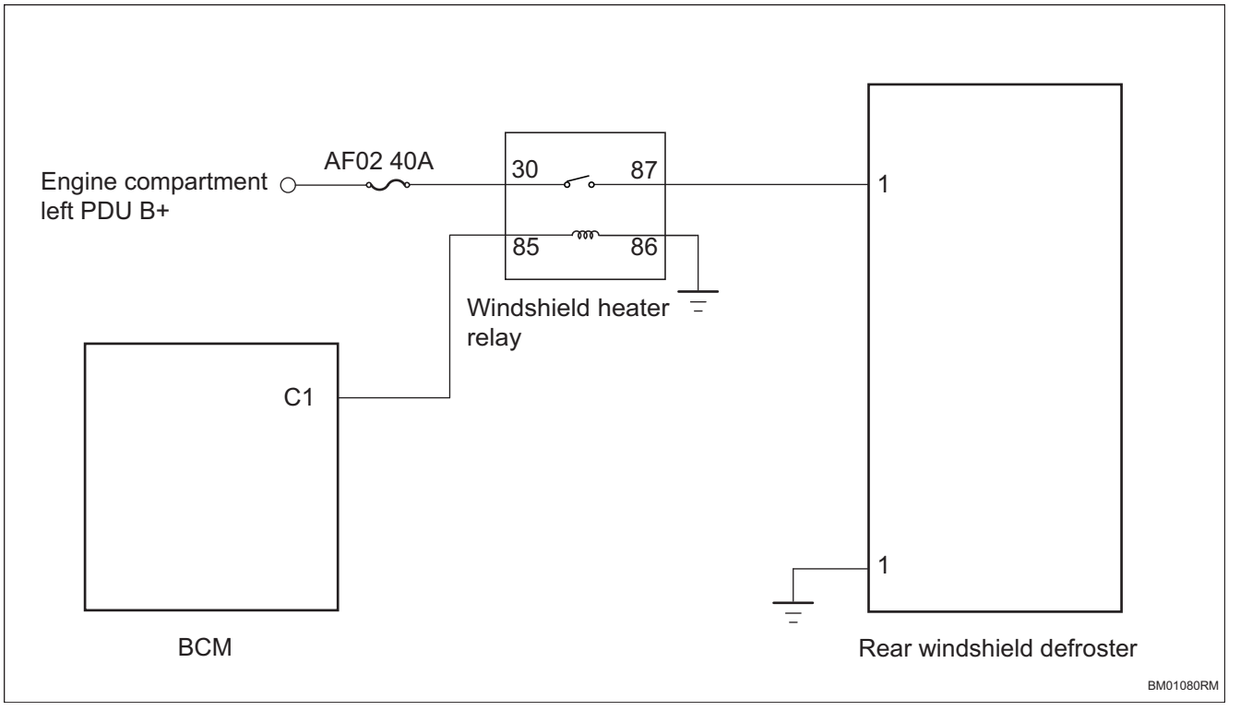
DTC	B103B14	Front/rear windshield heater failure

Description

When the rear windshield heating function is abnormal, BCM records the DTC.

DTC	DTC detection conditions	Faulty location
B103B14	(a) Rear windshield heater failure.	• BCM • Harness and connector • Rear windshield defroster

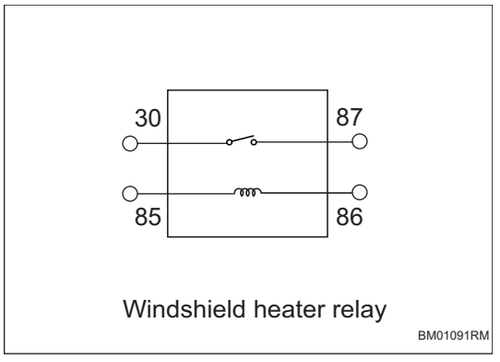
Circuit diagram



BM

Inspection procedure

1	Check the windshield heater relay



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the windshield heater relay.

(d) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Windshield heater relay 30# -windshield heater relay 87#	Apply battery voltage between 86# and 85#	Less than 1Ω

Detector connection	Detection conditions	Specified state
Windshield heater relay 30# -windshield heater relay 87#	No battery voltage is applied between 86# and 85#	10 KΩ or greater

NG → **Replace windshield heater relay**

OK

2 **Check windshield heater relay fuse**

(a) Remove the windshield heater relay fuse.

(b) Measure the resistance according to the values in the table below.

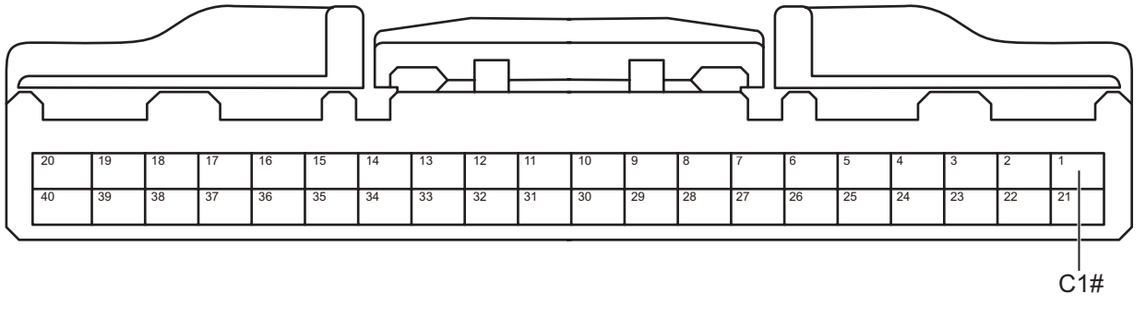
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

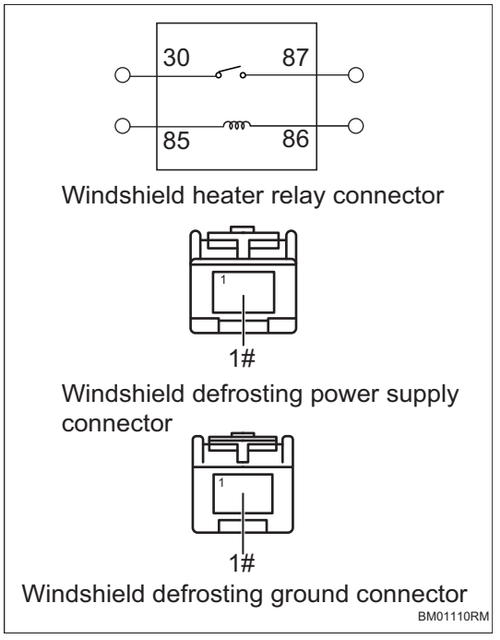
OK

3 **Check windshield heater relay harness and connector for open circuit**



BCM C connector

BM01101RM



(a) Disconnect the BCM connector.

(b) Disconnect the rear windshield defroster power supply connector.

(c) Disconnect the rear windshield defroster ground connector.

(d) Measure the resistance according to the values in the table below.

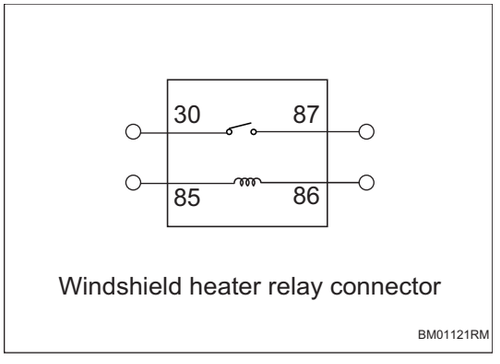
Standard value

Detector connection	Detection conditions	Specified state
Windshield heater relay connector 85# -BCM connector C1#	Always connected	Less than 1Ω
Windshield heater relay connector 87# - rear windshield defroster power supply connector 1#	Always connected	Less than 1Ω
Rear windshield defroster ground connector 1# -body GND	Always connected	Less than 1Ω
Windshield heater relay connector 86# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	Check windshield heater relay harness and connector for circuit shorted to ground



(a) Measure the resistance according to the values in the table below.

Standard value

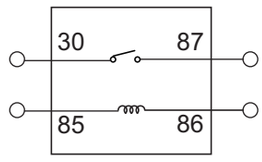
Detector connection	Detection conditions	Specified state
Windshield heater relay connector 87# -body GND	Always connected	10 KΩ or greater
Windshield heater relay connector 85# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	Check windshield heater relay harness and connector for circuit shorted to power supply

BM



Windshield heater relay connector

BM01121RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Windshield heater relay connector 87# -body GND	The ignition switch is set to "ON"	Less than 1 V
Windshield heater relay connector 85# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

6	**Replace rear windshield defroster (See page WS-5)**

(a) Replace the rear windshield defroster.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the BCM (See page BM-114)**

BM

OK

7	**End**

DTC	B103C87	Gear shifting authentication failure

Description

When the authentication of BCM and ACM (1.5 T models)/TCU (2.0 T and 1.8 T models)/MCU (HEV models) is abnormal, BCM records the DTC.

DTC	DTC detection conditions	Faulty location
B103C87	(a) Gear shifting authentication failure.	• BCM • ACM • TCU • MCU

Inspection procedure

1	Check whether the BCM has DTC output

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Read the DTC.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

NG → **Repair according to the DTC**

OK

2	Replace ACM/TCU/MCU (See page AM-29) (See page AX-224) (See page MC-70)

BM

DTC	B103D87	EMS authentication failure

Description

When the BCM and ECM authentications are abnormal, the BCM records the DTC.

DTC	DTC detection conditions	Faulty location
B103D87	(a) EMS authentication failure.	• BCM • ECM

Inspection procedure

1	Check whether the BCM has DTC output

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Read the DTC.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

NG → **Repair according to the DTC**

OK

2	Replace the ECM (See page ES-450)

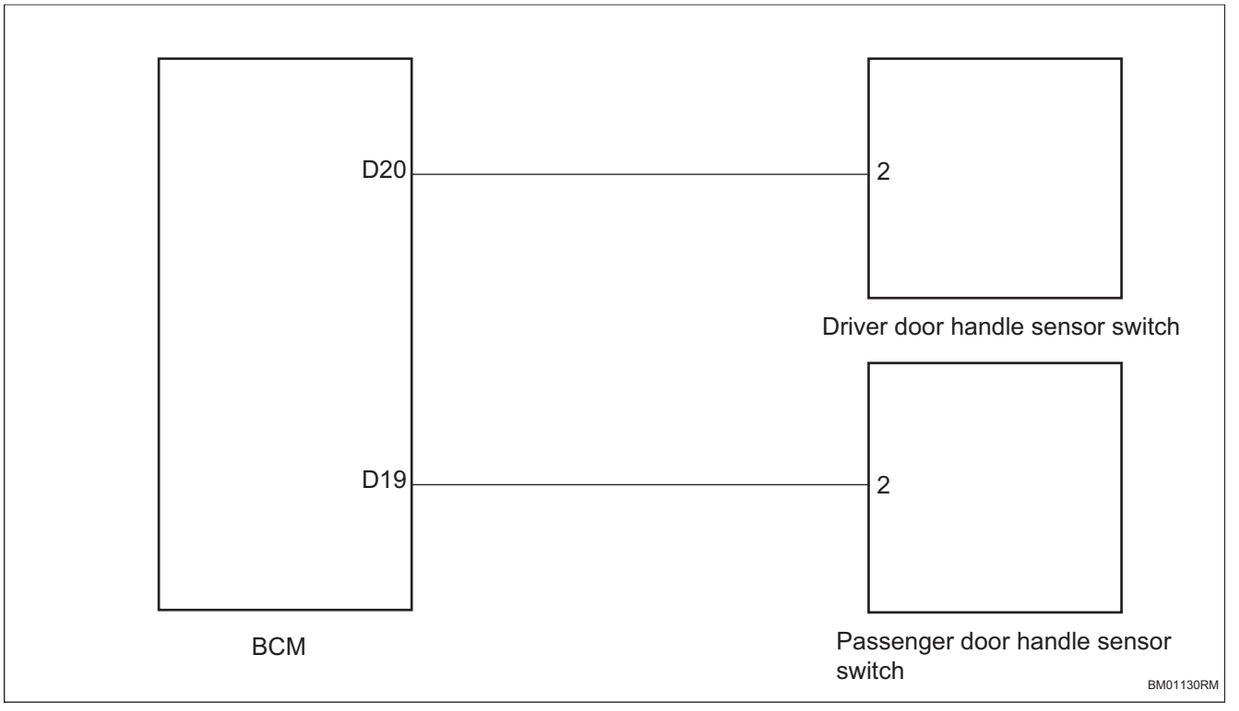
DTC	B103E11	Capacitor switch power supply output failure

Description

When a short circuit or an open circuit occurs in the capacitor switch circuit of the door handle sensor switch, BCM shall record the DTC.

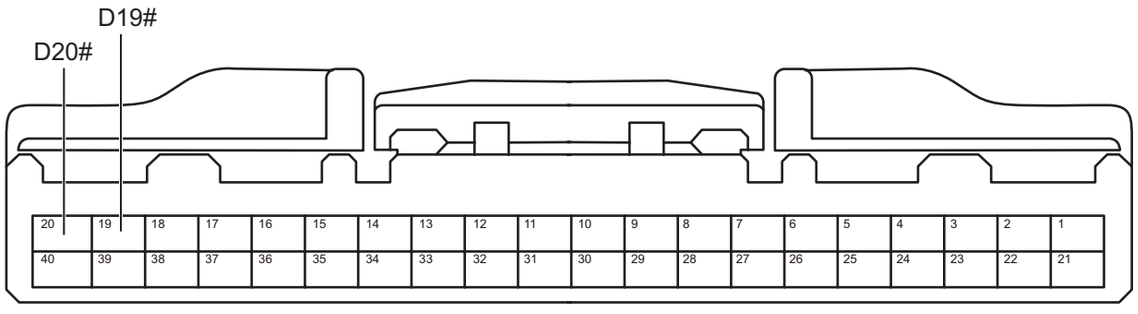
DTC	DTC detection conditions	Faulty location
B103E11	(a) Capacitor switch power supply output failure.	• BCM • Harness and connector • Driver door handle sensor switch • Passenger door handle sensor switch

Circuit diagram



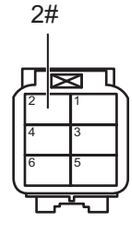
Inspection procedure

1	Check door handle sensor switch harness and connector for open circuit



BCM D connector

BM01141RM



Door handle sensor switch connector

BM01151RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the BCM connector.

(d) Disconnect the door handle sensor switch connector.

(e) Measure the resistance according to the values in the table below.

Standard value

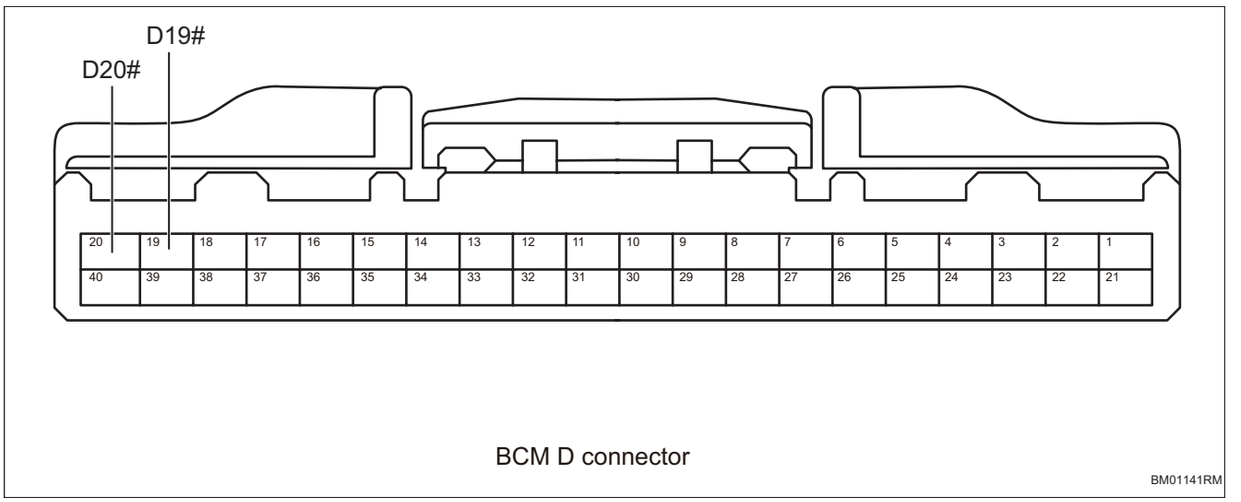
Detector connection	Detection conditions	Specified state
BCM connector D20# - driver door handle sensor switch connector 2#	Always connected	Less than 1Ω
BCM connector D19# - passenger door handle sensor switch connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

BM

OK

2	**Check door handle sensor switch harness and connector for circuit shorted to ground**



BCM D connector

BM01141RM

(a) Measure the resistance according to the values in the table below.

Standard value

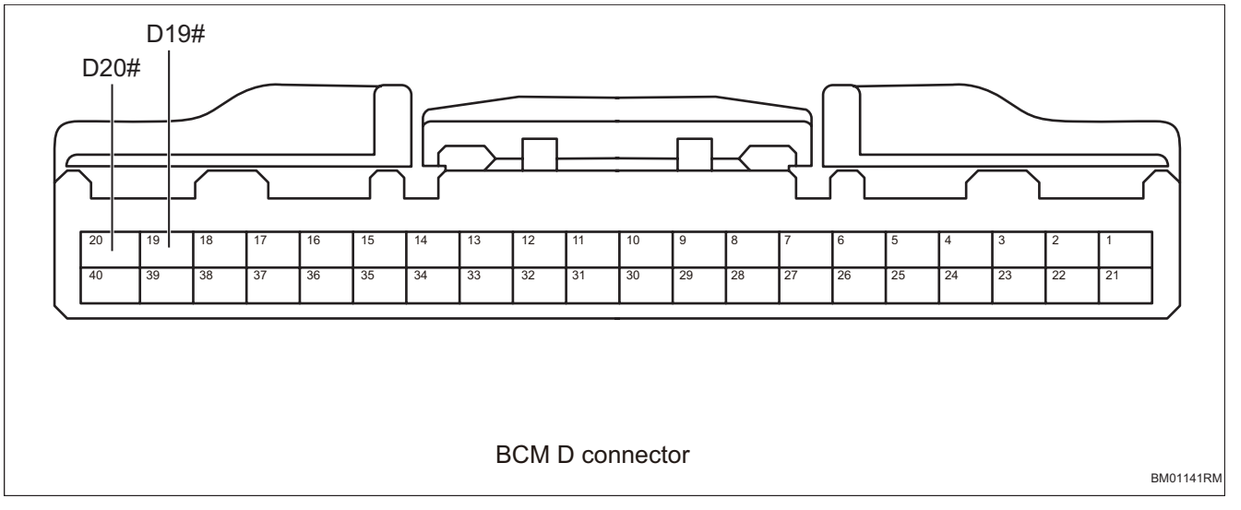
Detector connection	Detection conditions	Specified state
BCM connector D20# -body GND	Always connected	10 KΩ or greater
BCM connector D19# -body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

BM

3	**Check door handle sensor switch harness and connector for circuit shorted to power supply**



BCM D connector

BM01141RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BCM connector D20# -body GND	The ignition switch is set to "ON"	Less than 1 V
BCM connector D19# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the door handle sensor switch (See page DL-6)**

(a) Replace the door handle sensor switch.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the BCM (See page BM-114)**

OK

5	**End**

DTC	B103F29	Invalid TPMS ID
DTC	B104029	Front TPMS low pressure alarm threshold invalid
DTC	B104129	Rear TPMS low pressure alarm threshold invalid

Description

When the TPMS is abnormal, BCM records the DTC.

DTC	DTC detection conditions	Faulty location
B103F29	(a) TPMS ID invalid.	• BCM
B104029	(a) Front TPMS low pressure alarm threshold invalid.	• BCM
B104129	(a) Rear TPMS low pressure alarm threshold invalid.	• BCM

Inspection procedure

1	Match TPMS

(a) Adjust the tire air pressure.

(b) Connect the HQ-VDS.

(c) Re-match TPMS.

(d) Clear the DTC.

(e) Re-read the DTC.

Criteria:

No DTC is output.

BM

NG → **Replace the BCM (See page BM-114)**

OK

2	End

DTC	**B104587**	**Left front TPMS failure**
DTC	**B104616**	**Left front TPMS voltage low**
DTC	**B104787**	**Right front TPMS failure**
DTC	**B104816**	**Right front TPMS low voltage**
DTC	**B104987**	**Left rear TPMS failure**
DTC	**B104A16**	**Left rear TPMS low voltage**
DTC	**B104B87**	**Right rear TPMS failure**
DTC	**B104C16**	**Right rear TPMS low voltage**

Description

When the TPMS is abnormal or sensor undervoltage occurs, the BCM records a DTC.

DTC	DTC detection conditions	Faulty location
B104587	(a) Left front TPMS failure.	• Tire pressure sensor • RF control unit • BCM
B104616	(a) Left front TPMS low voltage.	• Tire pressure sensor • BCM
B104787	(a) Right front TPMS failure.	• Tire pressure sensor • RF control unit • BCM
B104816	(a) Right front TPMS low voltage.	• Tire pressure sensor • BCM
B104987	(a) Left rear TPMS failure.	• Tire pressure sensor • RF control unit • BCM
B104A16	(a) Left rear TPMS low voltage.	• Tire pressure sensor • BCM
B104B87	(a) Right rear TPMS failure.	• Tire pressure sensor • RF control unit • BCM
B104C16	(a) Right rear TPMS low voltage.	• Tire pressure sensor • BCM

BM

Inspection procedure

1	**Check tire air pressure**

(a) Check whether the tire pressure is normal.

(b) Check whether the tire pressure has been calibration correctly.

(c) Check whether the tire model is correct.

NG → **Repair according to the fault**

OK

2	**Check RF control unit**

(a) Check the RF control unit harness and connector for open circuit or short circuit.

(b) Check whether the RF control unit is damaged.

NG → **Repair according to the fault**

OK

3	**Replace tire pressure sensor (See page TW-5)**

(a) Replace the tire pressure sensor.

(b) Re-calibrate the tire air pressure.

(c) Connect the HQ-VDS.

(d) Clear the DTC.

(e) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the BCM (See page BM-114)**

BM

OK

4	**End**

DTC	**U002888**	**Body/comfort CAN bus off**
DTC	**U014687**	**GW node lost**
DTC	**U02E387**	**Headlamp control unit node lost**
DTC	**U020887**	**Driver seat control unit node lost**
DTC	**U024687**	**SCCU node lost**
DTC	**U019987**	**Driver door module node lost**
DTC	**U020087**	**Passenger door module node lost**
DTC	**U020187**	**Rear left door module node lost**
DTC	**U020287**	**Rear right door module node lost**
DTC	**U016487**	**A/C control unit 1 node lost**
DTC	**U112187**	**ESP message lost**
DTC	**U129187**	**ACM message lost**
DTC	**U115187**	**ACU message lost**
DTC	**U12E187**	**IHC message lost**
DTC	**U124387**	**ADV message lost**
DTC	**U110087**	**ECM message lost**
DTC	**U115887**	**HUD message lost**
DTC	**U124587**	**EnHost/IVI message lost**
DTC	**U115587**	**Instrument cluster control unit message lost**
DTC	**U123587**	**IFC message lost**
DTC	**U123287**	**Left lane change assist control unit message lost**
DTC	**U113187**	**EPS ECU message lost**
DTC	**U114687**	**GW message lost**
DTC	**U110187**	**TCU message lost**
DTC	**U129387**	**HCU message lost**

Description

When the communication between the BCM and other systems is abnormal or interrupted, the BCM records the DTC.

DTC	DTC detection conditions	Faulty location
U002888	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U02E387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U020887	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U024687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U019987	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U020087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U020187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U020287	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U016487	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U112187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U129187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U12E187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U124387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115887	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U124587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U123587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U123287	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

DTC	DTC detection conditions	Faulty location
U113187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U129387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

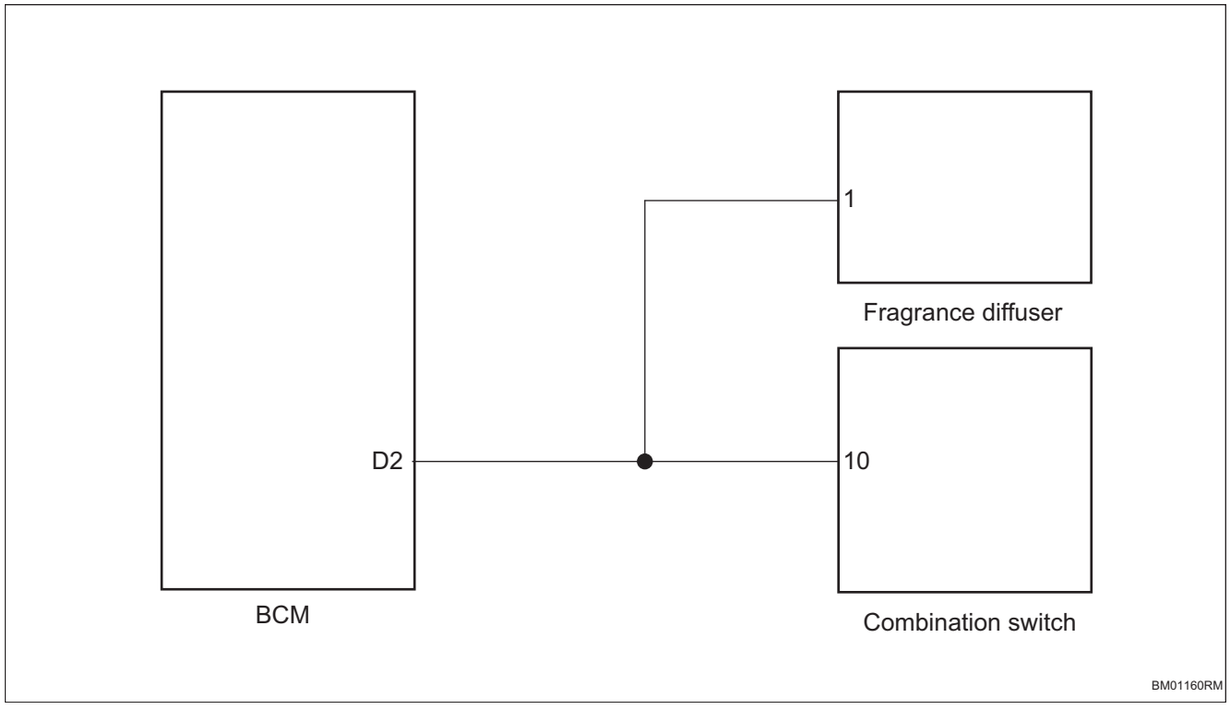
DTC	U100A88	LIN1 physical bus error
DTC	U133486	Combination switch LIN communication error
DTC	U011B87	Combination switch node lost
DTC	U134586	Fragrance diffuser control unit LIN communication error.
DTC	U013087	Fragrance diffuser node lost

Description

When the communication between the BCM and the combination switch and the fragrance diffuser is abnormal or interrupted, the BCM will record the DTC.

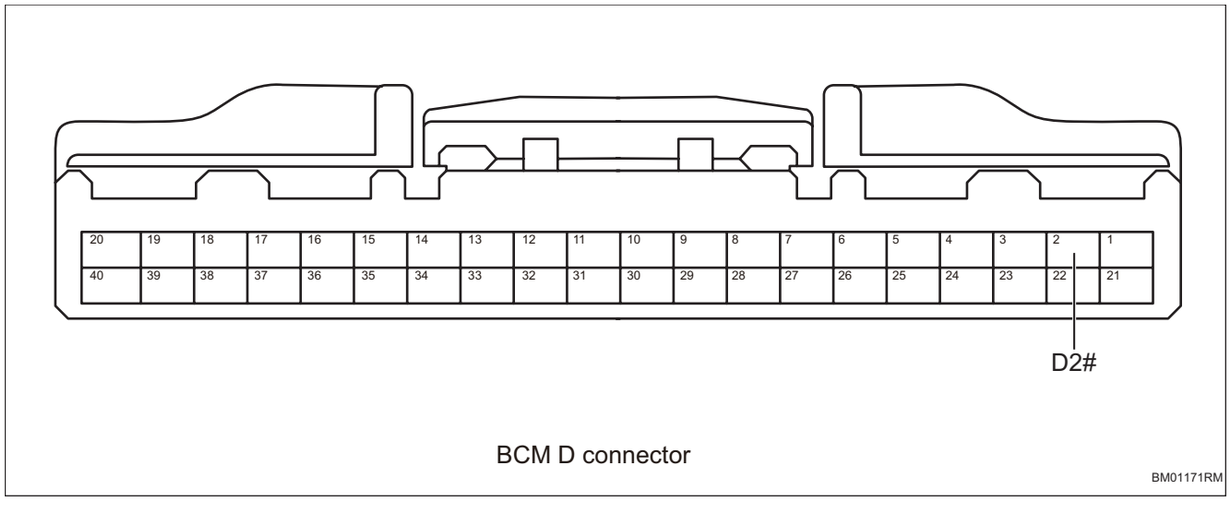
DTC	DTC detection conditions	Faulty location
U100A88	(a) LIN1 physical bus error.	• BCM • Harness and connector • Combination switch • Fragrance diffuser
U133486	(a) Combination switch LIN communication error.	• BCM • Harness and connector • Combination switch
U011B87	(a) Combination switch node lost.	• BCM • Harness and connector • Combination switch
U134586	(a) Fragrance diffuser control unit LIN communication error.	• BCM • Harness and connector • Fragrance diffuser
U013087	(a) Fragrance diffuser node lost.	• BCM • Harness and connector • Fragrance diffuser

Circuit diagram

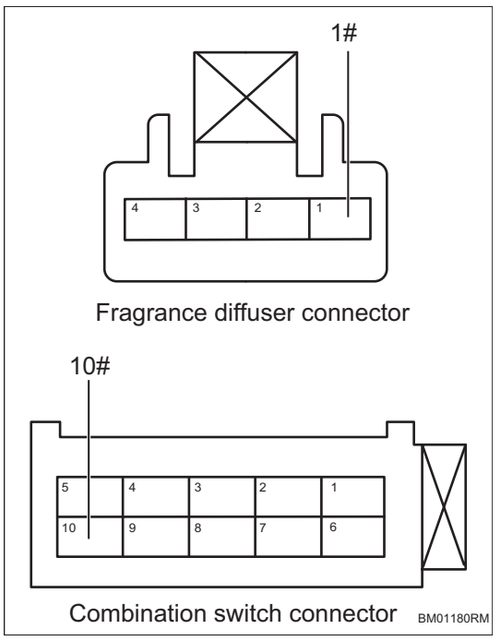


Inspection procedure

1	**Check harness and connector for open circuit (BCM - combination switch)**



BM



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the BCM connector.

(d) Disconnect the combination switch connector.

(e) Disconnect the fragrance diffuser connector.

(f) Measure the resistance according to the values in the table below.

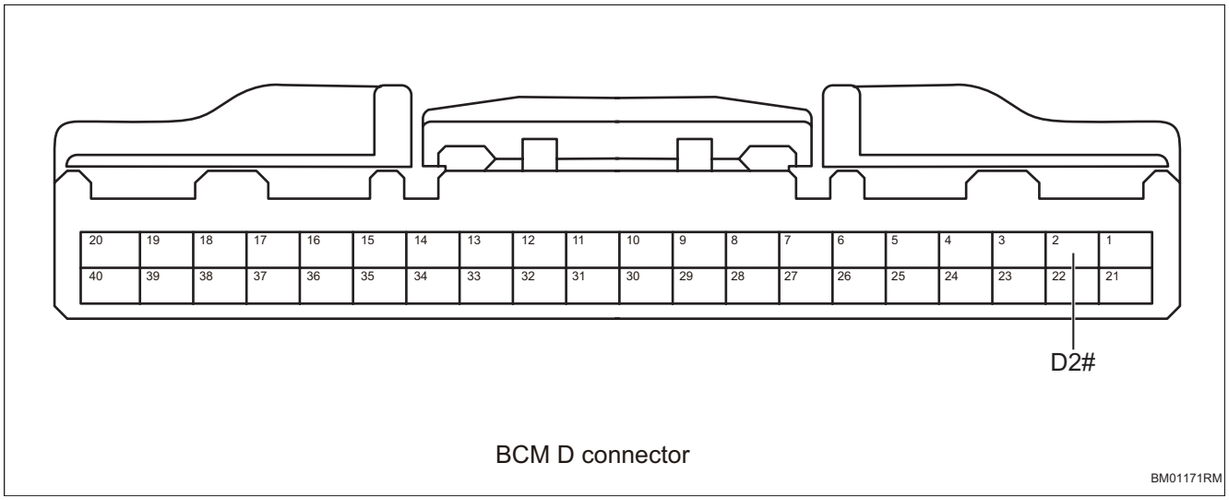
Standard value

Detector connection	Detection conditions	Specified state
BCM connector D2# - combination switch connector 10#	Always connected	Less than 1Ω
BCM connector D2# - fragrance diffuser connector 1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check harness and connector for circuit shorted to ground (BCM - combination switch)**



(a) Measure the resistance according to the values in the table below.

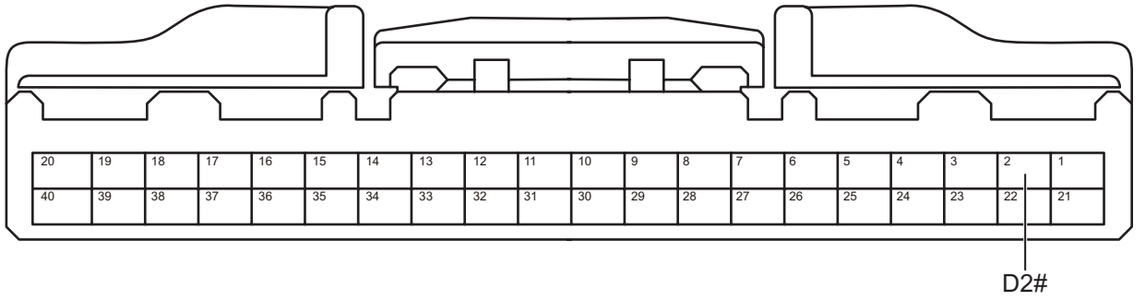
Standard value

Detector connection	Detection conditions	Specified state
BCM connector D2# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check harness and connector for circuit shorted to power supply (BCM - combination switch)**



BCM D connector

BM01171RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BCM connector D2# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the combination switch and fragrance diffuser (See page SR-5) (See page AC-110)**

(a) Replace the combination switch and fragrance diffuser.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the BCM (See page BM-114)**

OK

5	**End**

DTC	**U100B88**	**LIN2 physical bus error**
DTC	**U130086**	**RLS LIN communication error**
DTC	**U130886**	**Electronic wiper module LIN communication error**
DTC	**U130186**	**Sunroof LIN communication error**
DTC	**U130786**	**Power sunshade module LIN communication error**
DTC	**U023187**	**RLS node lost**
DTC	**U02FF87**	**Electric wiper module node lost**
DTC	**U016987**	**Sunroof control unit node lost**
DTC	**U020787**	**Electric sunshade node lost**

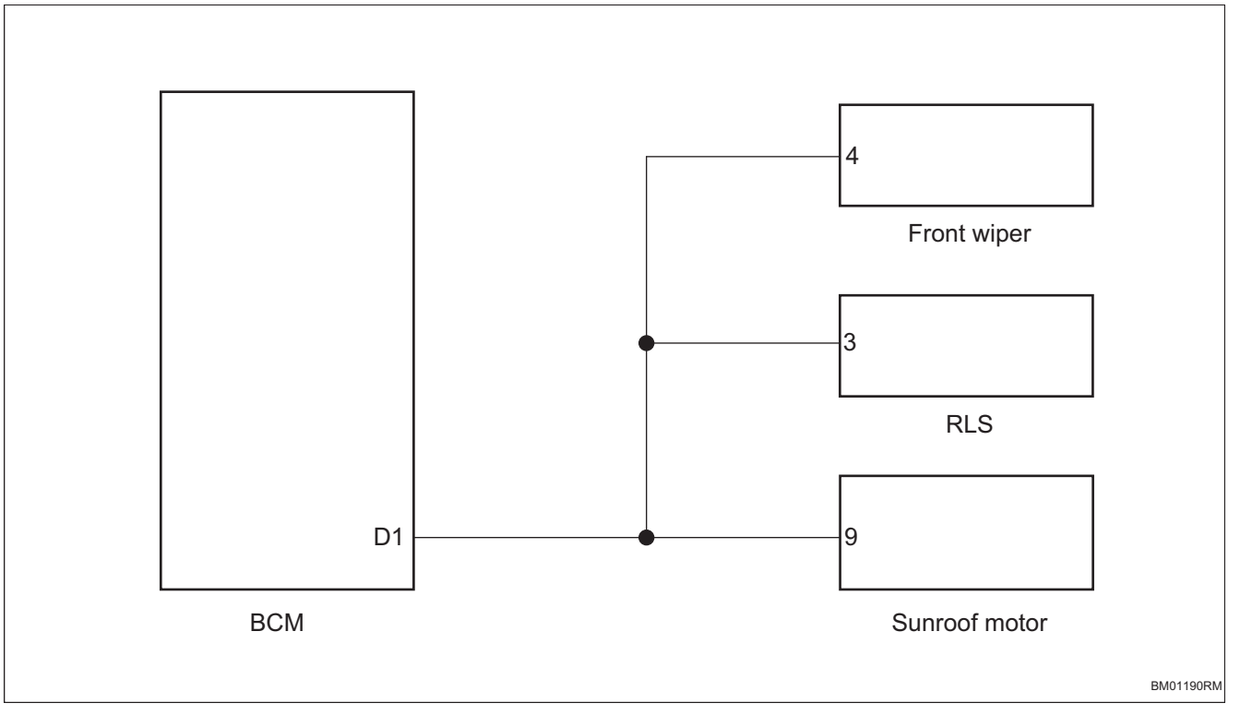
Description

When the communication between the BCM and the front wiper, RLS and sunroof motor is abnormal or interrupted, the BCM will record the DTC.

DTC	DTC detection conditions	Faulty location
U100B88	(a) LIN2 physical bus error.	• BCM • Harness and connector • Front wiper • Sunroof motor • RLS
U130086	(a) RLS LIN communication error.	• BCM • Harness and connector • RLS
U130886	(a) Front wiper LIN communication failure.	• BCM • Harness and connector • Front wiper
U130186	(a) Sunroof LIN communication error.	• BCM • Harness and connector • Sunroof motor
U130786	(a) Electric sunshade LIN communication failure.	• BCM • Harness and connector • Sunroof motor
U023187	(a) RLS node lost.	• BCM • Harness and connector • RLS
U02FF87	(a) Electric wiper module node lost.	• BCM • Harness and connector • Front wiper

DTC	DTC detection conditions	Faulty location
U016987	(a) Sunroof control unit node lost.	• BCM • Harness and connector • Sunroof motor
U020787	(a) Electric sunshade node lost.	• BCM • Harness and connector • Sunroof motor

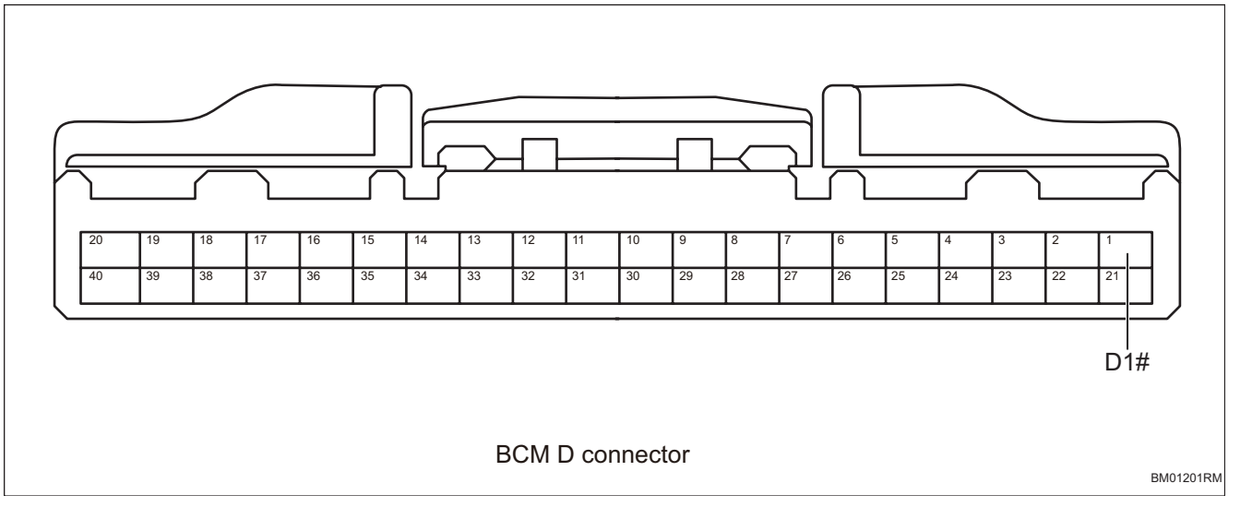
Circuit diagram

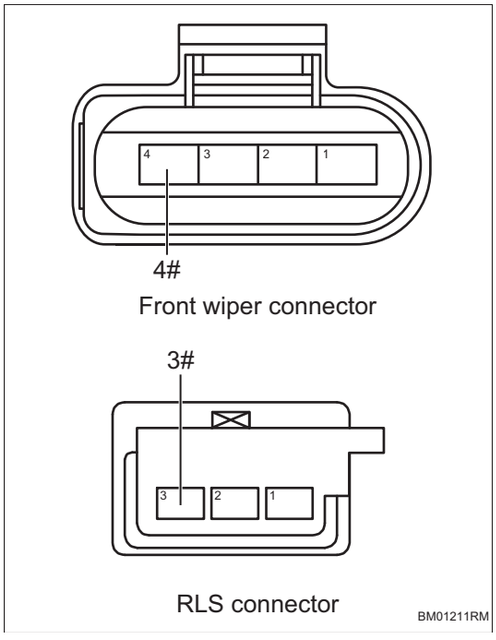


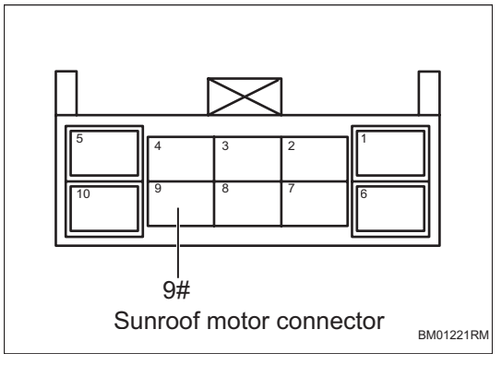
Inspection procedure

BM

1	Check BCM harness and connector for open circuit







(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the BCM connector.

(d) Disconnect the front wiper connector.

(e) Disconnect the RLS connector.

(f) Disconnect the sunroof motor connector.

(g) Measure the resistance according to the values in the table below.

Standard value

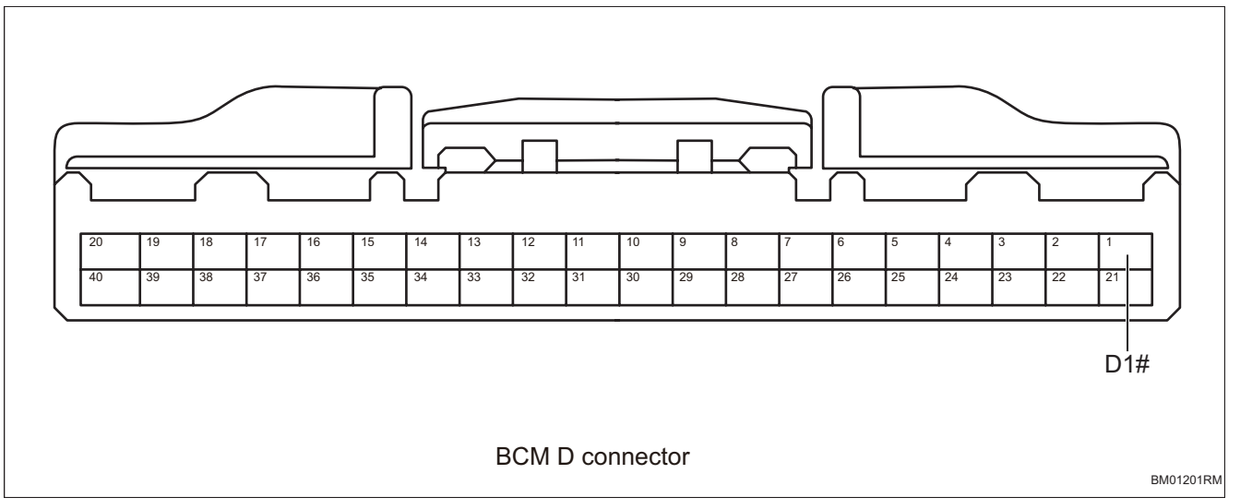
Detector connection	Detection conditions	Specified state
BCM connector D1# - front wiper connector 4#	Always connected	Less than 1Ω
BCM connector D1# - RLS connector 3#	Always connected	Less than 1Ω
BCM connector D1# - sunroof motor connector 9#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check BCM harness and connector for circuit shorted to ground**

BM



BCM D connector

BM01201RM

(a) Measure the resistance according to the values in the table below.

Standard value

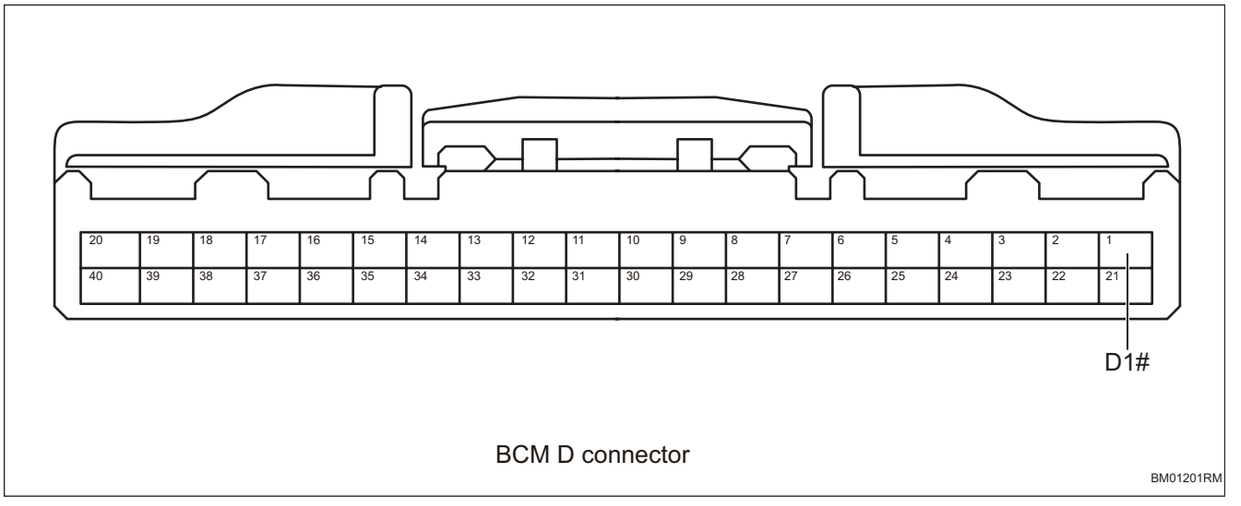
Detector connection	Detection conditions	Specified state
BCM connector D1# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	Check BCM harness and connector for circuit shorted to power supply

BM



BCM D connector

BM01201RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BCM connector D1# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace front wiper or RLS or sunroof motor (See page WW-6) (See page AC-106) (See page RF-1)**

(a) Replace the front wiper or RLS or sunroof motor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the BCM (See page BM-114)**

OK

5	**End**

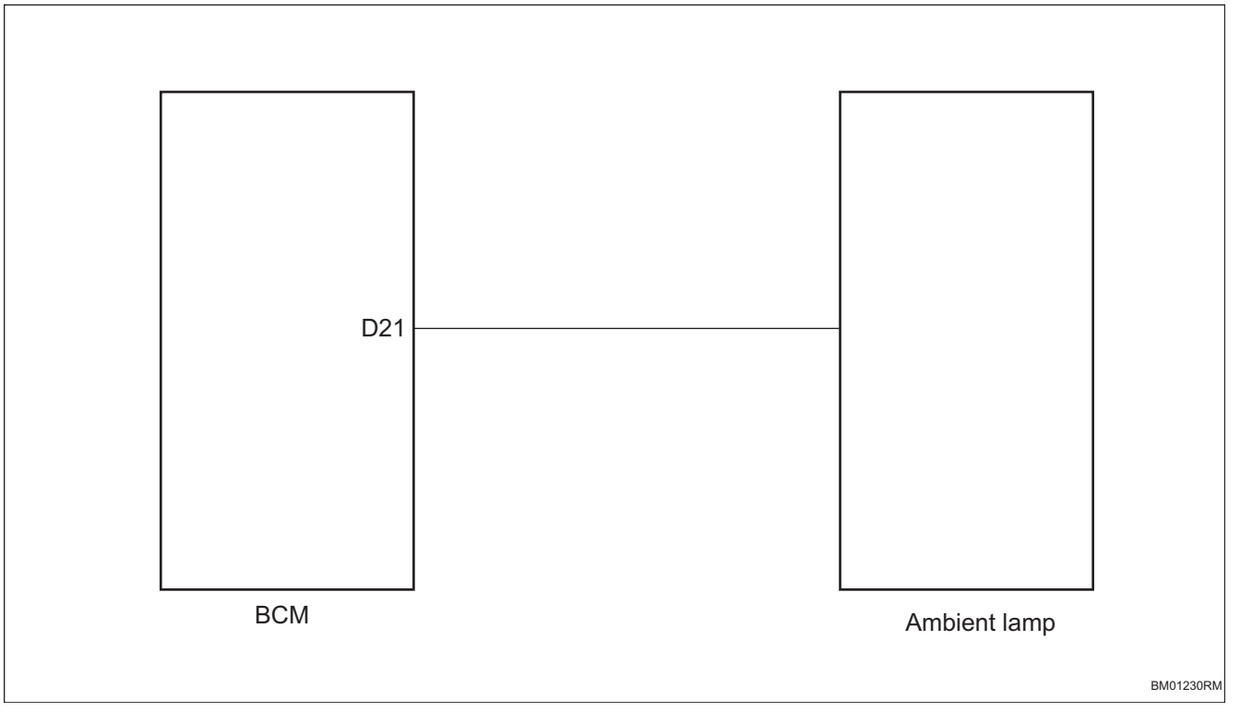
DTC	U100C88	LIN3 physical bus error
DTC	B103112	Ambient lamp grounding failure

Description

When the communication between the BCM and the ambient lamp is abnormal or interrupted, the BCM records the DTC.

DTC	DTC detection conditions	Faulty location
U100C88	(a) LIN3 physical bus error.	• BCM • Harness and connector • Ambient lamp
B103112	(a) Ambient lamp grounding failure	• BCM • Harness and connector • Ambient lamp

Circuit diagram



Inspection procedure

1	Check ambient lamp

(a) Check whether the ambient lamp is damaged.

NG → Repair according to the fault

OK

2	Check ambient lamp harness and connector

(a) Check whether the ambient lamp connector is well connected.

(b) Check the ambient lamp harness and connector for short circuit or open circuit.

NG → **Repair according to the fault**

OK

3	**Replace the BCM (See page BM-114)**

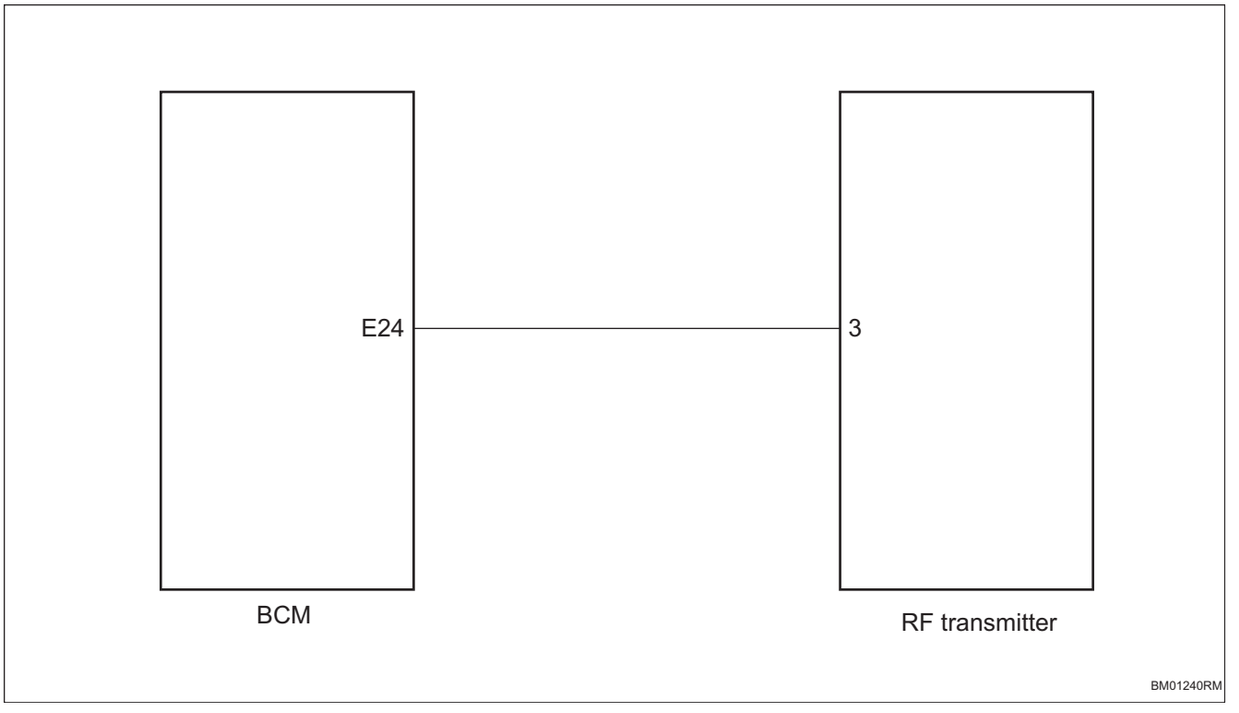
DTC	U100D88	LIN4 physical bus error
DTC	U020987	RFR node lost

Description

When the communication between the BCM and the RF control unit is abnormal or interrupted, the BCM will record the DTC.

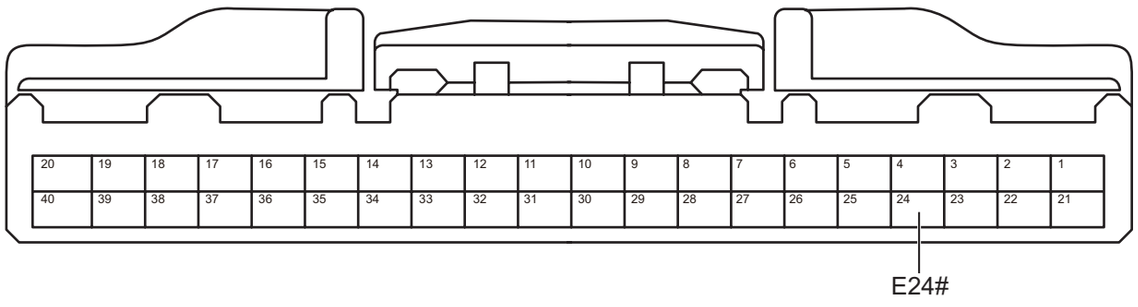
DTC	DTC detection conditions	Faulty location
U100D88	(a) LIN4 bus fault.	• BCM • Harness and connector • RF transmitter
U020987	(a) RFR node lost.	• BCM • Harness and connector • RF transmitter

Circuit diagram



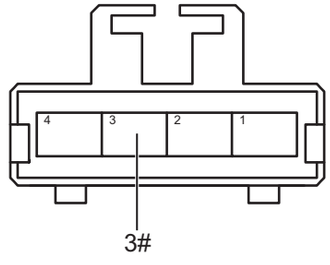
Inspection procedure

1	Check harness and connector for open circuit (BCM - RF transmitter)



BCM E connector

BM01251RM



RF transmitter connector

BM01260RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the BCM connector.

(d) Disconnect the RF transmitter connector.

(e) Measure the resistance according to the values in the table below.

Standard value

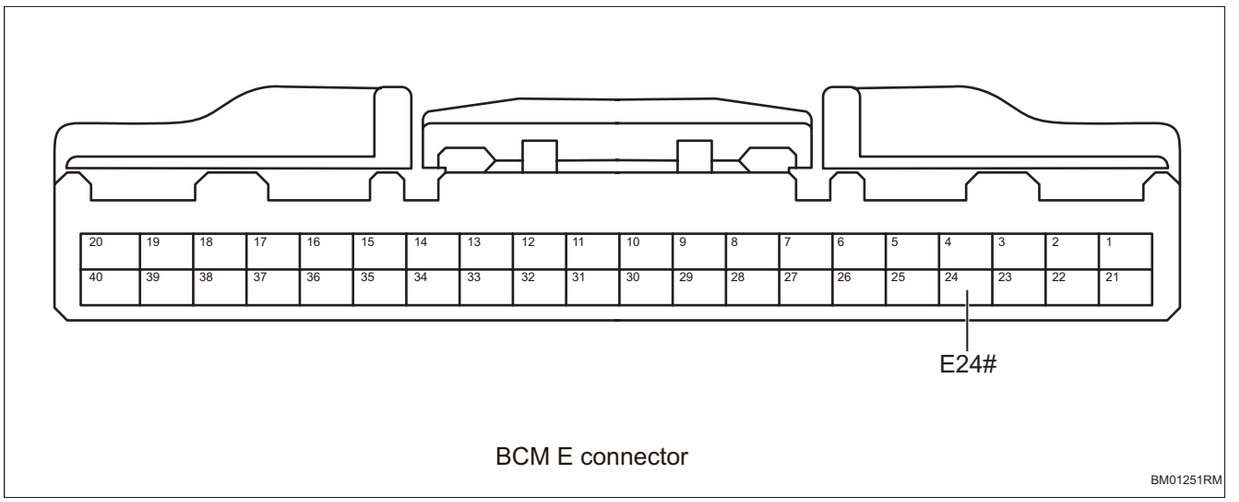
Detector connection	Detection conditions	Specified state
BCM connector E24# - RF transmitter connector 3#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

BM

OK

2	**Check harness and connector for circuit shorted to ground (BCM - RF transmitter)**



BCM E connector

BM01251RM

(a) Measure the resistance according to the values in the table below.

Standard value

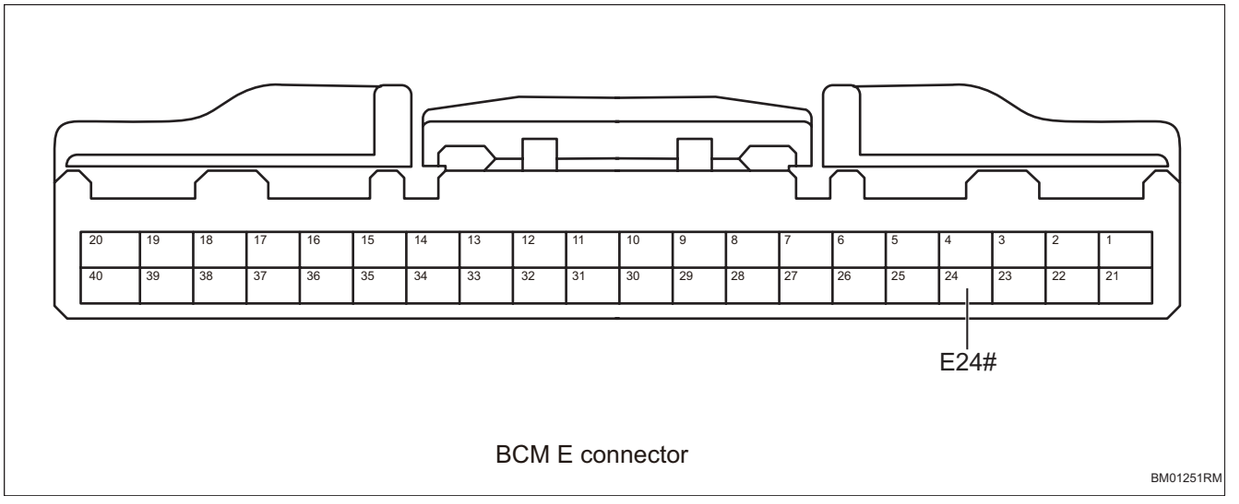
Detector connection	Detection conditions	Specified state
BCM connector E24# -body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

3	**Check harness and connector for circuit shorted to power supply (BCM - RF transmitter)**

BM



BCM E connector

BM01251RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BCM connector E24# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace RF transmitter (See page TD-6)**

(a) Replace the RF transmitter.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the BCM (See page BM-114)**

OK

5	**End**

DTC	B104D16	Smart key low voltage

Description

When the smart key is in low voltage, BCM records the DTC.

DTC	DTC detection conditions	Faulty location
B104D16	(a) Smart key low voltage.	• Key battery • Smart key • BCM

Inspection procedure

1	Check smart key voltage

(a) Check if the smart key voltage is normal.

NG → **Replace smart key battery**

OK

2	Replace smart key (See page TD-12)

(a) Replace the smart key.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the BCM (See page BM-114)**

OK

3	End

DTC	B105787	RLS configuration writing failure

Description

When the BCM number does not match the vehicle configuration, the BCM records the DTC.

DTC	DTC detection conditions	Faulty location
B105787	(a) RLS configuration writing failure.	• BCM

Inspection procedure

1	BCM executes automatic configuration module program

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) BCM executes automatic configuration module program.

(d) Clear the DTC.

(e) Re-read the DTC.

Criteria:

No DTC is output.

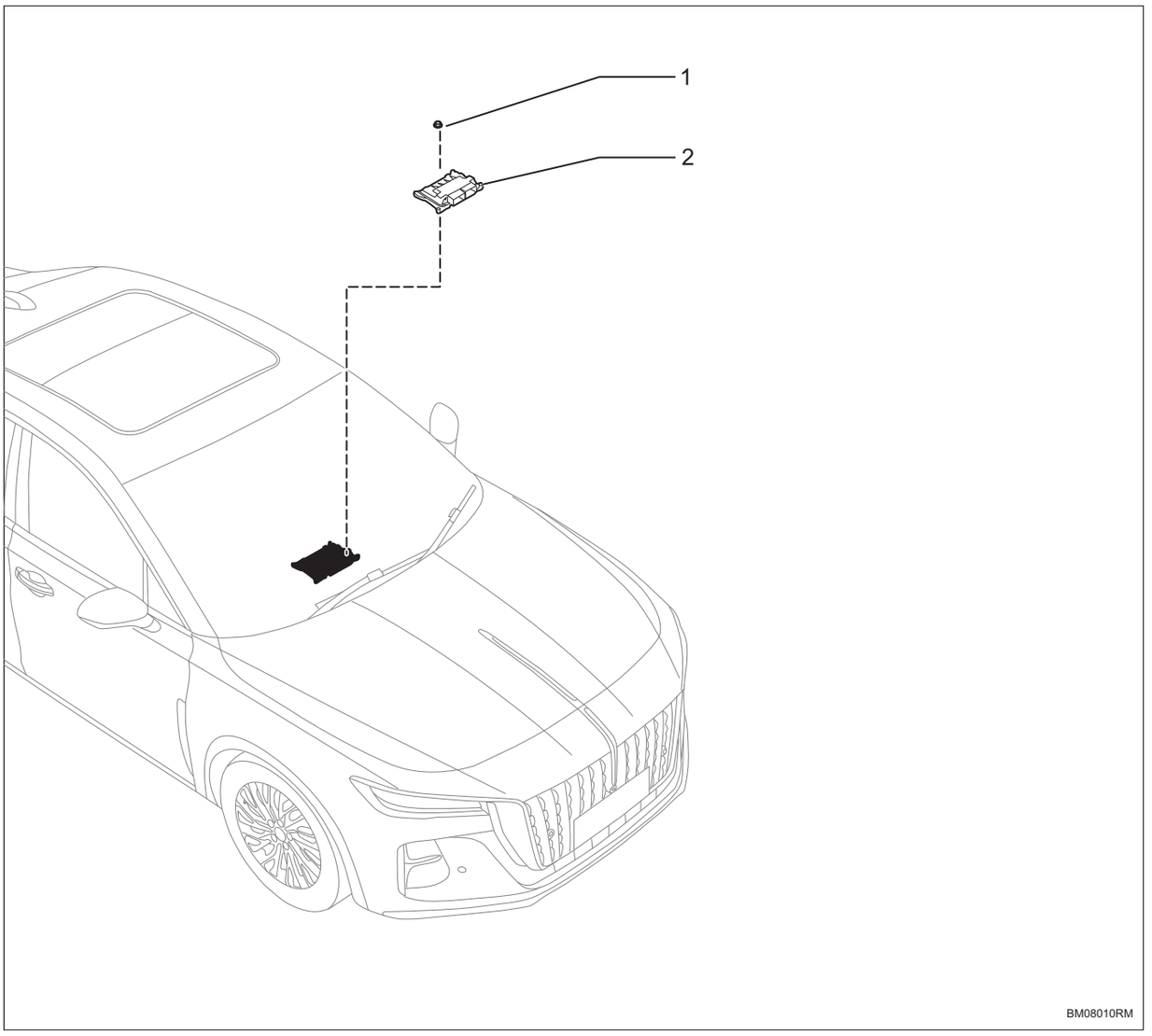
NG → **Replace the BCM (See page BM-114)**

OK

2	End

BCM assembly

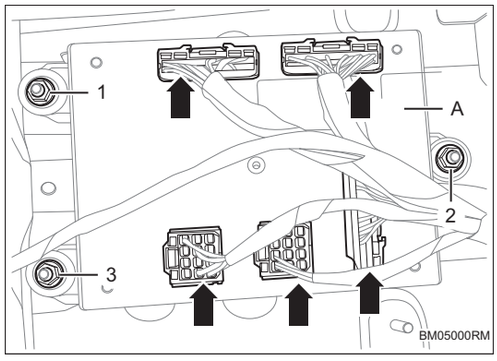
Parts



1. **Hexagon flange nut**
   - X3
   - Torque: 3~6 N · m
2. **BCM assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the console assembly (See page IP-17)**
3. **Remove BCM assembly**



(a) Disconnect the harness connector-as arrowed.

(b) Remove the nuts -1-3- and remove the BCM assembly-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Door control system

Front left door control system ED-1
Precautions ED-1
Location of parts ED-3
System diagram ED-5
System description ED-8
Symptom chart ED-8
ECU terminal ED-9
DTC chart ED-10
B110017 ..... ED-12
B110016 ..... ED-12
B110111 ..... ED-15
B110211 ..... ED-15
B110311 ..... ED-15
B110411 ..... ED-15
B110511 ..... ED-15
B110611 ..... ED-15
B110711 ..... ED-15
B110811 ..... ED-15
B110918 ..... ED-21
B110919 ..... ED-21
B110A18 ..... ED-25
B110A19 ..... ED-25
B110B18 ..... ED-25
B110B19 ..... ED-25
B110C18 ..... ED-25
B110C19 ..... ED-25
B110D18 ..... ED-25
B110D19 ..... ED-25
B110E11 ..... ED-31
B110F11 ..... ED-31
B111011 ..... ED-31
B111111 ..... ED-31
B111511 ..... ED-31
B111611 ..... ED-31
B111711 ..... ED-31
B111811 ..... ED-31
B111911 ..... ED-31
B111211 ..... ED-37
B111311 ..... ED-37

B111C18 .....ED-41
B111C19 .....ED-41
B111D18 .....ED-41
B111D19 .....ED-41
B111E13 .....ED-45
B111E11 .....ED-45
U002888 .....ED-49
U014687 .....ED-49
U014087 .....ED-49
U020187 .....ED-49
U020287 .....ED-49
U016487 .....ED-49
U112187 .....ED-49
U115187 .....ED-49
U115587 .....ED-49
U123287 .....ED-49
U110087 .....ED-49
U114687 .....ED-49
U129387 .....ED-49
Front right door control system ED-51
Precautions ED-51
Location of parts ED-53
System diagram ED-55
System description ED-58
Symptom chart ED-58
ECU terminal ED-59
DTC chart ED-60
B114017 .....ED-62
B114016 .....ED-62
B114111 .....ED-65
B114211 .....ED-65
B114318 .....ED-69
B114319 .....ED-69
B114418 .....ED-73
B114419 .....ED-73
B114518 .....ED-73
B114519 .....ED-73
B114618 .....ED-73
B114619 .....ED-73
B114718 .....ED-73
B114719 .....ED-73
B114818 .....ED-78

B114819 ..... ED-78
B114918 ..... ED-78
B114919 ..... ED-78
B114A13 ..... ED-82
B114A11 ..... ED-82
U002888 ..... ED-86
U014687 ..... ED-86
U014087 ..... ED-86
U016487 ..... ED-86
U019987 ..... ED-86
U112187 ..... ED-86
U115187 ..... ED-86
U124587 ..... ED-86
U123287 ..... ED-86
U110187 ..... ED-86
U110087 ..... ED-86
U114687 ..... ED-86
U115587 ..... ED-86
U129387 ..... ED-86
Rear left door control system ED-88
Precautions ED-88
Location of parts ED-90
System diagram ED-93
System description ED-94
Symptom chart ED-94
ECU terminal ED-95
DTC chart ED-95
B118017 ..... ED-97
B118016 ..... ED-97
B118111 ..... ED-100
B118311 ..... ED-100
B118518 ..... ED-104
B118519 ..... ED-104
B118618 ..... ED-108
B118619 ..... ED-108
B118718 ..... ED-108
B118719 ..... ED-108
U002888 ..... ED-112
U014687 ..... ED-112
U014087 ..... ED-112
U016487 ..... ED-112
U019987 ..... ED-112

U020287 ....ED-112
U112187 ....ED-112
U115187 ....ED-112
U024687 ....ED-112
U110087 ....ED-112
U115587 ....ED-112
U129387 ....ED-112
Rear right door control system ED-114
Precautions ED-114
Location of parts ED-116
System diagram ED-120
System description ED-121
Symptom chart ED-121
ECU terminal ED-122
DTC chart ED-122
B11C017 ....ED-124
B11C016 ....ED-124
B11C111 ....ED-127
B11C311 ....ED-127
B11C518 ....ED-131
B11C519 ....ED-131
B11C618 ....ED-135
B11C619 ....ED-135
B11C718 ....ED-135
B11C719 ....ED-135
U002888 ....ED-139
U014687 ....ED-139
U014087 ....ED-139
U016487 ....ED-139
U019987 ....ED-139
U020187 ....ED-139
U112187 ....ED-139
U115187 ....ED-139
U024687 ....ED-139
U115187 ....ED-139
U110087 ....ED-139
U129387 ....ED-139

Front left door control system

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Warning:

Before repairing the high voltage system or adjacent high voltage system components, be sure to carefully read the "Instructions and precautions for maintenance work" in the introduction carefully!

2. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

3. when the battery cable is disconnected and reconnected, some systems require initialization.

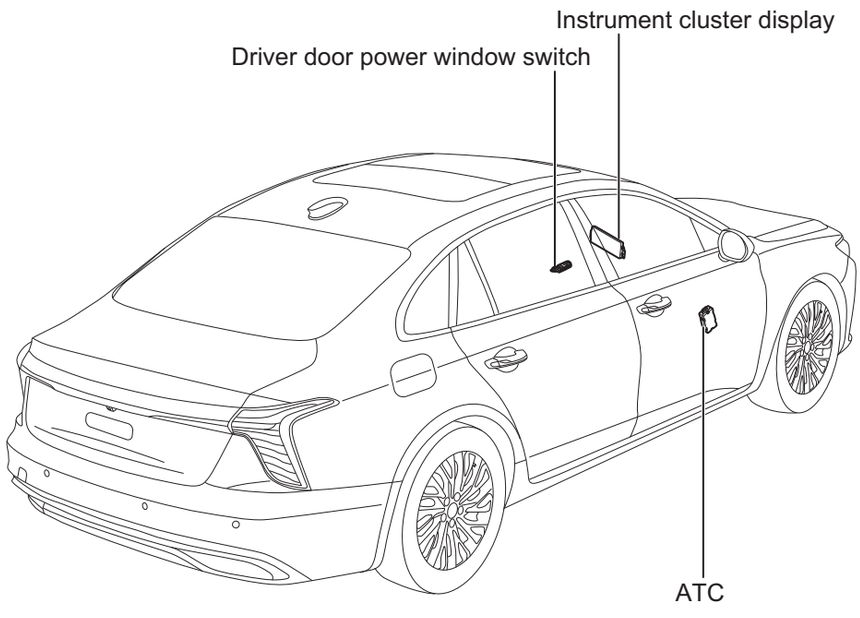
4. General repair instructions

(a) When checking the driver door control system, it may affect the operation of the airbag. Therefore, before carrying out maintenance work, be sure to carefully read and confirm the precautions for airbag.

(b) When parts need to be replaced or the connector needs to be disconnected during maintenance of driver door control system, the battery negative cable shall be disconnected.

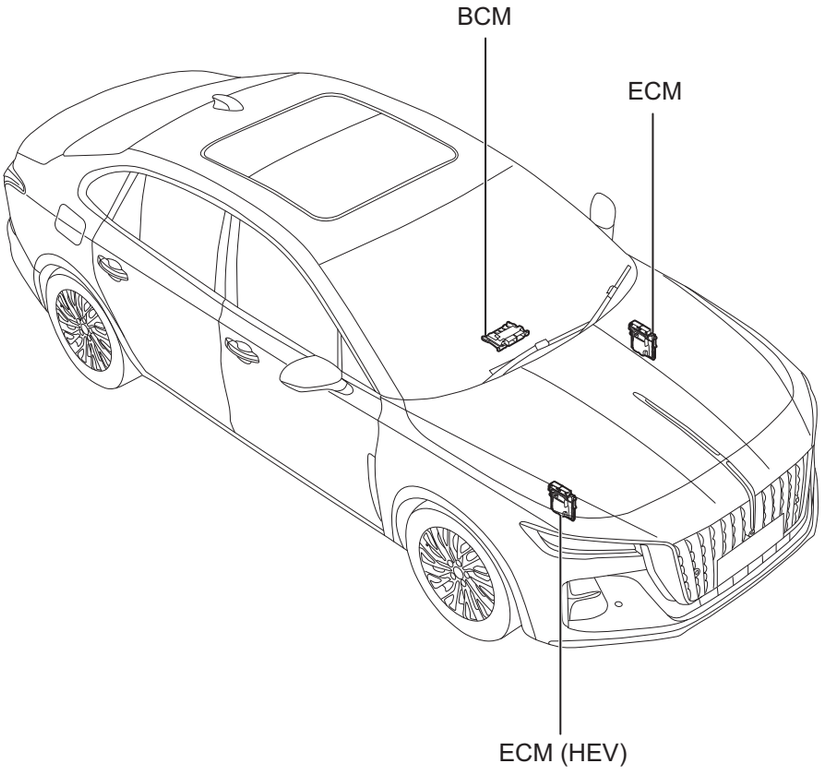
(c) The driver door control system needs to be initialized after reconnecting the battery. And use the HQ-VDS to "clear the DTC" for all electronic control systems.

Location of parts



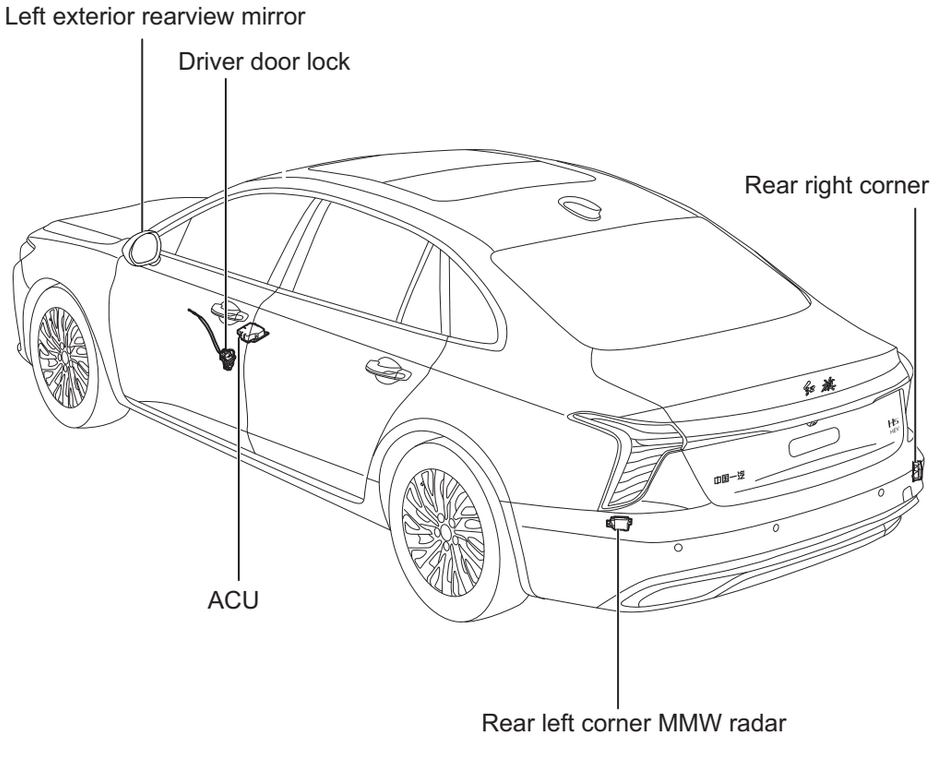
ED00050RM

Location of parts



ED00060RM

Location of parts

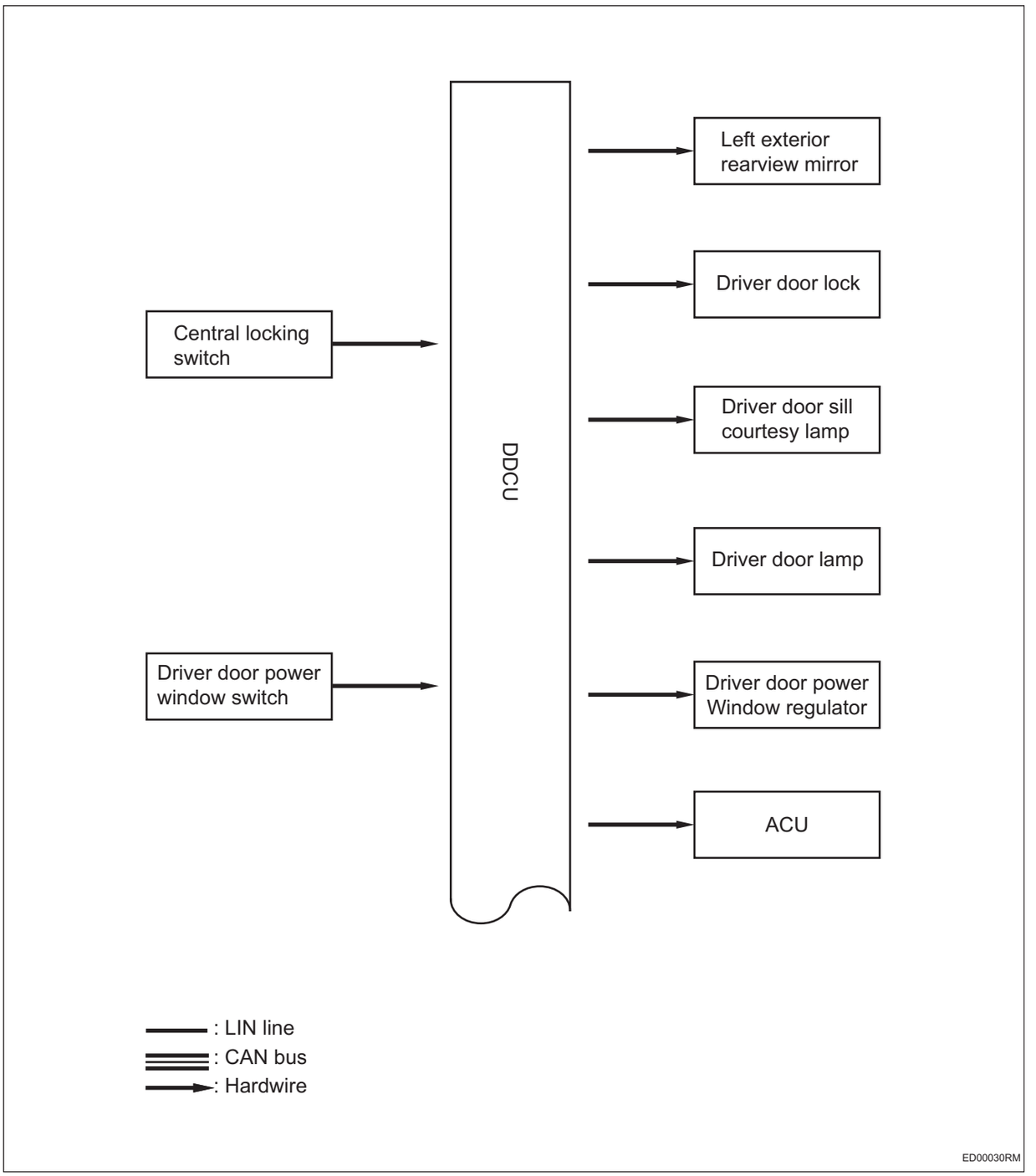


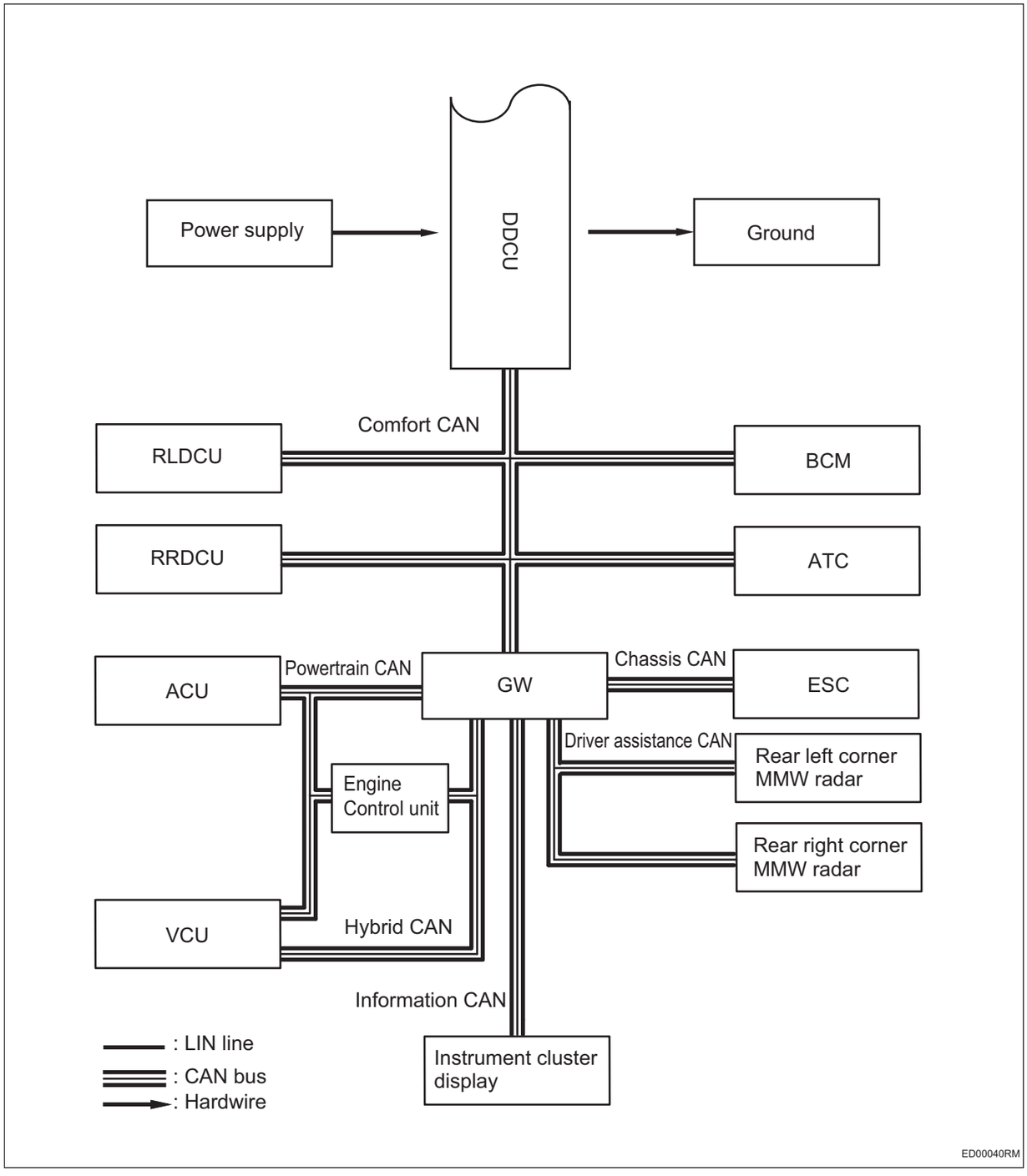
ED00070RM

ED

System diagram

DDCU


Left exterior rearview mirror
Driver door lock
Central locking switch
Driver door sill courtesy lamp
DDCU
Driver door lamp
Driver door power window switch
Driver door power Window regulator
ACU
: LIN line
: CAN bus
: Hardwire
ED00030RM


Power supply
DDCU
Ground
Comfort CAN
RLDCU
BCM
RRDCU
ATC
ACU
Powertrain CAN
GW
Chassis CAN
ESC
Driver assistance CAN
Rear left corner MMW radar
Engine Control unit
Rear right corner MMW radar
VCU
Hybrid CAN
Information CAN
: LIN line
: CAN bus
: Hardwire
Instrument cluster display
ED00040RM

ED

System description

1. DDCU

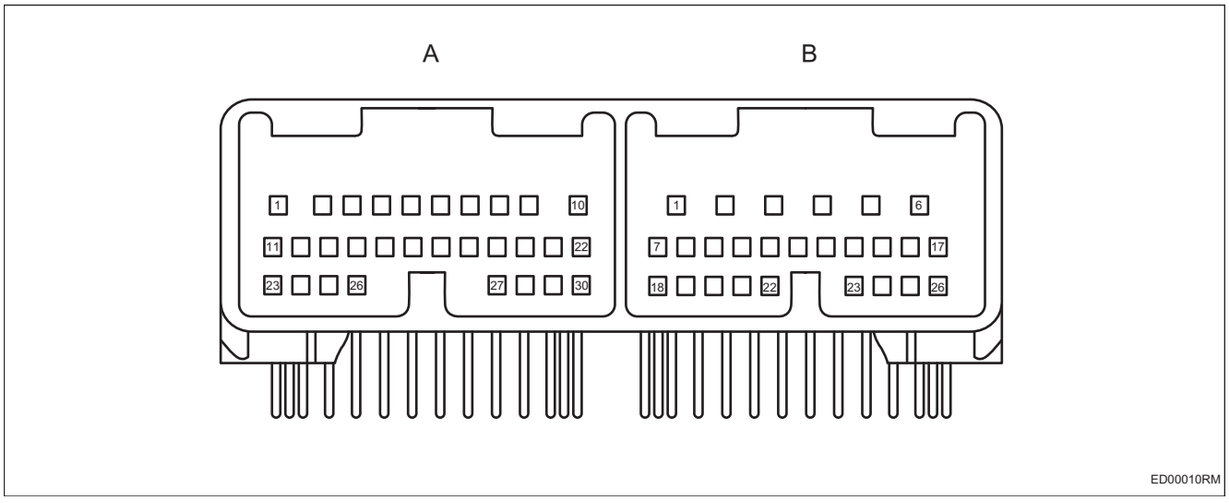
(a) The DDCU mainly realizes the detection of windows, door lock, rearview mirrors, door status and lock status, and the driving of door lamps; The vehicle is equipped with a control unit for each door.

Symptom chart

Fault	Possible location
Window lifting/lowering abnormity	• Power window switch • Related harness and connector • DCU • Power window regulator • Battery
Abnormal exterior rearview mirror operation	• Driver door power window switch • Exterior rearview mirror • DCU • Related harness and connector • Battery
Door unlocking abnormity	• Central locking switch • Related harness and connector • DCU • Door lock • Battery

ECU terminal

DDCU



DDCU A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	-	16	Central lock unlocking input
2	-	17	Driver door locking signal
3	BSD status indicator lamp	18	Hardwired impact signal
4	Rear window locking indicator lamp	19	-
5	Left exterior rearview mirror selection indicator lamp	20	Right exterior rearview mirror selection indicator lamp
6	-	21	Central locking input
7	Central locking indicator lamp	22	-
8	Driver door unlocking output	23	-
9	Driver door locking output	24	-
10	-	25	-
11	Driver door unlocking signal	26	CAN-H
12	Mechanical key unlocking switch	27	Switch backlight output
13	Driver door status switch	28	-
14	CAN-L	29	-
15	Mechanical key locking switch	30	-

DDCU B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Power supply	14	Exterior rearview mirror function selection switch
2	Power GND	15	Driver side left front window switch
3	Window lifting	16	Driver side right front window switch
4	Window lowering	17	-

DDCU B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
5	-	18	Driver door lamp/driver door sill trim strip
6	-	19	Rearview mirror unfolding
7	Left exterior rearview mirror left/upward adjustment/folding	20	Left front rearview mirror heater
8	Left exterior rearview mirror right adjustment	21	Rear window lock switch
9	Left exterior rearview mirror downward adjustment	22	Exterior rearview mirror position memory ground
10	-	23	Rearview mirror heating indicator lamp
11	Rearview mirror position memory power supply	24	Exterior rearview mirror upper/lower position memory signal
12	Driver side right rear window switch	25	Exterior rearview mirror adjusting switch
13	Driver side left rear window switch	26	Exterior rearview mirror left/right position memory signal

DTC chart

DDCU

DTC	Description	Reference page
B110017	Battery overvoltage	(See page ED-12)
B110016	Battery undervoltage	(See page ED-12)
B110111	Driver door window Up button stuck	(See page ED-15)
B110211	Passenger door window Up button stuck	(See page ED-15)
B110311	Rear left door window Up button stuck	(See page ED-15)
B110411	Rear right door window Up button stuck	(See page ED-15)
B110511	Driver door window Down button stuck	(See page ED-15)
B110611	Passenger door window Down button stuck	(See page ED-15)
B110711	Rear left door window Down button stuck	(See page ED-15)
B110811	Rear right door window Down button stuck	(See page ED-15)
B110918	Driver door window motor output current low	(See page ED-21)
B110919	Driver door window motor output current high	(See page ED-21)
B110A18	Rearview mirror upper adjustment output undercurrent	(See page ED-25)
B110A19	Rearview mirror upper adjustment output overcurrent	(See page ED-25)
B110B18	Rearview mirror lower adjustment output undercurrent	(See page ED-25)

DTC	Description	Reference page
B110B19	Rearview mirror lower adjustment output overcurrent	(See page ED-25)
B110C18	Rearview mirror left adjustment output undercurrent	(See page ED-25)
B110C19	Rearview mirror left adjustment output overcurrent	(See page ED-25)
B110D18	Rearview mirror right adjustment undercurrent	(See page ED-25)
B110D19	Rearview mirror right adjustment overcurrent	(See page ED-25)
B110E11	Rearview mirror upward adjustment button stuck	(See page ED-31)
B110F11	Rearview mirror downward adjustment button stuck	(See page ED-31)
B111011	Rearview mirror left adjustment button stuck	(See page ED-31)
B111111	Rearview mirror right adjustment button stuck	(See page ED-31)
B111211	Central unlocking button stuck	(See page ED-37)
B111311	Central locking button stuck	(See page ED-37)
B111511	Rearview mirror left selection button stuck	(See page ED-31)
B111611	Rearview mirror right selection button stuck	(See page ED-31)
B111711	Rearview mirror heater button stuck	(See page ED-31)
B111811	Rearview mirror folding/unfolding button stuck	(See page ED-31)
B111911	Rear window locking button stuck	(See page ED-31)
B111C18	Central lock motor unlocking undercurrent	(See page ED-41)
B111C19	Central lock motor unlocking overcurrent	(See page ED-41)
B111D18	Central lock motor locking undercurrent	(See page ED-41)
B111D19	Central lock motor locking overcurrent	(See page ED-41)
B111E13	BSD lamp open circuit	(See page ED-45)
B111E11	BSD lamp short circuit	(See page ED-45)
U002888	Comfort CAN bus off	(See page ED-49)
U014687	GW node lost	(See page ED-49)
U014087	BCM 1 node lost	(See page ED-49)
U020187	Rear left door module node lost	(See page ED-49)
U020287	Rear right door module node lost	(See page ED-49)
U016487	A/C control unit node lost	(See page ED-49)
U112187	ESP message lost	(See page ED-49)
U115187	ACU message lost	(See page ED-49)
U115587	Instrument cluster control unit message lost	(See page ED-49)
U123287	LCDA message lost	(See page ED-49)
U110087	ECM message lost	(See page ED-49)
U114687	GW message lost	(See page ED-49)
U129387	HCU message lost	(See page ED-49)

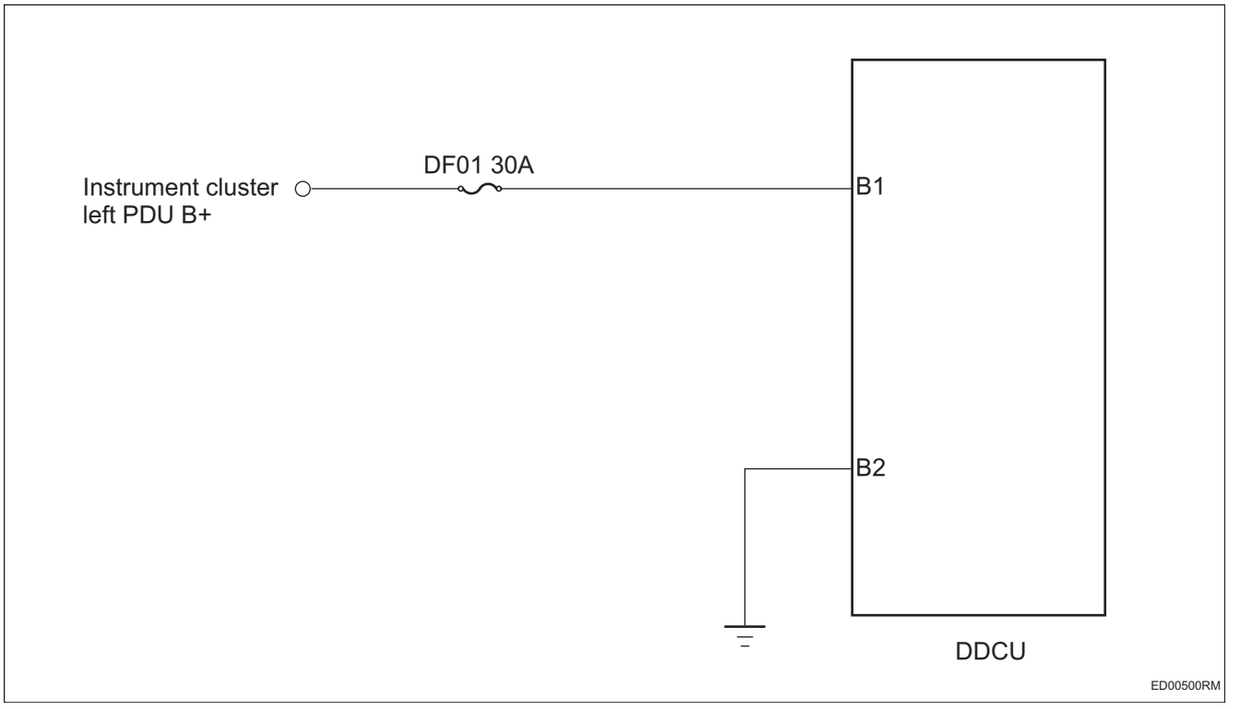
DTC	B110017	Battery overvoltage
DTC	B110016	Battery undervoltage

Description

When the DDCU power supply voltage exceeds the normal operating range, the DDCU records the DTC.

DTC	DTC detection conditions	Faulty location
B110017	(a) Battery overvoltage.	• DDCU • Harness and connector • Charging system
B110016	(a) Battery undervoltage.	• DDCU • Fuse • Harness and connector • Charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2 **Check the DDCU fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the DDCU fuse.

(d) Measure the resistance according to the values in the table below.

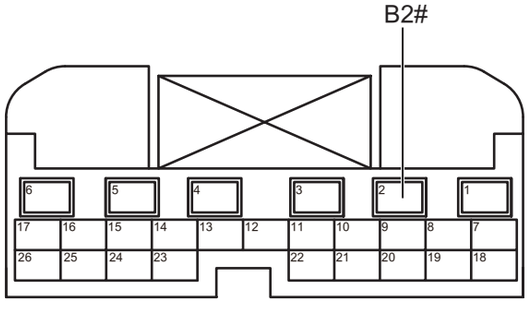
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3 **Check DDCU ground**



DDCU B connector

ED00510RM

(a) Disconnect the DDCU connector.

(b) Measure the resistance according to the values in the table below.

Standard value

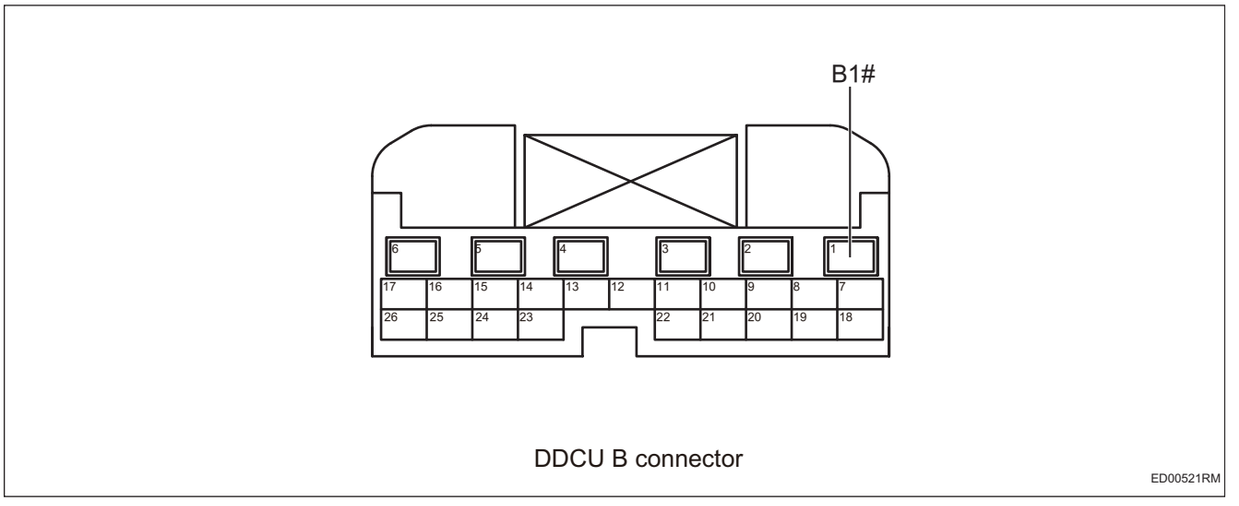
ED

Detector connection	Detection conditions	Specified state
DDCU connector B2# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check DDCU power supply**



DDCU B connector

ED00521RM

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DDCU connector B1# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace the DDCU (See page ED-32)**

ED

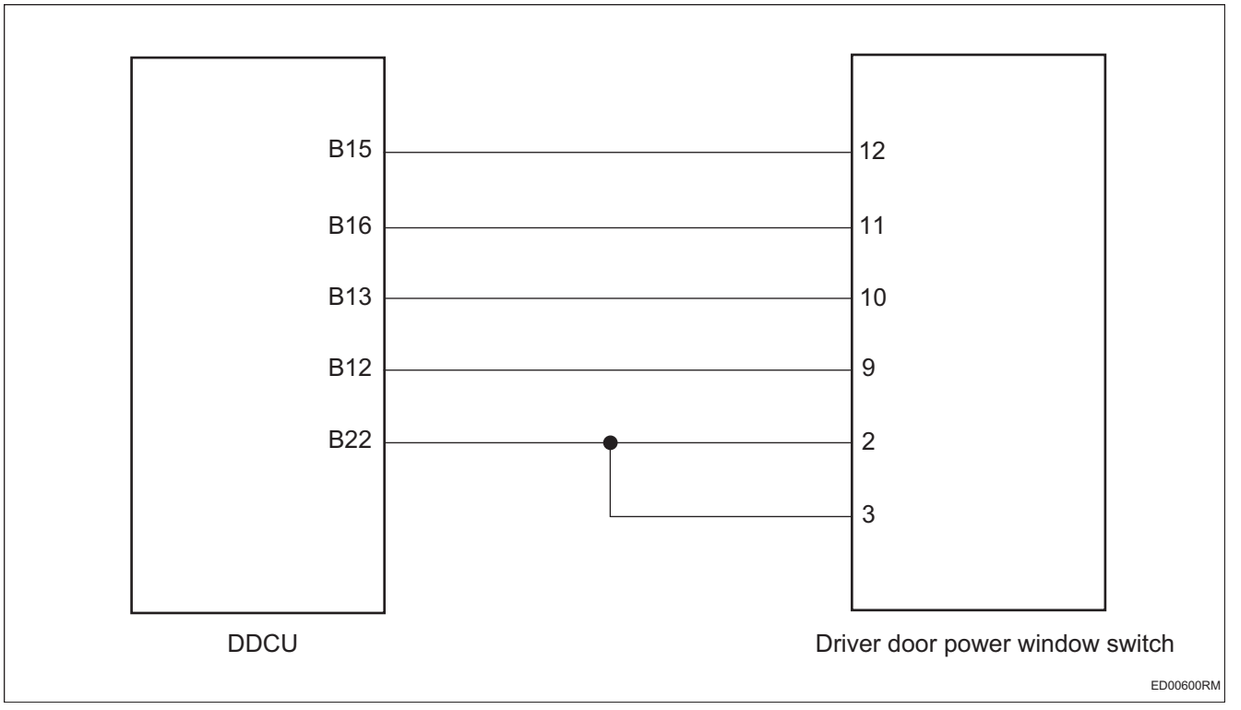
DTC	**B110111**	**Driver door window Up button stuck**
DTC	**B110211**	**Passenger door window Up button stuck**
DTC	**B110311**	**Rear left door window Up button stuck**
DTC	**B110411**	**Rear right door window Up button stuck**
DTC	**B110511**	**Driver door window Down button stuck**
DTC	**B110611**	**Passenger door window Down button stuck**
DTC	**B110711**	**Rear left door window Down button stuck**
DTC	**B110811**	**Rear right door window Down button stuck**

Description

When the driver door power window switch fails, DDCU records the DTC.

DTC	DTC detection conditions	Faulty location
B110111	(a) Driver door window Up button stuck.	• DDCU • Harness and connector • Driver door power window switch
B110211	(a) Passenger door window Up button stuck.	• DDCU • Harness and connector • Driver door power window switch
B110311	(a) Rear left door window Up button stuck.	• DDCU • Harness and connector • Driver door power window switch
B110411	(a) Rear right door window Up button stuck.	• DDCU • Harness and connector • Driver door power window switch
B110511	(a) Driver door window Down button stuck.	• DDCU • Harness and connector • Driver door power window switch
B110611	(a) Passenger door window Down button stuck.	• DDCU • Harness and connector • Driver door power window switch
B110711	(a) Rear left door window Down button stuck.	• DDCU • Harness and connector • Driver door power window switch
B110811	(a) Rear right door window Down button stuck.	• DDCU • Harness and connector • Driver door power window switch

Circuit diagram



Inspection procedure

1	**Check the driver door power window switch**

(a) Check the driver door power window switch for foreign matter.

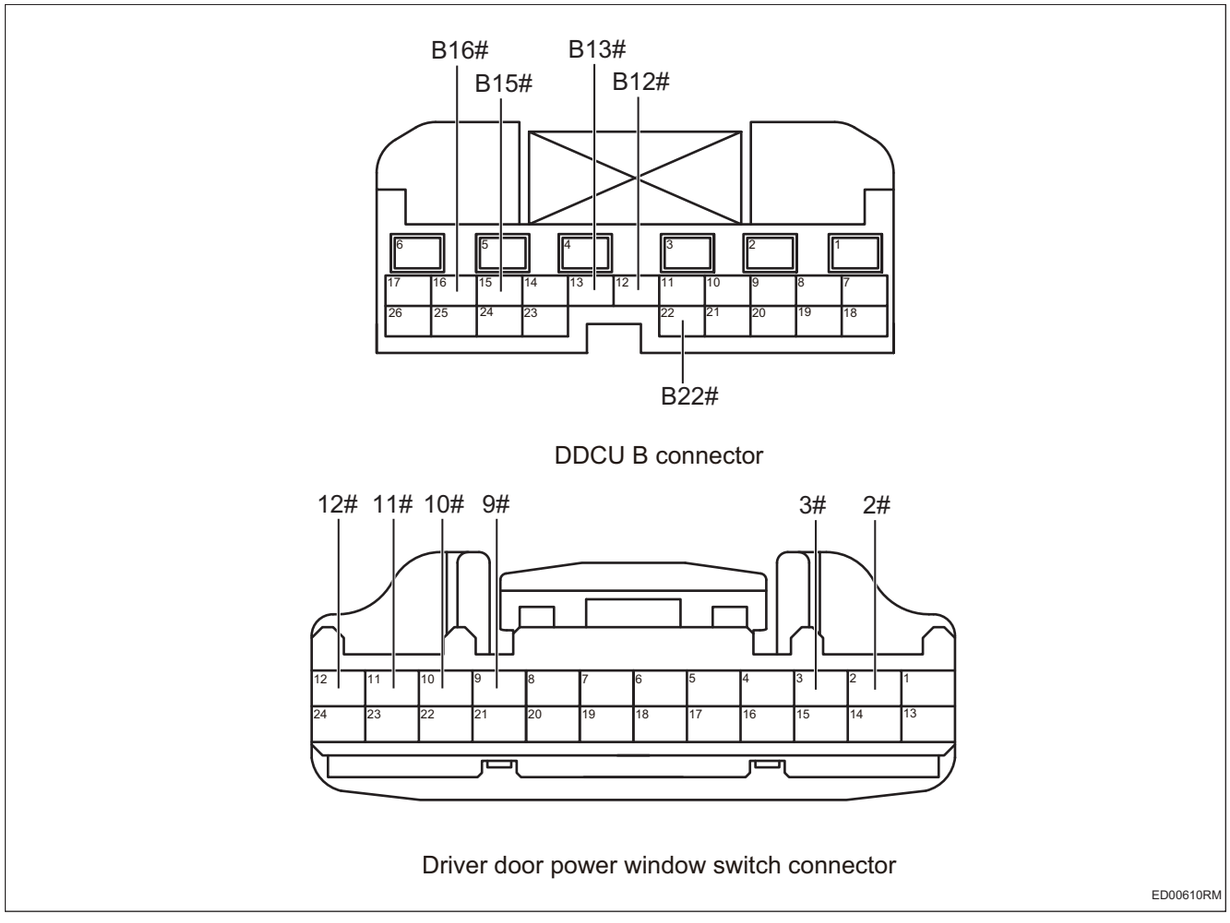
(b) Operate the switch to check whether it is stuck.

NG → **Repair according to the fault**

ED

OK

2	**Check driver door power window switch harness and connector for open circuit**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DDCU connector.

(d) Disconnect the driver door power window switch connector.

(e) Measure the resistance according to the values in the table below.

ED

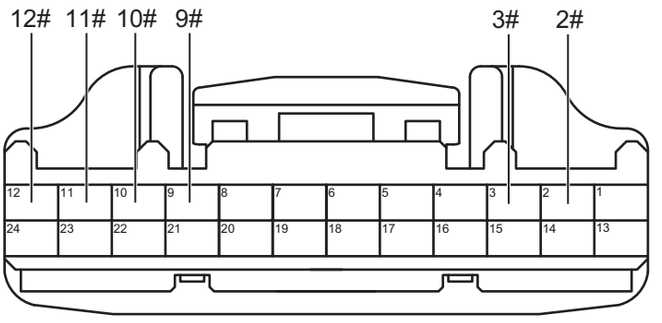
Standard value

Detector connection	Detection conditions	Specified state
DDCU connector B15# - driver door power window switch connector 12#	Always connected	Less than 1Ω
DDCU connector B16# - driver door power window switch connector 11#	Always connected	Less than 1Ω
DDCU connector B13# - driver door power window switch connector 10#	Always connected	Less than 1Ω
DDCU connector B12# - driver door power window switch connector 9#	Always connected	Less than 1Ω
DDCU connector B22# - driver door power window switch connector 2#	Always connected	Less than 1Ω
DDCU connector B22# - driver door power window switch connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check driver door power window switch harness and connector for circuit shorted to ground**



Driver door power window switch connector

ED00621RM

(a) Measure the resistance according to the values in the table below.

Standard value

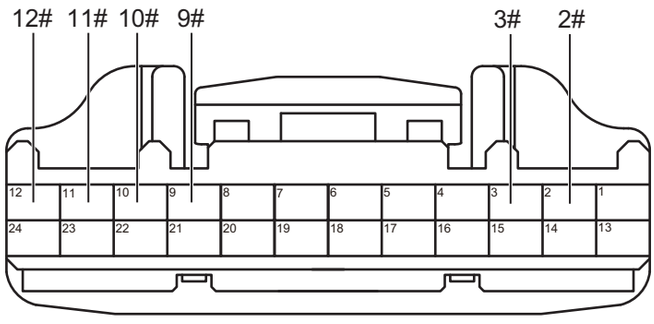
Detector connection	Detection conditions	Specified state
Driver door power window switch connector 12# -body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 11# -body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 10# -body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 9# -body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 2# -body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 3# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check driver door power window switch harness and connector for circuit shorted to power supply**

ED



Driver door power window switch connector

ED00621RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Driver door power window switch connector 12# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 11# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 10# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 9# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 2# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 3# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the driver door power window switch (See page IR-6)**

(a) Replace the driver door power window switch.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the DDCU (See page ED-32)**

OK

6	**End**

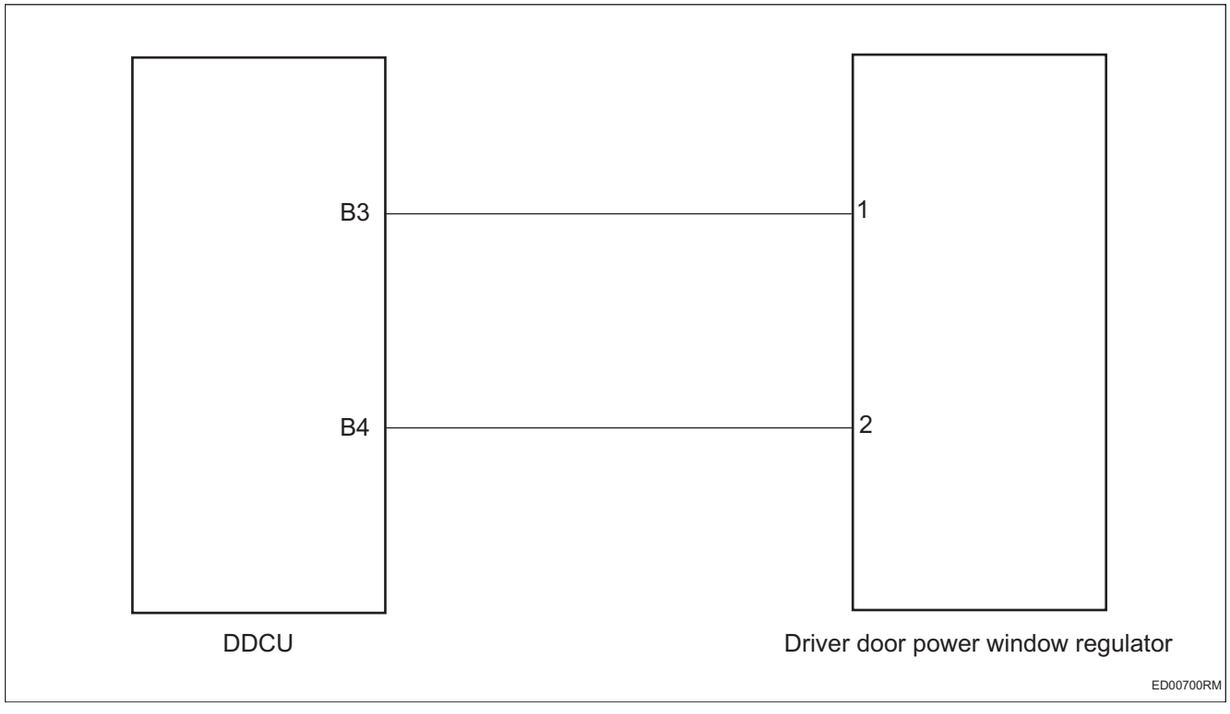
DTC	**B110918**	**Driver door window motor output current low**
DTC	**B110919**	**Driver door window motor output current high**

Description

When the driver door power window regulator output current is outside the normal range, the DDCU will record the DTC.

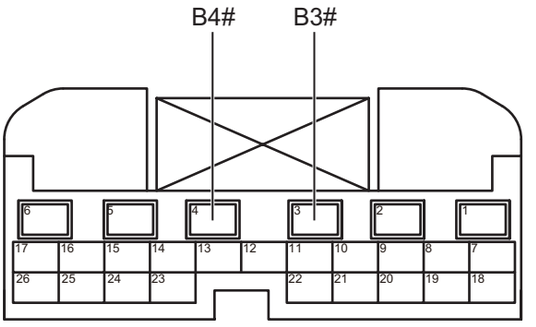
DTC	DTC detection conditions	Faulty location
B110918	(a) Driver door window motor output under-current.	• DDCU • Harness and connector • Driver door power window regulator
B110919	(a) Driver door window motor output current high.	• DDCU • Harness and connector • Driver door power window regulator

Circuit diagram



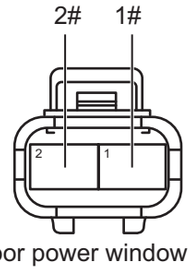
Inspection procedure

1	**Check the driver door power window regulator harness and connector for open circuit**



DDCU B connector

ED00711RM



Driver door power window regulator connector

ED00720RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DDCU connector.

(d) Disconnect the driver door power window regulator connector.

(e) Measure the resistance according to the values in the table below.

Standard value

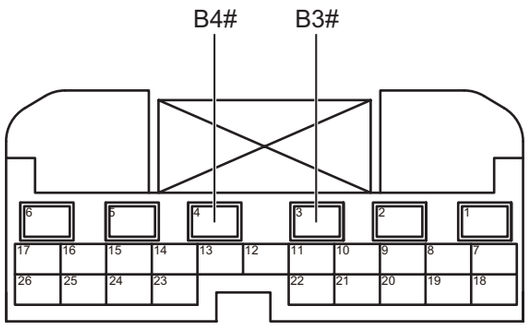
Detector connection	Detection conditions	Specified state
DDCU connector B3# -driver door power window regulator connector 1#	Always connected	Less than 1Ω
DDCU connector B4# -driver door power window regulator connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check driver door power window regulator harness and connector for circuit shorted to ground**

ED



DDCU B connector

ED00711RM

(a) Measure the resistance according to the values in the table below.

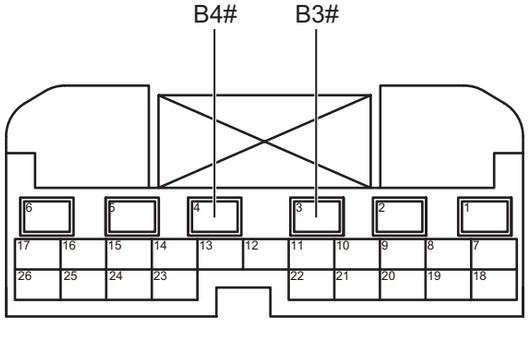
Standard value

Detector connection	Detection conditions	Specified state
DDCU connector B3# -body GND	Always connected	10 KΩ or greater
DDCU connector B4# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check driver door power window regulator harness and connector for circuit shorted to power supply**



DDCU B connector

ED00711RM

(a) Connect the battery negative terminal.

ED

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DDCU connector B3# -body GND	The ignition switch is set to "ON"	Less than 1 V
DDCU connector B4# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the driver door power window regulator (See page ED-9)**

(a) Replace the driver door power window regulator.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the DDCU (See page ED-32)**

ED

OK

5	**End**

DTC	**B110A18**	**Rearview mirror upper adjustment output undercurrent**
DTC	**B110A19**	**Rearview mirror upper adjustment output overcurrent**
DTC	**B110B18**	**Rearview mirror lower adjustment output undercurrent**
DTC	**B110B19**	**Rearview mirror lower adjustment output overcurrent**
DTC	**B110C18**	**Rearview mirror left adjustment output undercurrent**
DTC	**B110C19**	**Rearview mirror left adjustment output overcurrent**
DTC	**B110D18**	**Rearview mirror right adjustment undercurrent**
DTC	**B110D19**	**Rearview mirror right adjustment overcurrent**

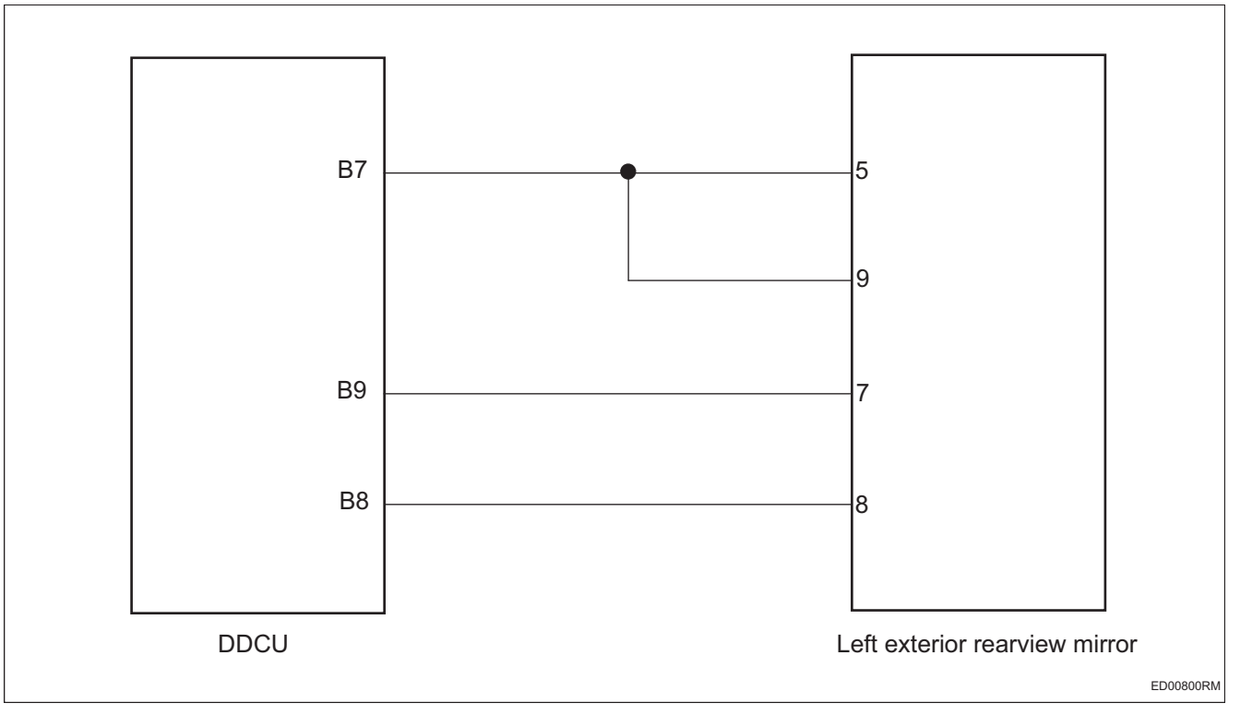
Description

When the left exterior rearview mirror adjustment output current exceeds the normal range, the DDCU records the DTC.

DTC	DTC detection conditions	Faulty location
B110A18	(a) Rearview mirror upper adjustment output undercurrent.	• DDCU • Harness and connector • Left exterior rearview mirror
B110A19	(a) Rearview mirror upward adjustment output current high.	• DDCU • Harness and connector • Left exterior rearview mirror
B110B18	(a) Rearview mirror lower adjustment output undercurrent.	• DDCU • Harness and connector • Left exterior rearview mirror
B110B19	(a) Rearview mirror downward adjustment output current high.	• DDCU • Harness and connector • Left exterior rearview mirror
B110C18	(a) Rearview mirror left adjustment output undercurrent.	• DDCU • Harness and connector • Left exterior rearview mirror
B110C19	(a) Rearview mirror left adjustment output current high.	• DDCU • Harness and connector • Left exterior rearview mirror

DTC	DTC detection conditions	Faulty location
B110D18	(a) Rearview mirror right adjustment output undercurrent.	• DDCU • Harness and connector • Left exterior rearview mirror
B110D19	(a) Rearview mirror right adjustment output current high.	• DDCU • Harness and connector • Left exterior rearview mirror

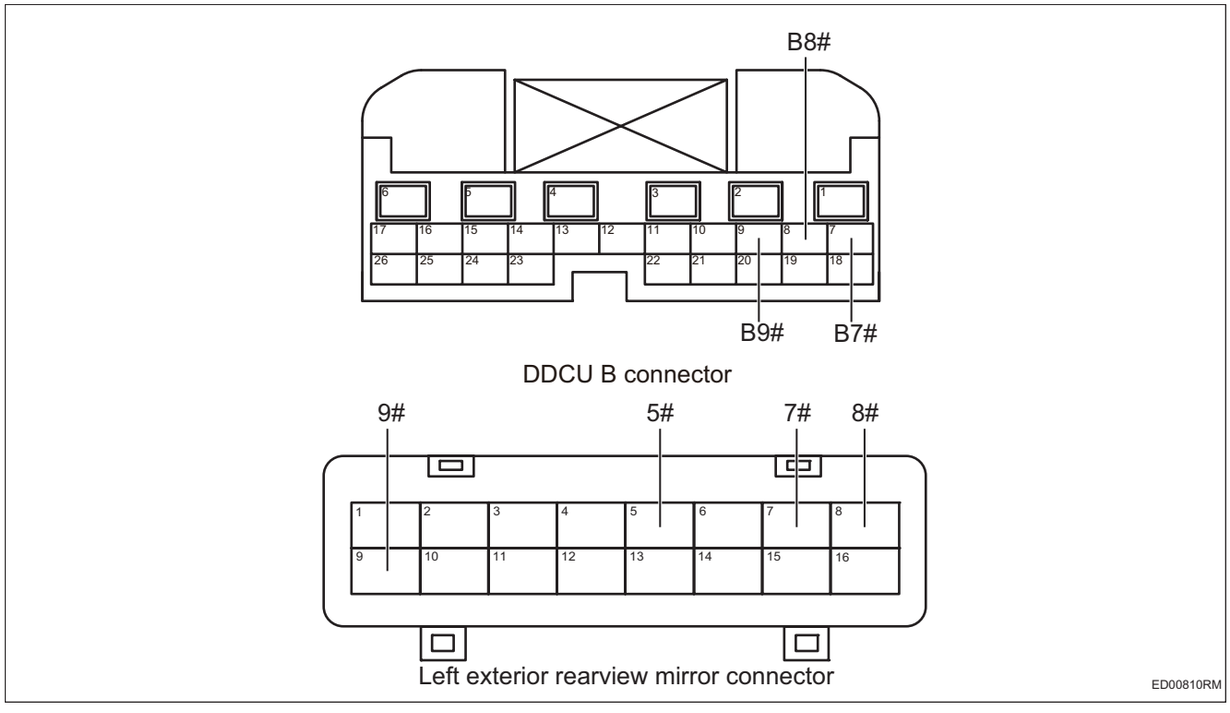
Circuit diagram



Inspection procedure

ED

1	**Check left exterior rearview mirror harness and connector for circuit open**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DDCU connector.

(d) Disconnect the left exterior rearview mirror connector.

(e) Measure the resistance according to the values in the table below.

Standard value

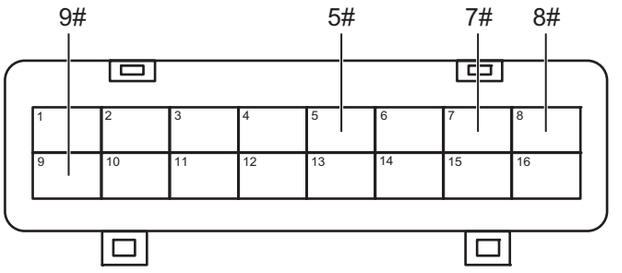
Detector connection	Detection conditions	Specified state
DDCU connector B7# -left exterior rearview mirror connector 5#	Always connected	Less than 1Ω
DDCU connector B7# -left exterior rearview mirror connector 9#	Always connected	Less than 1Ω
DDCU connector B9# -left exterior rearview mirror connector 7#	Always connected	Less than 1Ω
DDCU connector B8# -left exterior rearview mirror connector 8#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

2	**Check left exterior rearview mirror harness and connector for circuit shorted to ground**

ED



Left exterior rearview mirror connector

ED00821RM

(a) Measure the resistance according to the values in the table below.

Standard value

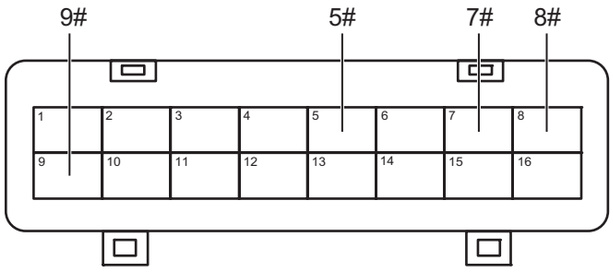
Detector connection	Detection conditions	Specified state
Left exterior rearview mirror connector 5# - body GND	Always connected	10 KΩ or greater
Left exterior rearview mirror connector 9# - body GND	Always connected	10 KΩ or greater
Left exterior rearview mirror connector 7# - body GND	Always connected	10 KΩ or greater
Left exterior rearview mirror connector 8# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

ED

OK

3	**Check left exterior rearview mirror harness and connector for circuit shorted to power supply**



Left exterior rearview mirror connector

ED00821RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Left exterior rearview mirror connector 5# - body GND	The ignition switch is set to "ON"	Less than 1 V
Left exterior rearview mirror connector 7# - body GND	The ignition switch	is set to "ON" Less than 1 V
Left exterior rearview mirror connector 8# - body GND	The ignition switch is set to "ON"	Less than 1 V
Left exterior rearview mirror connector 9# - body GND	The ignition switch is set to "ON"	Less than 1 V

ED

NG **Repair or replace the harness and connector**

OK

4	**Replace left exterior rearview mirror (See page IM-3)**

(a) Replace the left exterior rearview mirror.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the DDCU (See page ED-32)**

OK

5	**End**

DTC	**B110E11**	**Rearview mirror upward adjustment button stuck**
DTC	**B110F11**	**Rearview mirror downward adjustment button stuck**
DTC	**B111011**	**Rearview mirror left adjustment button stuck**
DTC	**B111111**	**Rearview mirror right adjustment button stuck**
DTC	**B111511**	**Rearview mirror left selection button stuck**
DTC	**B111611**	**Rearview mirror right selection button stuck**
DTC	**B111711**	**Rearview mirror heater button stuck**
DTC	**B111811**	**Rearview mirror folding/unfolding button stuck**
DTC	**B111911**	**Rear window locking button stuck**

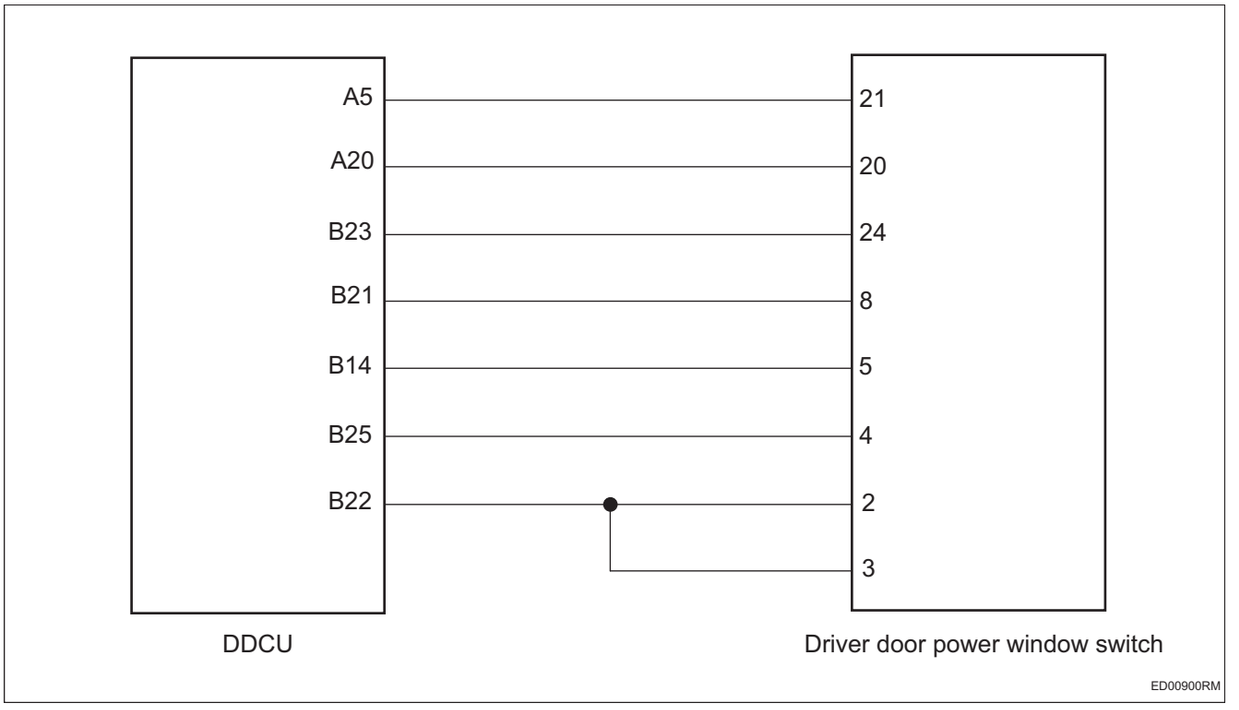
Description

When the driver door power window switch button function is abnormal, the DDCU will record the DTC.

DTC	DTC detection conditions	Faulty location
B110E11	(a) Rearview mirror upward adjustment button stuck.	• DDCU • Harness and connector • Driver door power window switch
B110F11	(a) Rearview mirror downward adjustment button stuck.	• DDCU • Harness and connector • Driver door power window switch
B111011	(a) Rearview mirror left adjustment button stuck.	• DDCU • Harness and connector • Driver door power window switch
B111111	(a) Rearview mirror right adjustment button stuck.	• DDCU • Harness and connector • Driver door power window switch
B111511	(a) Rearview mirror left selection button stuck.	• DDCU • Harness and connector • Driver door power window switch
B111611	(a) Rearview mirror right selection button stuck.	• DDCU • Harness and connector • Driver door power window switch
B111711	(a) Rearview mirror heater button stuck.	• DDCU • Harness and connector • Driver door power window switch

DTC	DTC detection conditions	Faulty location
B111811	(a) Rearview mirror holding/unfolding button stuck.	• DDCU • Harness and connector • Driver door power window switch
B111911	(a) Rear window locking button stuck.	• DDCU • Harness and connector • Driver door power window switch

Circuit diagram



Inspection procedure

ED

1	**Check the driver door power window switch**

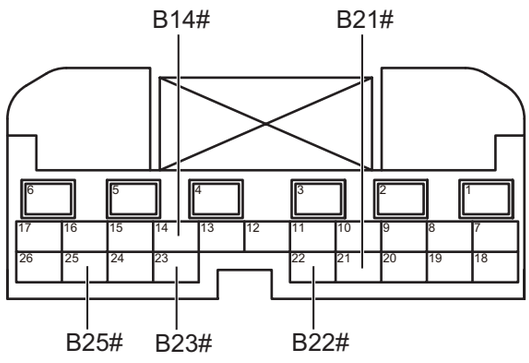
(a) Check the driver door power window switch for foreign matter.

(b) Check whether the driver door power window switch is stuck.

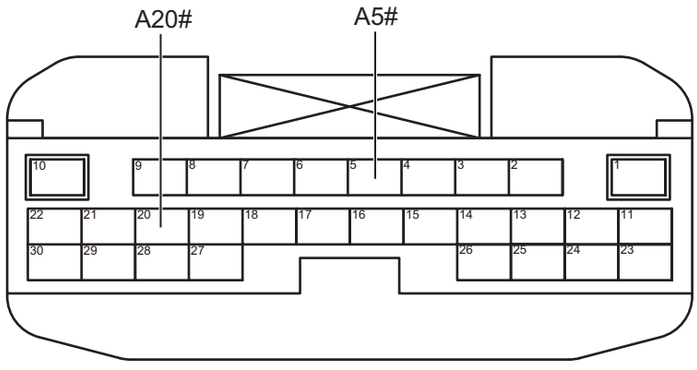
NG → **Repair according to the fault**

OK

2	**Check driver door power window switch harness and connector for open circuit**

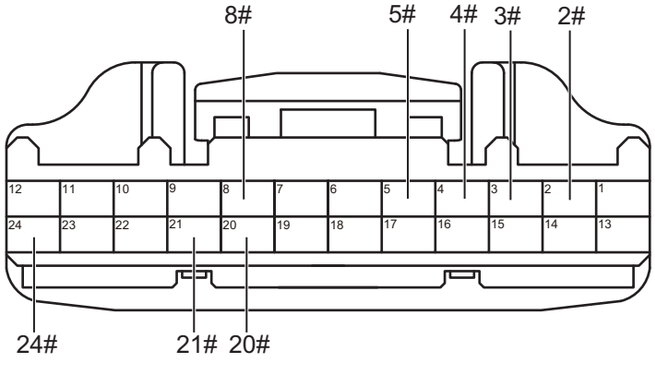


DDCU B connector



DDCU A connector

ED00910RM



Driver door power window switch connector

ED00921RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DDCU connector.

(d) Disconnect the driver door power window switch connector.

(e) Measure the resistance according to the values in the table below.

Standard value

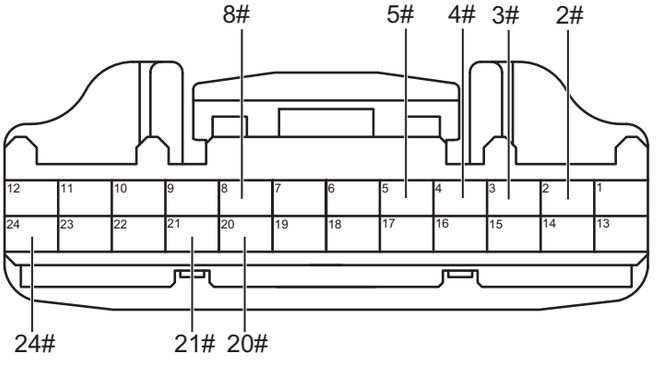
ED

Detector connection	Detection conditions	Specified state
DDCU connector B23# - driver door power window switch connector 24#	Always connected	Less than 1Ω
DDCU connector B21# - driver door power window switch connector 8#	Always connected	Less than 1Ω
DDCU connector B14# - driver door power window switch connector 5#	Always connected	Less than 1Ω
DDCU connector B25# - driver door power window switch connector 4#	Always connected	Less than 1Ω
DDCU connector B22# - driver door power window switch connector 2#	Always connected	Less than 1Ω
DDCU connector B22# - driver door power window switch connector 3#	Always connected	Less than 1Ω
DDCU connector A5# - driver door power window switch connector 21#	Always connected	Less than 1Ω
DDCU connector A20# - driver door power window switch connector 20#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	**Check driver door power window switch harness and connector for circuit shorted to ground**



Driver door power window switch connector

ED00921RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Driver door power window switch connector 21# - body GND	Always connected	10 KΩ or greater

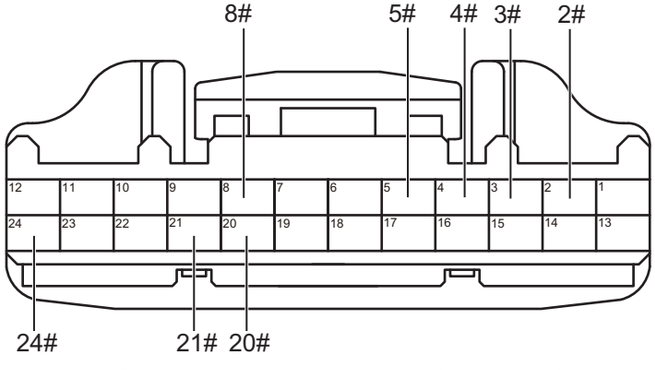
ED

Detector connection	Detection conditions	Specified state
Driver door power window switch connector 20# - body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 24# - body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 8# - body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 5# - body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 4# - body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 2# - body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 3# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check driver door power window switch harness and connector for circuit shorted to power supply**



Driver door power window switch connector

ED00921RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Driver door power window switch connector 24# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 8# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 5# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 4# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 2# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 3# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 21# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 20# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the driver door power window switch (See page IR-6)**

ED

(a) Replace the driver door power window switch.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the DDCU (See page ED-32)**

OK

6	**End**

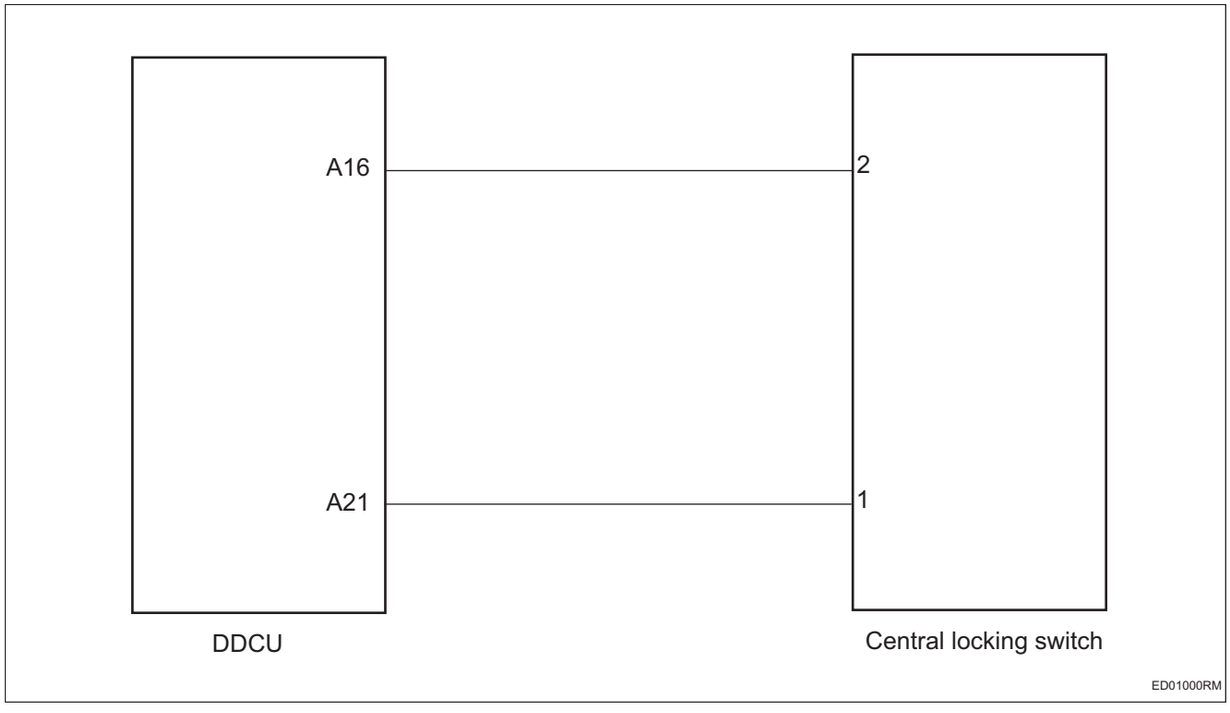
DTC	B111211	Central unlocking button stuck
DTC	B111311	Central locking button stuck

Description

When the central locking switch button works abnormally, the DDCU will record the DTC.

DTC	DTC detection conditions	Faulty location
B111211	(a) Central unlocking button stuck.	• DDCU • Harness and connector • Central locking switch
B111311	(a) Central locking button stuck.	• DDCU • Harness and connector • Central locking switch

Circuit diagram



Inspection procedure

1	Check the central locking switch

(a) Check the central locking switch for foreign matter.

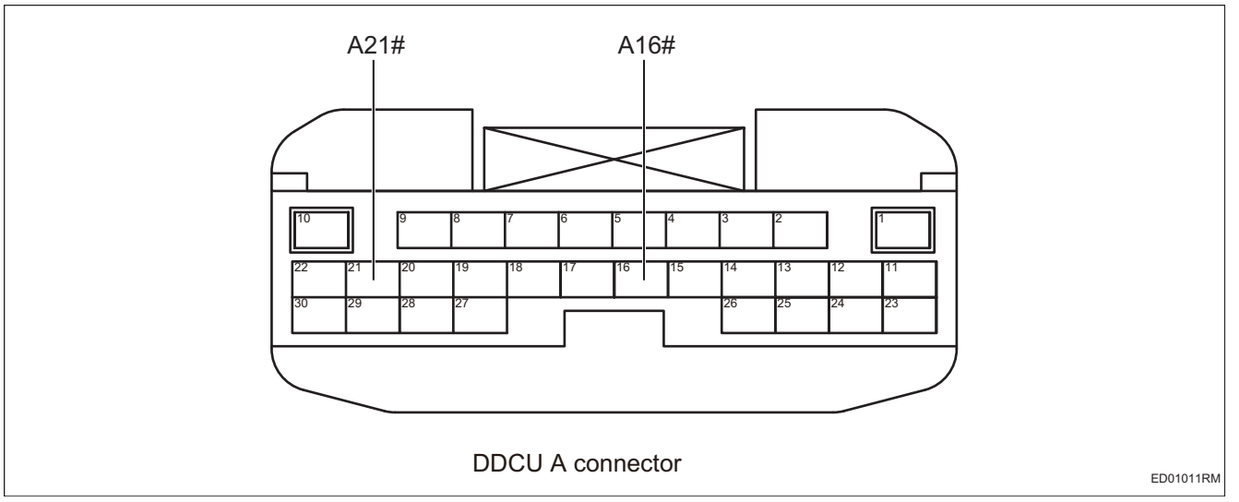
(b) Check whether the central locking switch is stuck.

NG → **Repair according to the fault**

ED

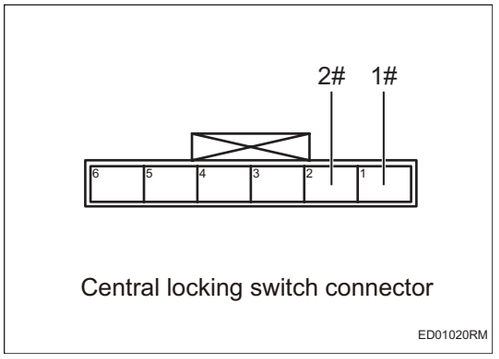
OK

2	**Check central locking switch harness and connector for open circuit**



DDCU A connector

ED01011RM



Central locking switch connector

ED01020RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DDCU connector.

(d) Disconnect the central locking switch connector.

(e) Measure the resistance according to the values in the table below.

Standard value

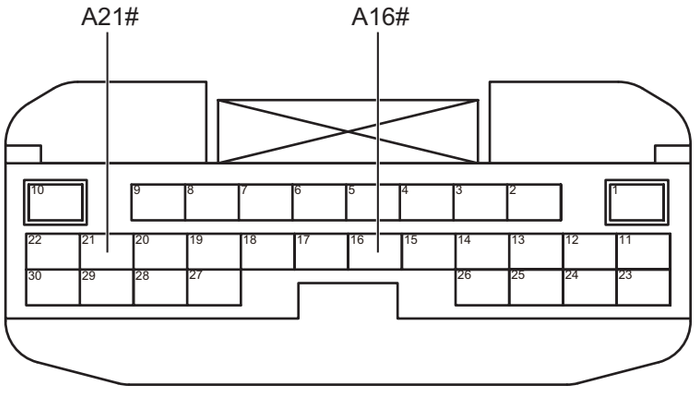
Detector connection	Detection conditions	Specified state
DDCU connector A16# -central locking switch connector 2#	Always connected	Less than 1Ω
DDCU connector A21# -central locking switch connector 1#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	**Check central locking switch harness and connector for circuit shorted to ground**

ED



DDCU A connector

ED01011RM

(a) Measure the resistance according to the values in the table below.

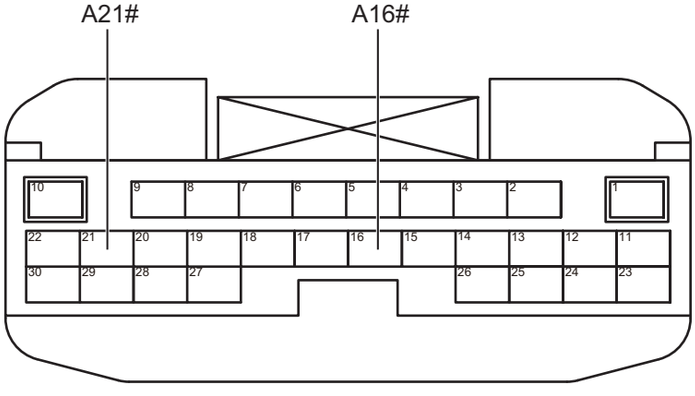
Standard value

Detector connection	Detection conditions	Specified state
DDCU connector A16# -body GND	Always connected	10 KΩ or greater
DDCU connector A21# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check central locking switch harness and connector for circuit shorted to power supply**



DDCU A connector

ED01011RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DDCU connector A16# -body GND	The ignition switch is set to "ON"	Less than 1 V
DDCU connector A21# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the central locking switch (See page IR-6)**

(a) Replace the central locking switch.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the DDCU (See page ED-32)**

ED

OK

6	**End**

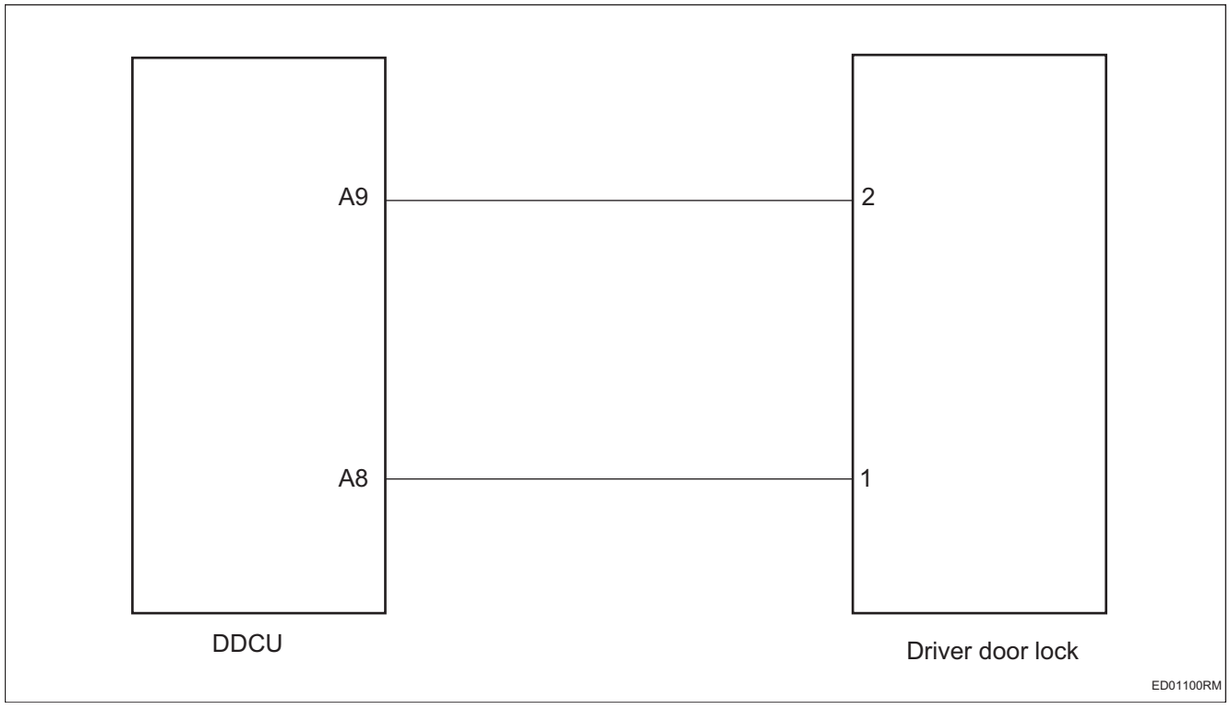
DTC	**B111C18**	**Central lock motor unlocking undercurrent**
DTC	**B111C19**	**Central lock motor unlocking overcurrent**
DTC	**B111D18**	**Central lock motor locking undercurrent**
DTC	**B111D19**	**Central lock motor locking overcurrent**

Description

When the working current of driver door lock is out of the normal range, the DDCU records the DTC.

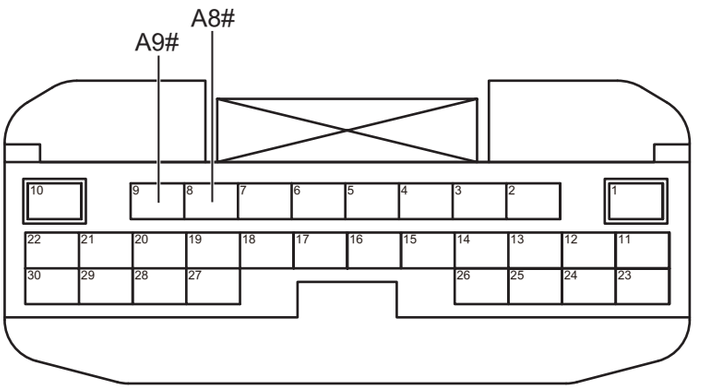
DTC	DTC detection conditions	Faulty location
B111C18	(a) Central lock motor unlocking undercurrent.	• DDCU • Harness and connector • Driver door lock
B111C19	(a) Central lock motor unlocking overcurrent.	• DDCU • Harness and connector • Driver door lock
B111D18	(a) Central lock motor locking undercurrent.	• DDCU • Harness and connector • Driver door lock
B111D19	(a) Central lock motor locking overcurrent.	• DDCU • Harness and connector • Driver door lock

Circuit diagram



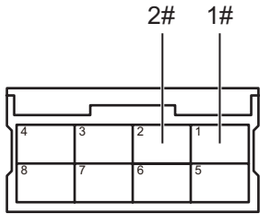
Inspection procedure

1	**Check driver door lock harness and connector for open circuit**



DDCU A connector

ED01111RM



Driver door lock connector

ED01120RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DDCU connector.

(d) Disconnect the driver door lock connector.

(e) Measure the resistance according to the values in the table below.

Standard value

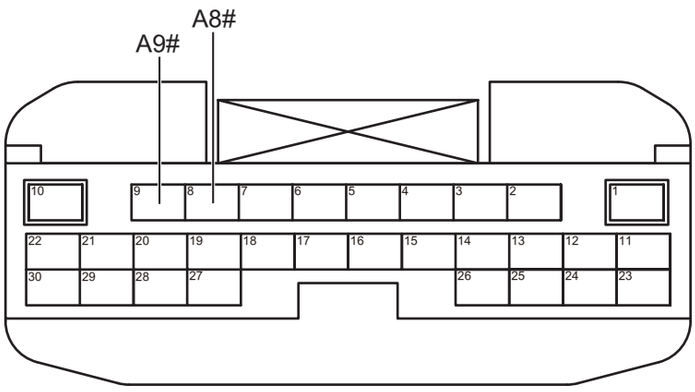
Detector connection	Detection conditions	Specified state
DDCU connector A9# -driver door lock connector 2#	Always connected	Less than 1Ω
DDCU connector A8# -driver door lock connector 1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check driver door lock harness and connector for circuit shorted to ground**

ED



DDCU A connector

ED01111RM

(a) Measure the resistance according to the values in the table below.

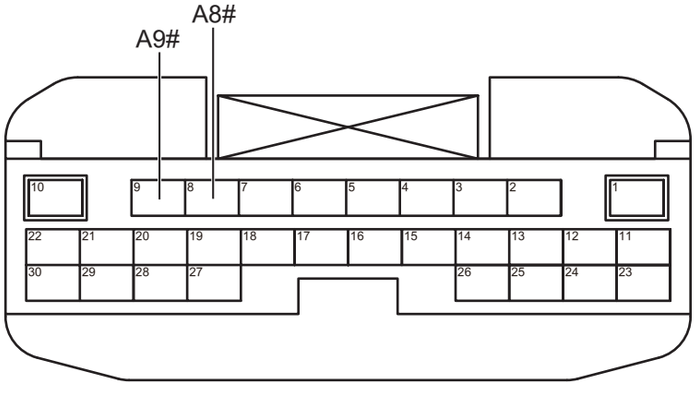
Standard value

Detector connection	Detection conditions	Specified state
DDCU connector A9# -body GND	Always connected	10 KΩ or greater
DDCU connector A8# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	Check driver door lock harness and connector for circuit shorted to power supply



DDCU A connector

ED01111RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DDCU connector A9# -body GND	The ignition switch is set to "ON"	Less than 1 V
DDCU connector A8# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace driver door lock (See page DL-12)**

(a) Replace the driver door lock.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the DDCU (See page ED-32)**

OK

ED

5	**End**

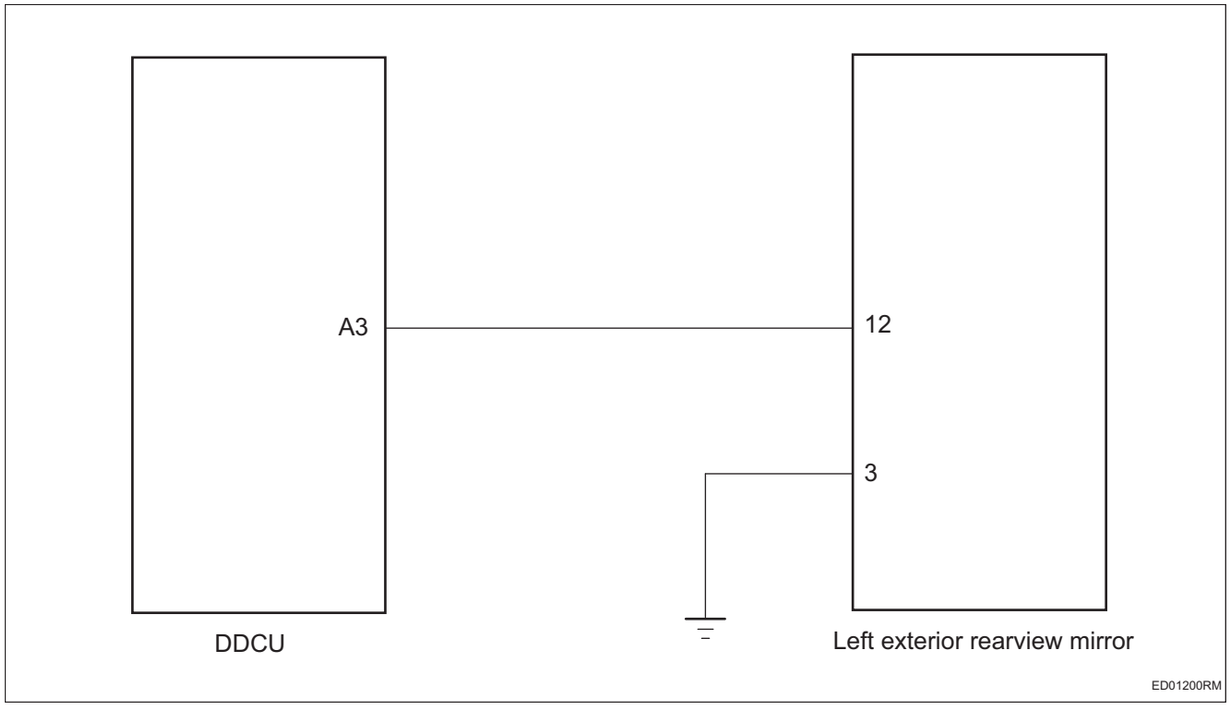
DTC	B111E13	BSD lamp open circuit
DTC	B111E11	BSD lamp short circuit

Description

When the circuit of left rearview mirror BSD lamp is open or shorted, the DDCU records the DTC.

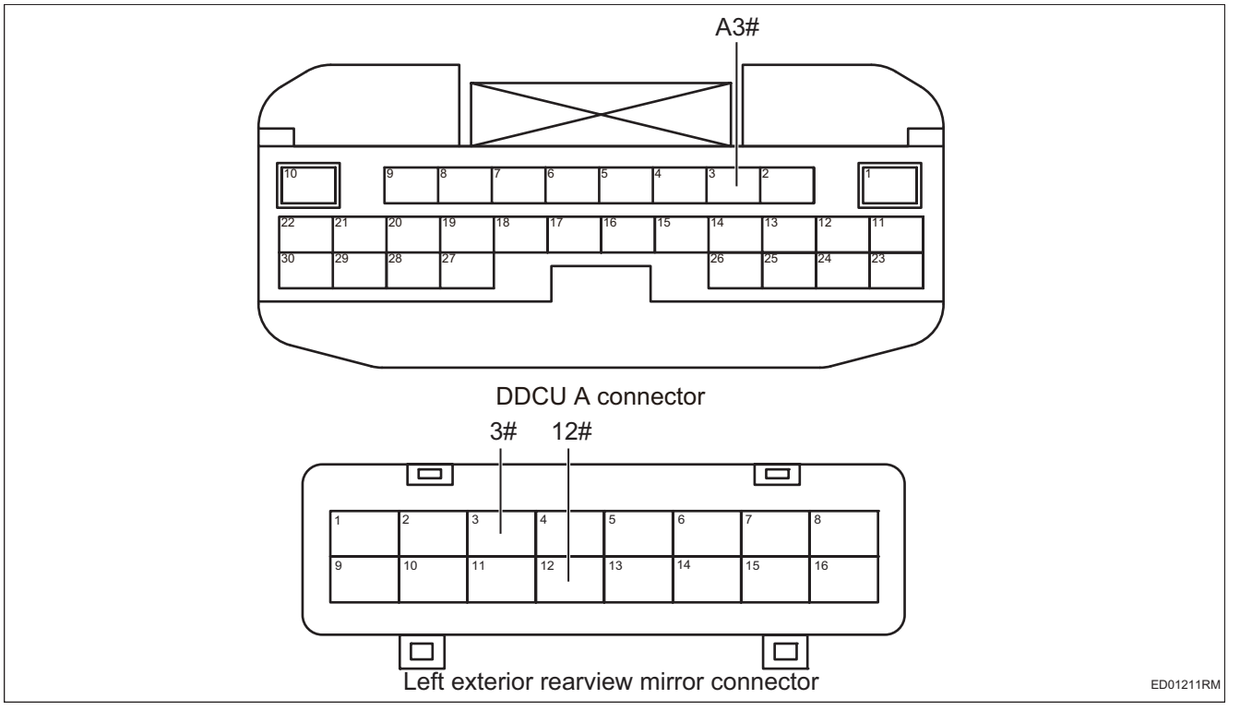
DTC	DTC detection conditions	Faulty location
B111E13	(a) BSD lamp open circuit.	• DDCU • Harness and connector • Left exterior rearview mirror
B111E11	(a) BSD lamp short circuit.	• DDCU • Harness and connector • Left exterior rearview mirror

Circuit diagram



Inspection procedure

1	Check left exterior rearview mirror harness and connector for circuit open



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DDCU connector.

(d) Disconnect the left exterior rearview mirror connector.

(e) Measure the resistance according to the values in the table below.

Standard value

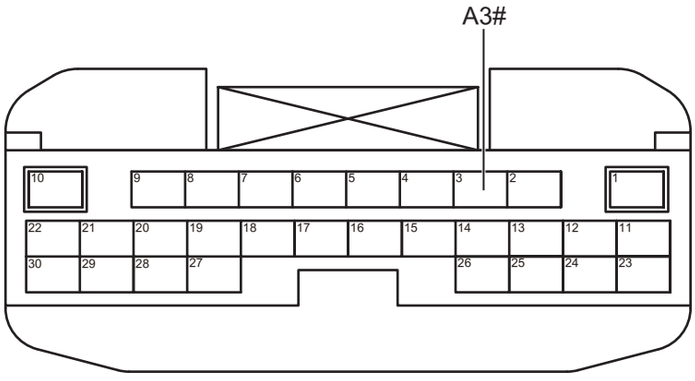
Detector connection	Detection conditions	Specified state
DDCU connector A3# -left exterior rearview mirror connector 12#	Always connected	Less than 1Ω
Left exterior rearview mirror connector 3# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check left exterior rearview mirror harness and connector for circuit shorted to ground**

ED



DDCU A connector

ED01221RM

(a) Measure the resistance according to the values in the table below.

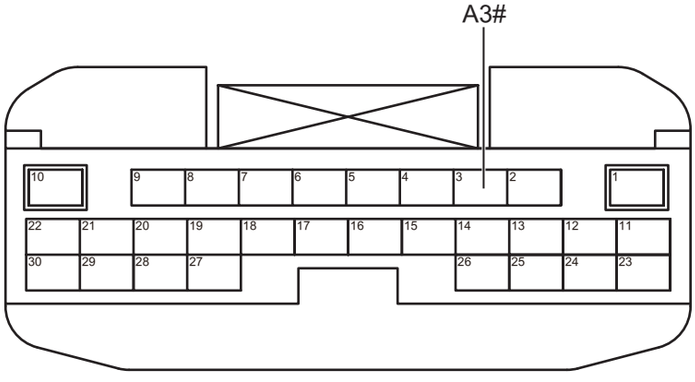
Standard value

Detector connection	Detection conditions	Specified state
DDCU connector A3# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check left exterior rearview mirror harness and connector for circuit shorted to power supply**



DDCU A connector

ED01221RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

ED

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DDCU connector A3# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace left exterior rearview mirror (See page IM-3)**

(a) Replace the left exterior rearview mirror.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the DDCU (See page ED-32)**

OK

5	**End**

DTC	**U002888**	**Comfort CAN bus off**
DTC	**U014687**	**GW node lost**
DTC	**U014087**	**BCM 1 node lost**
DTC	**U020187**	**Rear left door module node lost**
DTC	**U020287**	**Rear right door module node lost**
DTC	**U016487**	**A/C control unit node lost**
DTC	**U112187**	**ESP message lost**
DTC	**U115187**	**ACU message lost**
DTC	**U115587**	**Instrument cluster control unit message lost**
DTC	**U123287**	**LCDA message lost**
DTC	**U110087**	**ECM message lost**
DTC	**U114687**	**GW message lost**
DTC	**U129387**	**HCU message lost**

Description

When the communication between the DDCU and other systems is abnormal or interrupted, the DDCU will record the DTC.

DTC	DTC detection conditions	Faulty location
U002888	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U020187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U020287	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U016487	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U112187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

DTC	DTC detection conditions	Faulty location
U123287	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U129387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

Front right door control system

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Warning:

Before repairing the high voltage system or adjacent high voltage system components, be sure to carefully read the "Instructions and precautions for maintenance work" in the introduction carefully!

2. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

3. when the battery cable is disconnected and reconnected, some systems require initialization.

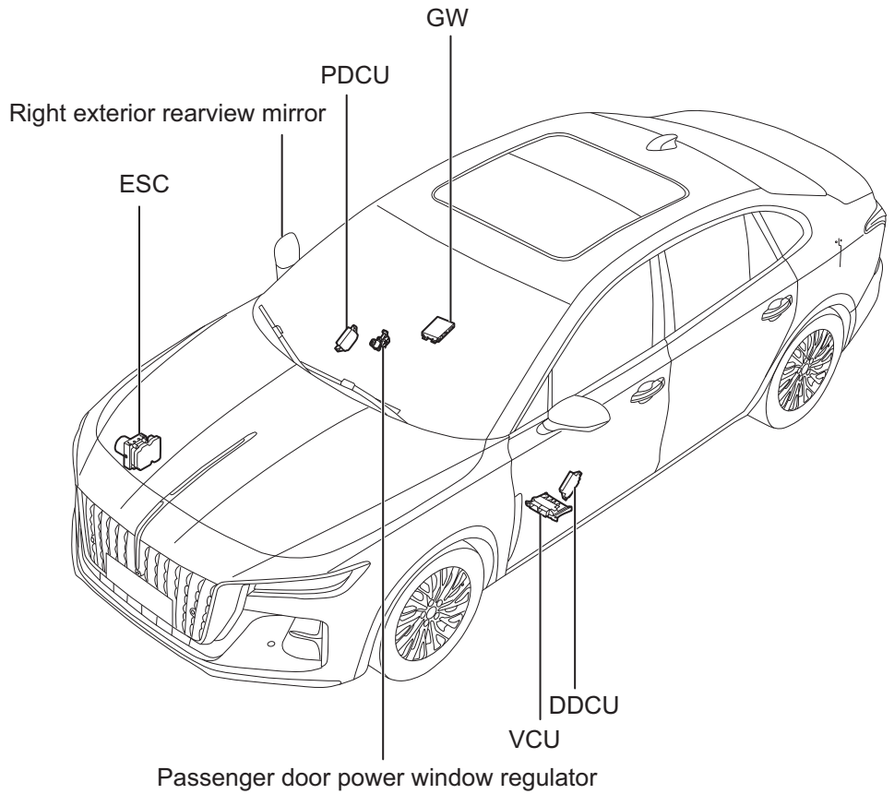
4. General repair instructions

(a) When checking the passenger door control system, the operation of the airbag may be affected. Therefore, before carrying out maintenance work, be sure to carefully read and confirm the precautions for airbag.

(b) When parts need to be replaced or the connector needs to be disconnected during maintenance of passenger door control system, the battery negative cable shall be disconnected.

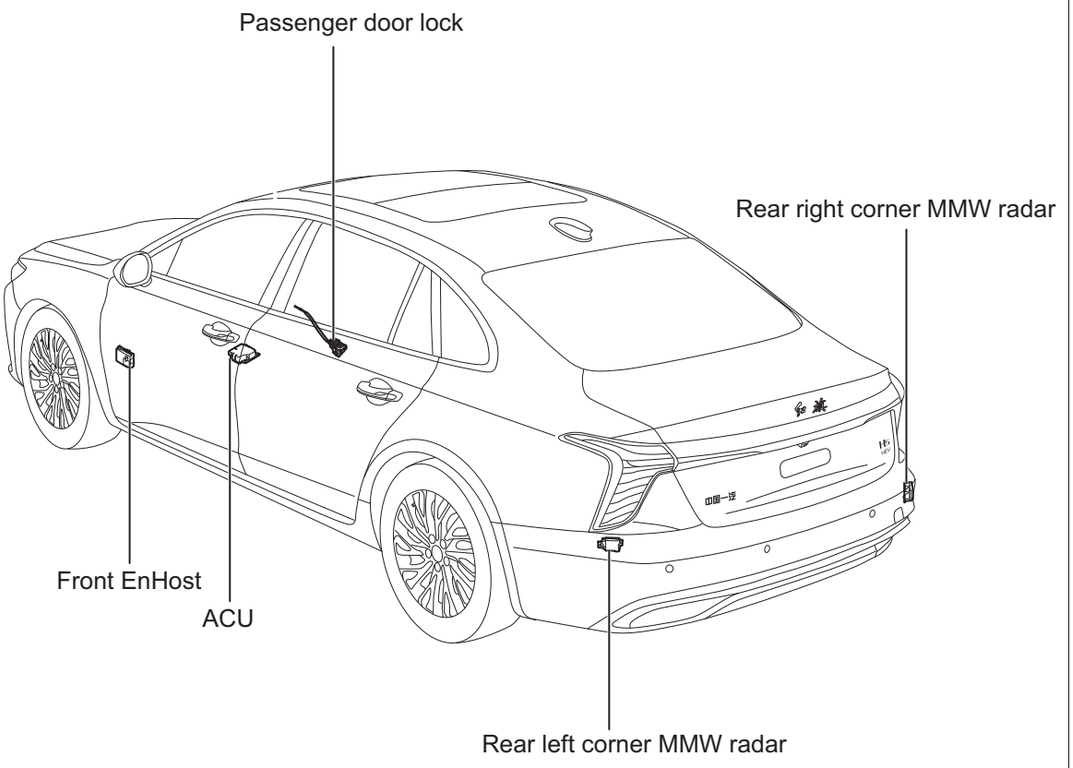
(c) The passenger door control system needs to be initialized after reconnecting the battery. And use the HQ-VDS to "clear the DTC" for all electronic control systems.

Location of parts



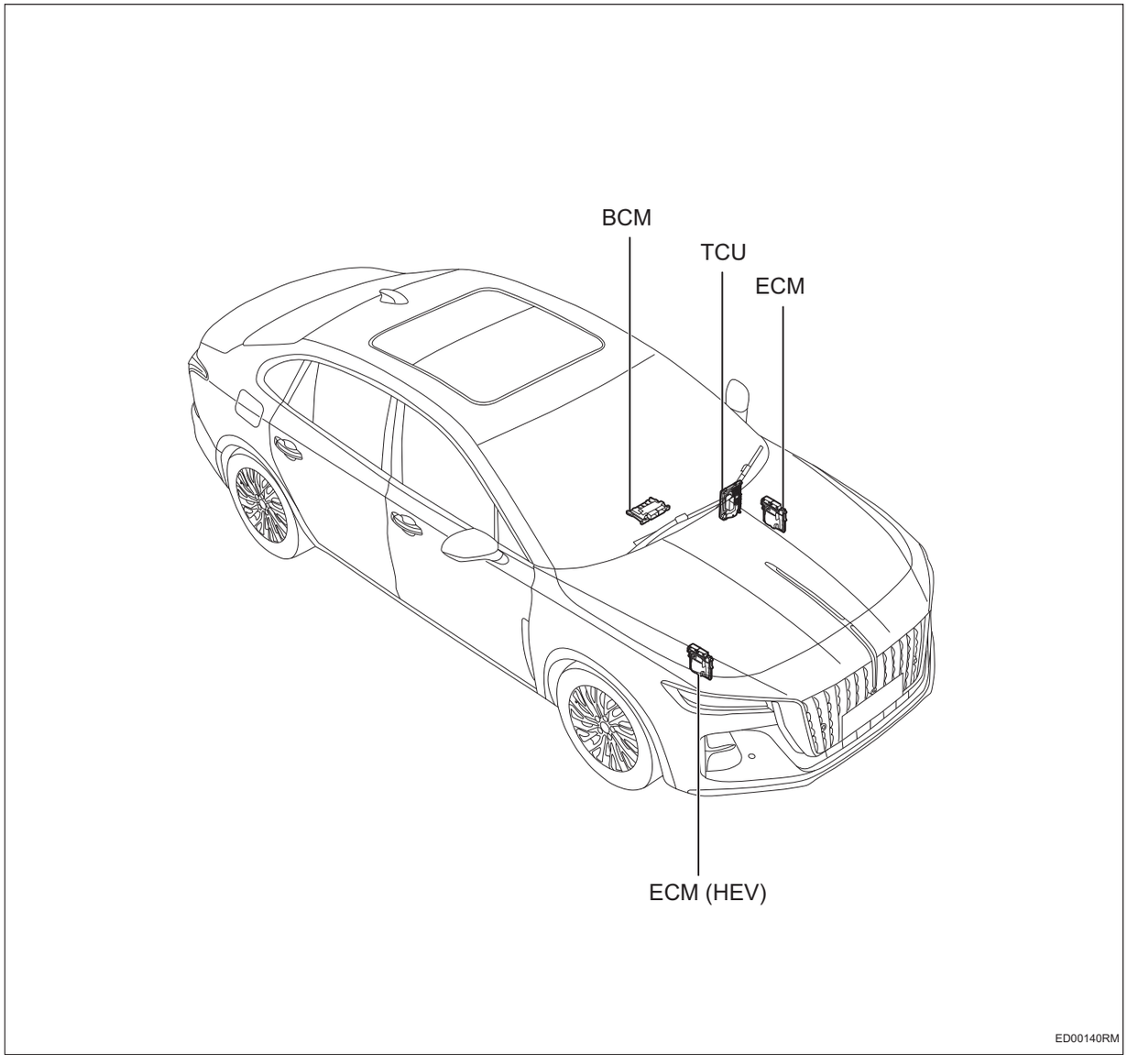
ED00120RM

Location of parts



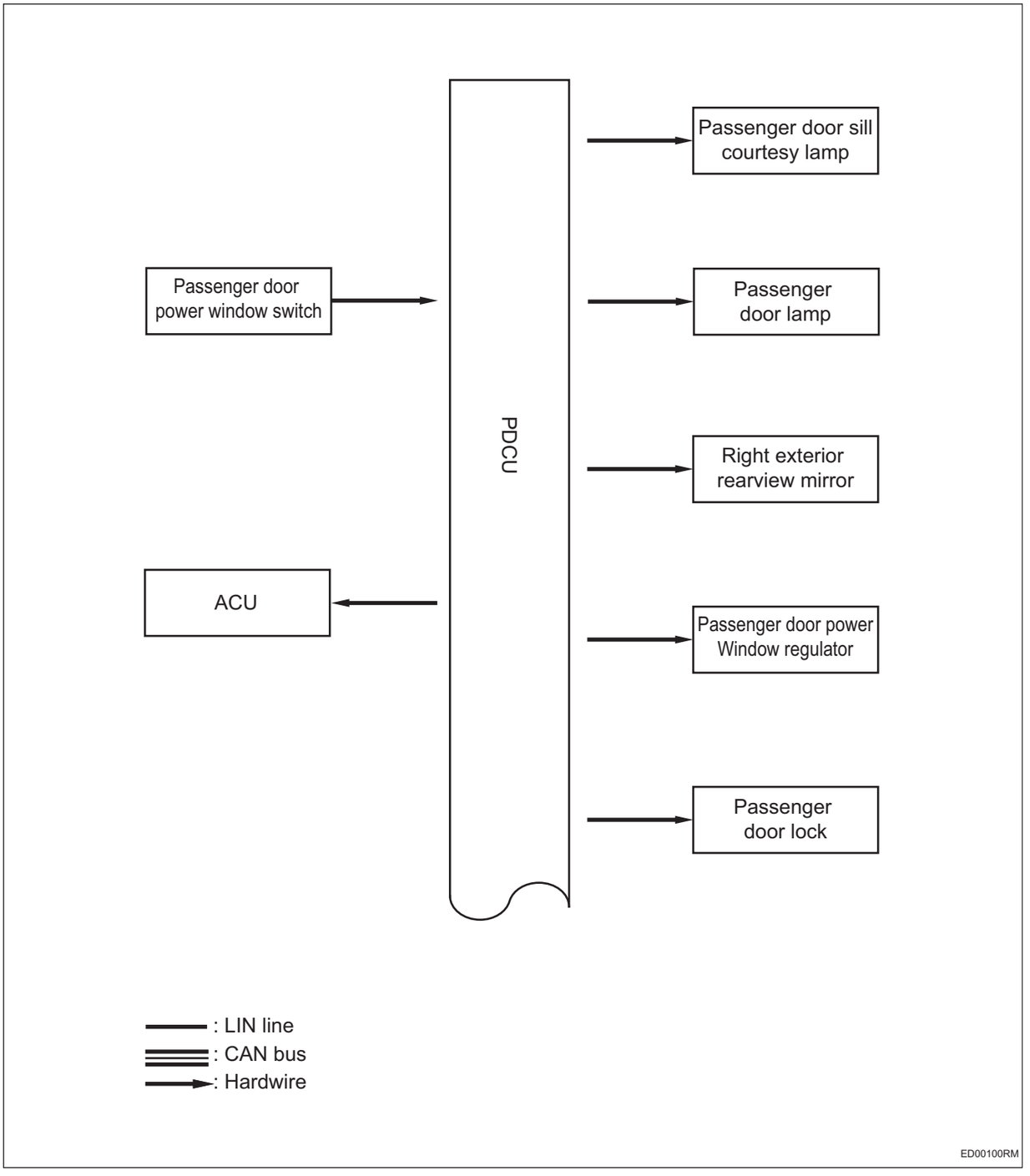
ED00130RM

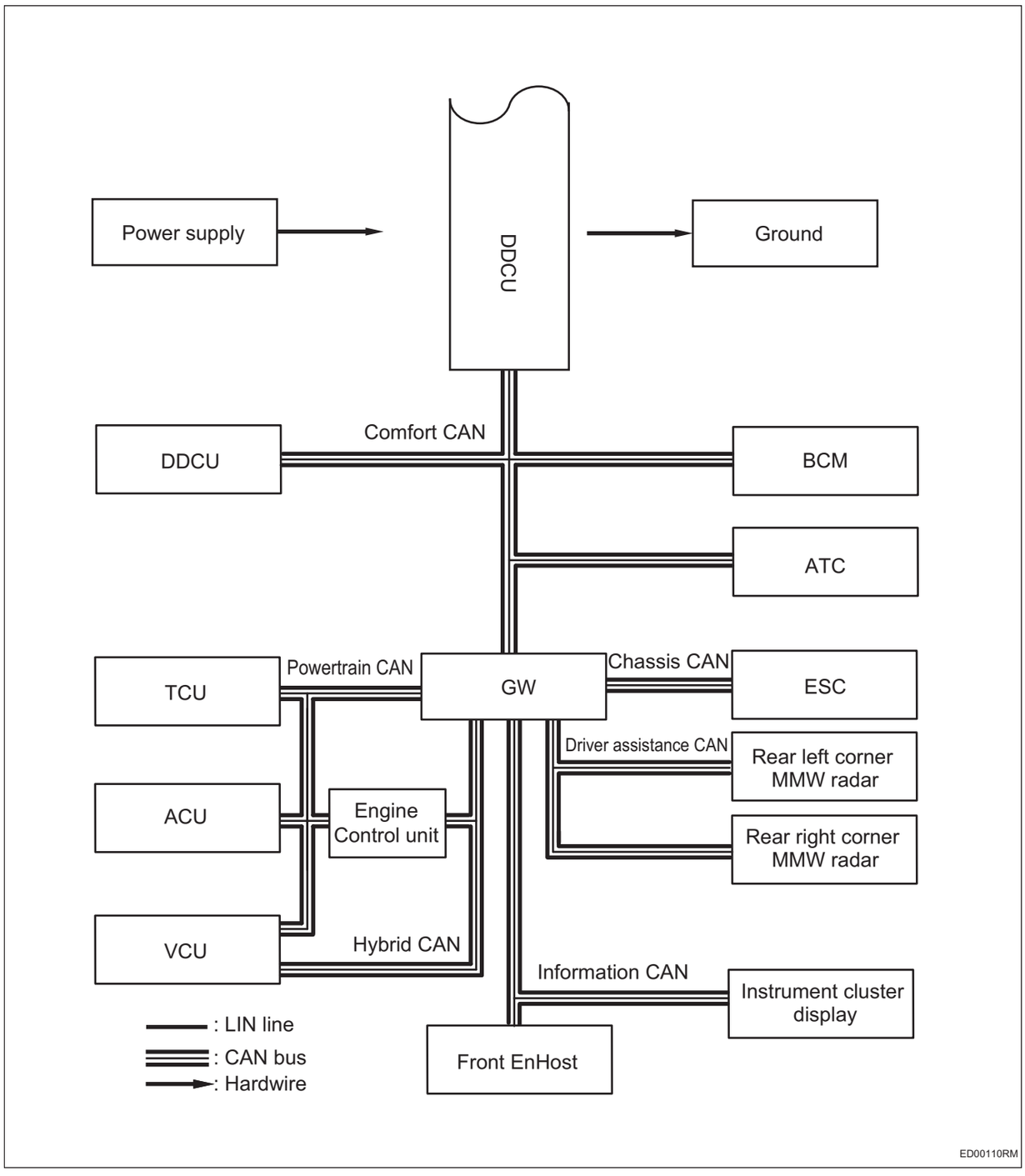
Location of parts



System diagram

PDCU


Passenger door sill courtesy lamp
Passenger door power window switch
Passenger door lamp
PDCU
Right exterior rearview mirror
ACU
Passenger door power Window regulator
Passenger door lock
: LIN line
: CAN bus
: Hardwire
ED00100RM


Power supply
DDCU
Ground
DDCU
Comfort CAN
BCM
ATC
TCU
Powertrain CAN
GW
Chassis CAN
ESC
Driver assistance CAN
Rear left corner MMW radar
ACU
Engine Control unit
Rear right corner MMW radar
VCU
Hybrid CAN
Information CAN
Instrument cluster display
: LIN line
: CAN bus
: Hardwire
Front EnHost
ED00110RM

ED

System description

1. PDCU

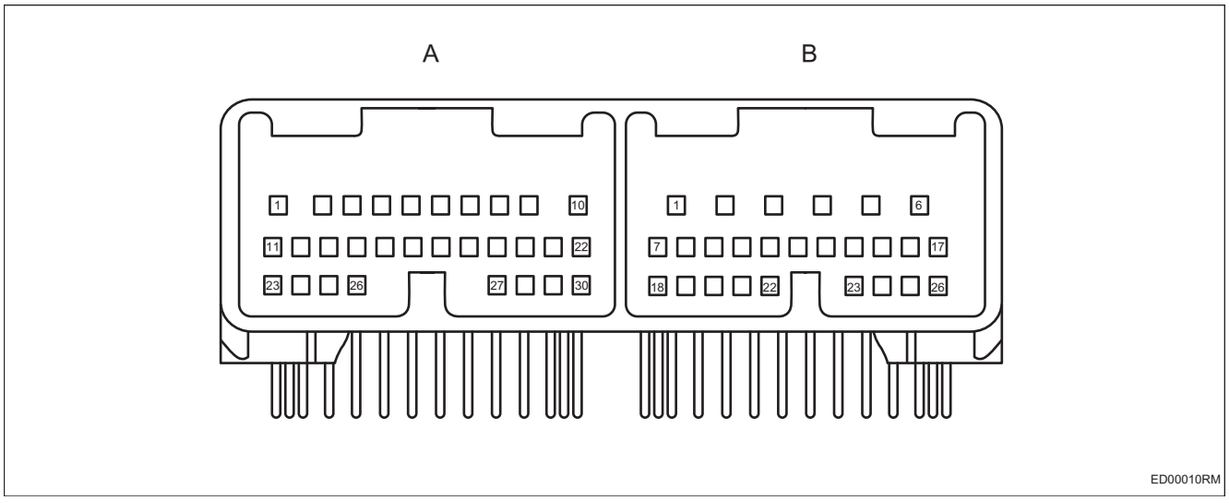
(a) The PDCU mainly realizes the detection of windows, door lock, rearview mirrors, door status and lock status, and the driving of door lamps; The vehicle is equipped with a control unit for each door.

Symptom chart

Fault	Possible location
Window lifting/lowering abnormity	• Power window switch • Related harness and connector • DCU • Power window regulator • Battery
Abnormal exterior rearview mirror operation	• Driver door power window switch • Exterior rearview mirror • DCU • Related harness and connector • Battery
Door unlocking abnormity	• Central locking switch • Related harness and connector • DCU • Door lock • Battery

ECU terminal

PDCU



PDCU A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	-	16	-
2	-	17	Passenger door locking signal
3	BSD status indicator lamp	18	Hardwired impact signal
4	-	19	-
5	-	20	-
6	-	21	-
7	-	22	-
8	Passenger door unlocking output	23	-
9	Passenger door locking output	24	-
10	-	25	-
11	Passenger door unlocking signal	26	CAN-H
12	-	27	Switch backlight output
13	Passenger door status switch	28	-
14	CAN-L	29	-
15	-	30	-

PDCU B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Power supply	14	-
2	Power GND	15	-
3	Window lifting	16	Right front window switch
4	Window lowering	17	-
5	-	18	Passenger door lamp/passenger door sill trim strip LED lamp

PDCU B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
6	-	19	Rearview mirror unfolding
7	Right exterior rearview mirror left/up adjustment/folding	20	Right front rearview mirror heater
8	Right exterior rearview mirror rightward adjustment	21	-
9	Right exterior rearview mirror downward adjustment	22	Exterior rearview mirror position memory ground
10	-	23	-
11	Rearview mirror position memory power supply	24	Exterior rearview mirror upper/lower position memory signal
12	-	25	-
13	-	26	Exterior rearview mirror left/right position memory signal

DTC chart

PDCU

DTC	Description	Reference page
B114017	Battery overvoltage	(See page ED-62)
B114016	Battery undervoltage	(See page ED-62)
B114111	Passenger door window Up button stuck	(See page ED-65)
B114211	Passenger door window Down button stuck	(See page ED-65)
B114318	Passenger door window motor output current low	(See page ED-69)
B114319	Passenger door window motor output current high	(See page ED-69)
B114418	Rearview mirror upper adjustment output undercurrent	(See page ED-73)
B114419	Rearview mirror upper adjustment output overcurrent	(See page ED-73)
B114518	Rearview mirror lower adjustment output undercurrent	(See page ED-73)
B114519	Rearview mirror lower adjustment output overcurrent	(See page ED-73)
B114618	Rearview mirror left adjustment output undercurrent	(See page ED-73)
B114619	Rearview mirror left adjustment output overcurrent	(See page ED-73)
B114718	Rearview mirror right adjustment undercurrent	(See page ED-73)
B114719	Rearview mirror right adjustment overcurrent	(See page ED-73)

DTC	Description	Reference page
B114818	Central lock motor unlocking undercurrent	(See page ED-78)
B114819	Central lock motor unlocking overcurrent	(See page ED-78)
B114918	Central lock motor locking undercurrent	(See page ED-78)
B114919	Central lock motor locking overcurrent	(See page ED-78)
B114A13	BSD lamp open circuit	(See page ED-82)
B114A11	BSD lamp short circuit	(See page ED-82)
U002888	Comfort CAN bus off	(See page ED-86)
U014687	GW node lost	(See page ED-86)
U014087	BCM 1 node lost	(See page ED-86)
U016487	A/C control unit node lost	(See page ED-86)
U019987	Driver door module node lost	(See page ED-86)
U112187	ESP message lost	(See page ED-86)
U115187	ACU message lost	(See page ED-86)
U124587	EnHost/IVI message lost	(See page ED-86)
U123287	LCDA message lost	(See page ED-86)
U110187	TCU message lost	(See page ED-86)
U110087	ECM message lost	(See page ED-86)
U114687	GW message lost	(See page ED-86)
U115587	Instrument cluster control unit message lost	(See page ED-86)
U129387	HCU message lost	(See page ED-86)

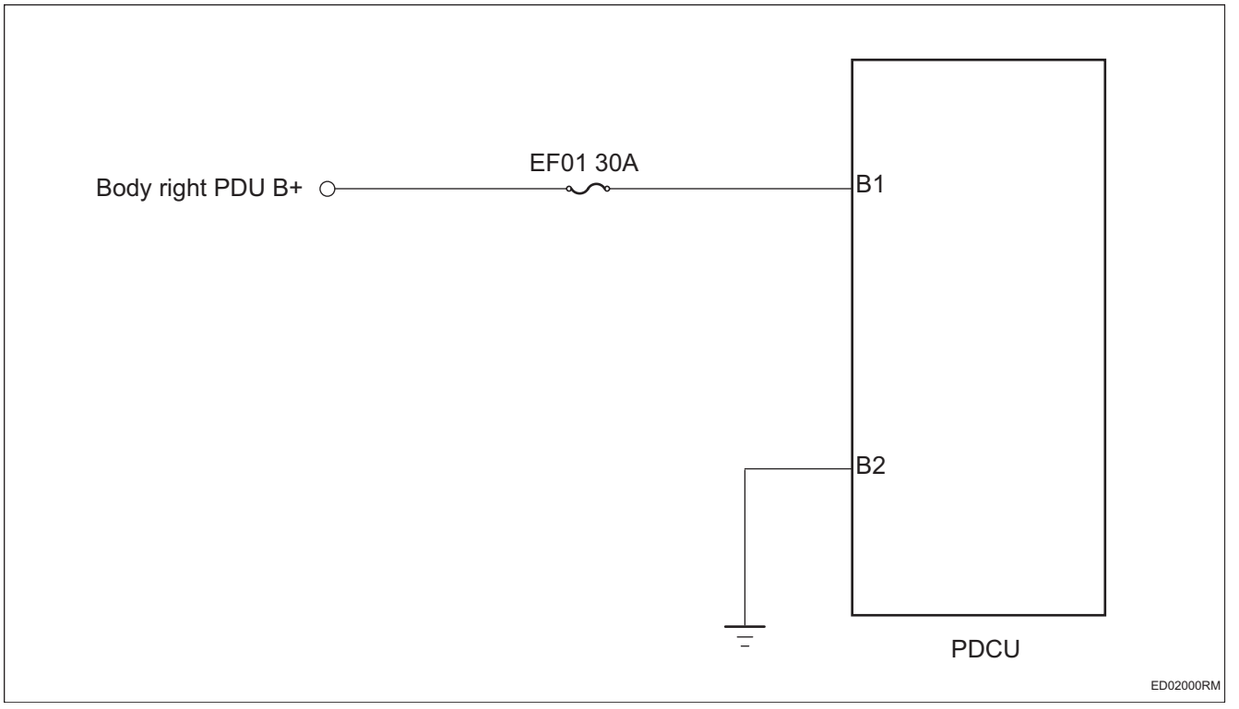
DTC	B114017	Battery overvoltage
DTC	B114016	Battery undervoltage

Description

When the PDCU power supply voltage exceeds the normal operating range, the PDCU records the DTC.

DTC	DTC detection conditions	Faulty location
B114017	(a) Battery overvoltage.	• PDCU • Harness and connector • Charging system
B114016	(a) Battery undervoltage.	• PDCU • Fuse • Harness and connector • Charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2	**Check PDCU fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the PDCU fuse.

(d) Measure the resistance according to the values in the table below.

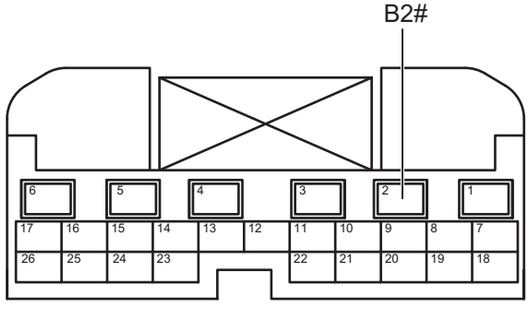
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3	**Check PDCU ground**



PDCU B connector

ED02010RM

(a) Disconnect the PDCU connector.

(b) Measure the resistance according to the values in the table below.

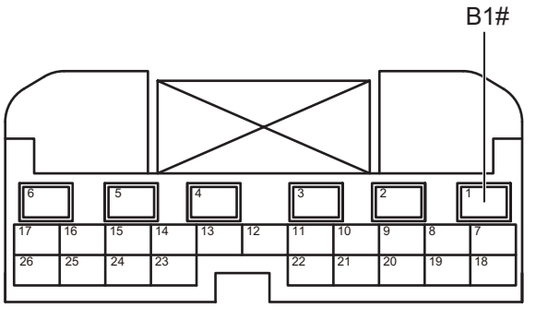
Standard value

Detector connection	Detection conditions	Specified state
PDCU connector B2# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check PDCU power supply**



PDCU B connector

ED02021RM

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PDCU connector B1# -body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace PDCU (See page ED-32)**

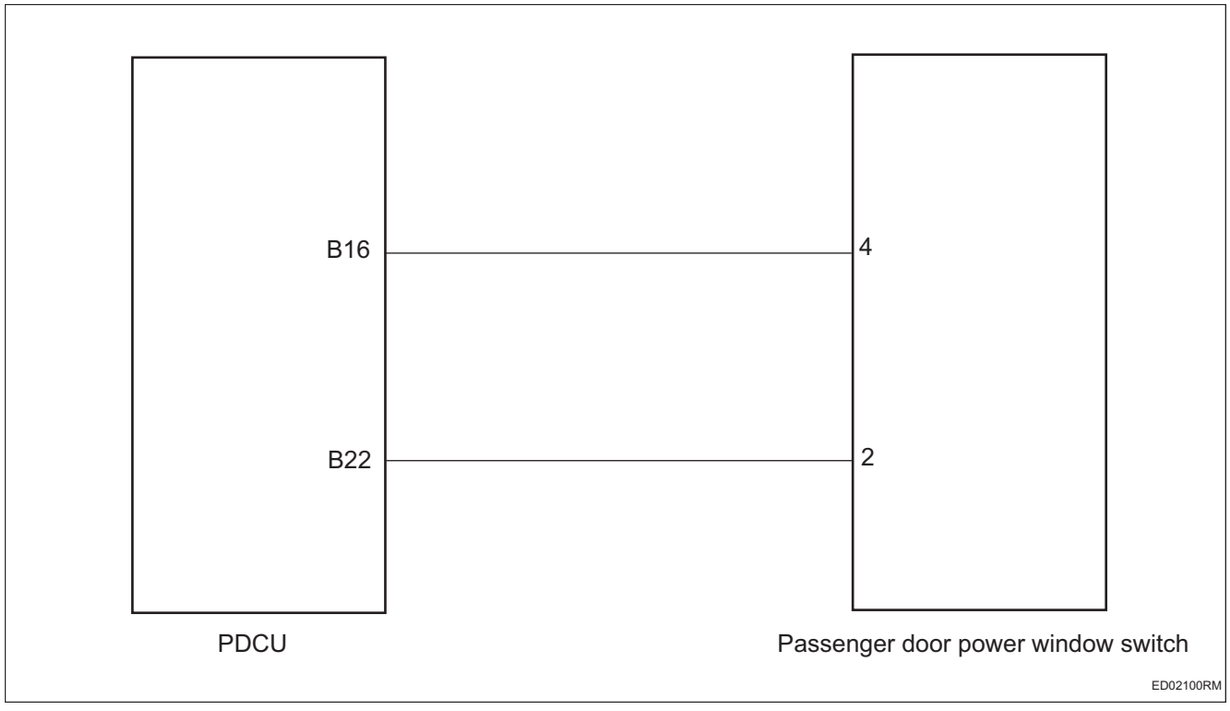
DTC	B114111	Passenger door window Up button stuck
DTC	B114211	Passenger door window Down button stuck

Description

When the passenger door power window switch fails, PDCU records the DTC.

DTC	DTC detection conditions	Faulty location
B114111	(a) Passenger door window Up button stuck.	• PDCU • Harness and connector • Passenger door power window switch
B114211	(a) Passenger door window Down button stuck.	• PDCU • Harness and connector • Passenger door power window switch

Circuit diagram



Inspection procedure

1	Check passenger door power window switch

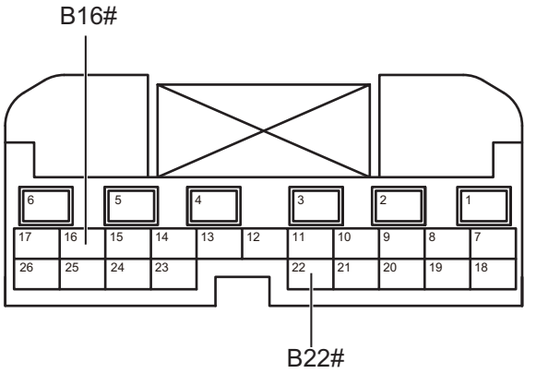
(a) Check the passenger door power window regulator for foreign matter.

(b) Check whether the passenger door power window switch is stuck.

NG	Repair according to the fault

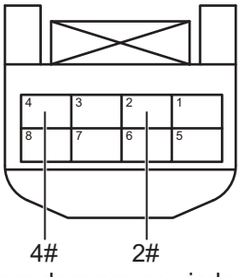
OK

2	**Check passenger door power window switch harness and connector for open circuit**



PDCU B connector

ED02111RM



Passenger door power window switch connector

ED02120RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDCU connector.

(d) Disconnect the passenger door power window switch connector.

(e) Measure the resistance according to the values in the table below.

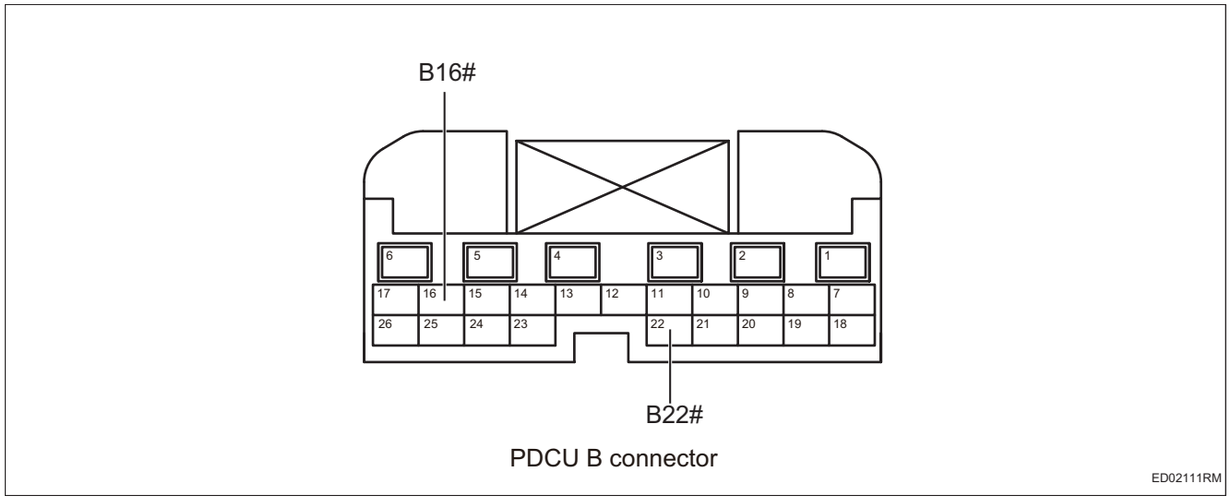
Standard value

Detector connection	Detection conditions	Specified state
PDCU connector B16# - passenger door power window switch connector 4#	Always connected	Less than 1Ω
PDCU connector B22# - passenger door power window switch connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check passenger door power window switch harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

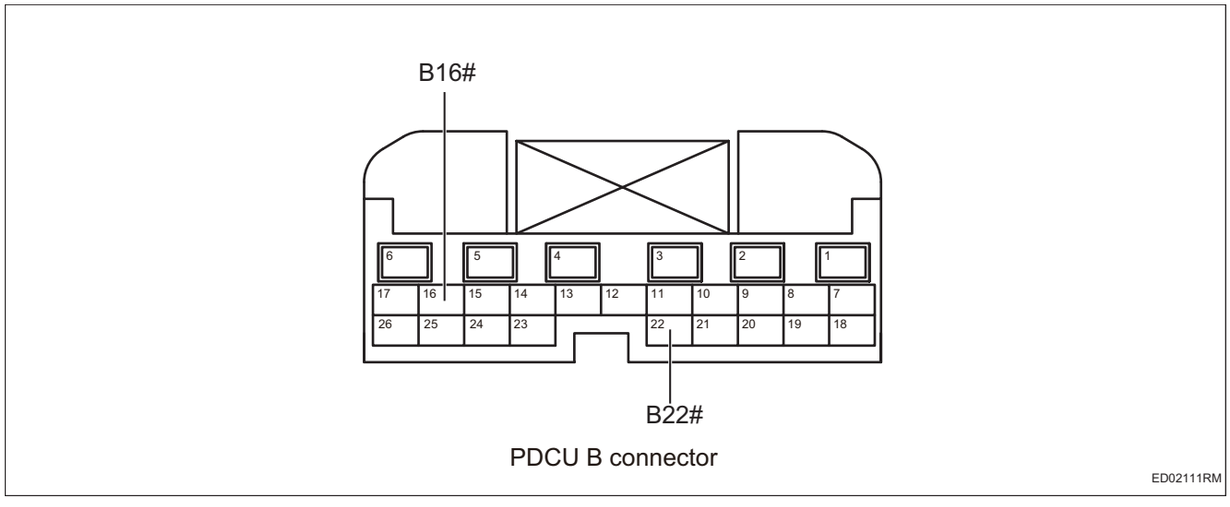
Detector connection	Detection conditions	Specified state
PDCU connector B16# -body GND	Always connected	10 KΩ or greater
PDCU connector B22# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check passenger door power window switch harness and connector for circuit shorted to power supply**

ED



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PDCU connector B16# -body GND	The ignition switch is set to "ON"	Less than 1 V
PDCU connector B22# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the passenger door power window switch (See page IR-6)**

(a) Replace the right front power window switch.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace PDCU (See page ED-32)**

ED

OK

6	**End**

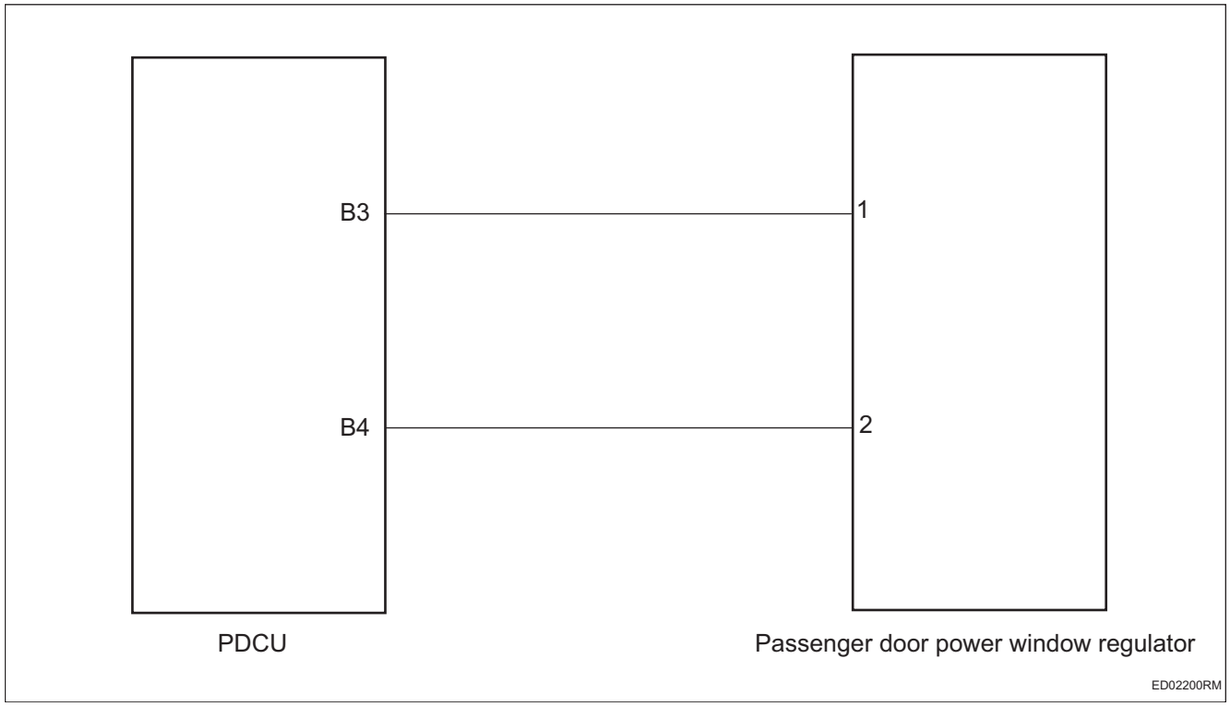
DTC	**B114318**	**Passenger door window motor output current low**
DTC	**B114319**	**Passenger door window motor output current high**

Description

When the passenger door power window regulator output current is abnormal, the PDCU will record the DTC.

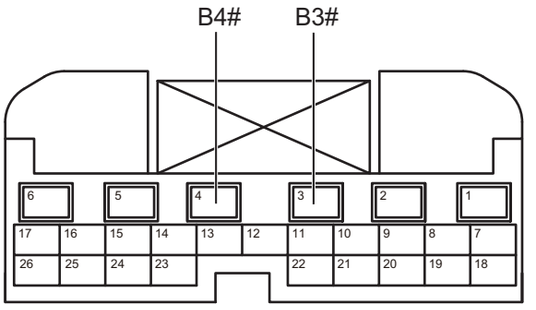
DTC	DTC detection conditions	Faulty location
B114318	(a) Passenger door window motor output undercurrent.	• PDCU • Harness and connector • Passenger door power window regulator
B114319	(a) Passenger door window motor output current high.	• PDCU • Harness and connector • Passenger door power window regulator

Circuit diagram



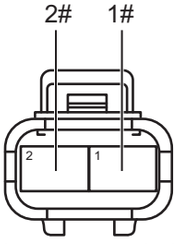
Inspection procedure

1	**Check passenger door power window regulator harness and connector for open circuit**



PDCU B connector

ED02211RM



Passenger door power window regulator connector

ED02220RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDCU connector.

(d) Disconnect the passenger door power window regulator connector.

(e) Measure the resistance according to the values in the table below.

Standard value

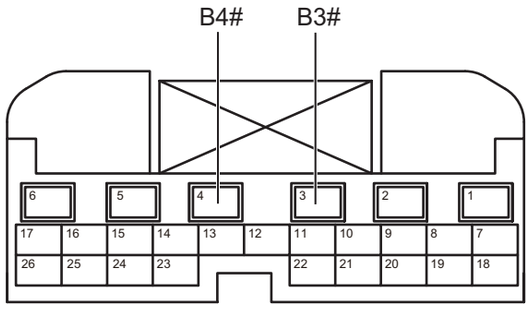
Detector connection	Detection conditions	Specified state
PDCU connector B3# -passenger door power window regulator connector 1#	Always connected	Less than 1Ω
PDCU connector B4# -passenger door power window regulator connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

ED

OK

2	**Check passenger door power window regulator harness and connector for circuit shorted to ground**



PDCU B connector

ED02211RM

(a) Measure the resistance according to the values in the table below.

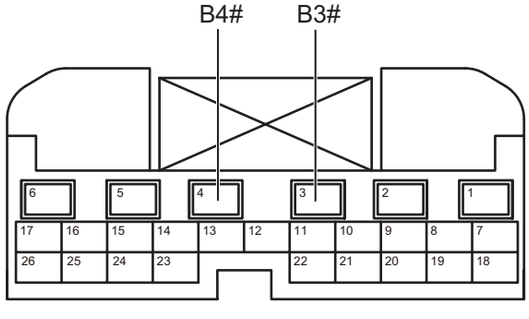
Standard value

Detector connection	Detection conditions	Specified state
PDCU connector B3# -body GND	Always connected	10 KΩ or greater
PDCU connector B4# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check passenger door power window regulator harness and connector for circuit shorted to power supply**



PDCU B connector

ED02211RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PDCU connector B3# -body GND	The ignition switch is set to "ON"	Less than 1 V
PDCU connector B4# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace passenger door power window regulator (See page ED-9)**

(a) Replace the passenger door power window regulator.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace PDCU (See page ED-32)**

ED

OK

5	**End**

DTC	**B114418**	**Rearview mirror upper adjustment output undercurrent**
DTC	**B114419**	**Rearview mirror upper adjustment output overcurrent**
DTC	**B114518**	**Rearview mirror lower adjustment output undercurrent**
DTC	**B114519**	**Rearview mirror lower adjustment output overcurrent**
DTC	**B114618**	**Rearview mirror left adjustment output undercurrent**
DTC	**B114619**	**Rearview mirror left adjustment output overcurrent**
DTC	**B114718**	**Rearview mirror right adjustment undercurrent**
DTC	**B114719**	**Rearview mirror right adjustment overcurrent**

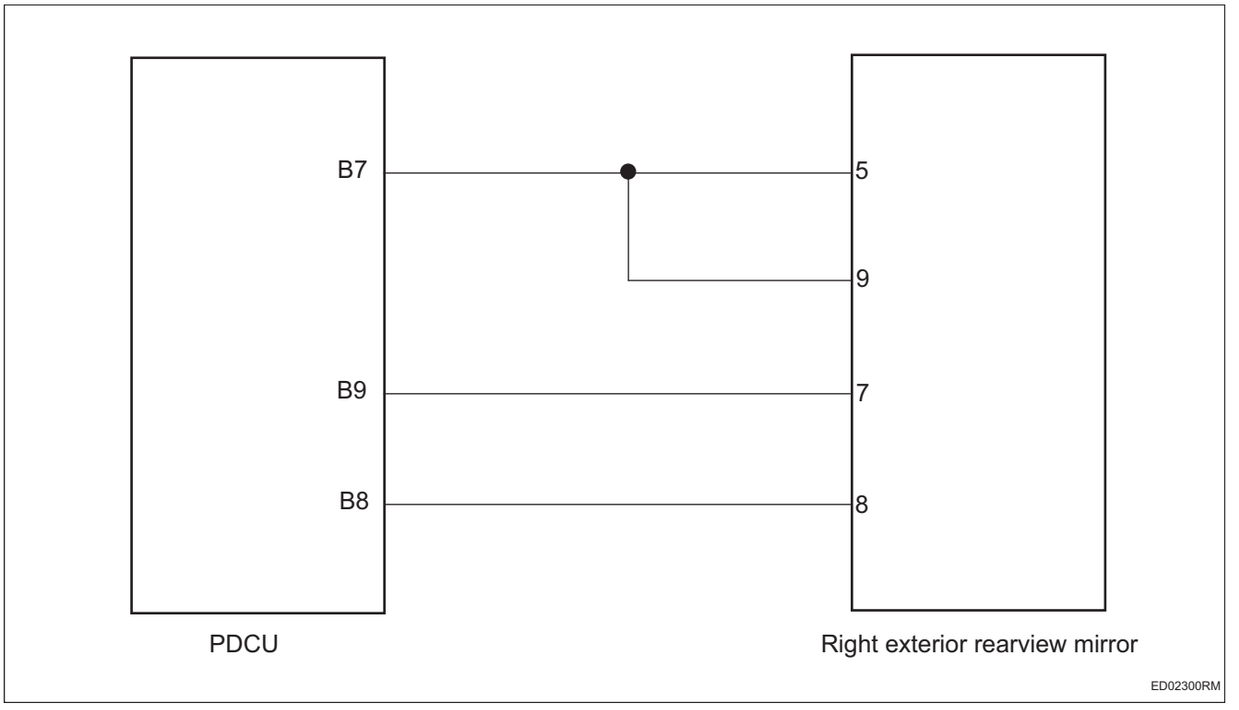
Description

When the adjustment output current of the right exterior rearview mirror exceeds the normal range, the PDCU records the DTC.

DTC	DTC detection conditions	Faulty location
B114418	(a) Rearview mirror upper adjustment output undercurrent.	• PDCU • Harness and connector • Right exterior rearview mirror
B114419	(a) Rearview mirror upward adjustment output current high.	• PDCU • Harness and connector • Right exterior rearview mirror
B114518	(a) Rearview mirror lower adjustment output undercurrent.	• PDCU • Harness and connector • Right exterior rearview mirror
B114519	(a) Rearview mirror downward adjustment output current high.	• PDCU • Harness and connector • Right exterior rearview mirror
B114618	(a) Rearview mirror left adjustment output undercurrent.	• PDCU • Harness and connector • Right exterior rearview mirror
B114619	(a) Rearview mirror left adjustment output current high.	• PDCU • Harness and connector • Right exterior rearview mirror

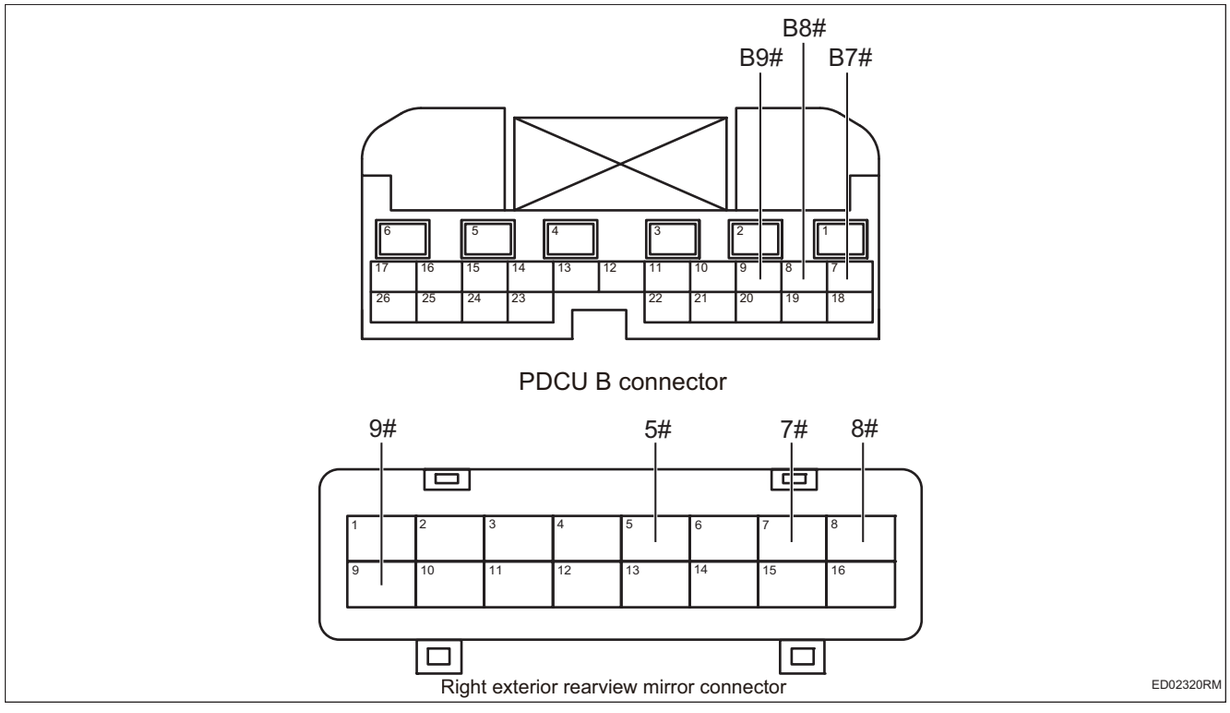
DTC	DTC detection conditions	Faulty location
B114718	(a) Rearview mirror right adjustment output undercurrent.	• PDCU • Harness and connector • Right exterior rearview mirror
B114719	(a) Rearview mirror right adjustment output current high.	• PDCU • Harness and connector • Right exterior rearview mirror

Circuit diagram



Inspection procedure

1	**Check right exterior rearview mirror harness and connector for open circuit**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDCU connector.

(d) Disconnect the right exterior rearview mirror connector.

(e) Measure the resistance according to the values in the table below.

Standard value

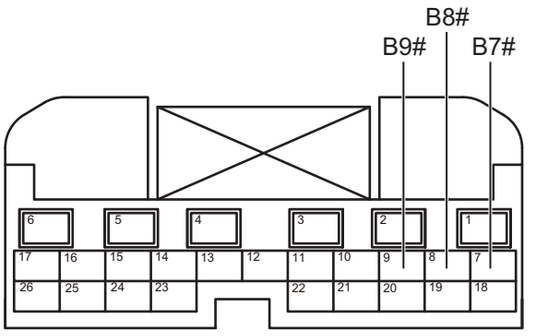
Detector connection	Detection conditions	Specified state
PDCU connector B7# - right exterior rearview mirror connector 5#	Always connected	Less than 1Ω
PDCU connector B7# -right exterior rearview mirror connector 9#	Always connected	Less than 1Ω
PDCU connector B9# -right exterior rearview mirror connector 7#	Always connected	Less than 1Ω
PDCU connector B8# -right exterior rearview mirror connector 8#	Always connected	Less than 1Ω

ED

NG → **Repair or replace the harness and connector**

OK

2	**Check right exterior rearview mirror harness and connector for circuit shorted to ground**



PDCU B connector

ED02311RM

(a) Measure the resistance according to the values in the table below.

Standard value

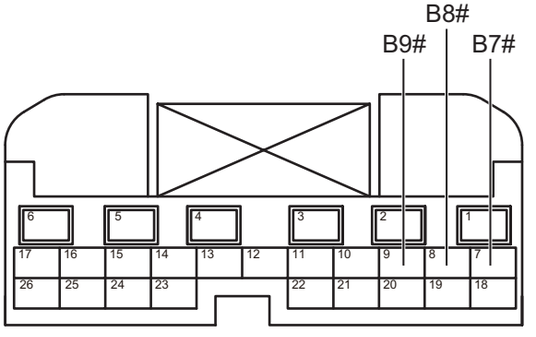
Detector connection	Detection conditions	Specified state
PDCU connector B7# -body GND	Always connected	10 KΩ or greater
PDCU connector B9# -body GND	Always connected	10 KΩ or greater
PDCU connector B8# -body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

ED

3	**Check right exterior rearview mirror harness and connector for circuit shorted to power supply**



PDCU B connector

ED02311RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PDCU connector B7# -body GND	The ignition switch is set to "ON"	Less than 1 V
PDCU connector B9# -body GND	The ignition switch is set to "ON"	Less than 1 V
PDCU connector B8# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the right exterior rearview mirror (See page IM-3)**

(a) Replace the right exterior rearview mirror.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace PDCU (See page ED-32)**

OK

5	**End**

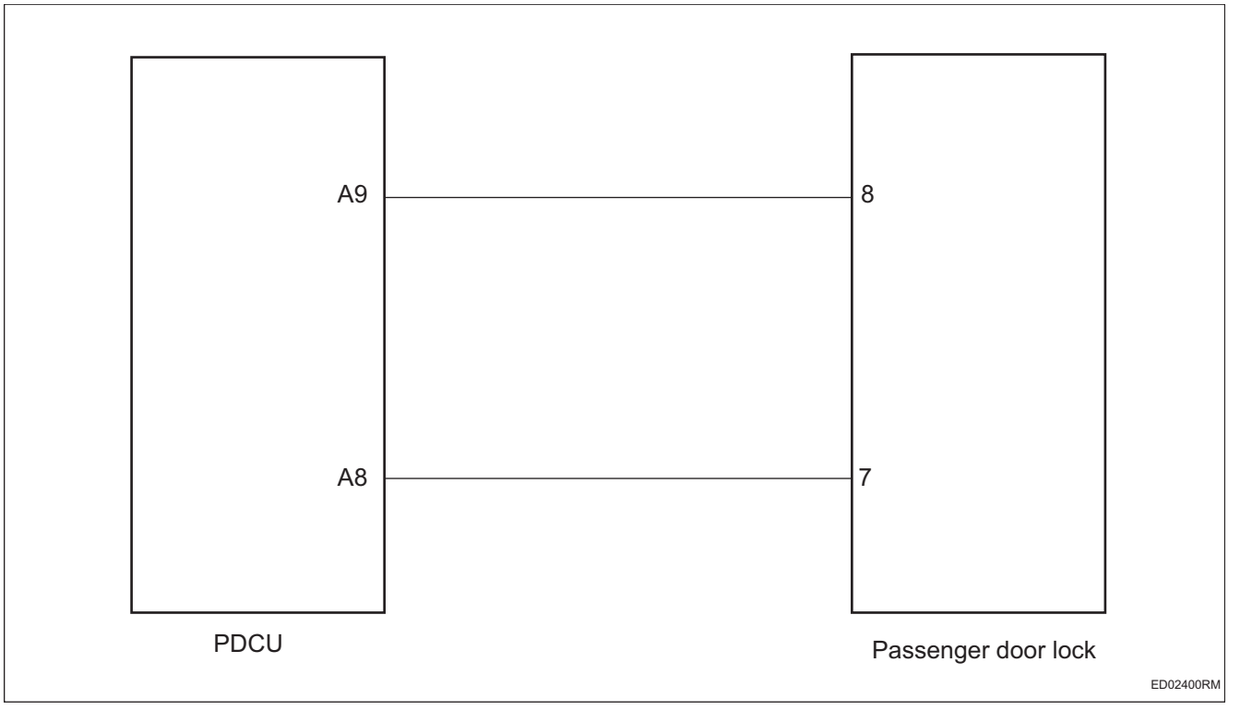
DTC	B114818	Central lock motor unlocking undercurrent
DTC	B114819	Central lock motor unlocking overcurrent
DTC	B114918	Central lock motor locking undercurrent
DTC	B114919	Central lock motor locking overcurrent

Description

When the working current of the passenger door lock exceeds the normal range, the PDCU records the DTC.

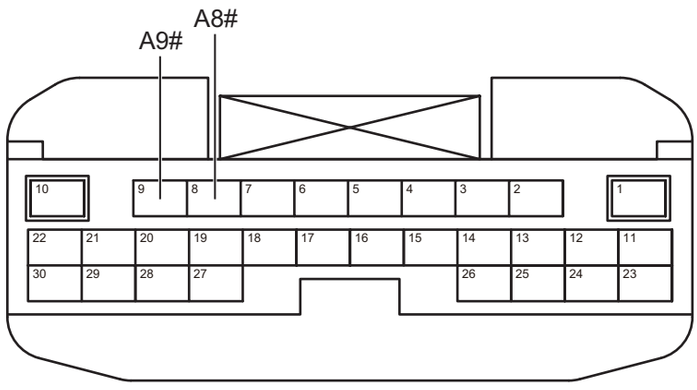
DTC	DTC detection conditions	Faulty location
B114818	(a) Central lock motor unlocking undercurrent.	• PDCU • Harness and connector • Passenger door lock
B114819	(a) Central lock motor unlocking overcurrent.	• PDCU • Harness and connector • Passenger door lock
B114918	(a) Central lock motor locking undercurrent.	• PDCU • Harness and connector • Passenger door lock
B114919	(a) Central lock motor locking overcurrent.	• PDCU • Harness and connector • Passenger door lock

Circuit diagram



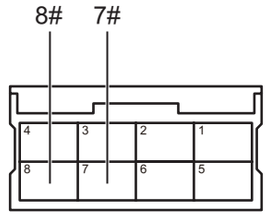
Inspection procedure

1	**Check passenger door lock harness and connector for open circuit**



PDCU A connector

ED02410RM



Passenger door lock connector

ED02420RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDCU connector.

(d) Disconnect the passenger door lock connector.

(e) Measure the resistance according to the values in the table below.

Standard value

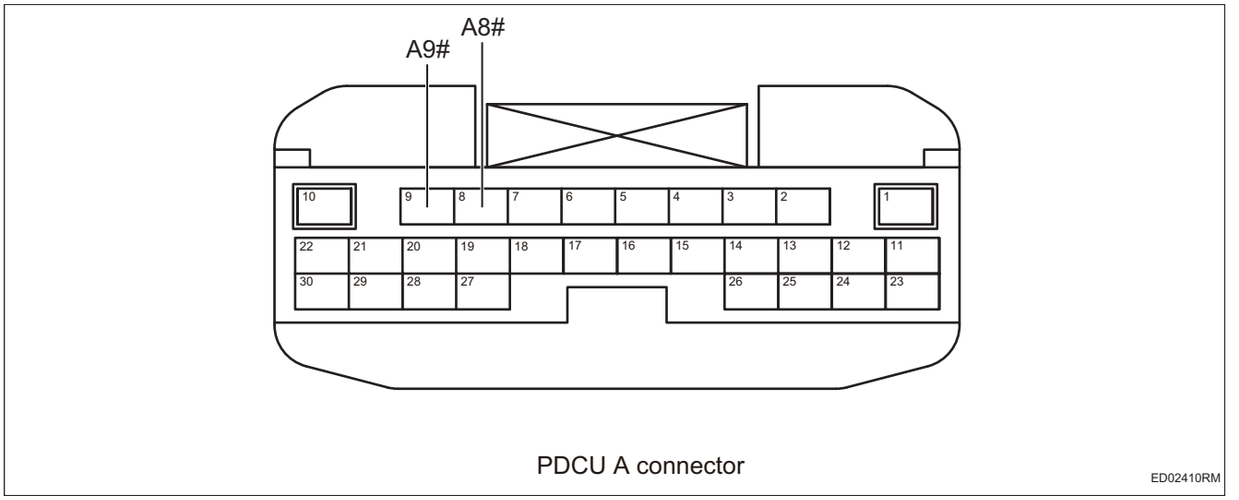
Detector connection	Detection conditions	Specified state
PDCU connector A9# -passenger door lock connector 8#	Always connected	Less than 1Ω
PDCU connector A8# -passenger door lock connector 7#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check passenger door lock harness and connector for circuit shorted to ground**

ED



PDCU A connector

ED02410RM

(a) Measure the resistance according to the values in the table below.

Standard value

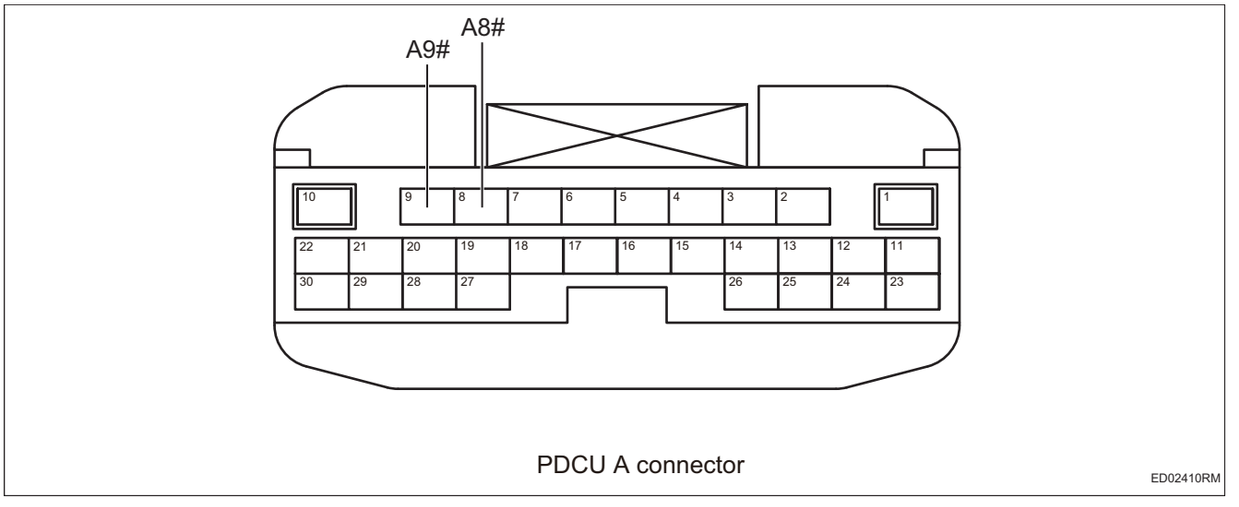
Detector connection	Detection conditions	Specified state
PDCU connector A9# -body GND	Always connected	10 KΩ or greater
PDCU connector A8# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check passenger door lock harness and connector for circuit shorted to power supply**

ED



PDCU A connector

ED02410RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PDCU connector A9# -body GND	The ignition switch is set to "ON"	Less than 1 V
PDCU connector A8# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace passenger door lock (See page DL-12)**

(a) Replace the passenger door lock.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace PDCU (See page IM-3)**

OK

5	**End**

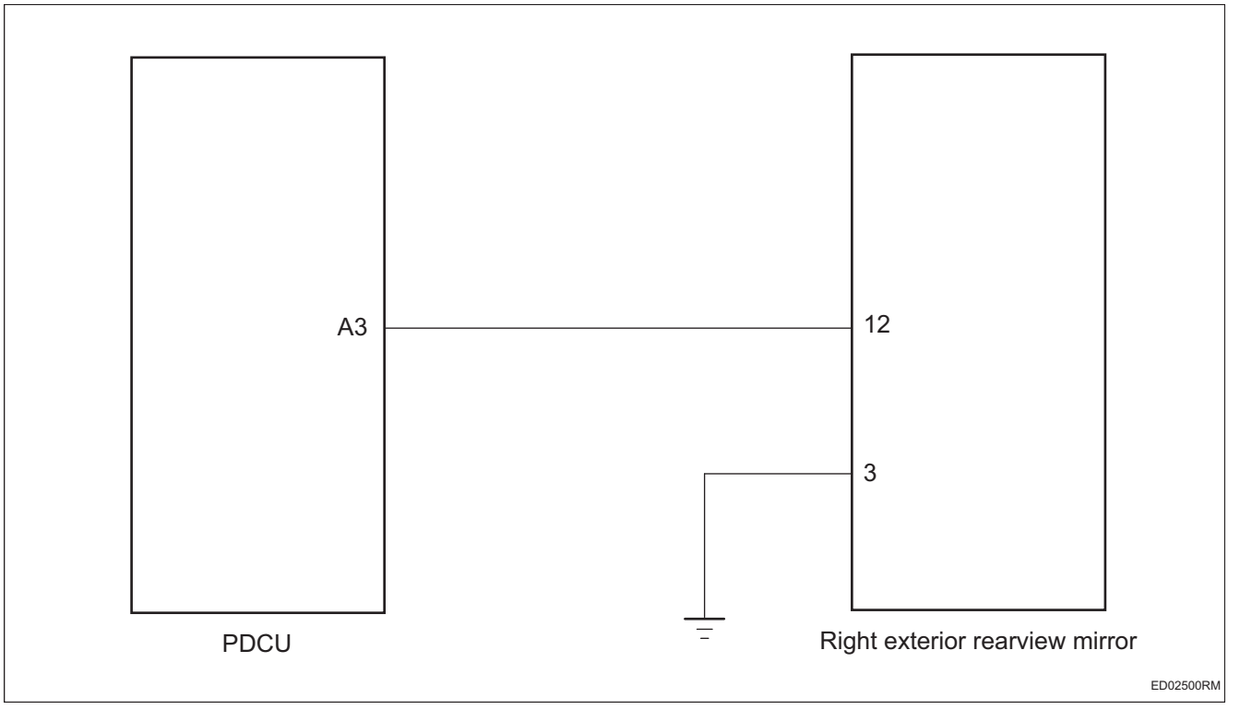
DTC	B114A13	BSD lamp open circuit
DTC	B114A11	BSD lamp short circuit

Description

When the circuit of right rearview mirror BSD lamp is open or shorted, the PDCU records the DTC.

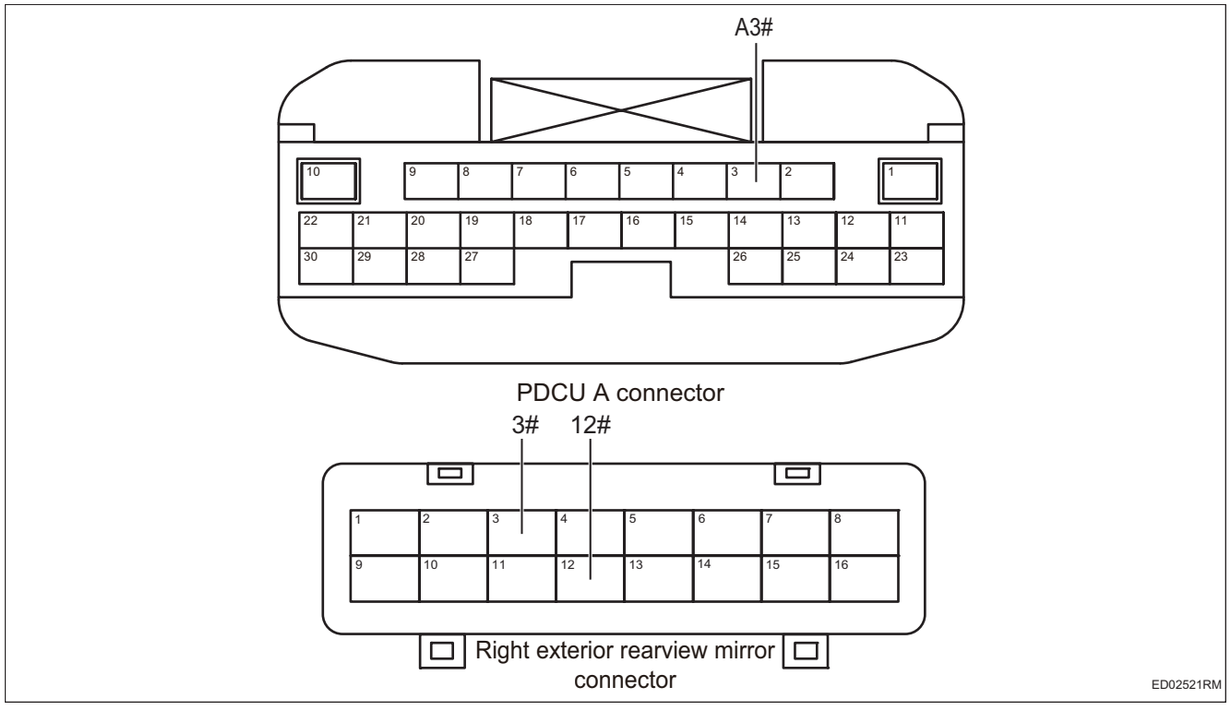
DTC	DTC detection conditions	Faulty location
B114A13	(a) BSD lamp open circuit.	• PDCU • Harness and connector • Right exterior rearview mirror
B114A11	(a) BSD lamp short circuit.	• PDCU • Harness and connector • Right exterior rearview mirror

Circuit diagram



Inspection procedure

1	Check right exterior rearview mirror harness and connector for open circuit



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDCU connector.

(d) Disconnect the right exterior rearview mirror connector.

(e) Measure the resistance according to the values in the table below.

Standard value

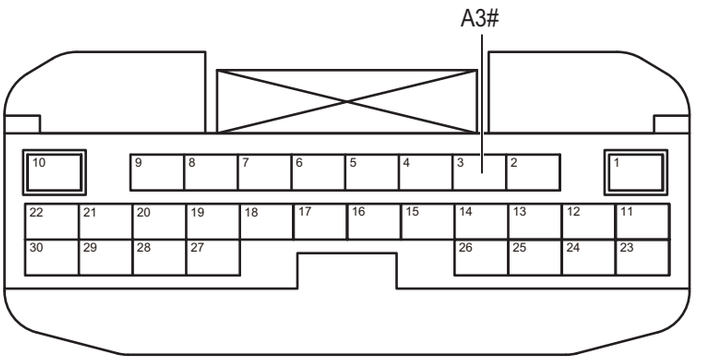
Detector connection	Detection conditions	Specified state
PDCU connector A3# -right exterior rearview mirror connector 12#	Always connected	Less than 1Ω
Right exterior rearview mirror connector 3# - body GND	Always connected	Less than 1Ω

ED

NG → **Repair or replace the harness and connector**

OK

2	**Check right exterior rearview mirror harness and connector for circuit shorted to ground**



PDCU A connector

ED02511RM

(a) Measure the resistance according to the values in the table below.

Standard value

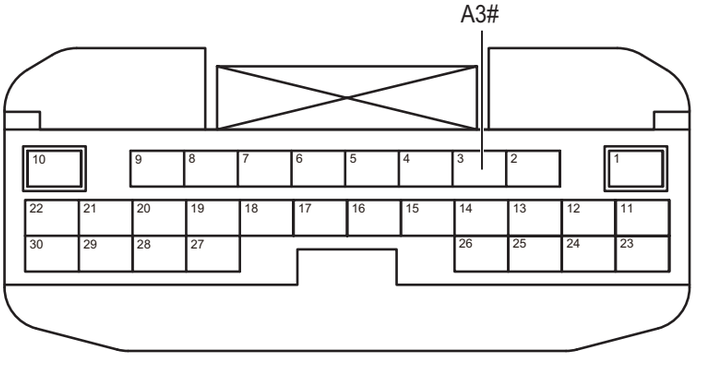
Detector connection	Detection conditions	Specified state
PDCU connector A3# -body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

3	**Check right exterior rearview mirror harness and connector for circuit shorted to power supply**

ED



PDCU A connector

ED02511RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PDCU connector A3# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the right exterior rearview mirror (See page IM-3)**

(a) Replace the right exterior rearview mirror.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace PDCU (See page ED-32)**

OK

5	**End**

DTC	**U002888**	**Comfort CAN bus off**
DTC	**U014687**	**GW node lost**
DTC	**U014087**	**BCM 1 node lost**
DTC	**U016487**	**A/C control unit node lost**
DTC	**U019987**	**Driver door module node lost**
DTC	**U112187**	**ESP message lost**
DTC	**U115187**	**ACU message lost**
DTC	**U124587**	**EnHost/IVI message lost**
DTC	**U123287**	**LCDA message lost**
DTC	**U110187**	**TCU message lost**
DTC	**U110087**	**ECM message lost**
DTC	**U114687**	**GW message lost**
DTC	**U115587**	**Instrument cluster control unit message lost**
DTC	**U129387**	**HCU message lost**

Description

When the communication between the PDCU and other systems is abnormal or interrupted, the PDCU will record the DTC.

DTC	DTC detection conditions	Faulty location
U002888	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U016487	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U019987	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U112187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U124587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

DTC	DTC detection conditions	Faulty location
U123287	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U129387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

Rear left door control system

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Warning:

Before repairing the high voltage system or adjacent high voltage system components, be sure to carefully read the "Instructions and precautions for maintenance work" in the introduction carefully!

2. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

3. when the battery cable is disconnected and reconnected, some systems require initialization.

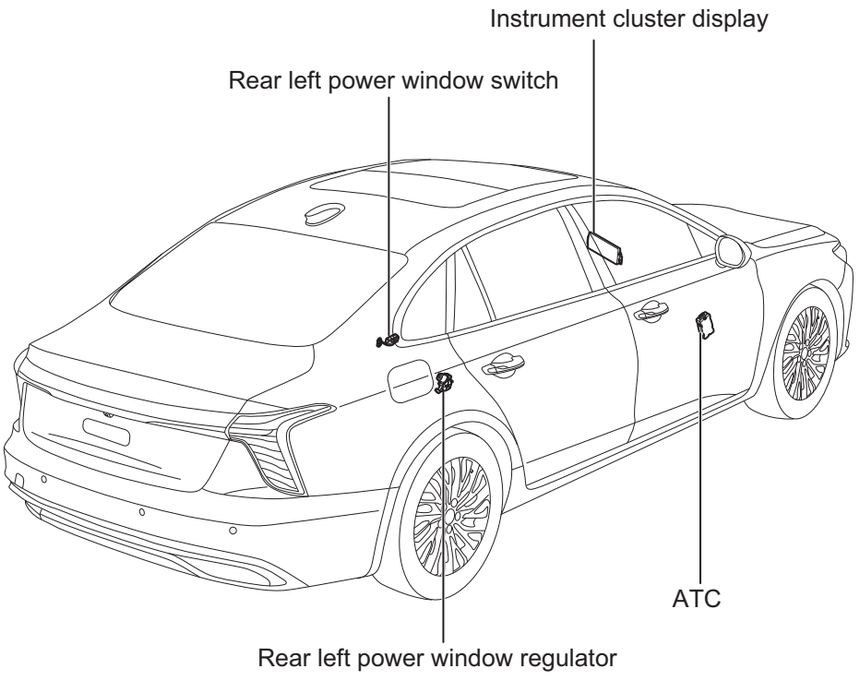
4. General repair instructions

(a) When checking the rear left door control system, it may affect the airbag work. Therefore, before carrying out maintenance work, be sure to carefully read and confirm the precautions for airbag.

(b) When parts need to be replaced or the connector needs to be disconnected during maintenance of rear left door control system, the battery negative cable shall be disconnected.

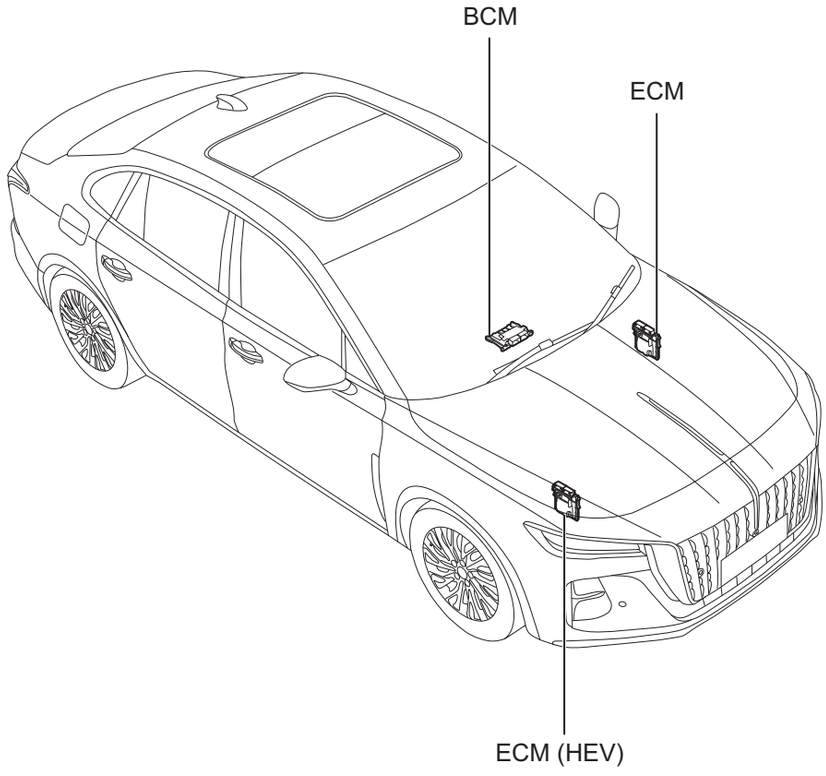
(c) The rear left door control system needs to be initialized after reconnecting the battery. And use the HQ-VDS to "clear the DTC" for all electronic control systems.

Location of parts



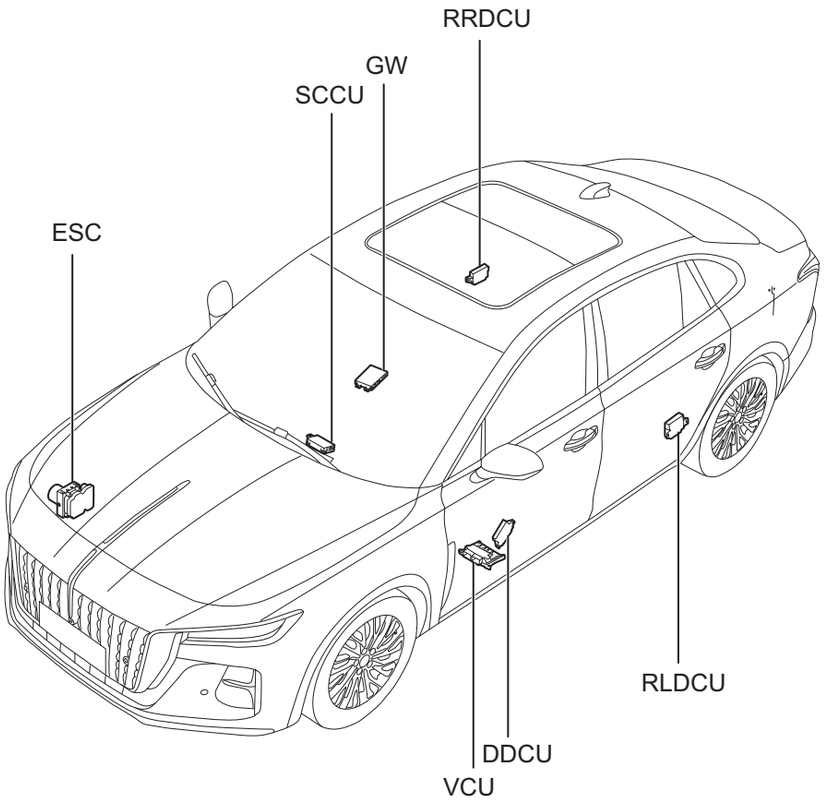
ED00320RM

Location of parts



ED00330RM

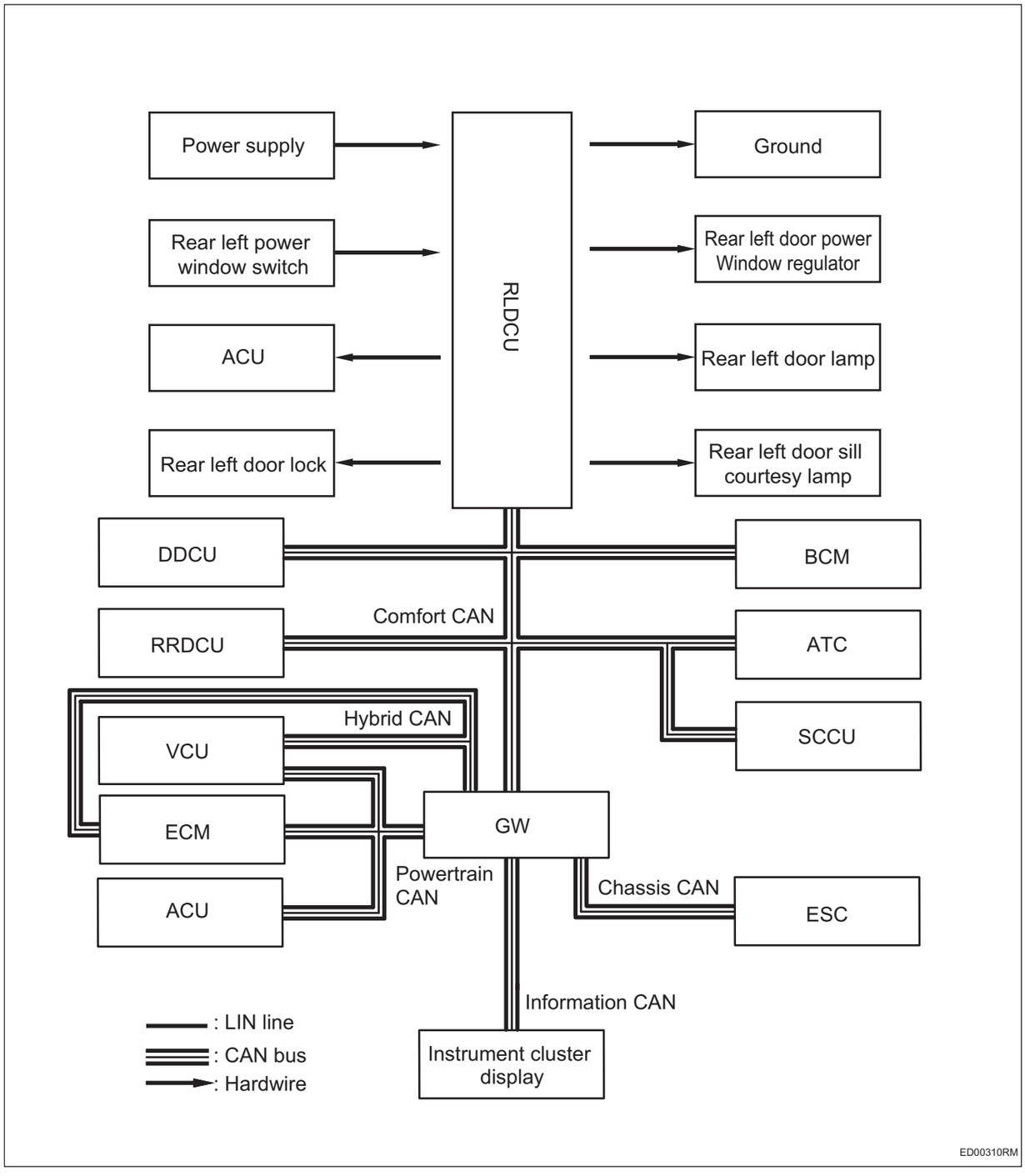
Location of parts



ED00340RM

System diagram

RLDCU



System description

1. RLDCU

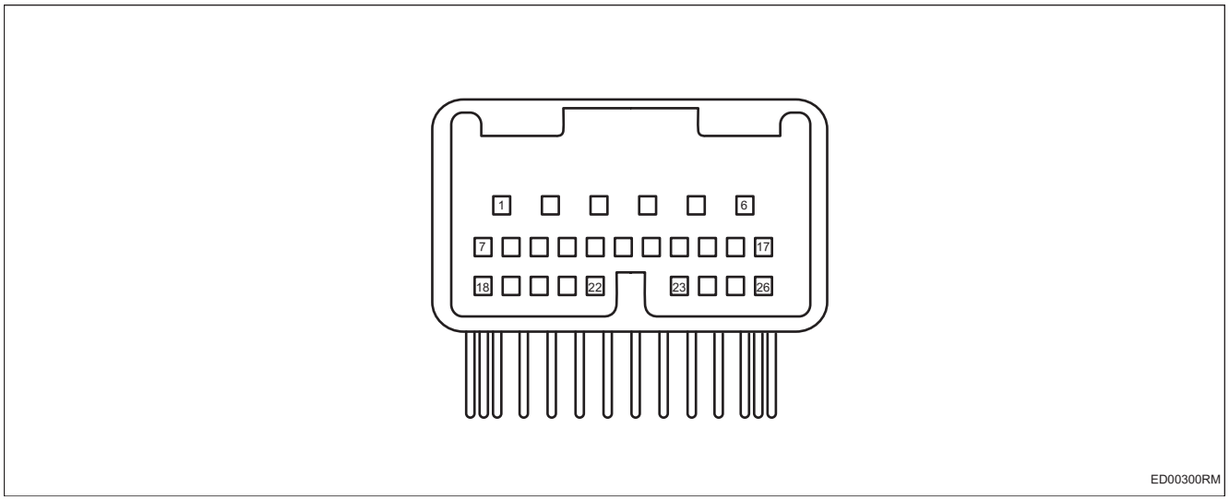
(a) The RLDCU mainly realizes the detection of windows, door lock, door status and lock status, and the driving of door lamps; The vehicle is equipped with a control unit for each door.

Symptom chart

Fault	Possible location
Window lifting/lowering abnormity	• Power window switch • Related harness and connector • DCU • Power window regulator • Battery
Door unlocking abnormity	• Central locking switch • Related harness and connector • DCU • Door lock • Battery

ECU terminal

RLDCU



RLDCU			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Power supply	14	Backlight switch
2	Power GND	15	-
3	Window lifting	16	CAN-L
4	Window lowering	17	Rear left door lock locking output
5	-	18	-
6	-	19	Rear left door lock status switch
7	Rear left door lamp/door sill trim strip LED lamp	20	-
8	-	21	Rear left seat heater switch
9	Rear left door lock locking signal	22	Rear left door window switch
10	Rear left door unlocking signal	23	Rear left seat heater working indicator lamp
11	Hardwired impact signal	24	Analog GND
12	-	25	-
13	CAN-H	26	Rear left door lock unlocking output

DTC chart

RLDCU

DTC	Description	Reference page
B118017	Battery overvoltage	(See page ED-97)

DTC	Description	Reference page
B118016	Battery undervoltage	(See page ED-97)
B118111	Rear left door window Up button stuck	(See page ED-100)
B118311	Rear left door window Down button stuck	(See page ED-100)
B118518	Rear left door window motor output current low	(See page ED-104)
B118519	Rear left door window motor output current high	(See page ED-104)
B118618	Central lock motor unlocking undercurrent	(See page ED-108)
B118619	Central lock motor unlocking overcurrent	(See page ED-108)
B118718	Central lock motor locking undercurrent	(See page ED-108)
B118719	Central lock motor locking overcurrent	(See page ED-108)
U002888	Comfort CAN bus off	(See page ED-112)
U014687	GW node lost	(See page ED-112)
U014087	BCM 1 node lost	(See page ED-112)
U016487	A/C control unit node lost	(See page ED-112)
U019987	Driver door module node lost	(See page ED-112)
U020287	Rear right door module node lost	(See page ED-112)
U112187	ESP message lost	(See page ED-112)
U115187	ACU message lost	(See page ED-112)
U024687	SCCU node lost	(See page ED-112)
U115587	Instrument cluster control unit message lost	(See page ED-112)
U110087	ECM message lost	(See page ED-112)
U129387	HCU message lost	(See page ED-112)

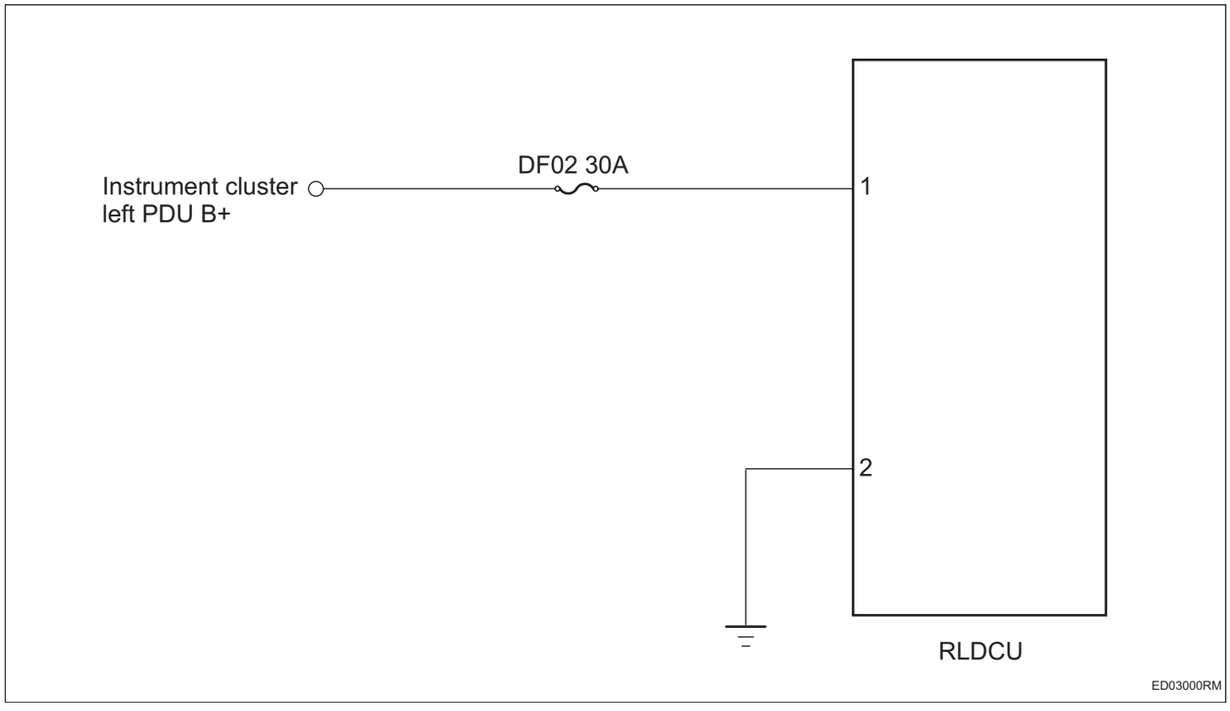
DTC	B118017	Battery overvoltage
DTC	B118016	Battery undervoltage

Description

When the RLDCU power supply voltage exceeds the normal operating range, the RLDCU records the DTC.

DTC	DTC detection conditions	Faulty location
B118017	(a) Battery overvoltage.	• RLDCU • Harness and connector • Charging system
B118016	(a) Battery undervoltage.	• RLDCU • Fuse • Harness and connector • Charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

ED

NG → **Overhaul the charging system**

OK

2 Check RLDCU fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the RLDCU fuse.

(d) Measure the resistance according to the values in the table below.

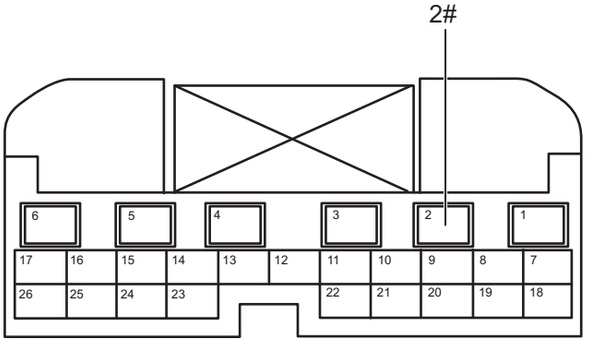
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3 Check RLDCU ground



RLDCU connector

ED03010RM

(a) Disconnect the RLDCU connector.

(b) Measure the resistance according to the values in the table below.

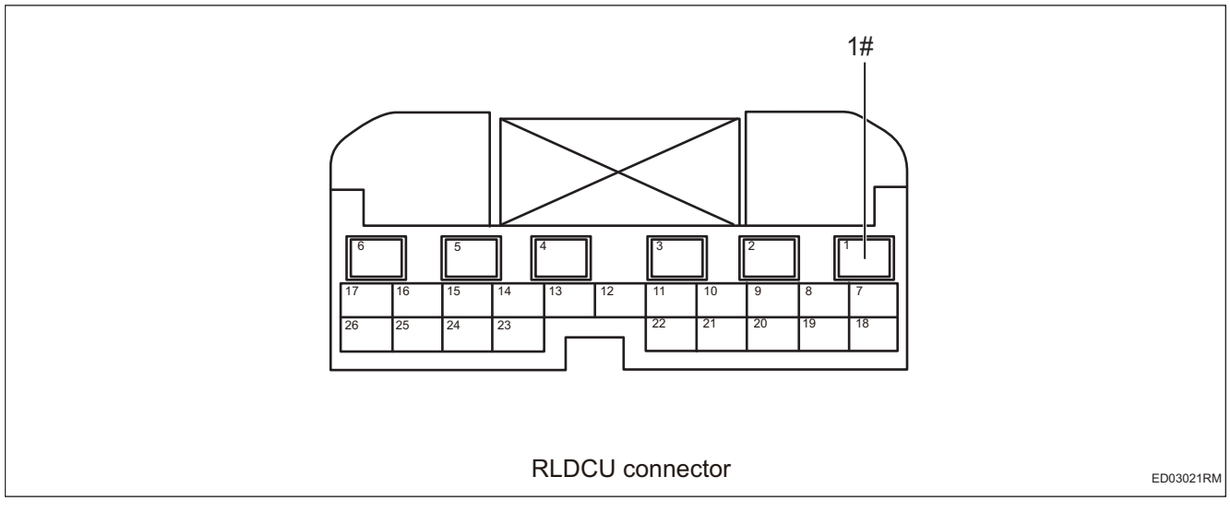
Standard value

Detector connection	Detection conditions	Specified state
RLDCU connector 2# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check RLDCU power supply**



RLDCU connector

ED03021RM

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
RLDCU connector 1# -body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace the RLDCU (See page ED-32)**

ED

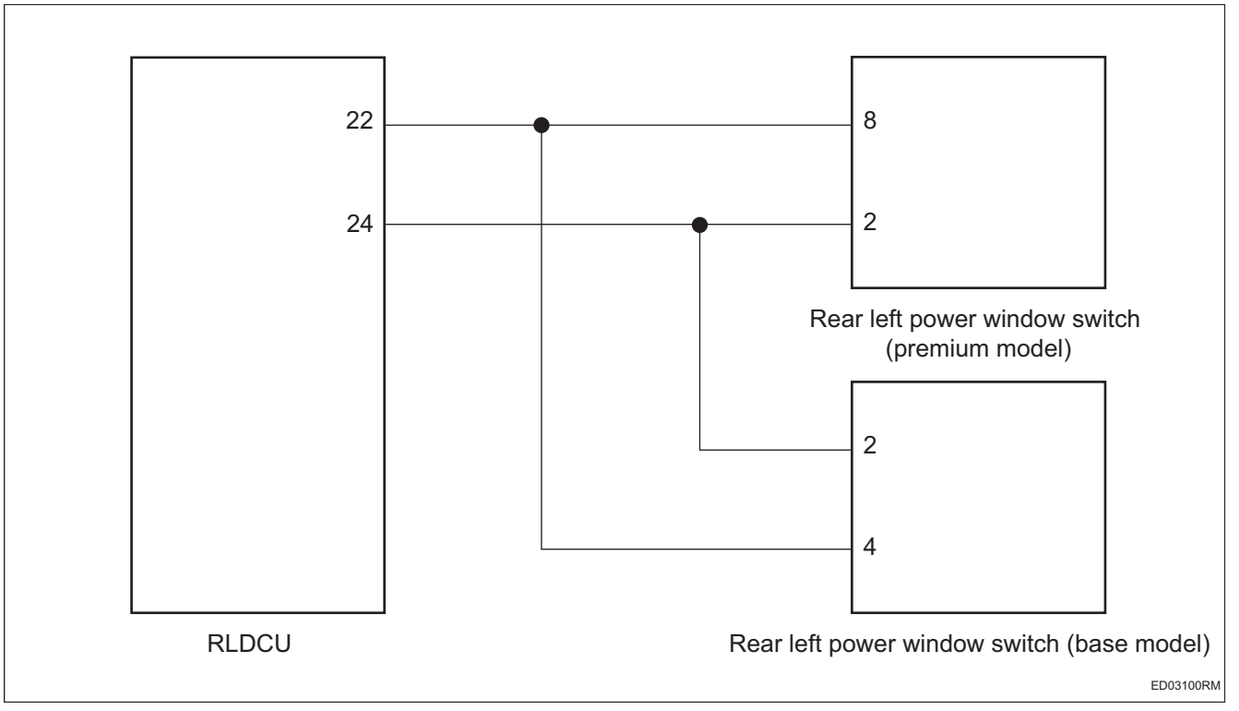
DTC	B118111	Rear left door window Up button stuck
DTC	B118311	Rear left door window Down button stuck

Description

When the rear left power window switch fails, RLDCU records the DTC.

DTC	DTC detection conditions	Faulty location
B118111	(a) Rear left door window Up button stuck.	• RLDCU • Harness and connector • Rear left power window switch
B118311	(a) Rear left door window Down button stuck.	• RLDCU • Harness and connector • Rear left power window switch

Circuit diagram



Inspection procedure

1	Check the rear left power window switch

(a) Check the rear left power window switch for foreign matter.

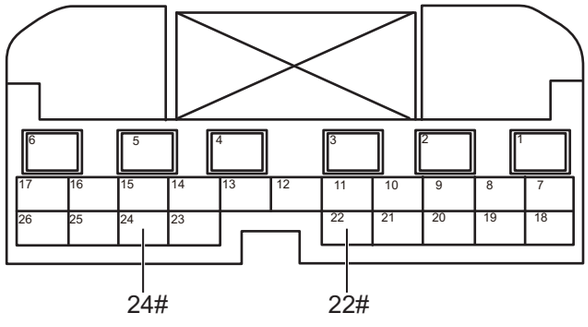
(b) Check whether the rear left power window switch is stuck.

NG	Repair according to the fault

ED

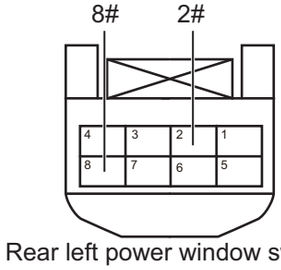
OK

2	**Check rear left power window switch harness and connector for open circuit**

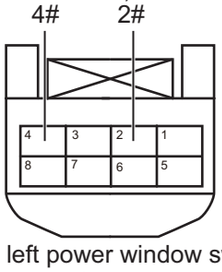


RLDCU connector

ED03111RM



Rear left power window switch (premium model) connector



Rear left power window switch (base model) connector

ED03120RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the RLDCU connector.

(d) Disconnect the rear left power window switch connector.

(e) Measure the resistance according to the values in the table below.

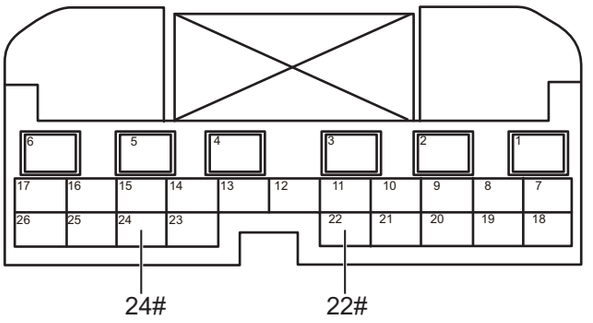
Standard value

Detector connection	Detection conditions	Specified state
RLDCU connector 22# - rear left power window switch (premium model) connector 8#	Always connected	Less than 1Ω
RLDCU connector 24# - rear left power window switch (premium model) connector 2#	Always connected	Less than 1Ω
RLDCU connector 22# - rear left power window switch (base model) connector 4#	Always connected	Less than 1Ω
RLDCU connector 24# - rear left power window switch (base model) connector 2#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	**Check rear left power window switch harness and connector for circuit shorted to ground**



RLDCU connector

ED03111RM

(a) Measure the resistance according to the values in the table below.

Standard value

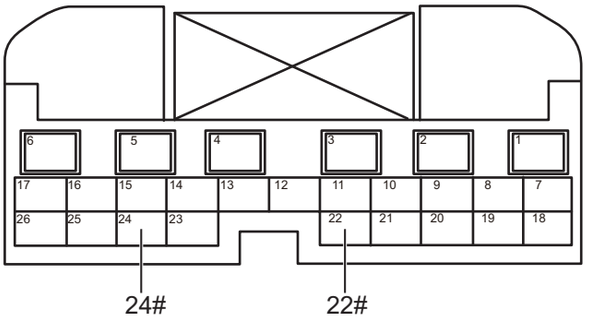
Detector connection	Detection conditions	Specified state
RLDCU connector 24# -body GND	Always connected	10 KΩ or greater
RLDCU connector 22# -body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

4	**Check rear left power window switch harness and connector for circuit shorted to power supply**

ED



RLDCU connector

ED03111RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
RLDCU connector 24# -body GND	The ignition switch is set to "ON"	Less than 1 V
RLDCU connector 22# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the rear left power window switch (See page IR-18)**

(a) Replace the rear left power window switch.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the RLDCU (See page ED-32)**

OK

6	**End**

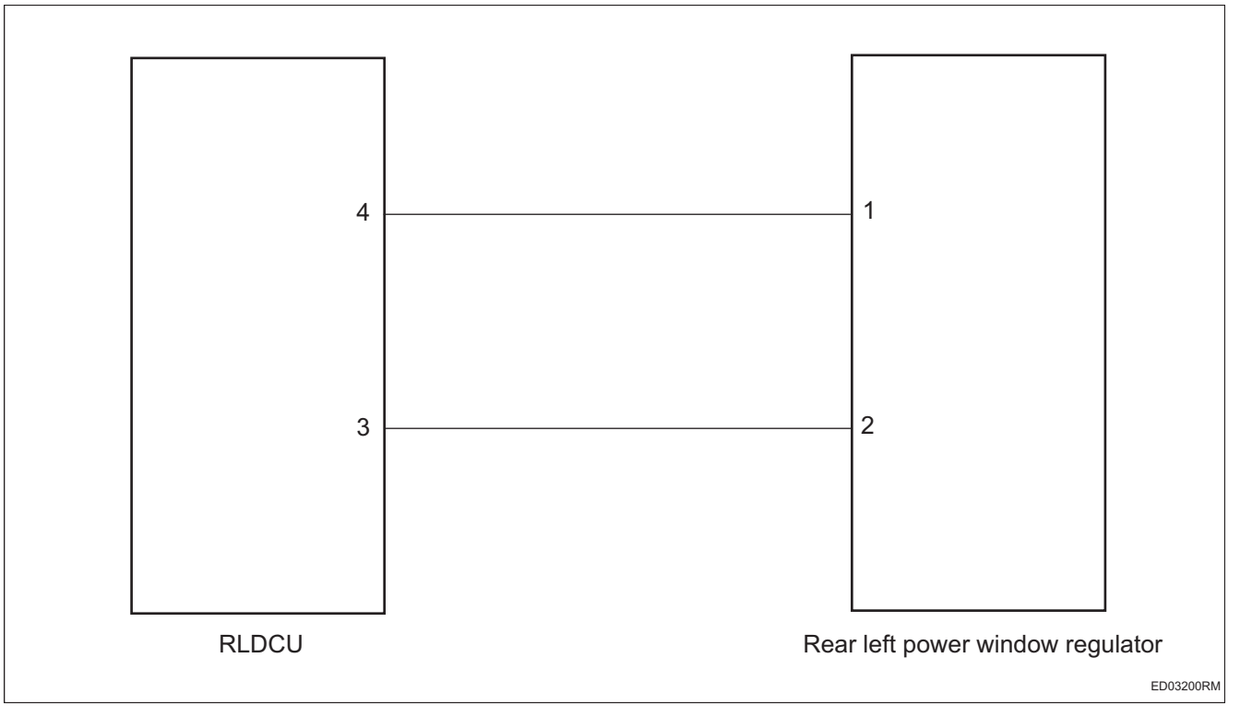
DTC	**B118518**	**Rear left door window motor output current low**
DTC	**B118519**	**Rear left door window motor output current high**

Description

When the rear left power window regulator output current is abnormal, the RLDCU will record the DTC.

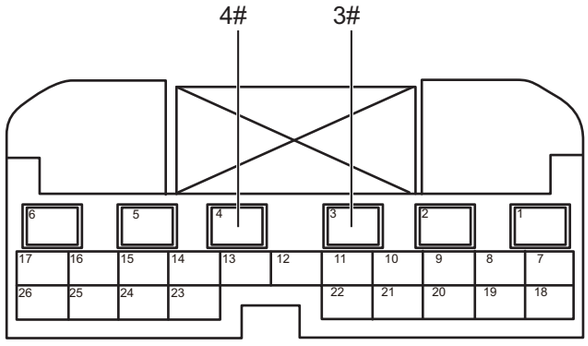
DTC	DTC detection conditions	Faulty location
B118518	(a) Rear left door window motor output undercurrent.	• RLDCU • Harness and connector • Rear left power window regulator
B118519	(a) Rear left door window motor output current high.	• RLDCU • Harness and connector • Rear left power window regulator

Circuit diagram



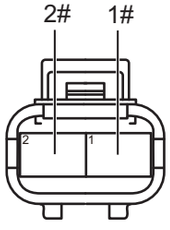
Inspection procedure

1	**Check rear left power window regulator harness and connector for open circuit**



RLDCU connector

ED03211RM



Rear left power window regulator connector

ED03220RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the RLDCU connector.

(d) Disconnect the rear left power window regulator connector.

(e) Measure the resistance according to the values in the table below.

Standard value

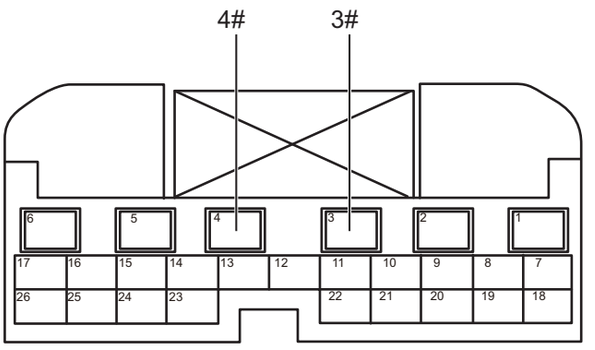
Detector connection	Detection conditions	Specified state
RLDCU connector 4# -rear left power window regulator connector 1#	Always connected	Less than 1Ω
RLDCU connector 3# - rear left power window regulator connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

ED

OK

2	**Check rear left power window regulator harness and connector for circuit shorted to ground**



RLDCU connector

ED03211RM

(a) Measure the resistance according to the values in the table below.

Standard value

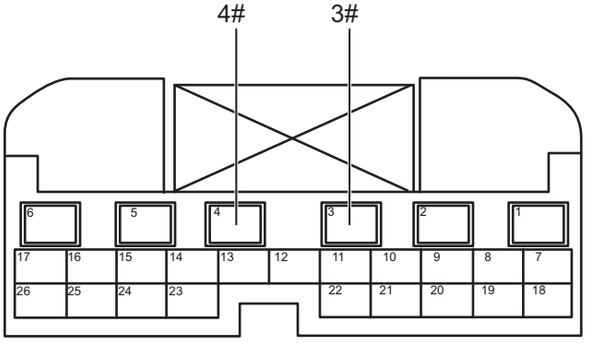
Detector connection	Detection conditions	Specified state
RLDCU connector 3# -body GND	Always connected	10 KΩ or greater
RLDCU connector 4# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check rear left power window regulator harness and connector for circuit shorted to power supply**

ED



RLDCU connector

ED03211RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
RLDCU connector 3# -body GND	The ignition switch is set to "ON"	Less than 1 V
RLDCU connector 4# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the rear left power window regulator (See page ED-20)**

(a) Replace the rear left power window regulator.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the RLDCU (See page ED-32)**

OK

5	**End**

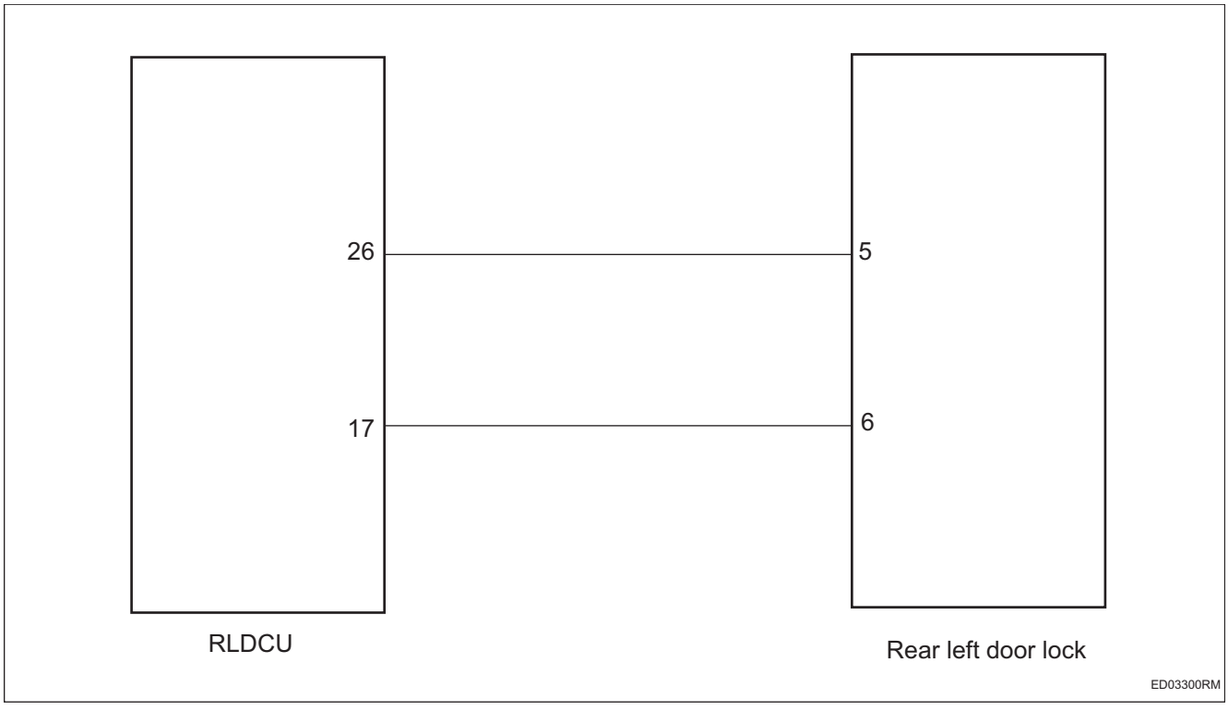
DTC	**B118618**	**Central lock motor unlocking undercurrent**
DTC	**B118619**	**Central lock motor unlocking overcurrent**
DTC	**B118718**	**Central lock motor locking undercurrent**
DTC	**B118719**	**Central lock motor locking overcurrent**

Description

When the working current of the rear left door lock is out of the normal range, the RLDCU records the DTC.

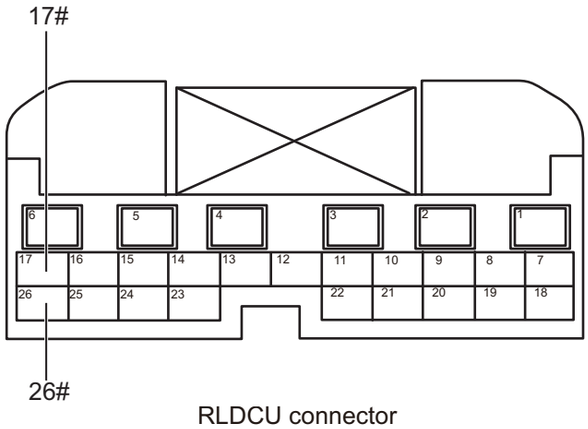
DTC	DTC detection conditions	Faulty location
B118618	(a) Central lock motor unlocking undercurrent.	• RLDCU • Harness and connector • Rear left door lock
B118619	(a) Central lock motor unlocking overcurrent.	• RLDCU • Harness and connector • Rear left door lock
B118718	(a) Central lock motor locking undercurrent.	• RLDCU • Harness and connector • Rear left door lock
B118719	(a) Central lock motor locking overcurrent.	• RLDCU • Harness and connector • Rear left door lock

Circuit diagram



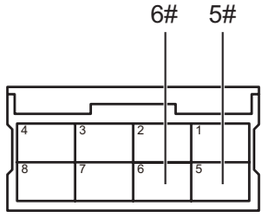
Inspection procedure

1	**Check rear left door lock harness and connector for open circuit**



RLDCU connector

ED03311RM



Rear left door lock connector

ED03321RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the RLDCU connector.

(d) Disconnect the rear left door lock connector.

(e) Measure the resistance according to the values in the table below.

Standard value

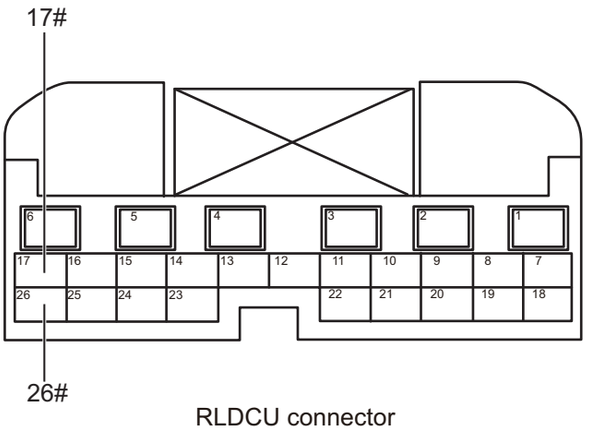
Detector connection	Detection conditions	Specified state
RLDCU connector 26# -rear left door lock connector 5#	Always connected	Less than 1Ω
RLDCU connector 17# -rear left door lock connector 6#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check rear left door lock harness and connector for circuit shorted to ground**

ED



RLDCU connector

ED03311RM

(a) Measure the resistance according to the values in the table below.

Standard value

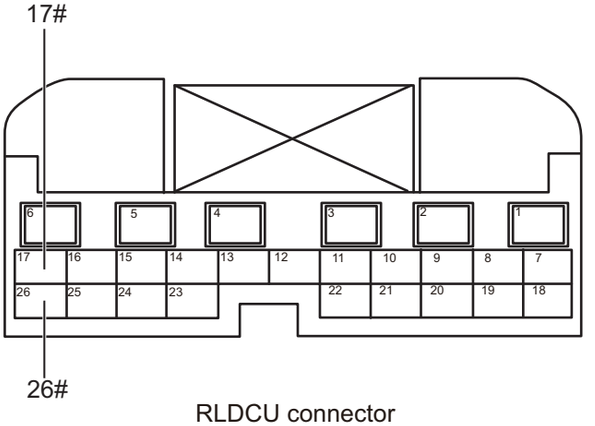
Detector connection	Detection conditions	Specified state
RLDCU connector 26# -body GND	Always connected	10 KΩ or greater
RLDCU connector 17# -body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

3	**Check rear left door lock harness and connector for circuit shorted to power supply**

ED



RLDCU connector

ED03311RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
RLDCU connector 26# -body GND	The ignition switch is set to "ON"	Less than 1 V
RLDCU connector 17# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace rear left door lock (See page DL-12)**

(a) Replace the rear left door lock.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the RLDCU (See page ED-32)**

OK

5	**End**

DTC	**U002888**	**Comfort CAN bus off**
DTC	**U014687**	**GW node lost**
DTC	**U014087**	**BCM 1 node lost**
DTC	**U016487**	**A/C control unit node lost**
DTC	**U019987**	**Driver door module node lost**
DTC	**U020287**	**Rear right door module node lost**
DTC	**U112187**	**ESP message lost**
DTC	**U115187**	**ACU message lost**
DTC	**U024687**	**SCCU node lost**
DTC	**U110087**	**ECM message lost**
DTC	**U115587**	**Instrument cluster control unit message lost**
DTC	**U129387**	**HCU message lost**

Description

When the communication between the RLDCU and other systems is abnormal or interrupted, the RLDCU records the DTC.

DTC	DTC detection conditions	Faulty location
U002888	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U016487	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U019987	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U020287	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U112187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U024687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

DTC	DTC detection conditions	Faulty location
U115587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U129387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

Rear right door control system

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Warning:

Before repairing the high voltage system or adjacent high voltage system components, be sure to carefully read the "Instructions and precautions for maintenance work" in the introduction carefully!

2. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

3. when the battery cable is disconnected and reconnected, some systems require initialization.

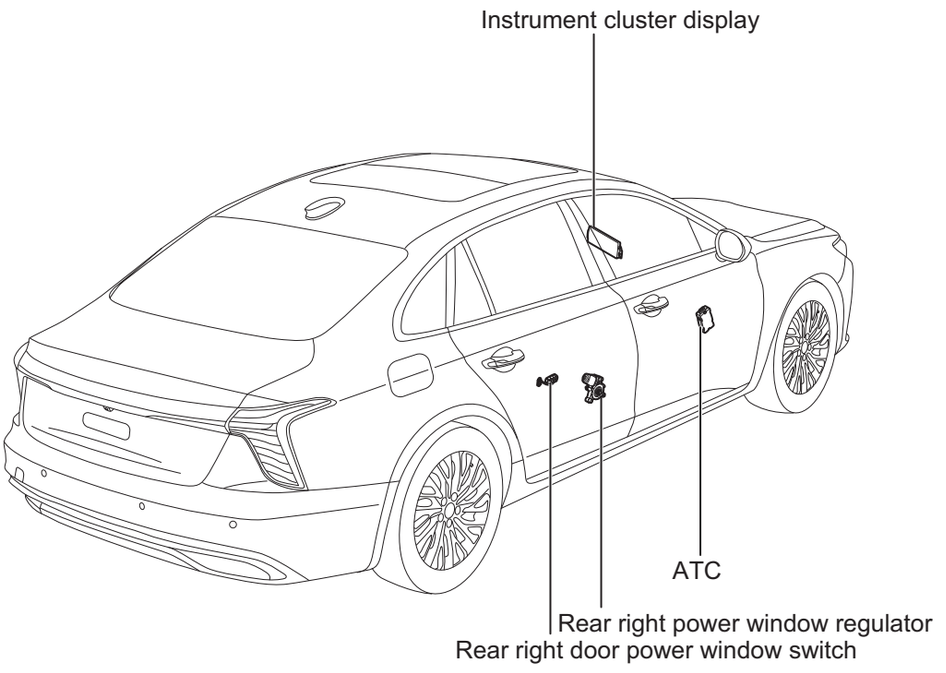
4. General repair instructions

(a) When checking the rear right door control system, it may affect the airbag work. Therefore, before carrying out maintenance work, be sure to carefully read and confirm the precautions for airbag.

(b) When parts need to be replaced or the connector needs to be disconnected during maintenance of rear right door control system, the battery negative cable shall be disconnected.

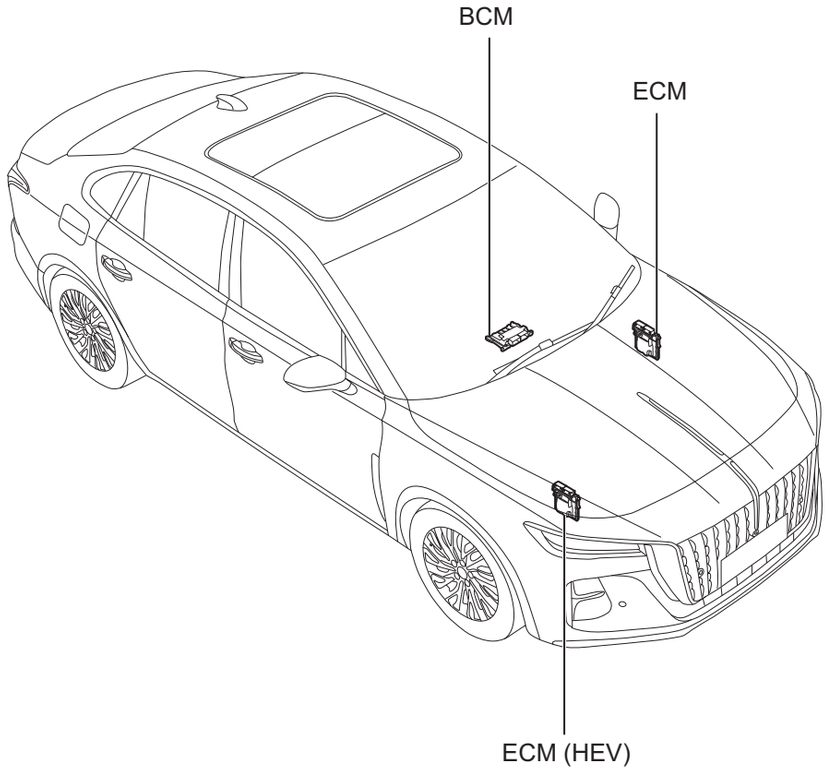
(c) The rear right door control system needs to be initialized after reconnecting the battery. And use the HQ-VDS to "clear the DTC" for all electronic control systems.

Location of parts



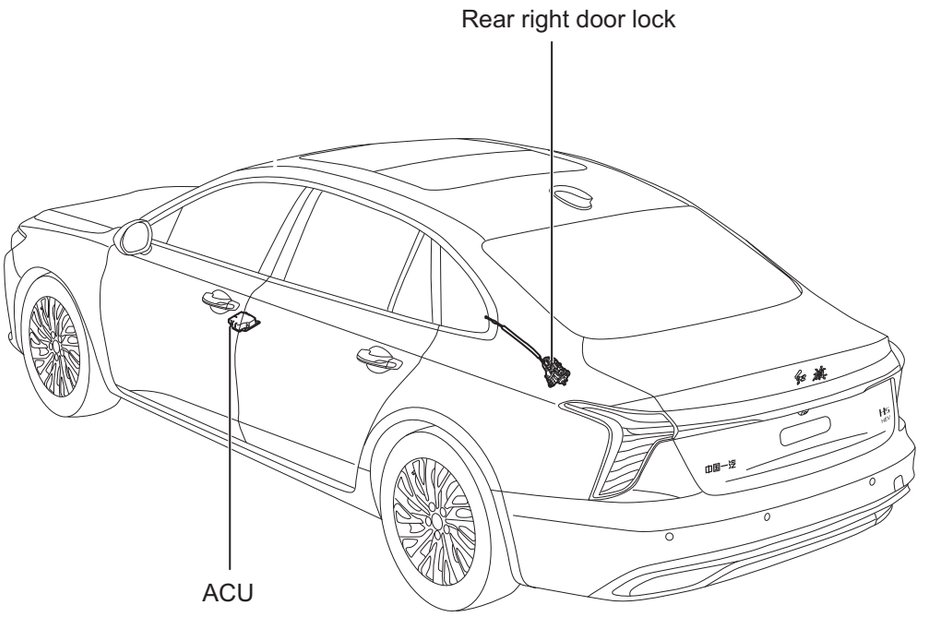
ED00420RM

Location of parts



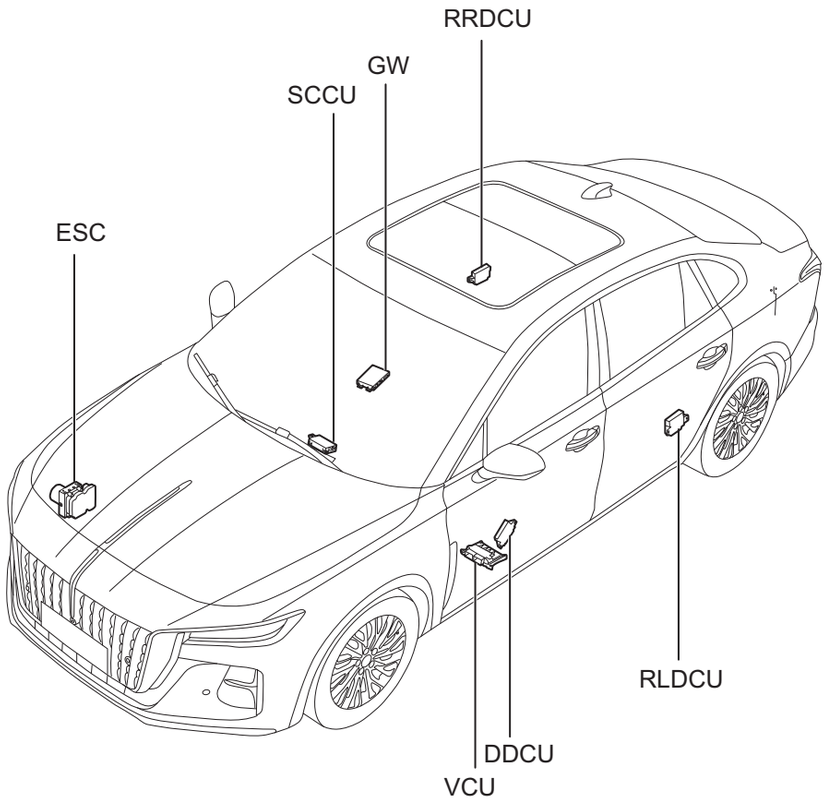
ED00430RM

Location of parts



ED00440RM

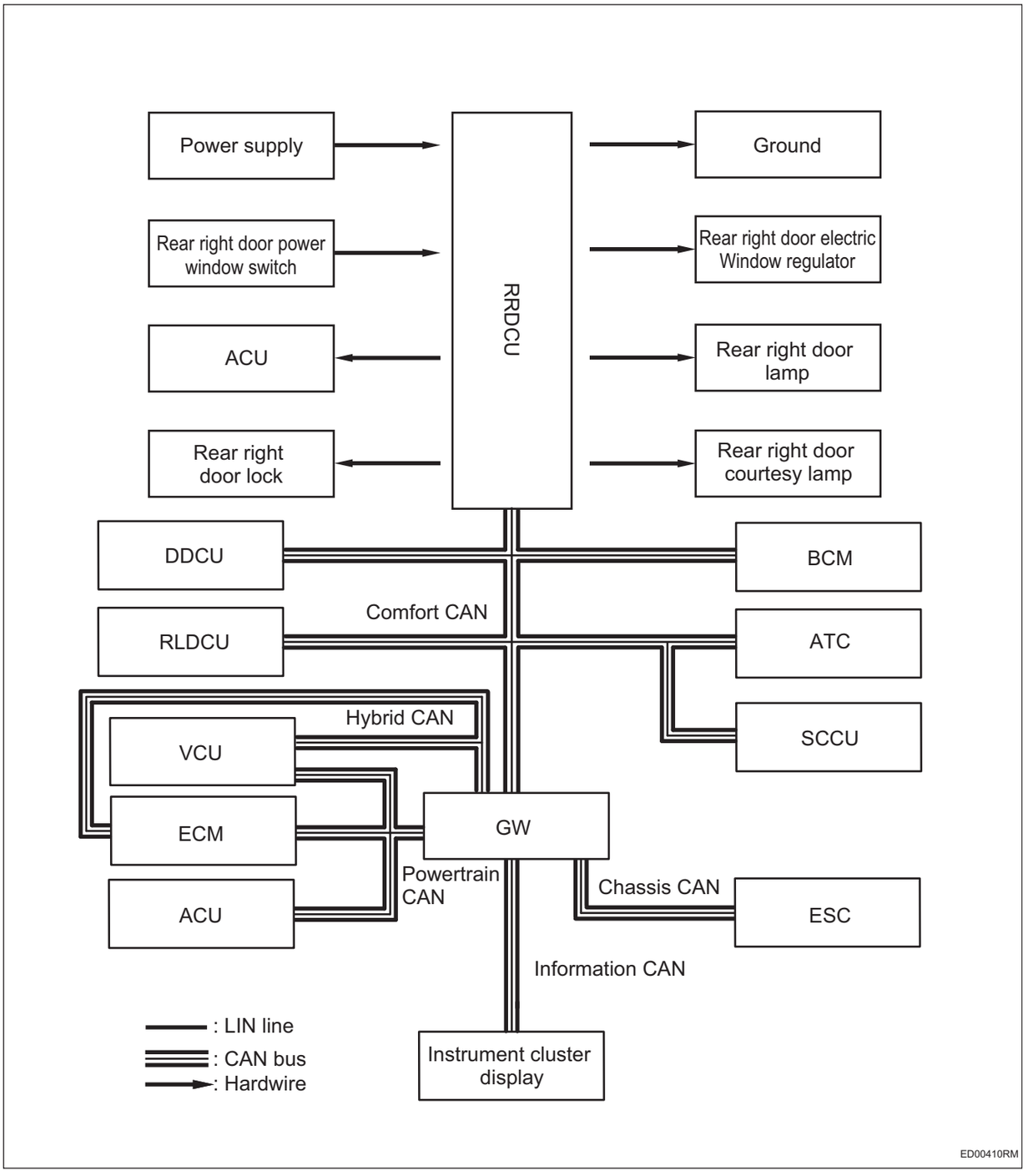
Location of parts



ED00450RM

System diagram

RRDCU



System description

1. RRDCU

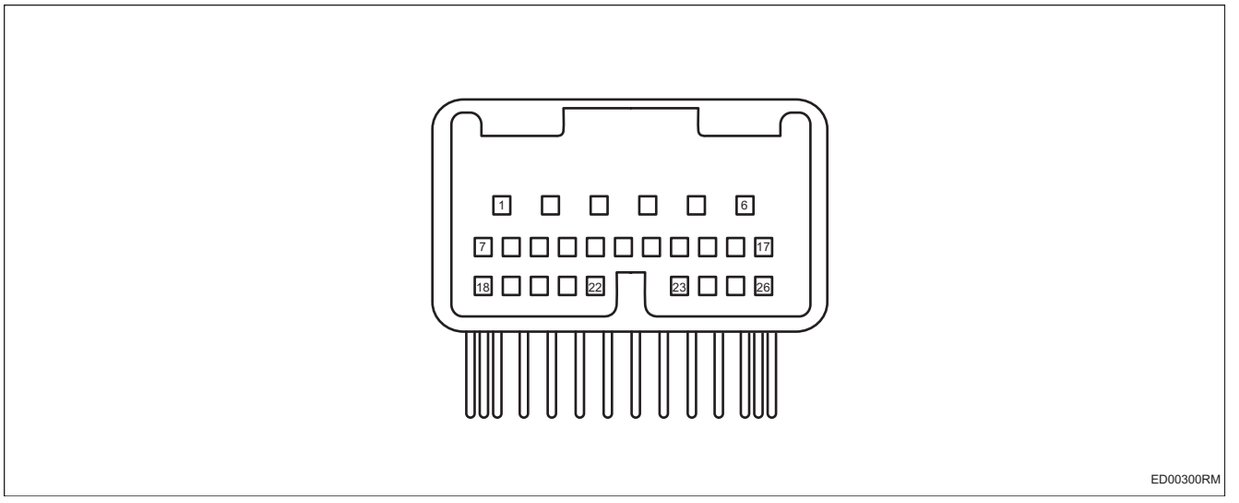
(a) The RRDCU mainly realizes the detection of windows, door lock, door status and lock status, and the driving of door lamps; The vehicle is equipped with a control unit for each door.

Symptom chart

Fault	Possible location
Window lifting/lowering abnormity	• Power window switch • Related harness and connector • DCU • Power window regulator • Battery
Door unlocking abnormity	• Central locking switch • Related harness and connector • DCU • Door lock • Battery

ECU terminal

RRDCU



RRDCU			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Power supply	14	Switch backlight power supply
2	Power GND	15	-
3	Window lifting	16	CAN-L
4	Window lowering	17	Rear right door locking output
5	-	18	-
6	-	19	Rear right door lock status switch
7	Rear right door lamp/door sill trim strip LED lamp	20	-
8	-	21	Rear right seat heater switch
9	Rear right door lock locking signal	22	-
10	Rear right door unlocking signal	23	Rear right seat heater working indicator lamp
11	Hardwired impact signal	24	Analog GND
12	Rear right door window switch	25	-
13	CAN-H	26	Rear right door lock unlocking output

DTC chart

RRDCU

DTC	Description	Reference page
B11C017	Battery overvoltage	(See page ED-124)
B11C016	Battery undervoltage	(See page ED-124)
B11C111	Rear right door window Up button stuck	(See page ED-127)

DTC	Description	Reference page
B11C311	Rear right door window Down button stuck	(See page ED-127)
B11C518	Rear right door window motor output current low	(See page ED-131)
B11C519	Rear right door window motor output current high	(See page ED-131)
B11C618	Central lock motor unlocking undercurrent	(See page ED-135)
B11C619	Central lock motor unlocking overcurrent	(See page ED-135)
B11C718	Central lock motor locking undercurrent	(See page ED-135)
B11C719	Central lock motor locking overcurrent	(See page ED-135)
U002888	Comfort CAN bus off	(See page ED-139)
U014687	GW node lost	(See page ED-139)
U014087	BCM 1 node lost	(See page ED-139)
U016487	A/C control unit node lost	(See page ED-139)
U019987	Driver door module node lost	(See page ED-139)
U020187	Rear left door module node lost	(See page ED-139)
U112187	ESP message lost	(See page ED-139)
U115187	ACU message lost	(See page ED-139)
U024687	SCCU node lost	(See page ED-139)
U115187	Instrument cluster control unit message lost	(See page ED-139)
U110087	ECM message lost	(See page ED-139)
U129387	HCU message lost	(See page ED-139)

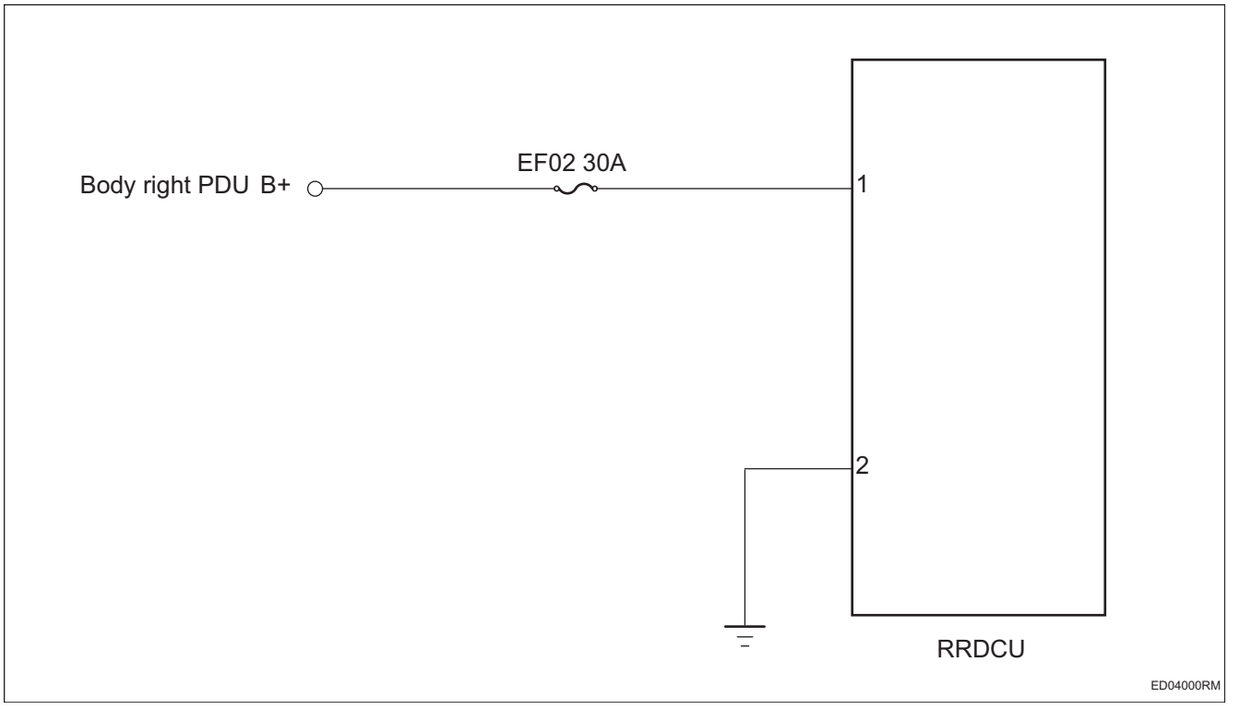
DTC	B11C017	Battery overvoltage
DTC	B11C016	Battery undervoltage

Description

When the RRDCU power supply voltage exceeds the normal operating range, the RRDCU records the DTC.

DTC	DTC detection conditions	Faulty location
B11C017	(a) Battery overvoltage.	• RRDCU • Fuse • Harness and connector • Charging system
B11C016	(a) Battery undervoltage.	• RRDCU • Fuse • Harness and connector • Charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2 **Check RRDCU fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the RRDCU fuse.

(d) Measure the resistance according to the values in the table below.

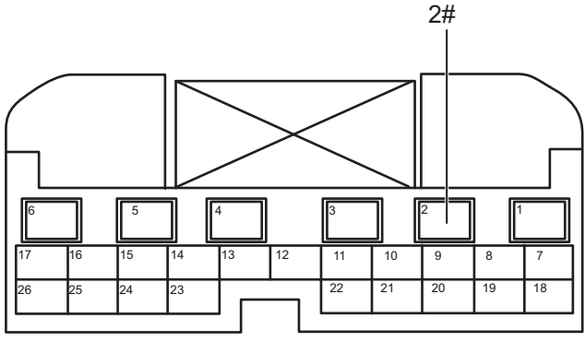
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3 **Check RRDCU ground**



RRDCU connector

ED04010RM

(a) Disconnect the RRDCU connector.

(b) Measure the resistance according to the values in the table below.

ED

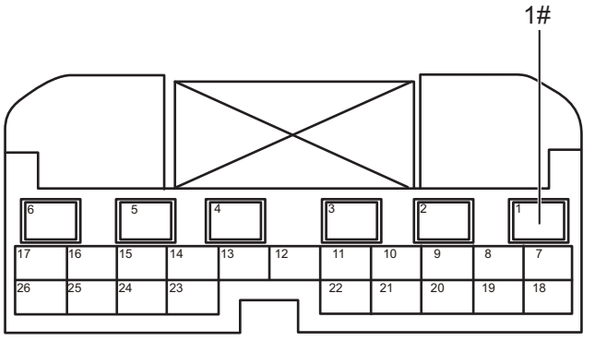
Standard value

Detector connection	Detection conditions	Specified state
RRDCU connector 2# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check RRDCU power supply**



RRDCU connector

ED04021RM

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
RRDCU connector 1# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace the RRDCU (See page ED-32)**

ED

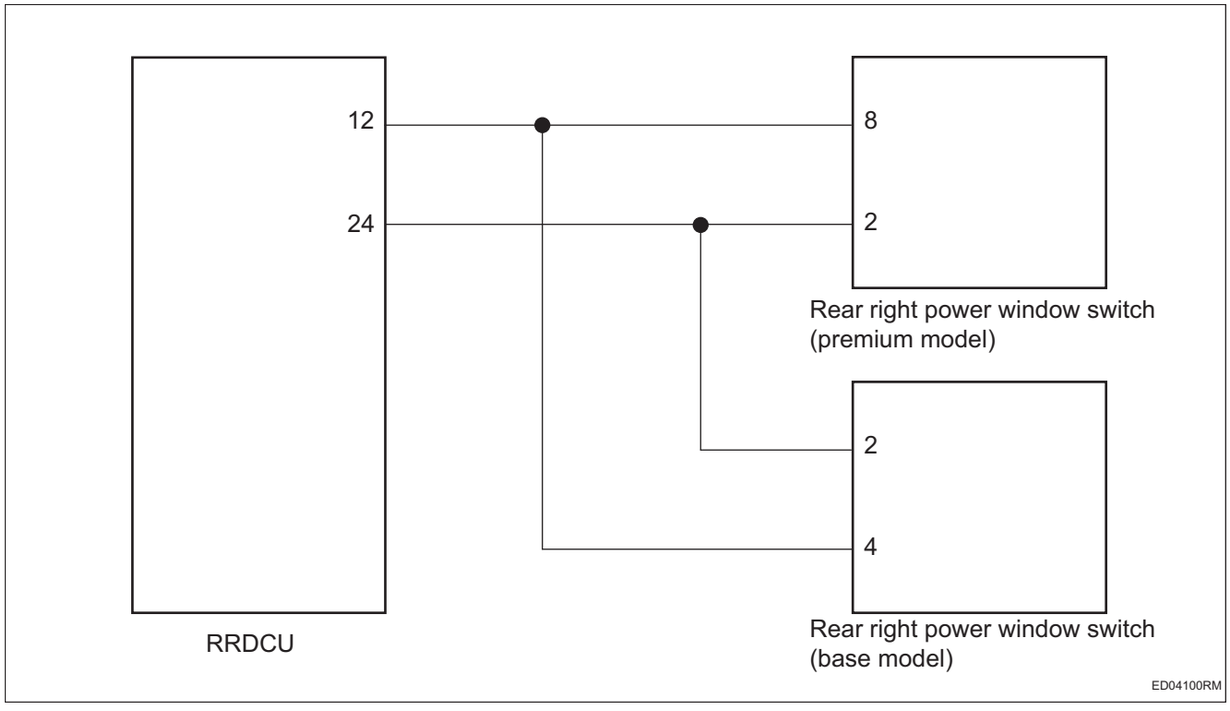
DTC	B11C111	Rear right door window Up button stuck
DTC	B11C311	Rear right door window Down button stuck

Description

When the rear right power window switch fails, RRDCU records the DTC.

DTC	DTC detection conditions	Faulty location
B11C111	(a) Rear right door window Up button stuck.	• RRDCU • Harness and connector • Rear right power window switch
B11C311	(a) Rear right door window Down button stuck.	• RRDCU • Harness and connector • Rear right power window switch

Circuit diagram



Inspection procedure

1	Check rear right power window switch

(a) Check the rear right power window switch for foreign matter.

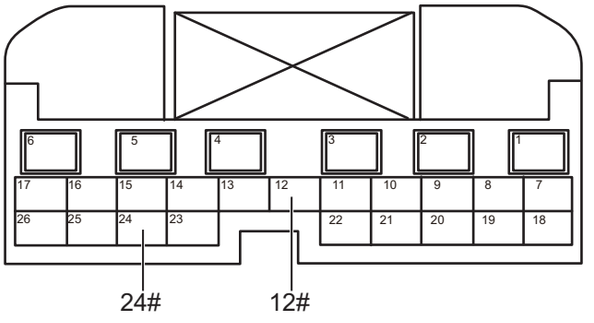
(b) Check whether the rear right power window switch is stuck.

NG	Repair according to the fault

ED

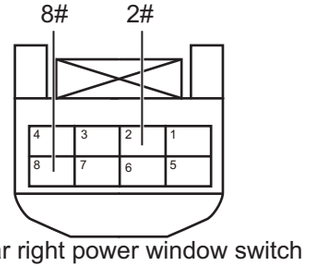
OK

2	**Check rear right power window switch harness and connector for open circuit**

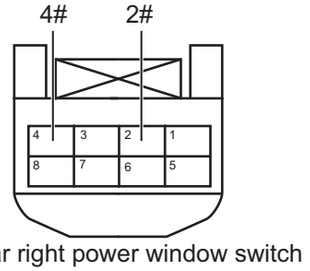


RRDCU connector

ED04111RM



Rear right power window switch (premium model) connector



Rear right power window switch (base model) connector

ED04120RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the RRDCU connector.

(d) Disconnect the rear right power window switch connector.

(e) Measure the resistance according to the values in the table below.

Standard value

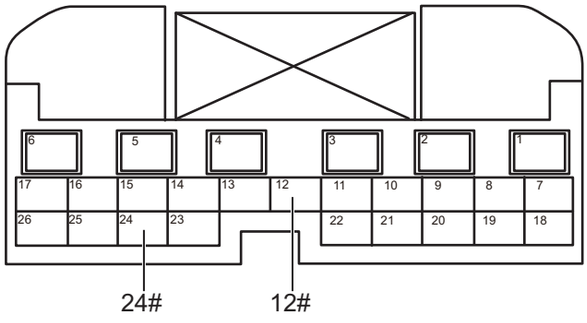
Detector connection	Detection conditions	Specified state
RRDCU connector 12# - rear right power window switch (premium model) connector 8#	Always connected	Less than 1Ω
RRDCU connector 24# - rear right power window switch (premium model) connector 2#	Always connected	Less than 1Ω
RRDCU connector 12# - rear right power window switch (base model) connector 4#	Always connected	Less than 1Ω
RRDCU connector 24# - rear right power window switch (base model) connector 2#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	**Check rear right power window switch harness and connector for circuit shorted to ground**

ED



RRDCU connector

ED04111RM

(a) Measure the resistance according to the values in the table below.

Standard value

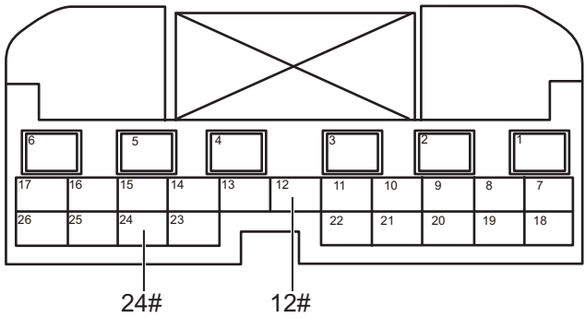
Detector connection	Detection conditions	Specified state
RRDCU connector 24# -body GND	Always connected	10 KΩ or greater
RRDCU connector 12# -body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

4	**Check rear right power window switch harness and connector for circuit shorted to power supply**

ED



RRDCU connector

ED04111RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
RRDCU connector 24# -body GND	The ignition switch is set to "ON"	Less than 1 V
RRDCU connector 12# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the rear right power window switch (See page IR-18)**

(a) Replace the rear right power window switch.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the RRDCU (See page ED-32)**

ED

OK

6	**End**

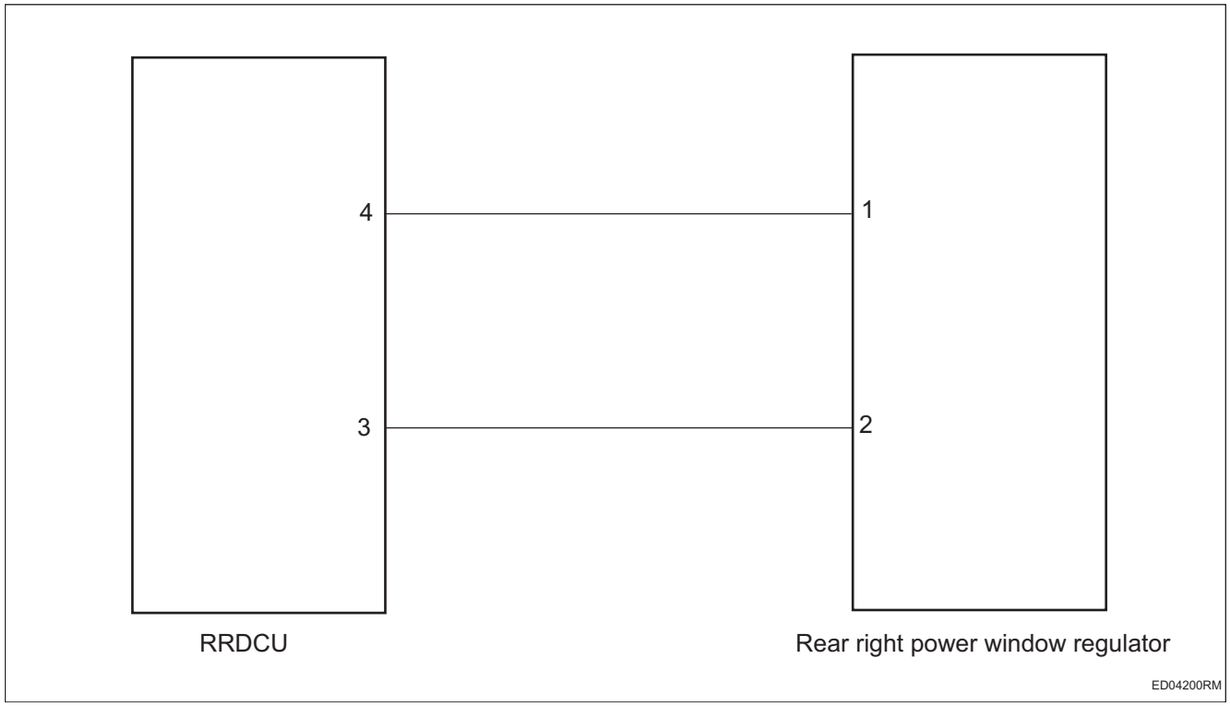
DTC	**B11C518**	**Rear right door window motor output current low**
DTC	**B11C519**	**Rear right door window motor output current high**

Description

When the rear right power window regulator output current is abnormal, the RRDCU will record the DTC.

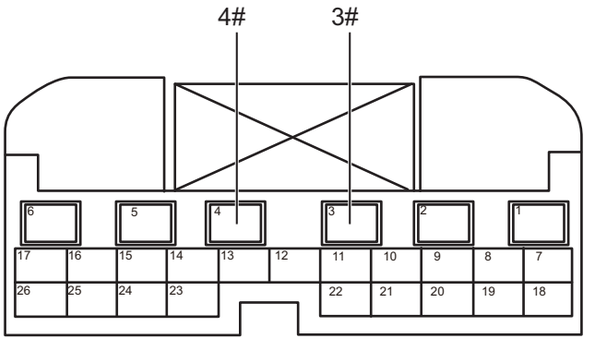
DTC	DTC detection conditions	Faulty location
B11C518	(a) Rear right door window motor output undercurrent.	• RRDCU • Harness and connector • Rear right power window regulator
B11C519	(a) Rear right door window motor output current high.	• RRDCU • Harness and connector • Rear right power window regulator

Circuit diagram



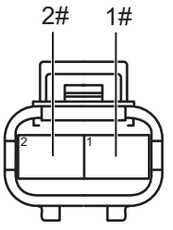
Inspection procedure

1	**Check rear right power window regulator harness and connector for open circuit**



RRDCU connector

ED04211RM



Rear right power window regulator connector

ED04220RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the RRDCU connector.

(d) Disconnect the rear right power window regulator connector.

(e) Measure the resistance according to the values in the table below.

Standard value

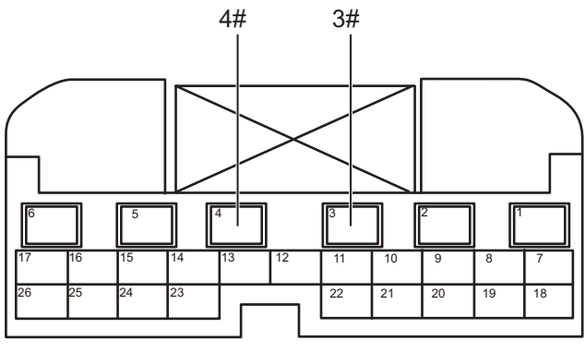
Detector connection	Detection conditions	Specified state
RRDCU connector 4# -rear right power window regulator connector 1#	Always connected	Less than 1Ω
RRDCU connector 3# -rear right power window regulator connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

ED

OK

2	**Check rear right power window regulator harness and connector for circuit shorted to ground**



RRDCU connector

ED04211RM

(a) Measure the resistance according to the values in the table below.

Standard value

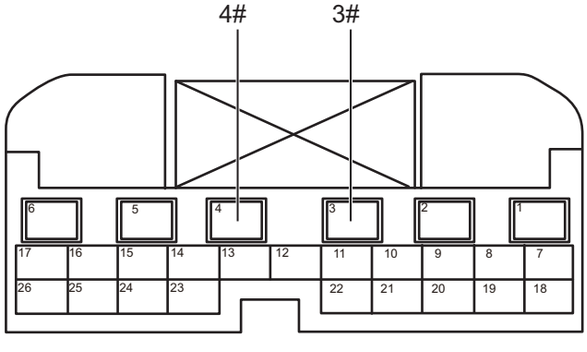
Detector connection	Detection conditions	Specified state
RRDCU connector 3# -body GND	Always connected	10 KΩ or greater
RRDCU connector 4# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check rear right power window regulator harness and connector for circuit shorted to power supply**

ED



RRDCU connector

ED04211RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
RRDCU connector 3# -body GND	The ignition switch is set to "ON"	Less than 1 V
RRDCU connector 4# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the rear right power window regulator (See page ED-20)**

(a) Replace the rear right power window regulator.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the RRDCU (See page ED-32)**

ED

OK

5	**End**

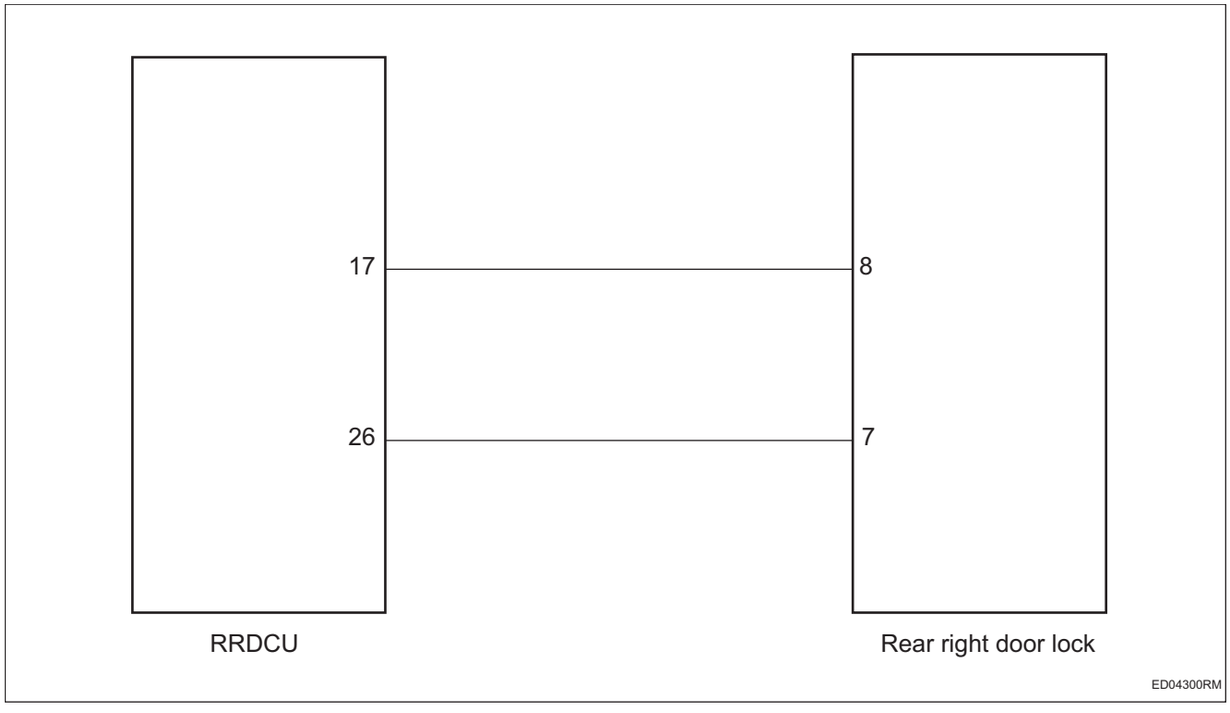
DTC	**B11C618**	**Central lock motor unlocking undercurrent**
DTC	**B11C619**	**Central lock motor unlocking overcurrent**
DTC	**B11C718**	**Central lock motor locking undercurrent**
DTC	**B11C719**	**Central lock motor locking overcurrent**

Description

When the working current of the rear right door lock exceeds the normal range, the RRDCU records the DTC.

DTC	DTC detection conditions	Faulty location
B11C618	(a) Central lock motor unlocking undercurrent.	• RRDCU • Harness and connector • Rear right door lock
B11C619	(a) Central lock motor unlocking overcurrent.	• RRDCU • Harness and connector • Rear right door lock
B11C718	(a) Central lock motor locking undercurrent.	• RRDCU • Harness and connector • Rear right door lock
B11C719	(a) Central lock motor locking overcurrent.	• RRDCU • Harness and connector • Rear right door lock

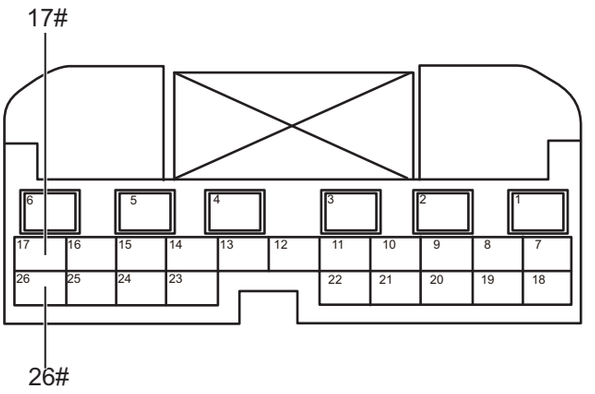
Circuit diagram



ED

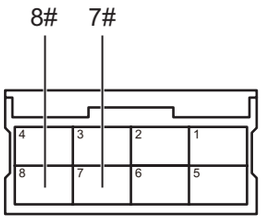
Inspection procedure

1	**Check rear right door lock harness and connector for open circuit**



RRDCU connector

ED04311RM



Rear right door lock connector

ED04320RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the RRDCU connector.

(d) Disconnect the rear right door lock connector.

(e) Measure the resistance according to the values in the table below.

Standard value

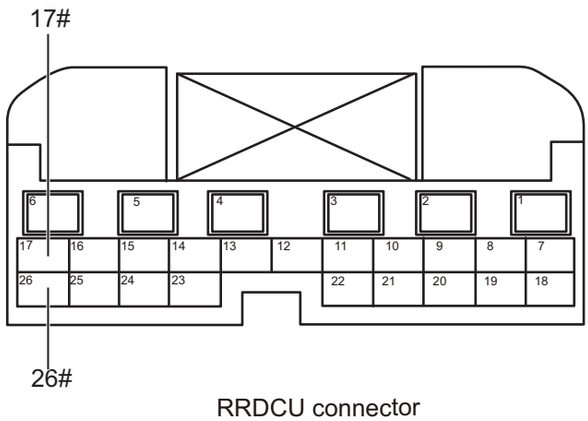
Detector connection	Detection conditions	Specified state
RRDCU connector 17# -rear right door lock connector 8#	Always connected	Less than 1Ω
RRDCU connector 26# -rear right door lock connector 7#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check rear right door lock harness and connector for circuit shorted to ground**

ED



RRDCU connector

ED04311RM

(a) Measure the resistance according to the values in the table below.

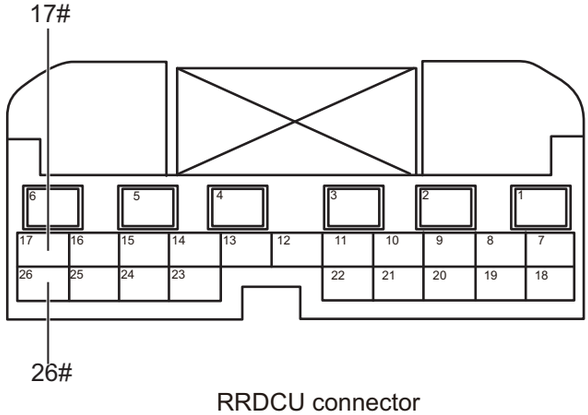
Standard value

Detector connection	Detection conditions	Specified state
RRDCU connector 17# -body GND	Always connected	10 KΩ or greater
RRDCU connector 26# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check rear right door lock harness and connector for circuit shorted to power supply**



RRDCU connector

ED04311RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

ED

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
RRDCU connector 17# -body GND	The ignition switch is set to "ON"	Less than 1 V
RRDCU connector 26# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace rear right door lock (See page DL-12)**

(a) Replace the rear right door lock.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the RRDCU (See page ED-32)**

OK

5	**End**

DTC	**U002888**	**Comfort CAN bus off**
DTC	**U014687**	**GW node lost**
DTC	**U014087**	**BCM 1 node lost**
DTC	**U016487**	**A/C control unit node lost**
DTC	**U019987**	**Driver door module node lost**
DTC	**U020187**	**Rear left door module node lost**
DTC	**U112187**	**ESP message lost**
DTC	**U115187**	**ACU message lost**
DTC	**U024687**	**SCCU node lost**
DTC	**U115187**	**Instrument cluster control unit message lost**
DTC	**U110087**	**ECM message lost**
DTC	**U129387**	**HCU message lost**

Description

When the communication between the RRDCU and other systems is abnormal or interrupted, the RRDCU records the DTC.

DTC	DTC detection conditions	Faulty location
U002888	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U016487	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U019987	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U020187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U112187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U024687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

DTC	DTC detection conditions	Faulty location
U110087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U129387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

Door control system (one-drive-two)

Front left door control system ED-1
Precautions ED-1
Location of parts ED-3
System diagram ED-6
System description ED-9
Symptom chart ED-9
ECU terminal ED-10
DTC chart ED-11
B110017 ..... ED-14
B110016 ..... ED-14
B110111 ..... ED-17
B110211 ..... ED-17
B110311 ..... ED-17
B110411 ..... ED-17
B110511 ..... ED-17
B110611 ..... ED-17
B110711 ..... ED-17
B110811 ..... ED-17
B110918 ..... ED-23
B110919 ..... ED-23
B110A19 ..... ED-27
B110B19 ..... ED-27
B110C19 ..... ED-27
B110D19 ..... ED-27
B110E11 ..... ED-32
B110F11 ..... ED-32
B111011 ..... ED-32
B111111 ..... ED-32
B111511 ..... ED-32
B111611 ..... ED-32
B111711 ..... ED-32
B111811 ..... ED-32
B111911 ..... ED-32
B111211 ..... ED-38
B111311 ..... ED-38
B111C18 ..... ED-42
B111C19 ..... ED-42
B111D18 ..... ED-42
B111D19 ..... ED-42

B111E11 .....ED-47
B118111 .....ED-50
B118311 .....ED-50
B118518 .....ED-55
B118519 .....ED-55
B118618 .....ED-59
B118619 .....ED-59
B118718 .....ED-59
B118719 .....ED-59
U002888 .....ED-64
U014687 .....ED-64
U014087 .....ED-64
U024687 .....ED-64
U020287 .....ED-64
U016487 .....ED-64
U112187 .....ED-64
U115187 .....ED-64
U124387 .....ED-64
U115587 .....ED-64
U123287 .....ED-64
U110087 .....ED-64
U114687 .....ED-64
U129387 .....ED-64
Front right door control system ED-66
Precautions ED-66
Location of parts ED-68
System diagram ED-71
System description ED-74
Symptom chart ED-74
ECU terminal ED-75
DTC chart ED-76
B114017 .....ED-78
B114016 .....ED-78
B114111 .....ED-81
B114211 .....ED-81
B114318 .....ED-85
B114319 .....ED-85
B114419 .....ED-89
B114519 .....ED-89
B114619 .....ED-89
B114719 .....ED-89
B114818 .....ED-94

B114819 ..... ED-94
B114918 ..... ED-94
B114919 ..... ED-94
B114A11 ..... ED-99
B11C111 ..... ED-102
B11C311 ..... ED-102
B11C518 ..... ED-107
B11C519 ..... ED-107
B11C618 ..... ED-111
B11C619 ..... ED-111
B11C718 ..... ED-111
B11C719 ..... ED-111
U002888 ..... ED-116
U014687 ..... ED-116
U014087 ..... ED-116
U016487 ..... ED-116
U019987 ..... ED-116
U024687 ..... ED-116
U124387 ..... ED-116
U112187 ..... ED-116
U115187 ..... ED-116
U124587 ..... ED-116
U123287 ..... ED-116
U110187 ..... ED-116
U110087 ..... ED-116
U114687 ..... ED-116
U115587 ..... ED-116
U129387 ..... ED-116

Front left door control system

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Warning:

Be sure to carefully read the Maintenance Instructions and Precautions in the introduction before repairing the high voltage system or near the high voltage system components!

2. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

3. when the battery cable is disconnected and reconnected, some systems require initialization.

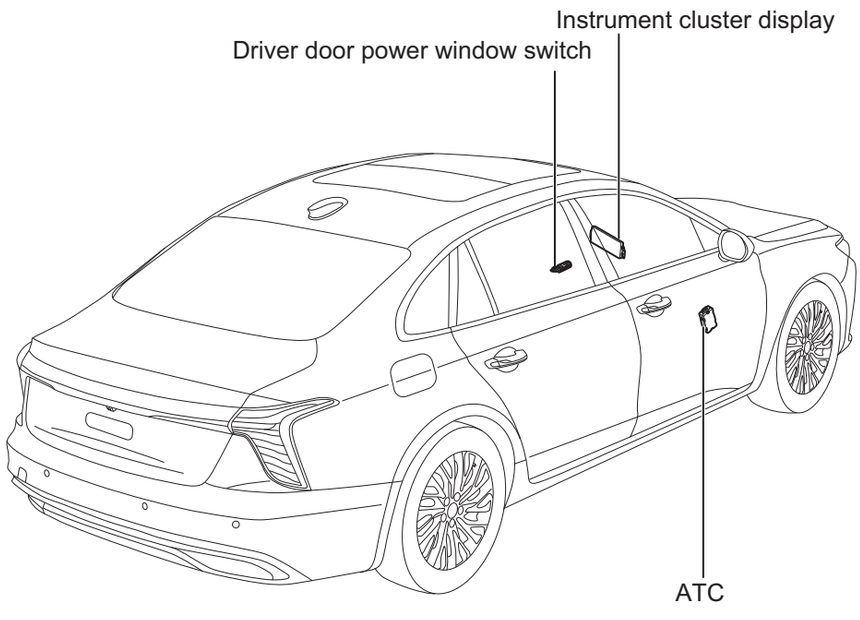
4. General repair instructions

(a) When checking the driver door control system, it may affect the operation of the airbag. Therefore, before carrying out maintenance work, be sure to carefully read and confirm the precautions for airbag.

(b) When parts need to be replaced or the connector needs to be disconnected during maintenance of driver door control system, the battery negative cable shall be disconnected.

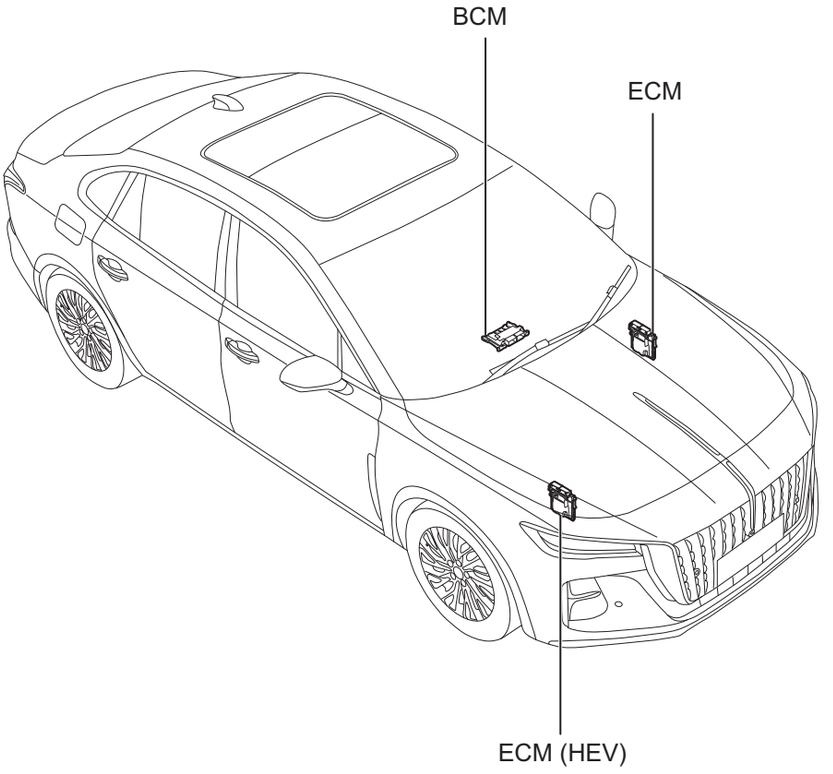
(c) The driver door control system needs to be initialized after reconnecting the battery. And use the HQ-VDS to "clear the DTC" for all electronic control systems.

Location of parts



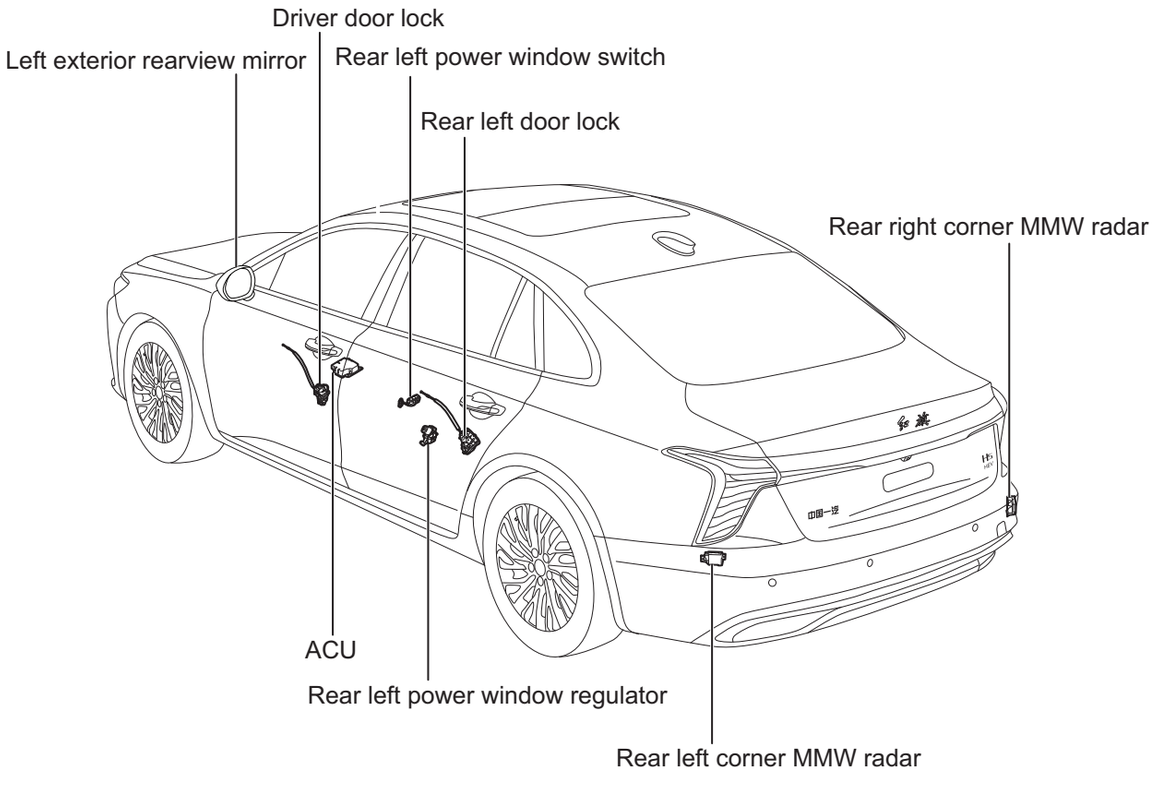
ED60050RM

Location of parts



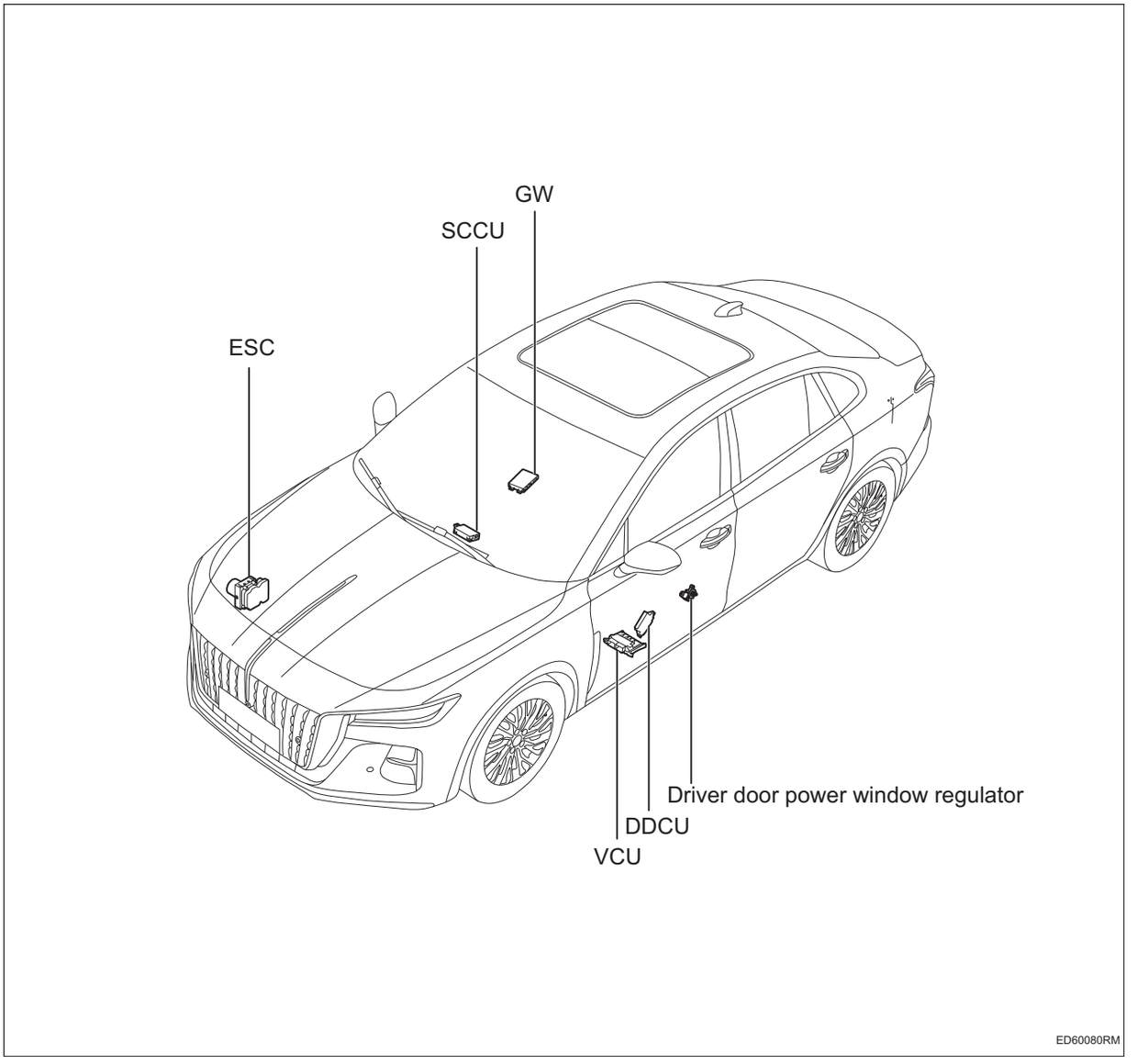
ED60060RM

Location of parts



ED60070RM

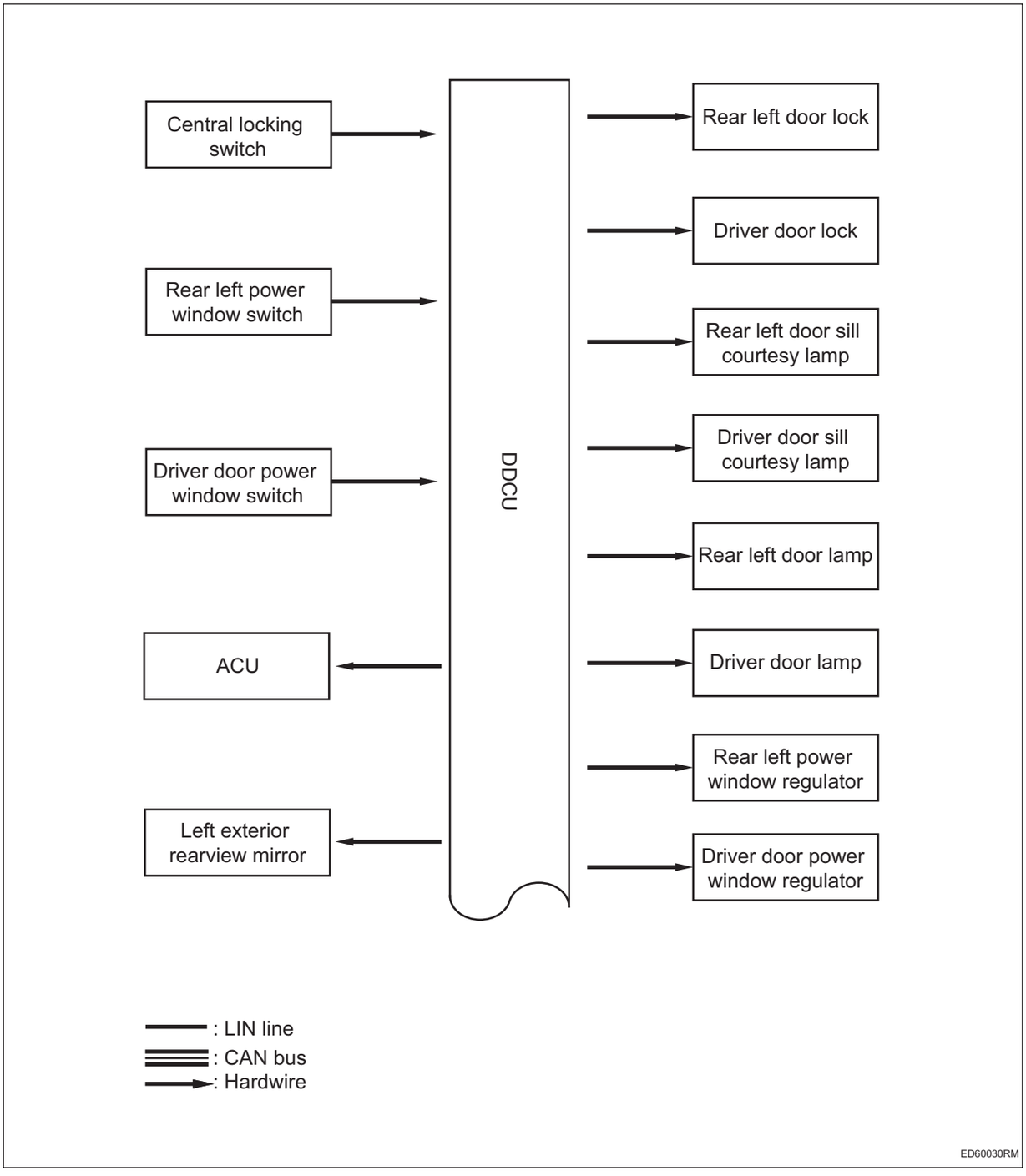
Location of parts

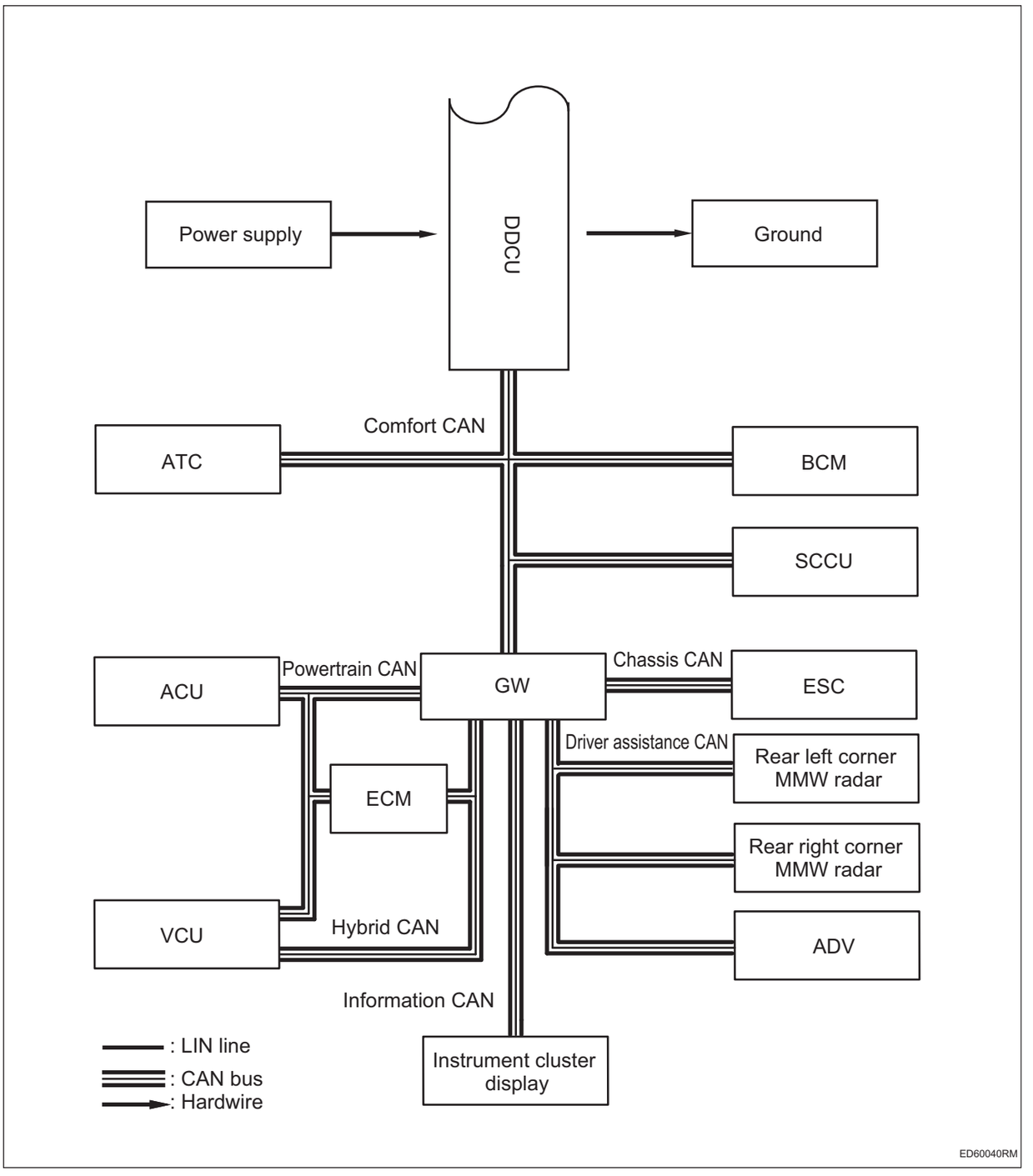


ED

System diagram

DDCU


Central locking switch
Rear left power window switch
Driver door power window switch
ACU
Left exterior rearview mirror
DDCU
Rear left door lock
Driver door lock
Rear left door sill courtesy lamp
Driver door sill courtesy lamp
Rear left door lamp
Driver door lamp
Rear left power window regulator
Driver door power window regulator
: LIN line
: CAN bus
: Hardwire
ED60030RM


Power supply
DDCU
Ground
Comfort CAN
ATC
BCM
SCCU
ACU
Powertrain CAN
GW
Chassis CAN
ESC
Driver assistance CAN
Rear left corner MMW radar
ECM
Rear right corner MMW radar
VCU
Hybrid CAN
ADV
Information CAN
: LIN line
: CAN bus
: Hardwire
Instrument cluster display
ED60040RM

System description

1. DDCU

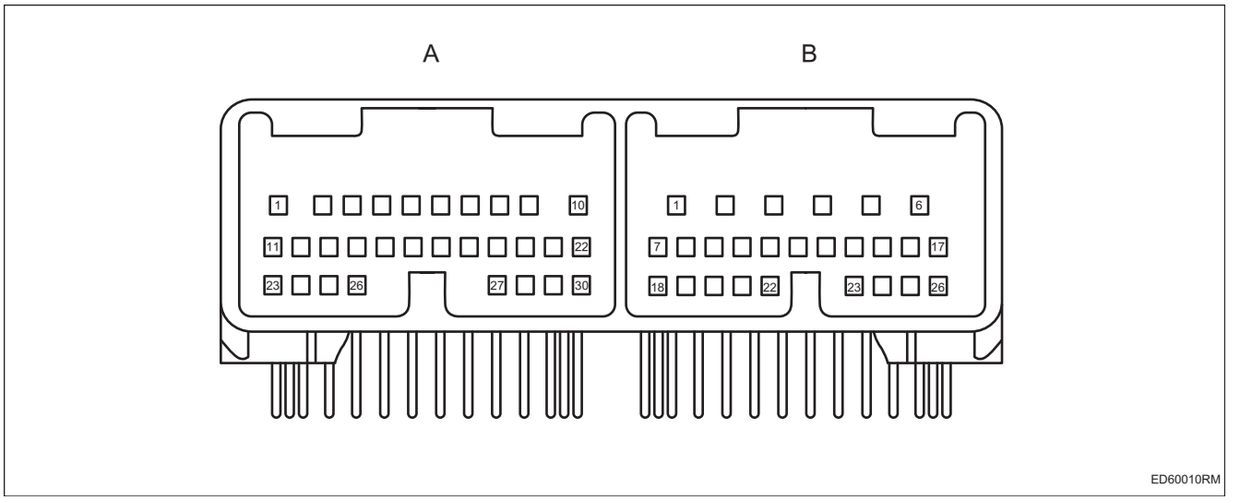
(a) The DDCU mainly realizes the detection of left window, door lock, rearview mirror, door status and lock status, and drives the door lamps.

Symptom chart

Fault	Possible location
Window lifting/lowering abnormity	• Power window switch • Related harness and connector • DCU • Power window regulator • Battery
Abnormal exterior rearview mirror operation	• Driver door power window switch • Exterior rearview mirror • DCU • Related harness and connector • Battery
Door unlocking abnormity	• Central locking switch • Related harness and connector • DCU • Door lock • Battery

ECU terminal

DDCU



DDCU A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Driver door/rear left door lock locking output	16	Central unlocking input
2	Rearview mirror heating indicator lamp	17	Driver door locking signal
3	BSD status indicator lamp	18	Hardwired impact signal
4	Rear window locking indicator lamp	19	Rear left door status switch
5	Left exterior rearview mirror selection indicator lamp	20	Right exterior rearview mirror selection indicator lamp
6	-	21	Central locking input
7	Central locking indicator lamp	22	-
8	Driver door unlocking output	23	Rear left door unlocking signal
9	Rear left door unlocking output	24	Rear left door locking signal
10	-	25	-
11	Driver door unlocking signal	26	CAN-H
12	Mechanical key unlocking switch	27	Switch backlight output (left front)
13	Driver door status switch	28	Rear left seat heater switch
14	CAN-L	29	-
15	Mechanical key locking switch	30	Passenger side left rear window switch

DDCU B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Power supply	14	Rearview mirror function selection switch
2	Power GND	15	Driver side left front window switch
3	Left front window lifting	16	Driver side right front window switch
4	Left front window lowering	17	-

DDCU B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
5	Left rear window lifting	18	Driver door door lamp/sill trim strip
6	Left rear window down	19	Left exterior rearview mirror unfolding
7	Left exterior rearview mirror left/upward adjustment/folding	20	Left front rearview mirror heater
8	Left exterior rearview mirror right adjustment	21	Rear window lock switch
9	Left exterior rearview mirror downward adjustment	22	Switch simulation GND (rearview mirror memory ground)
10	Rear left door lamp	23	Rear left seat heater indicator lamp
11	Rearview mirror position memory power supply	24	Exterior rearview mirror upper/lower position memory signal
12	Driver side right rear window switch	25	Left exterior rearview mirror adjustment switch
13	Driver side left rear window switch	26	Left exterior rearview mirror left and right position memory signal

DTC chart

DDCU

DTC	Description	Reference page
B110017	Battery overvoltage	(See page ED-14)
B110016	Battery undervoltage	(See page ED-14)
B110111	Driver door window Up button stuck	(See page ED-17)
B110211	Passenger door window Up button stuck	(See page ED-17)
B110311	Rear left door window Up button stuck	(See page ED-17)
B110411	Rear right door window Up button stuck	(See page ED-17)
B110511	Driver door window Down button stuck	(See page ED-17)
B110611	Passenger door window Down button stuck	(See page ED-17)
B110711	Rear left door window Down button stuck	(See page ED-17)
B110811	Rear right door window Down button stuck	(See page ED-17)
B118111	Rear left door window Up button stuck	(See page ED-50)
B118311	Rear left door window Down button stuck	(See page ED-50)
B110918	Driver door window motor output current low	(See page ED-23)
B110919	Driver door window motor output current high	(See page ED-23)
B118518	Rear left door window motor output current low	(See page ED-55)
B118519	Rear left door window motor output current high	(See page ED-55)
B110A19	Rearview mirror upper adjustment output overcurrent	(See page ED-27)
B110B19	Rearview mirror lower adjustment output overcurrent	(See page ED-27)

DTC	Description	Reference page
B110C19	Rearview mirror left adjustment output overcurrent	(See page ED-27)
B110D19	Rearview mirror right adjustment overcurrent	(See page ED-27)
B110E11	Rearview mirror upward adjustment button stuck	(See page ED-32)
B110F11	Rearview mirror downward adjustment button stuck	(See page ED-32)
B111011	Rearview mirror left adjustment button stuck	(See page ED-32)
B111111	Rearview mirror right adjustment button stuck	(See page ED-32)
B111211	Central unlocking button stuck	(See page ED-38)
B111311	Central locking button stuck	(See page ED-38)
B111511	Rearview mirror left selection button stuck	(See page ED-32)
B111611	Rearview mirror right selection button stuck	(See page ED-32)
B111711	Rearview mirror heater button stuck	(See page ED-32)
B111811	Rearview mirror folding/unfolding button stuck	(See page ED-32)
B111911	Rear window locking button stuck	(See page ED-32)
B111C18	Left front central lock motor unlocking undercurrent	(See page ED-42)
B111C19	Left front central lock motor unlocking overcurrent	(See page ED-42)
B111D18	Left front central lock motor locking undercurrent	(See page ED-42)
B111D19	Left front central lock motor locking overcurrent	(See page ED-42)
B118618	Left rear central lock motor unlocking undercurrent	(See page ED-59)
B118619	Left rear central lock motor unlocking overcurrent	(See page ED-59)
B118718	Left rear central lock motor locking undercurrent	(See page ED-59)
B118719	Left rear central lock motor locking overcurrent	(See page ED-59)
B111E11	BSD lamp short circuit	(See page ED-47)
U002888	Comfort CAN bus off	(See page ED-64)
U014687	GW node lost	(See page ED-64)
U014087	BCM 1 node lost	(See page ED-64)
U024687	SCCU node lost	(See page ED-64)
U020287	Rear right door module node lost	(See page ED-64)
U016487	A/C control unit node lost	(See page ED-64)
U112187	ESP message lost	(See page ED-64)
U115187	ACU message lost	(See page ED-64)
U115587	Instrument cluster control unit message lost	(See page ED-64)
U123287	LCDA message lost	(See page ED-64)

DTC	Description	Reference page
U110087	ECM message lost	(See page ED-64)
U114687	GW message lost	(See page ED-64)
U129387	HCU message lost	(See page ED-64)
U124387	ADV message loss	(See page ED-64)

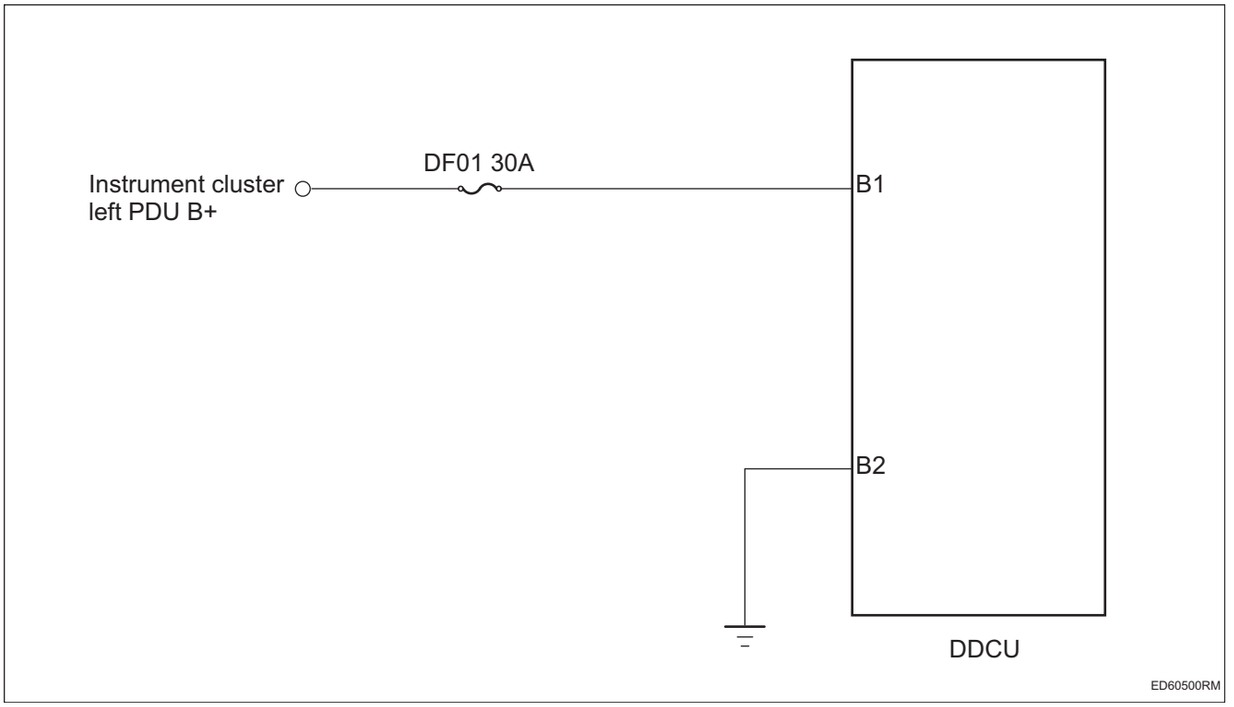
DTC	B110017	Battery overvoltage
DTC	B110016	Battery undervoltage

Description

When the DDCU power supply voltage exceeds the normal operating range, the DDCU records the DTC.

DTC	DTC detection conditions	Faulty location
B110017	(a) Battery overvoltage.	• DDCU • Harness and connector • Charging system
B110016	(a) Battery undervoltage.	• DDCU • Fuse • Harness and connector • Charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2 **Check the DDCU fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the DDCU fuse.

(d) Measure the resistance according to the values in the table below.

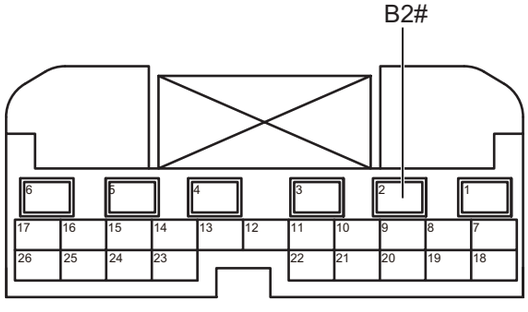
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3 **Check DDCU ground**



DDCU B connector

ED60510RM

(a) Disconnect the DDCU connector.

(b) Measure the resistance according to the values in the table below.

Standard value

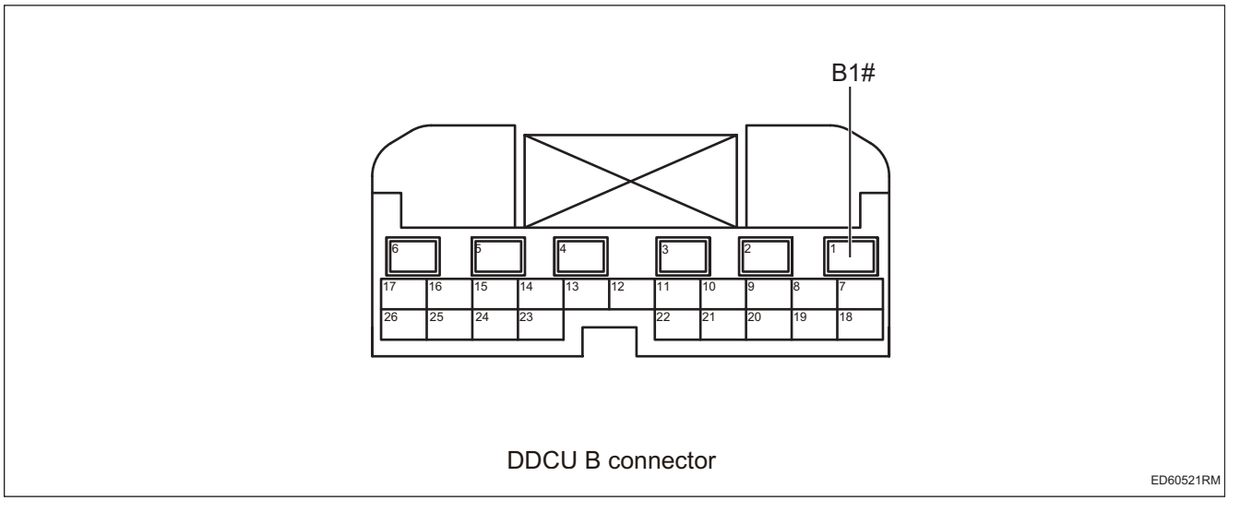
ED

Detector connection	Detection conditions	Specified state
DDCU connector B2# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check DDCU power supply**



DDCU B connector

ED60521RM

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DDCU connector B1# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace the DDCU (See page ED-32)**

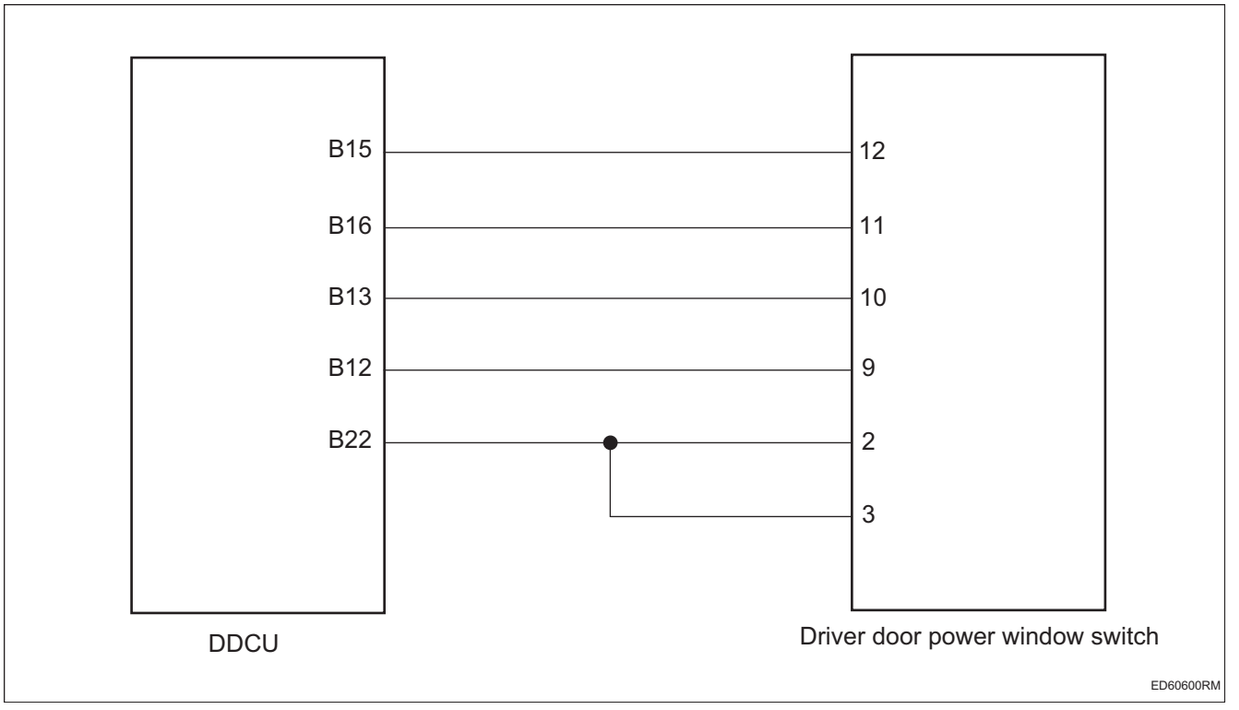
DTC	**B110111**	**Driver door window Up button stuck**
DTC	**B110211**	**Passenger door window Up button stuck**
DTC	**B110311**	**Rear left door window Up button stuck**
DTC	**B110411**	**Rear right door window Up button stuck**
DTC	**B110511**	**Driver door window Down button stuck**
DTC	**B110611**	**Passenger door window Down button stuck**
DTC	**B110711**	**Rear left door window Down button stuck**
DTC	**B110811**	**Rear right door window Down button stuck**

Description

When the driver door power window switch fails, DDCU records the DTC.

DTC	DTC detection conditions	Faulty location
B110111	(a) Driver door window Up button stuck.	• DDCU • Harness and connector • Driver door power window switch
B110211	(a) Passenger door window Up button stuck.	• DDCU • Harness and connector • Driver door power window switch
B110311	(a) Rear left door window Up button stuck.	• DDCU • Harness and connector • Driver door power window switch
B110411	(a) Rear right door window Up button stuck.	• DDCU • Harness and connector • Driver door power window switch
B110511	(a) Driver door window Down button stuck.	• DDCU • Harness and connector • Driver door power window switch
B110611	(a) Passenger door window Down button stuck.	• DDCU • Harness and connector • Driver door power window switch
B110711	(a) Rear left door window Down button stuck.	• DDCU • Harness and connector • Driver door power window switch
B110811	(a) Rear right door window Down button stuck.	• DDCU • Harness and connector • Driver door power window switch

Circuit diagram



Inspection procedure

1	**Check the driver door power window switch**

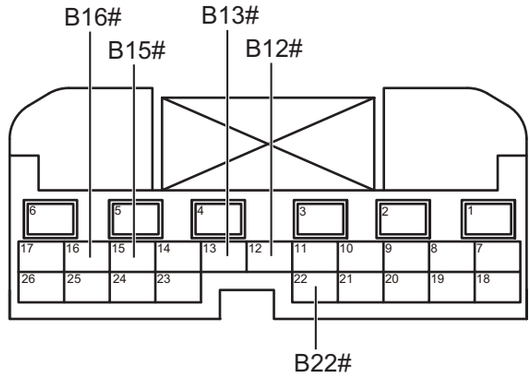
(a) Check the driver door power window switch for foreign matter.

(b) Operate the switch to check whether it is stuck.

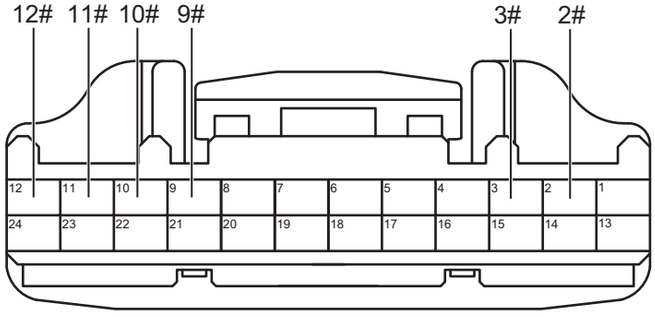
NG → **Repair according to the fault**

OK

2	**Check driver door power window switch harness and connector for open circuit**



DDCU B connector



Driver door power window switch connector

ED60610RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DDCU connector.

(d) Disconnect the driver door power window switch connector.

(e) Measure the resistance according to the values in the table below.

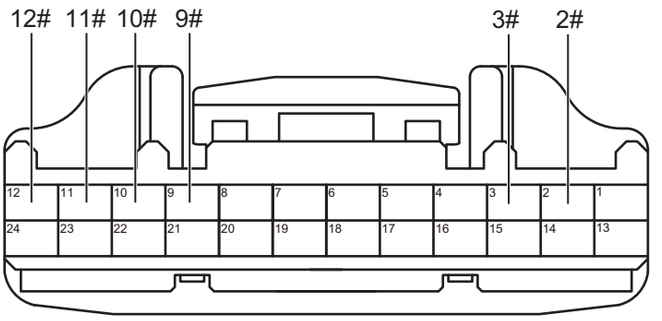
Standard value

Detector connection	Detection conditions	Specified state
DDCU connector B15# - driver door power window switch connector 12#	Always connected	Less than 1Ω
DDCU connector B16# - driver door power window switch connector 11#	Always connected	Less than 1Ω
DDCU connector B13# - driver door power window switch connector 10#	Always connected	Less than 1Ω
DDCU connector B12# - driver door power window switch connector 9#	Always connected	Less than 1Ω
DDCU connector B22# - driver door power window switch connector 2#	Always connected	Less than 1Ω
DDCU connector B22# - driver door power window switch connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check driver door power window switch harness and connector for circuit shorted to ground**



Driver door power window switch connector

ED60621RM

(a) Measure the resistance according to the values in the table below.

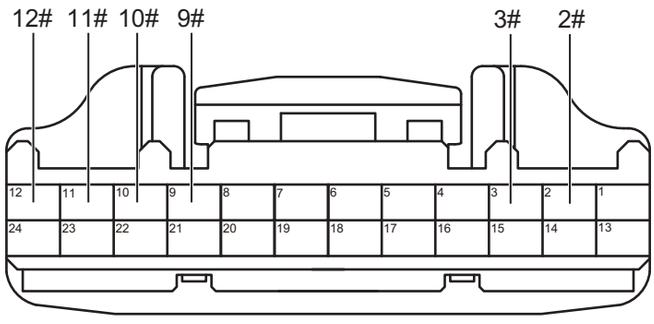
Standard value

Detector connection	Detection conditions	Specified state
Driver door power window switch connector 12# -body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 11# -body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 10# -body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 9# -body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 2# -body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 3# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check driver door power window switch harness and connector for circuit shorted to power supply**



Driver door power window switch connector

ED60621RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Driver door power window switch connector 12# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 11# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 10# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 9# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 2# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 3# -body GND	The ignition switch is set to "ON"	Less than 1 V

ED

NG → **Repair or replace the harness and connector**

OK

5	**Replace the driver door power window switch (See page IR-6)**

(a) Replace the driver door power window switch.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the DDCU (See page ED-32)**

OK →

6	**End**

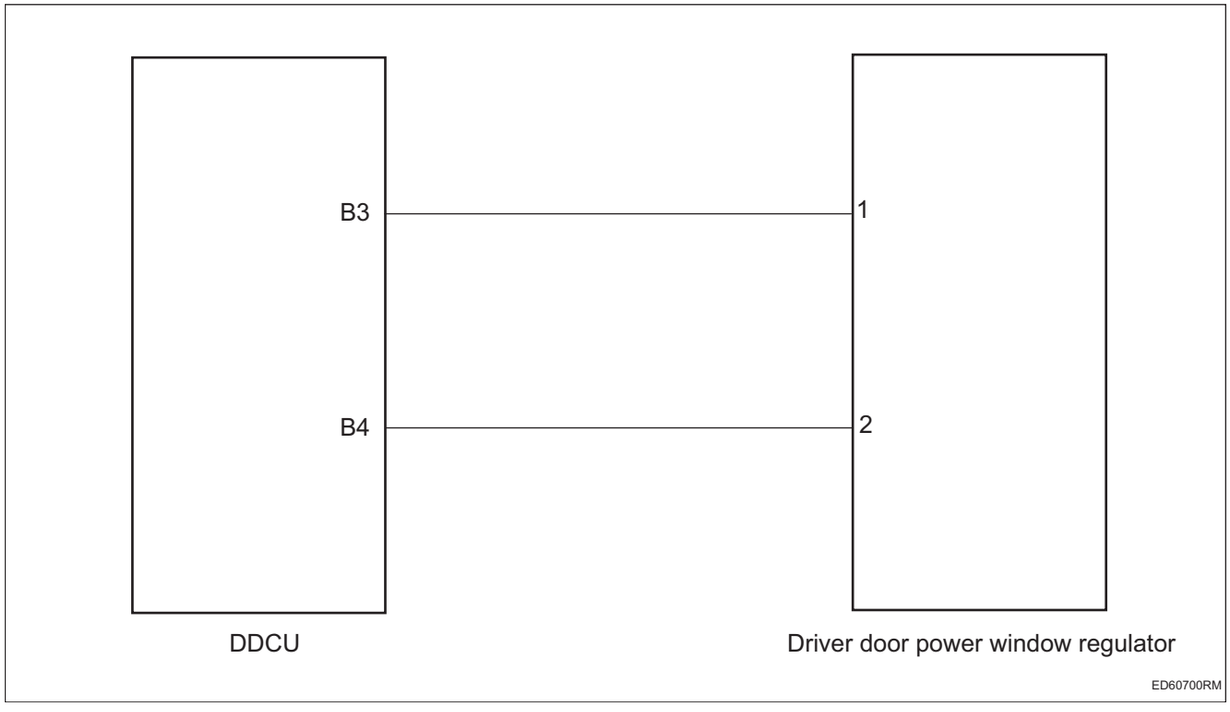
DTC	**B110918**	**Driver door window motor output current low**
DTC	**B110919**	**Driver door window motor output current high**

Description

When the driver door power window regulator output current is outside the normal range, the DDCU will record the DTC.

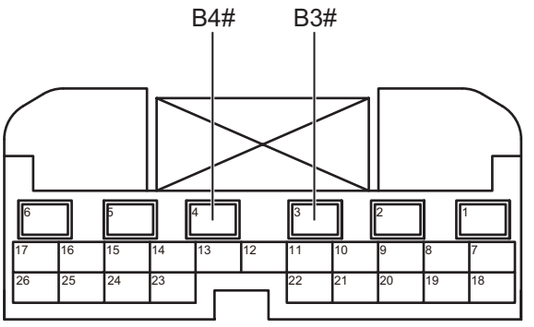
DTC	DTC detection conditions	Faulty location
B110918	(a) Driver door window motor output under-current.	• DDCU • Harness and connector • Driver door power window regulator
B110919	(a) Driver door window motor output current high.	• DDCU • Harness and connector • Driver door power window regulator

Circuit diagram



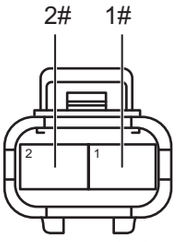
Inspection procedure

1	**Check the driver door power window regulator harness and connector for open circuit**



DDCU B connector

ED60711RM



Driver door power window regulator connector

ED60720RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DDCU connector.

(d) Disconnect the driver door power window regulator connector.

(e) Measure the resistance according to the values in the table below.

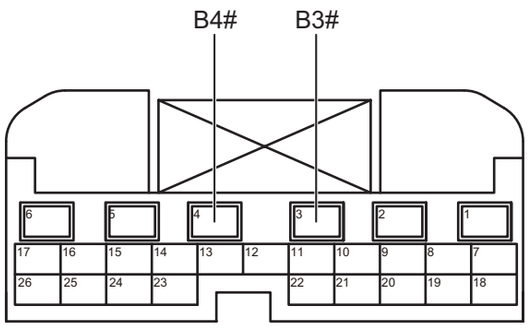
Standard value

Detector connection	Detection conditions	Specified state
DDCU connector B3# -driver door power window regulator connector 1#	Always connected	Less than 1Ω
DDCU connector B4# -driver door power window regulator connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check driver door power window regulator harness and connector for circuit shorted to ground**



DDCU B connector

ED60711RM

(a) Measure the resistance according to the values in the table below.

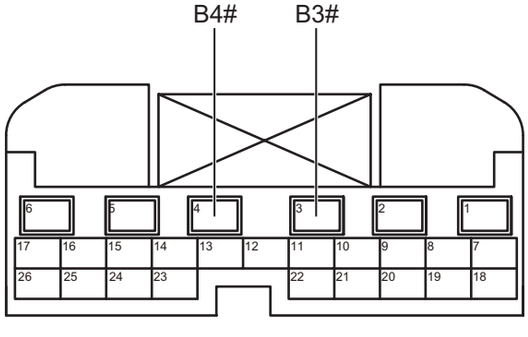
Standard value

Detector connection	Detection conditions	Specified state
DDCU connector B3# -body GND	Always connected	10 KΩ or greater
DDCU connector B4# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check driver door power window regulator harness and connector for circuit shorted to power supply**



DDCU B connector

ED60711RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DDCU connector B3# -body GND	The ignition switch is set to "ON"	Less than 1 V
DDCU connector B4# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the driver door power window regulator (See page ED-9)**

(a) Replace the driver door power window regulator.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the DDCU (See page ED-32)**

OK

5	**End**

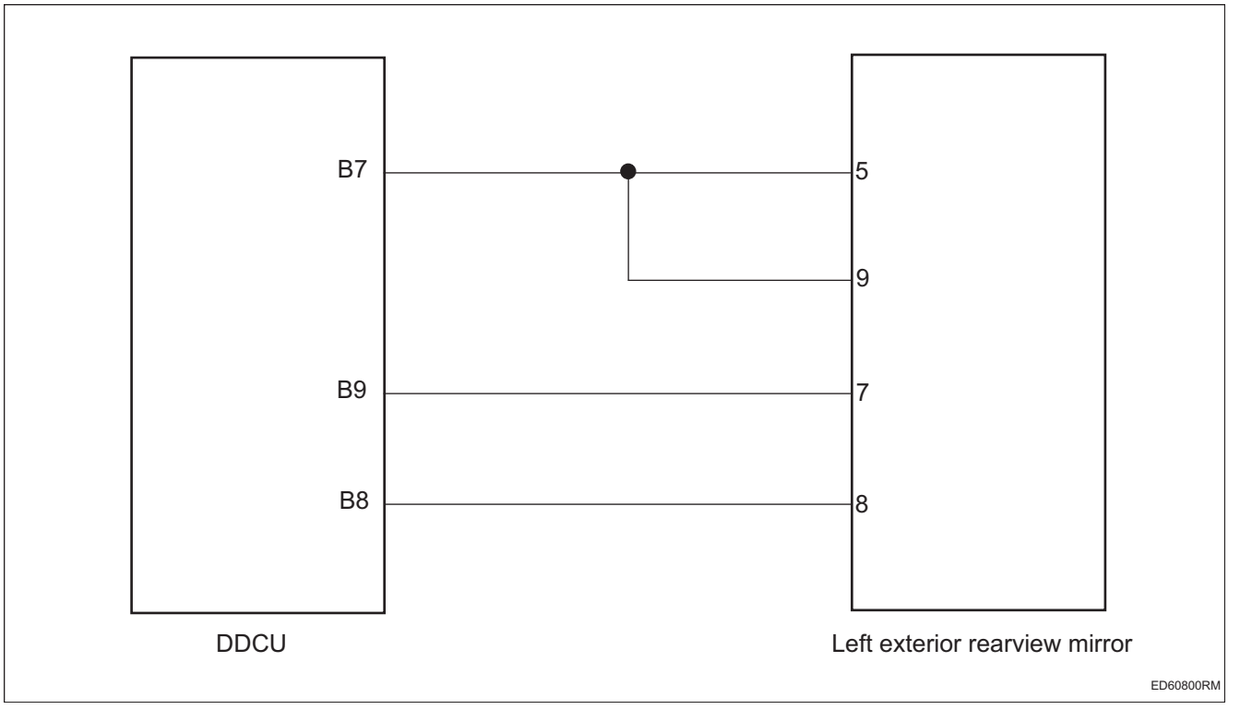
DTC	**B110A19**	**Rearview mirror upper adjustment output overcurrent**
DTC	**B110B19**	**Rearview mirror lower adjustment output overcurrent**
DTC	**B110C19**	**Rearview mirror left adjustment output overcurrent**
DTC	**B110D19**	**Rearview mirror right adjustment overcurrent**

Description

When the left exterior rearview mirror adjustment output current exceeds the normal range, the DDCU records the DTC.

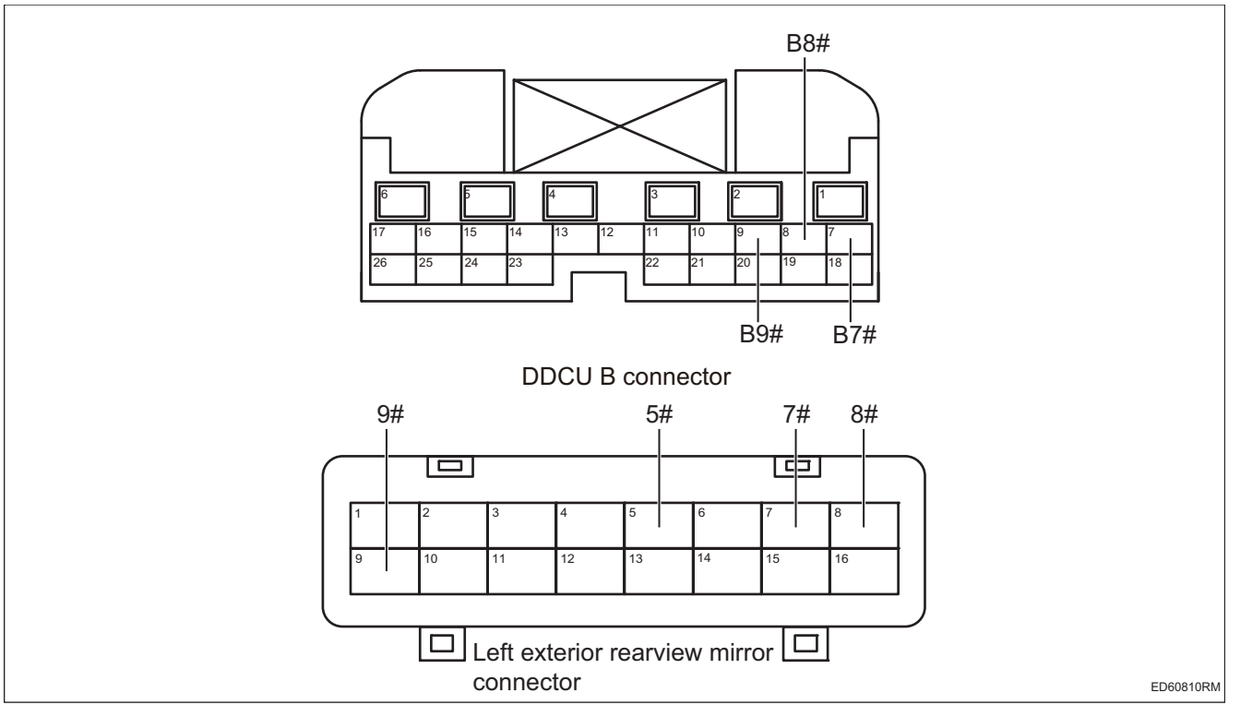
DTC	DTC detection conditions	Faulty location
B110A19	(a) Rearview mirror upward adjustment output current high.	• DDCU • Harness and connector • Left exterior rearview mirror
B110B19	(a) Rearview mirror downward adjustment output current high.	• DDCU • Harness and connector • Left exterior rearview mirror
B110C19	(a) Rearview mirror left adjustment output current high.	• DDCU • Harness and connector • Left exterior rearview mirror
B110D19	(a) Rearview mirror right adjustment output current high.	• DDCU • Harness and connector • Left exterior rearview mirror

Circuit diagram



Inspection procedure

1	**Check left exterior rearview mirror harness and connector for circuit open**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DDCU connector.

(d) Disconnect the left exterior rearview mirror connector.

(e) Measure the resistance according to the values in the table below.

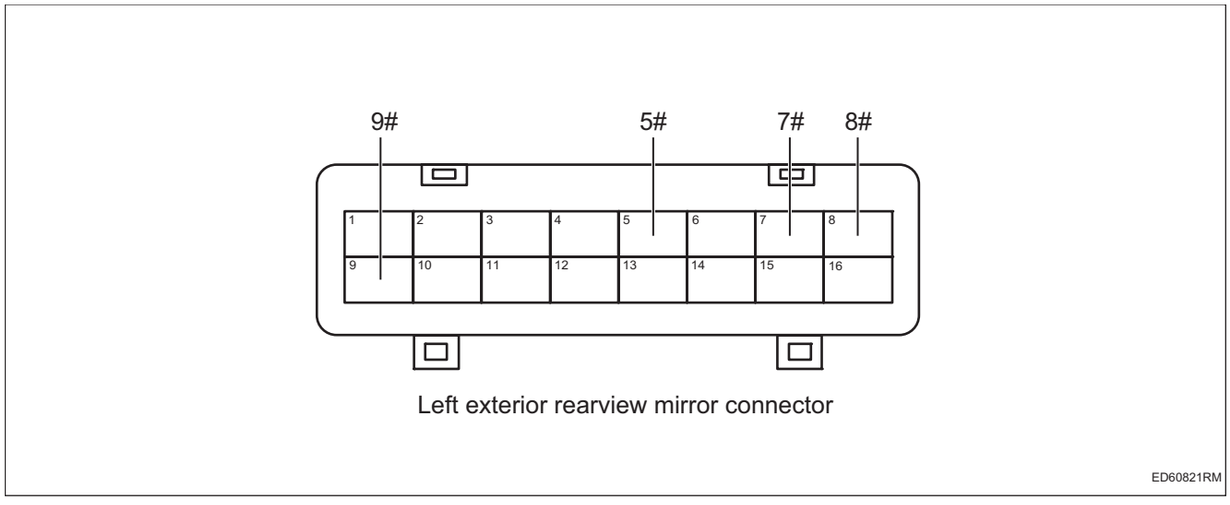
Standard value

Detector connection	Detection conditions	Specified state
DDCU connector B7# -left exterior rearview mirror connector 5#	Always connected	Less than 1Ω
DDCU connector B7# -left exterior rearview mirror connector 9#	Always connected	Less than 1Ω
DDCU connector B9# -left exterior rearview mirror connector 7#	Always connected	Less than 1Ω
DDCU connector B8# -left exterior rearview mirror connector 8#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

2	**Check left exterior rearview mirror harness and connector for circuit shorted to ground**



Left exterior rearview mirror connector

ED60821RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Left exterior rearview mirror connector 5# - body GND	Always connected	10 KΩ or greater
Left exterior rearview mirror connector 9# - body GND	Always connected	10 KΩ or greater

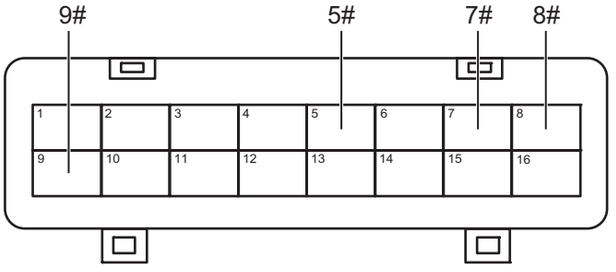
ED

Detector connection	Detection conditions	Specified state
Left exterior rearview mirror connector 7# - body GND	Always connected	10 KΩ or greater
Left exterior rearview mirror connector 8# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check left exterior rearview mirror harness and connector for circuit shorted to power supply**



Left exterior rearview mirror connector

ED60821RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Left exterior rearview mirror connector 5# - body GND	The ignition switch is set to "ON"	Less than 1 V
Left exterior rearview mirror connector 7# - body GND	The ignition switch is set to "ON"	Less than 1 V
Left exterior rearview mirror connector 8# - body GND	The ignition switch is set to "ON"	Less than 1 V
Left exterior rearview mirror connector 9# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace left exterior rearview mirror (See page IM-3)**

(a) Replace the left exterior rearview mirror.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the DDCU (See page ED-32)**

OK

5	**End**

DTC	**B110E11**	**Rearview mirror upward adjustment button stuck**
DTC	**B110F11**	**Rearview mirror downward adjustment button stuck**
DTC	**B111011**	**Rearview mirror left adjustment button stuck**
DTC	**B111111**	**Rearview mirror right adjustment button stuck**
DTC	**B111511**	**Rearview mirror left selection button stuck**
DTC	**B111611**	**Rearview mirror right selection button stuck**
DTC	**B111711**	**Rearview mirror heater button stuck**
DTC	**B111811**	**Rearview mirror folding/unfolding button stuck**
DTC	**B111911**	**Rear window locking button stuck**

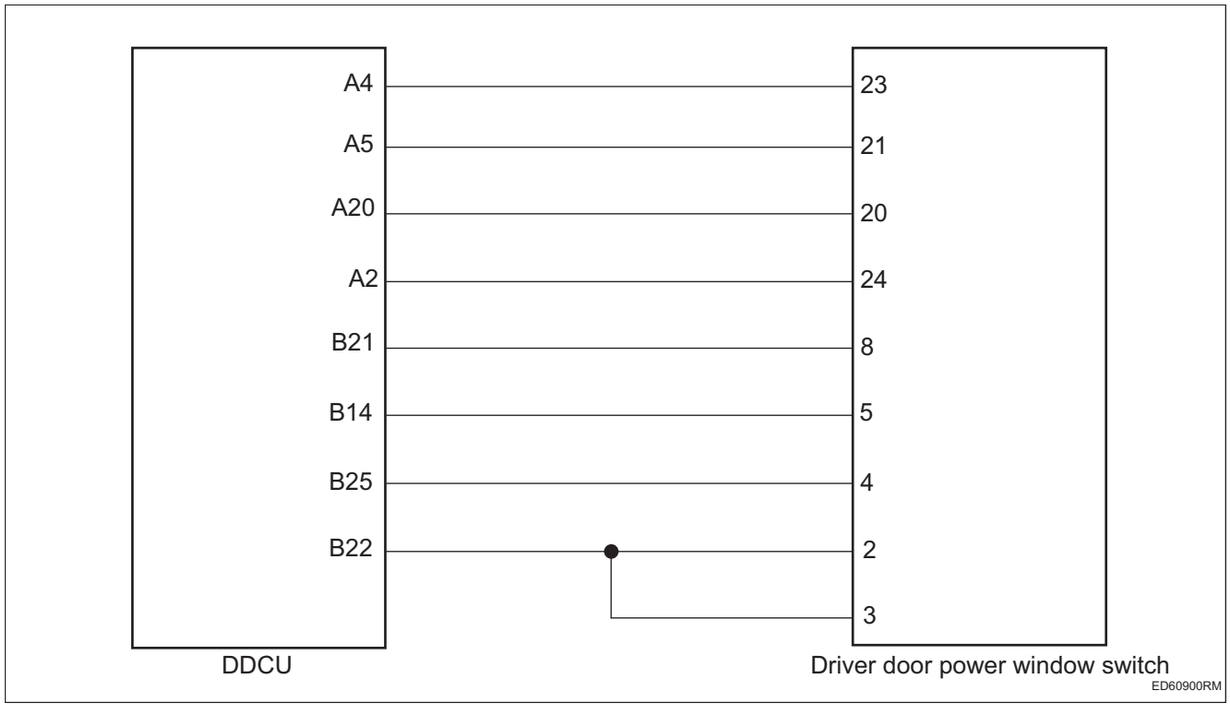
Description

When the driver door power window switch button function is abnormal, the DDCU will record the DTC.

DTC	DTC detection conditions	Faulty location
B110E11	(a) Rearview mirror upward adjustment button stuck.	• DDCU • Harness and connector • Driver door power window switch
B110F11	(a) Rearview mirror downward adjustment button stuck.	• DDCU • Harness and connector • Driver door power window switch
B111011	(a) Rearview mirror left adjustment button stuck.	• DDCU • Harness and connector • Driver door power window switch
B111111	(a) Rearview mirror right adjustment button stuck.	• DDCU • Harness and connector • Driver door power window switch
B111511	(a) Rearview mirror left selection button stuck.	• DDCU • Harness and connector • Driver door power window switch
B111611	(a) Rearview mirror right selection button stuck.	• DDCU • Harness and connector • Driver door power window switch
B111711	(a) Rearview mirror heater button stuck.	• DDCU • Harness and connector • Driver door power window switch

DTC	DTC detection conditions	Faulty location
B111811	(a) Rearview mirror holding/unfolding button stuck.	• DDCU • Harness and connector • Driver door power window switch
B111911	(a) Rear window locking button stuck.	• DDCU • Harness and connector • Driver door power window switch

Circuit diagram



Inspection procedure

1	**Check the driver door power window switch**

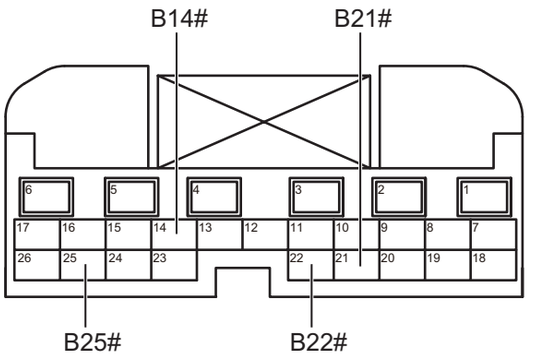
(a) Check the driver door power window switch for foreign matter.

(b) Check whether the driver door power window switch is stuck.

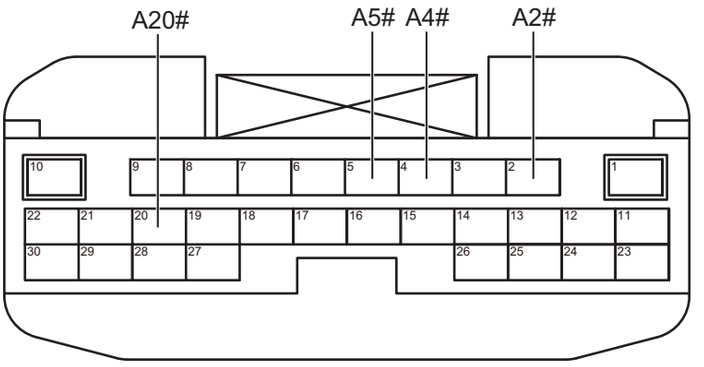
NG → **Repair according to the fault**

OK

2	**Check driver door power window switch harness and connector for open circuit**

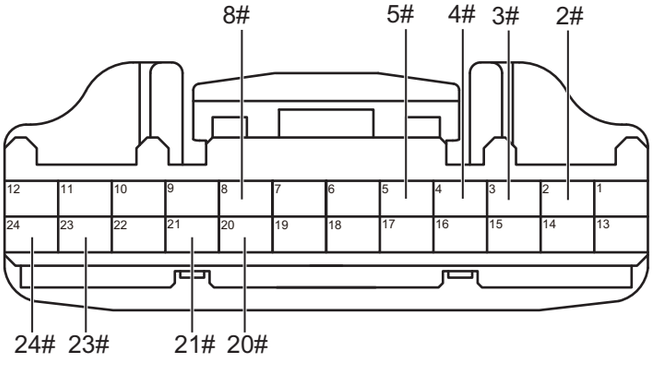


DDCU B connector



DDCU A connector

ED60910RM



Driver door power window switch connector

ED60921RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DDCU connector.

(d) Disconnect the driver door power window switch connector.

(e) Measure the resistance according to the values in the table below.

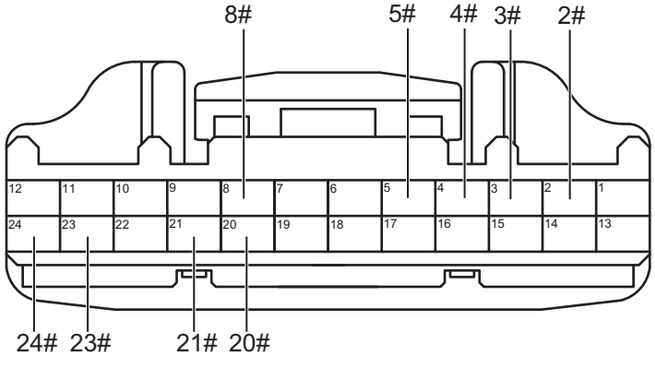
Standard value

Detector connection	Detection conditions	Specified state
DDCU connector A4# -driver door power window switch connector 23#	Always connected	Less than 1Ω
DDCU connector A5# - driver door power window switch connector 21#	Always connected	Less than 1Ω
DDCU connector A20# - driver door power window switch connector 20#	Always connected	Less than 1Ω
DDCU connector A2# -driver door power window switch connector 24#	Always connected	Less than 1Ω
DDCU connector B21# - driver door power window switch connector 8#	Always connected	Less than 1Ω
DDCU connector B14# - driver door power window switch connector 5#	Always connected	Less than 1Ω
DDCU connector B25# - driver door power window switch connector 4#	Always connected	Less than 1Ω
DDCU connector B22# - driver door power window switch connector 2#	Always connected	Less than 1Ω
DDCU connector B22# - driver door power window switch connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check driver door power window switch harness and connector for circuit shorted to ground**



Driver door power window switch connector

ED60921RM

(a) Measure the resistance according to the values in the table below.

Standard value

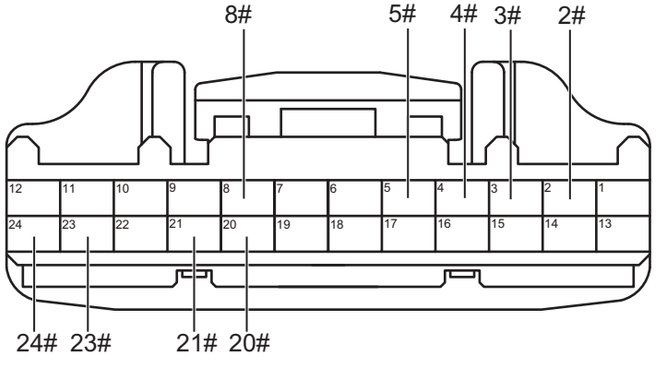
ED

Detector connection	Detection conditions	Specified state
Driver door power window switch connector 23# -body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 21# -body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 20# -body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 24# -body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 8# -body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 5# -body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 4# -body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 2# -body GND	Always connected	10 KΩ or greater
Driver door power window switch connector 3# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check driver door power window switch harness and connector for circuit shorted to power supply**



Driver door power window switch connector

ED60921RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Driver door power window switch connector 23# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 21# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 20# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 24# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 8# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 5# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 4# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 2# -body GND	The ignition switch is set to "ON"	Less than 1 V
Driver door power window switch connector 3# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the driver door power window switch (See page IR-6)**

(a) Replace the driver door power window switch.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the DDCU (See page ED-32)**

OK

6	**End**

ED

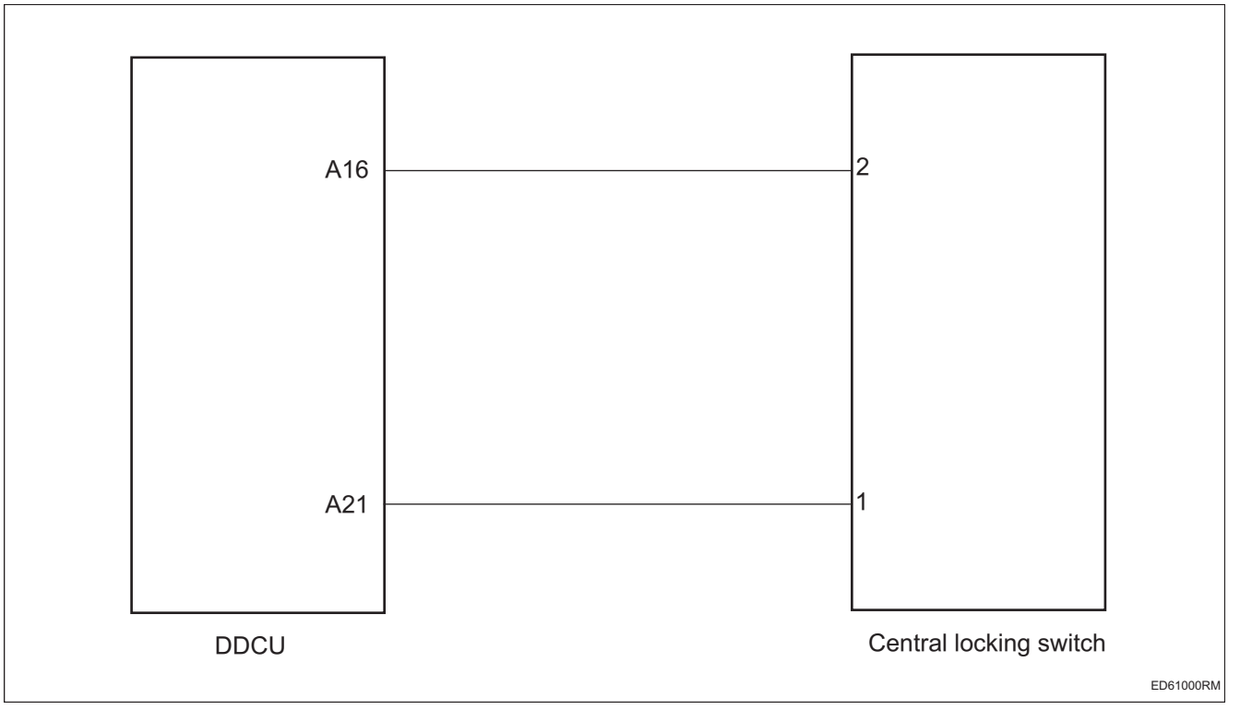
DTC	B111211	Central unlocking button stuck
DTC	B111311	Central locking button stuck

Description

When the central locking switch button works abnormally, the DDCU will record the DTC.

DTC	DTC detection conditions	Faulty location
B111211	(a) Central unlocking button stuck.	• DDCU • Harness and connector • Central locking switch
B111311	(a) Central locking button stuck.	• DDCU • Harness and connector • Central locking switch

Circuit diagram



Inspection procedure

1	Check the central locking switch

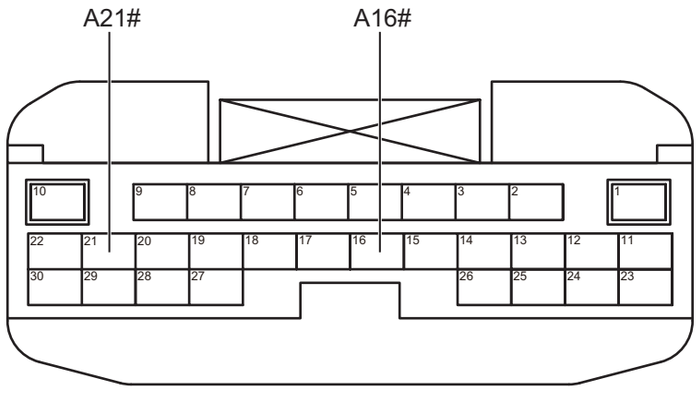
(a) Check the central locking switch for foreign matter.

(b) Check whether the central locking switch is stuck.

NG	Repair according to the fault

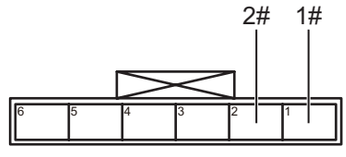
OK

2	**Check central locking switch harness and connector for open circuit**



DDCU A connector

ED61011RM



Central locking switch connector

ED61020RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DDCU connector.

(d) Disconnect the central locking switch connector.

(e) Measure the resistance according to the values in the table below.

Standard value

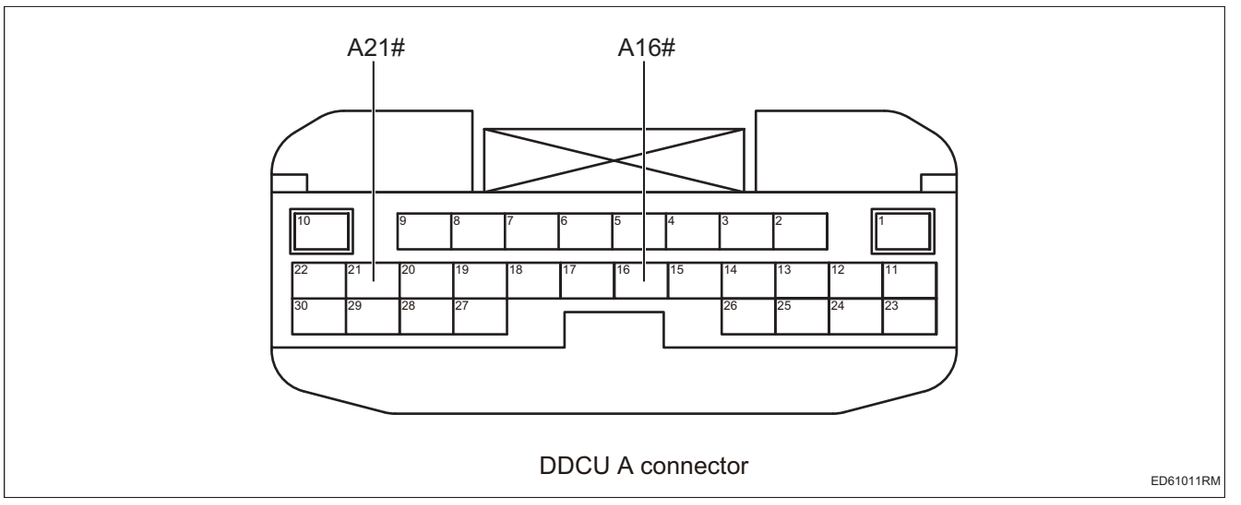
Detector connection	Detection conditions	Specified state
DDCU connector A16# -central locking switch connector 2#	Always connected	Less than 1Ω
DDCU connector A21# -central locking switch connector 1#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	**Check central locking switch harness and connector for circuit shorted to ground**

ED



DDCU A connector

ED61011RM

(a) Measure the resistance according to the values in the table below.

Standard value

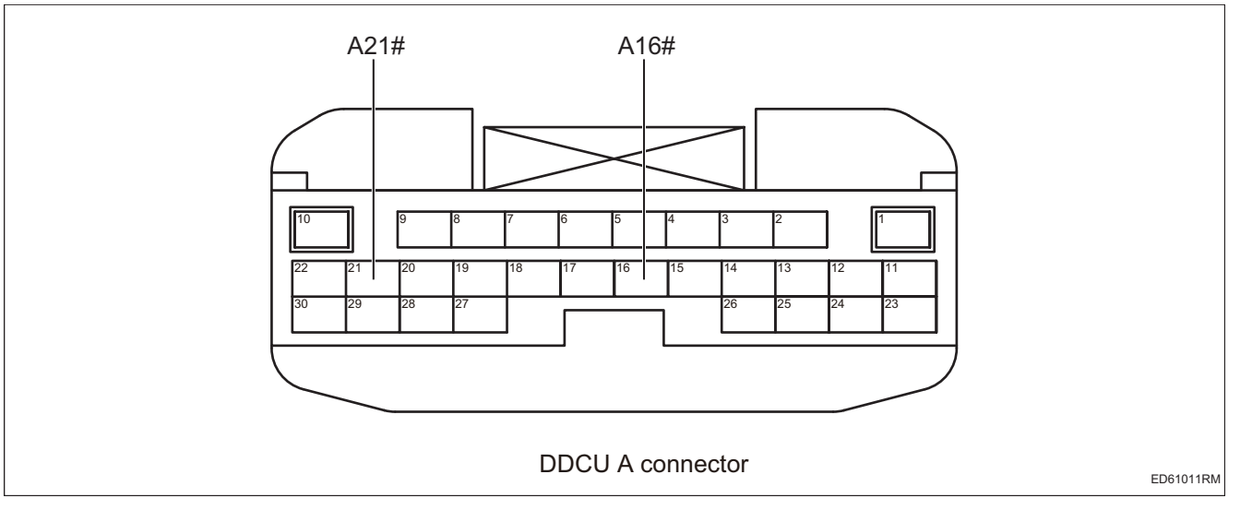
Detector connection	Detection conditions	Specified state
DDCU connector A16# -body GND	Always connected	10 KΩ or greater
DDCU connector A21# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check central locking switch harness and connector for circuit shorted to power supply**

ED



DDCU A connector

ED61011RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DDCU connector A16# -body GND	The ignition switch is set to "ON"	Less than 1 V
DDCU connector A21# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the central locking switch (See page IR-6)**

(a) Replace the central locking switch.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the DDCU (See page ED-32)**

OK

6	**End**

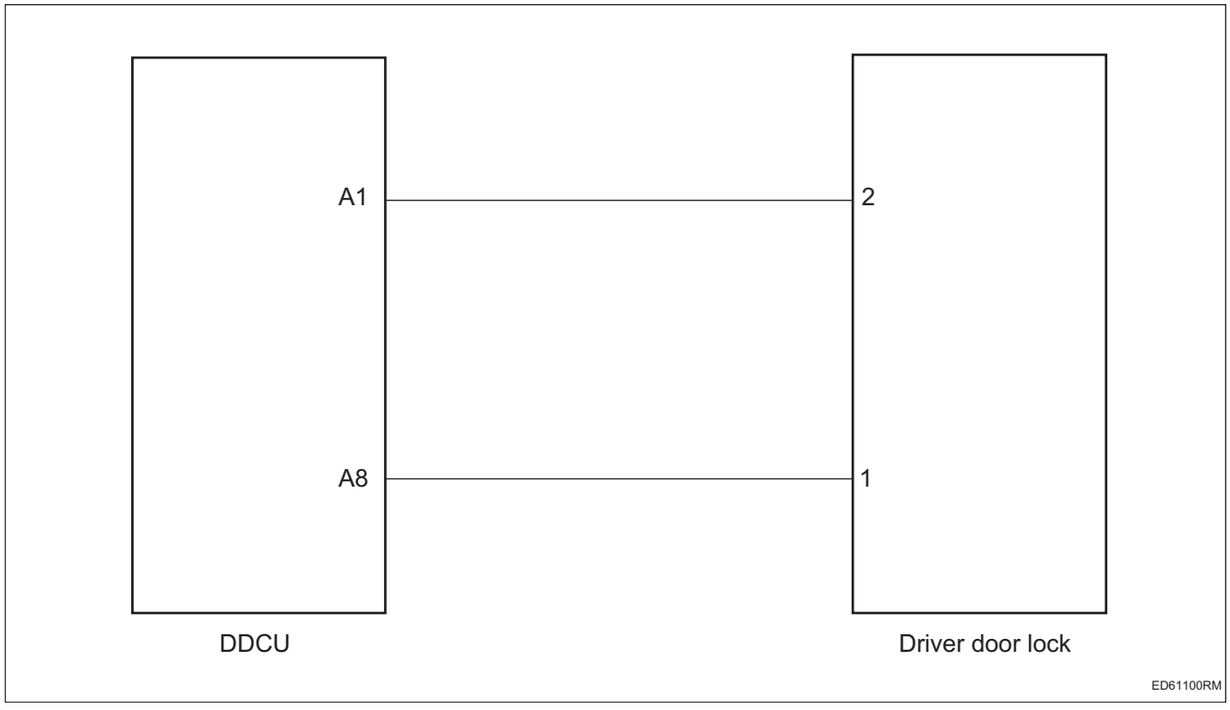
DTC	**B111C18**	**Left front central lock motor unlocking undercurrent**
DTC	**B111C19**	**Left front central lock motor unlocking overcurrent**
DTC	**B111D18**	**Left front central lock motor locking undercurrent**
DTC	**B111D19**	**Left front central lock motor locking overcurrent**

Description

When the working current of driver door lock is out of the normal range, the DDCU records the DTC.

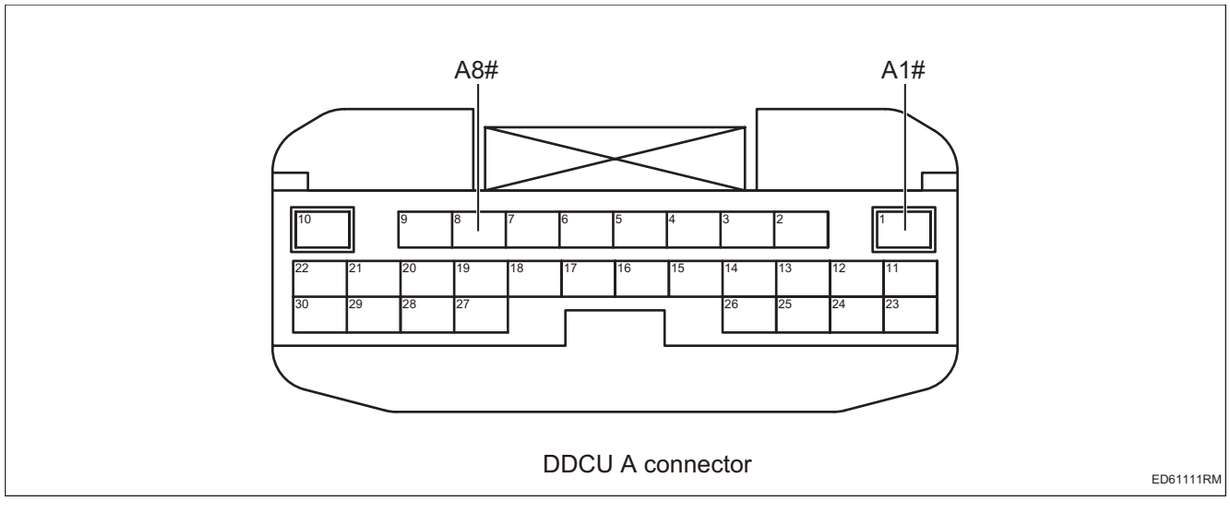
DTC	DTC detection conditions	Faulty location
B111C18	(a) Left front central lock motor unlocking undercurrent.	• DDCU • Harness and connector • Driver door lock
B111C19	(a) Left front central lock motor unlocking overcurrent.	• DDCU • Harness and connector • Driver door lock
B111D18	(a) Left front central lock motor locking undercurrent.	• DDCU • Harness and connector • Driver door lock
B111D19	(a) Left front central lock motor locking overcurrent.	• DDCU • Harness and connector • Driver door lock

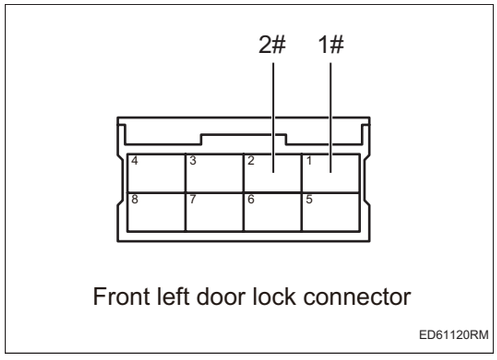
Circuit diagram



Inspection procedure

1	Check driver door lock harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DDCU connector.

(d) Disconnect the driver door lock connector.

(e) Measure the resistance according to the values in the table below.

Standard value

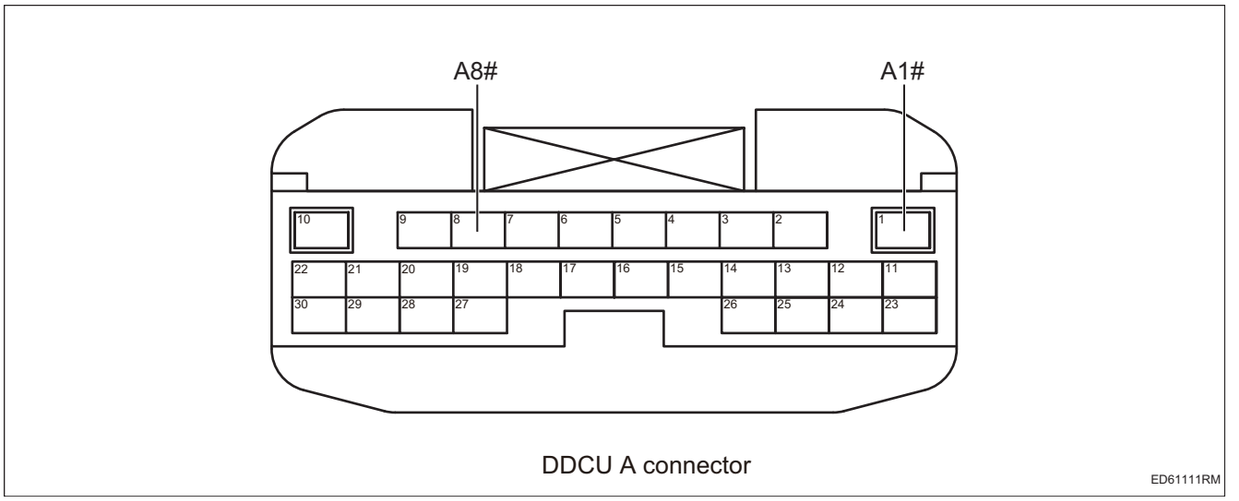
ED

Detector connection	Detection conditions	Specified state
DDCU connector A1# -driver door lock connector 2#	Always connected	Less than 1Ω
DDCU connector A8# -driver door lock connector 1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check driver door lock harness and connector for circuit shorted to ground**



DDCU A connector

ED61111RM

(a) Measure the resistance according to the values in the table below.

Standard value

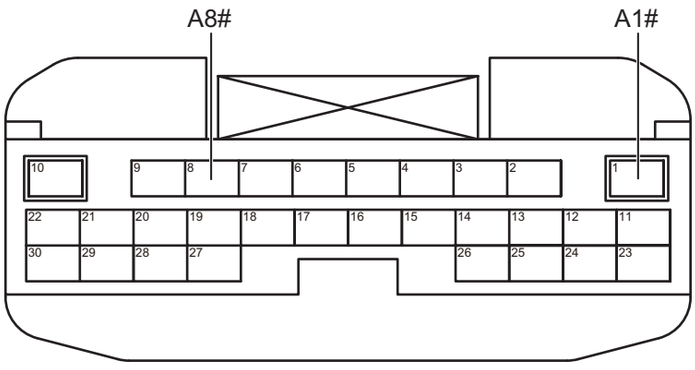
Detector connection	Detection conditions	Specified state
DDCU connector A1# -body GND	Always connected	10 KΩ or greater
DDCU connector A8# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check driver door lock harness and connector for circuit shorted to power supply**

ED



DDCU A connector

ED61111RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DDCU connector A1# -body GND	The ignition switch is set to "ON"	Less than 1 V
DDCU connector A8# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace driver door lock (See page DL-12)**

(a) Replace the driver door lock.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the DDCU (See page ED-32)**

ED

OK

5	**End**

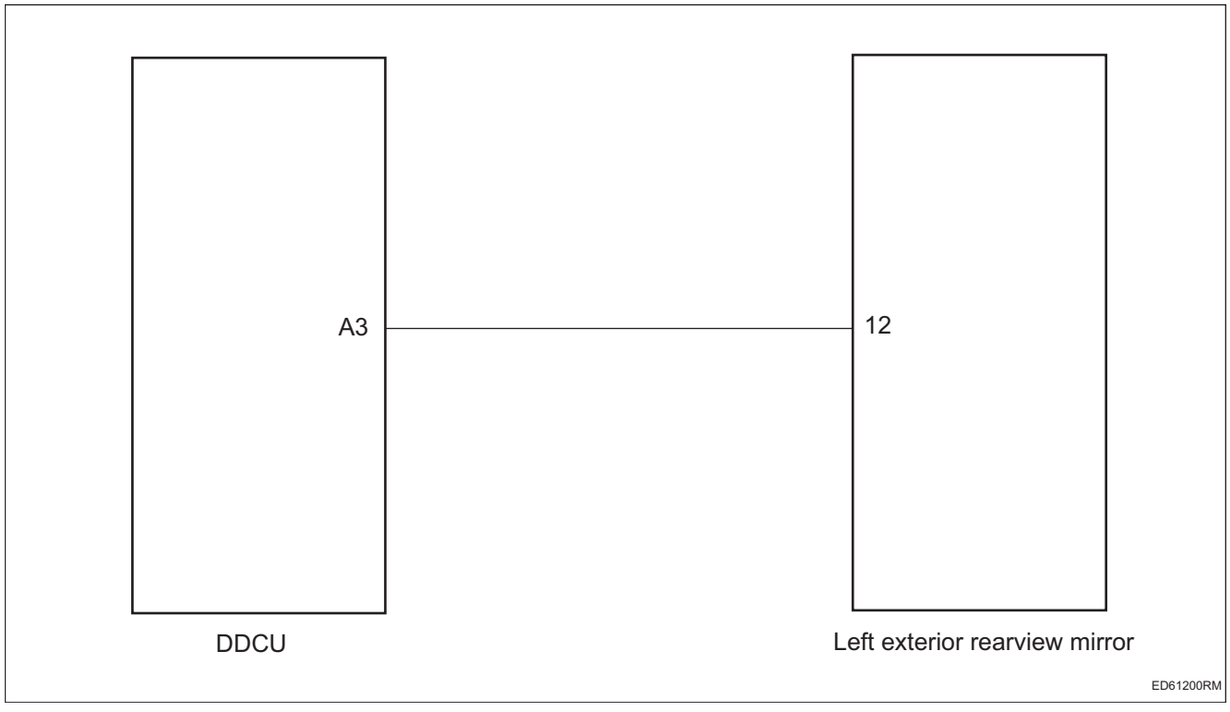
DTC	B111E11	BSD lamp short circuit

Description

When the left rearview mirror BSD lamp circuit is shorted, the DDCU records the DTC.

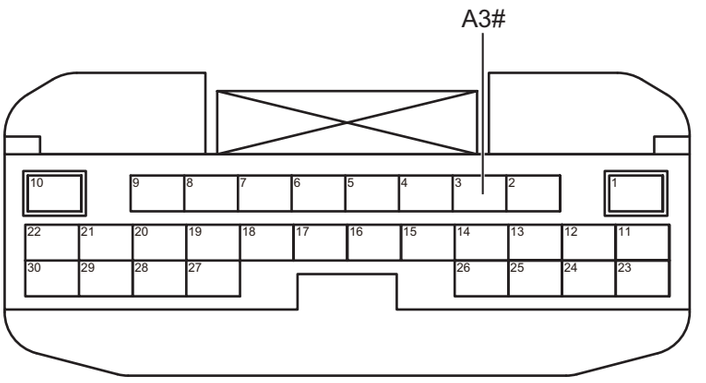
DTC	DTC detection conditions	Faulty location
B111E11	(a) BSD lamp short circuit.	• DDCU • Harness and connector • Left exterior rearview mirror

Circuit diagram



Inspection procedure

1	**Check left exterior rearview mirror harness and connector for circuit shorted to ground**



DDCU A connector

ED61221RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DDCU connector.

(d) Disconnect the left exterior rearview mirror connector.

(e) Measure the resistance according to the values in the table below.

Standard value

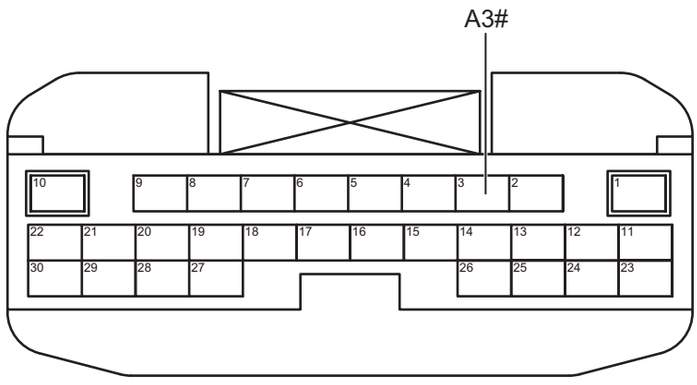
Detector connection	Detection conditions	Specified state
DDCU connector A3# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

ED

2	**Check left exterior rearview mirror harness and connector for circuit shorted to power supply**



DDCU A connector

ED61221RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DDCU connector A3# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

3	**Replace left exterior rearview mirror (See page IM-3)**

(a) Replace the left exterior rearview mirror.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Standard:

No DTC is output.

NG → **Replace the DDCU (See page ED-32)**

OK

4	**End**

ED

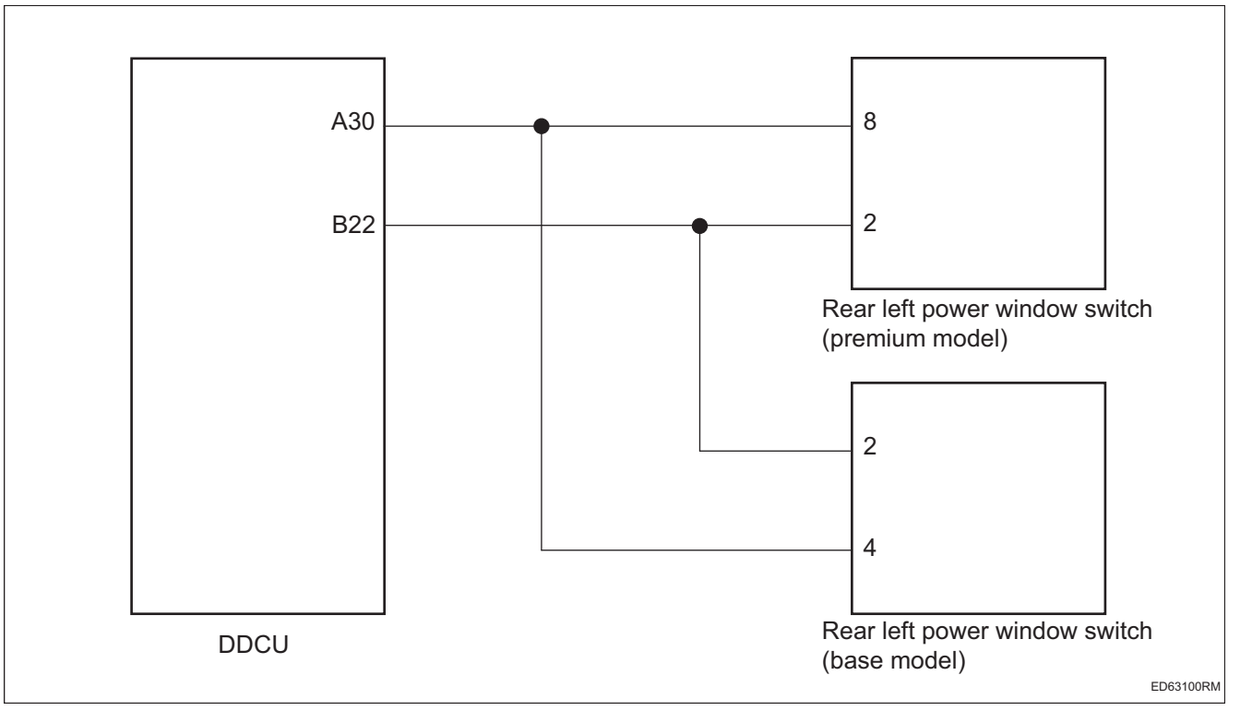
DTC	B118111	Rear left door window Up button stuck
DTC	B118311	Rear left door window Down button stuck

Description

When the rear left power window switch fails, DDCU records the DTC.

DTC	DTC detection conditions	Faulty location
B118111	(a) Rear left door window Up button stuck.	• DDCU • Harness and connector • Rear left power window switch
B118311	(a) Rear left door window Down button stuck.	• DDCU • Harness and connector • Rear left power window switch

Circuit diagram



Inspection procedure

1	Check the rear left power window switch

(a) Check the rear left power window switch for foreign matter.

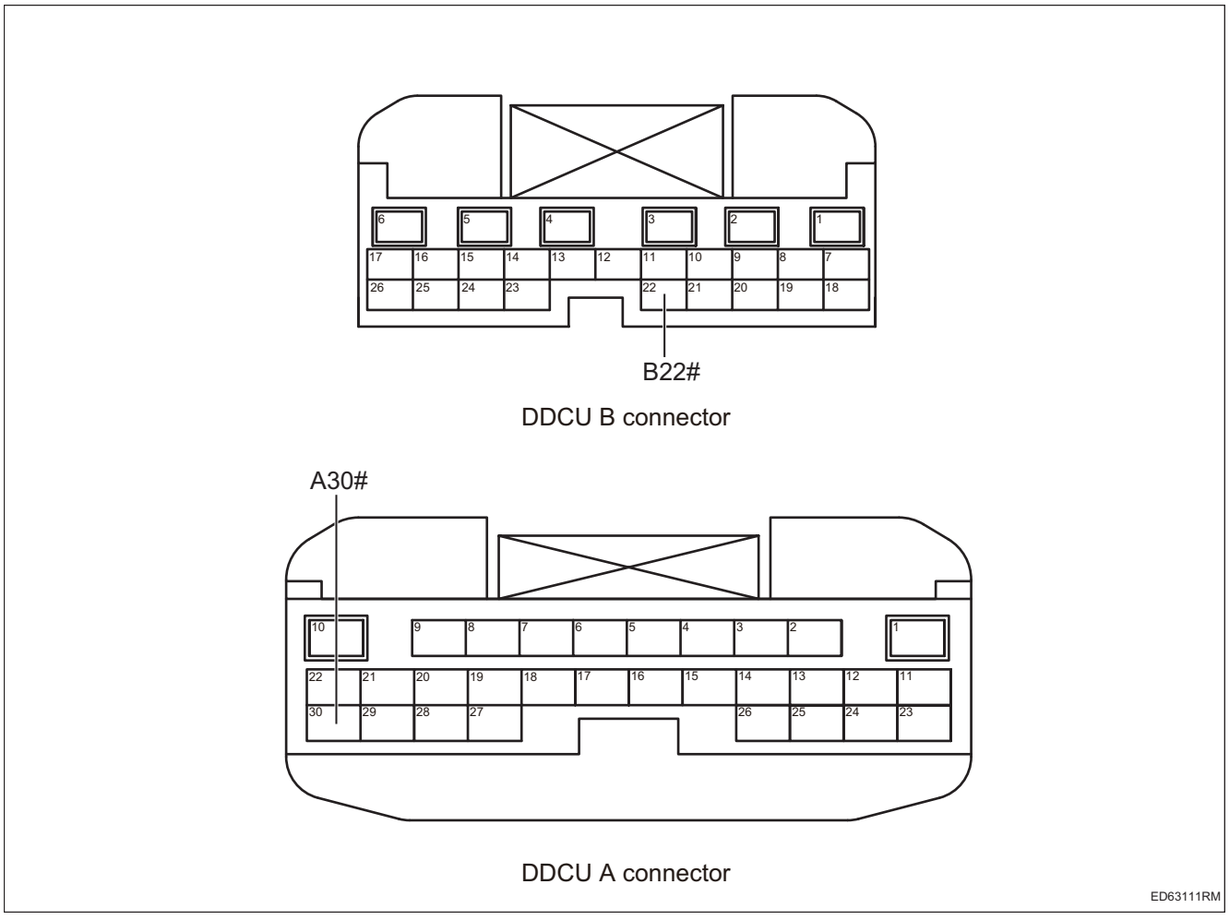
(b) Check whether the rear left power window switch is stuck.

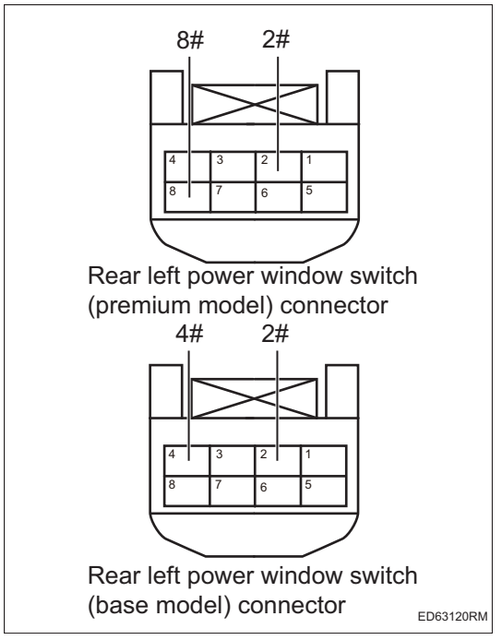
NG	Repair according to the fault

ED

OK

2	**Check rear left power window switch harness and connector for open circuit**





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DDCU connector.

(d) Disconnect the rear left power window switch connector.

(e) Measure the resistance according to the values in the table below.

Standard value

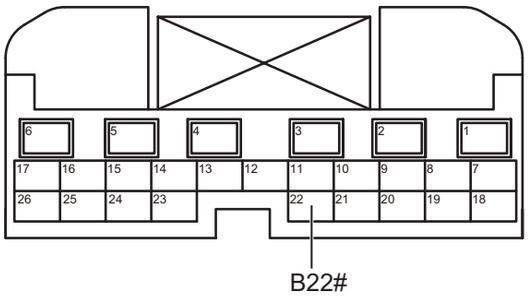
Detector connection	Detection conditions	Specified state
DDCU connector A30# - rear left power window switch (premium model) connector 8#	Always connected	Less than 1Ω
DDCU connector B22# - rear left power window switch (premium model) connector 2#	Always connected	Less than 1Ω
DDCU connector A30# - rear left power window switch (base model) connector 4#	Always connected	Less than 1Ω
DDCU connector B22# - rear left power window switch (base model) connector 2#	Always connected	Less than 1Ω

ED

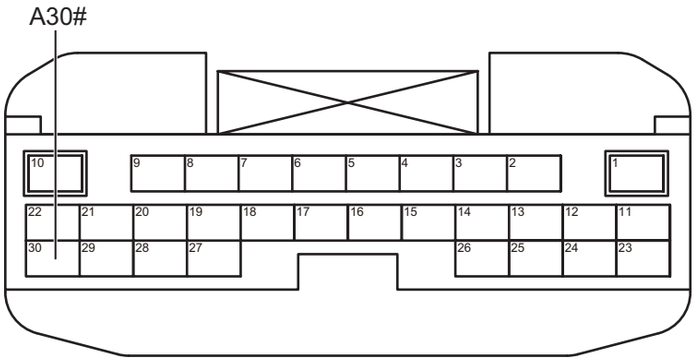
NG → **Repair or replace the harness and connector**

OK

3	**Check rear left power window switch harness and connector for circuit shorted to ground**



DDCU B connector



DDCU A connector

ED63111RM

(a) Measure the resistance according to the values in the table below.

Standard value

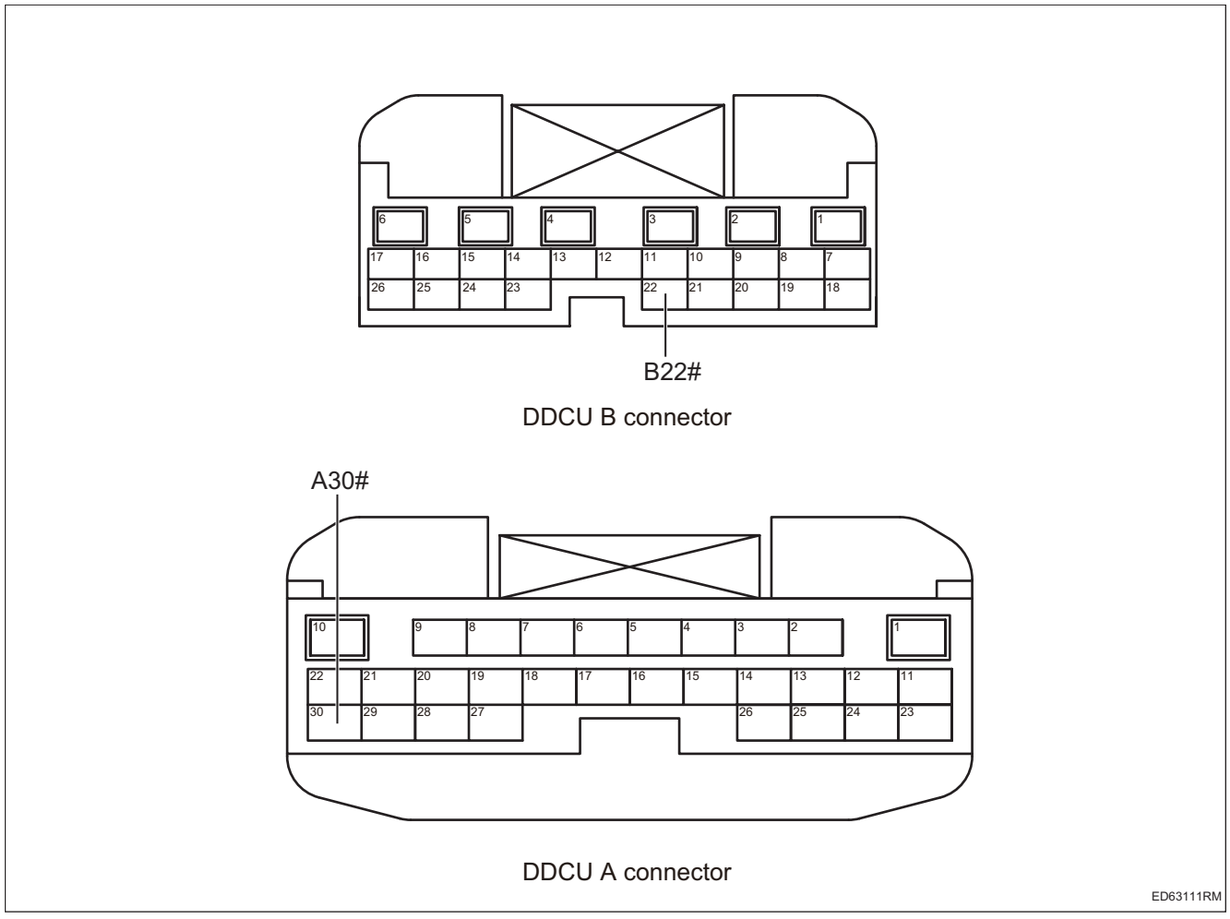
Detector connection	Detection conditions	Specified state
DDCU connector B22# -body GND	Always connected	10 KΩ or greater
DDCU connector A30# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

ED

OK

4	**Check rear left power window switch harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DDCU connector B22# -body GND	The ignition switch is set to "ON"	Less than 1 V
DDCU connector A30# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG **Repair or replace the harness and connector**

ED

OK

5	**Replace the rear left power window switch (See page IR-18)**

(a) Replace the rear left power window switch.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the DDCU (See page ED-32)**

OK

6	**End**

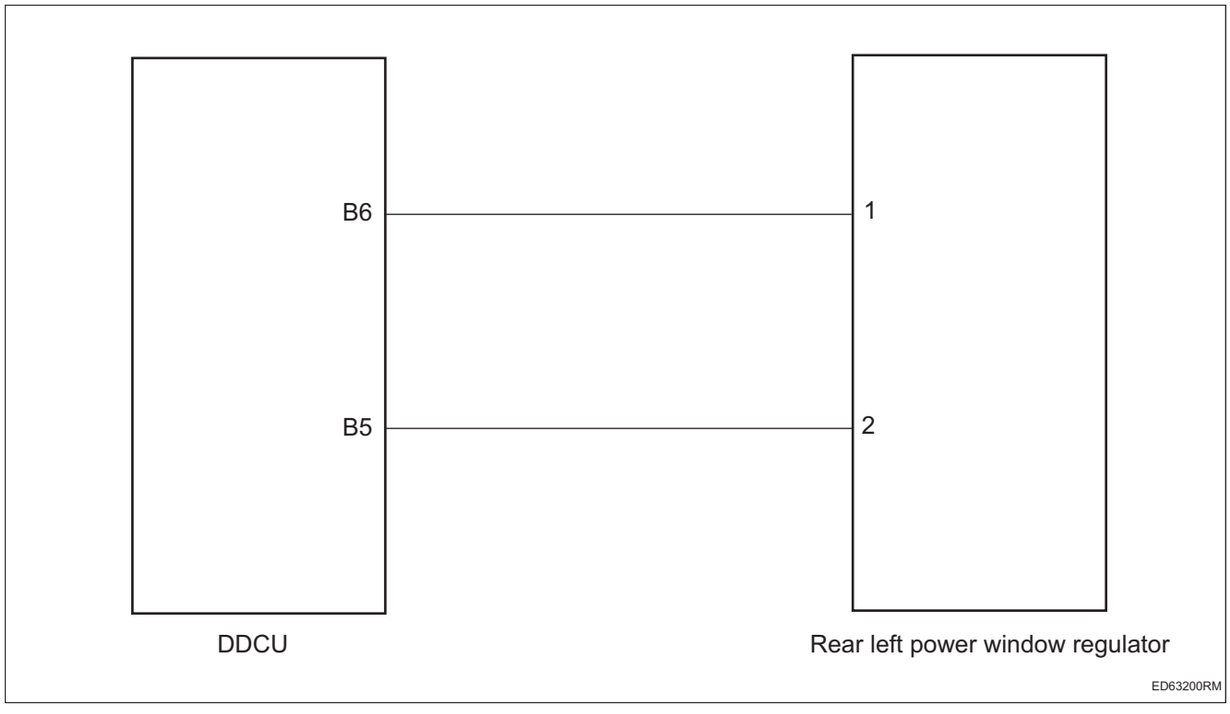
DTC	**B118518**	**Rear left door window motor output current low**
DTC	**B118519**	**Rear left door window motor output current high**

Description

When the rear left power window regulator output current is abnormal, the DDCU will record the DTC.

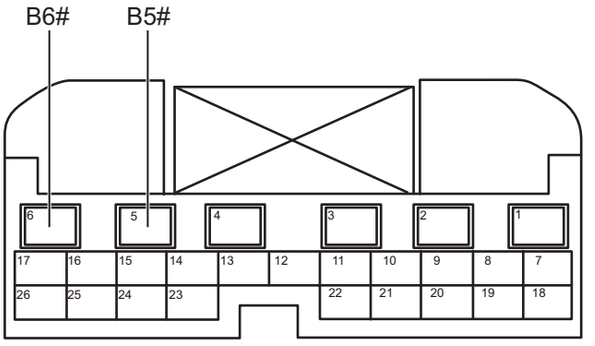
DTC	DTC detection conditions	Faulty location
B118518	(a) Rear left door window motor output undercurrent.	• DDCU • Harness and connector • Rear left power window regulator
B118519	(a) Rear left door window motor output current high.	• DDCU • Harness and connector • Rear left power window regulator

Circuit diagram



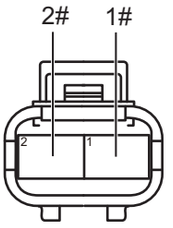
Inspection procedure

1	**Check rear left power window regulator harness and connector for open circuit**



DDCU connector

ED63211RM



Rear left power window regulator connector

ED63220RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DDCU connector.

(d) Disconnect the rear left power window regulator connector.

(e) Measure the resistance according to the values in the table below.

Standard value

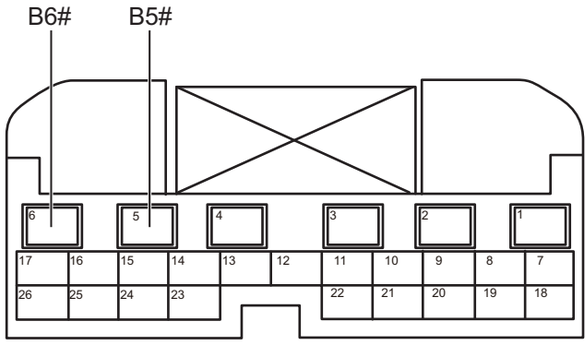
Detector connection	Detection conditions	Specified state
DDCU connector B6# -rear left power window regulator connector 1#	Always connected	Less than 1Ω
DDCU connector B5# -rear left power window regulator connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

ED

OK

2	**Check rear left power window regulator harness and connector for circuit shorted to ground**



DDCU connector

ED63211RM

(a) Measure the resistance according to the values in the table below.

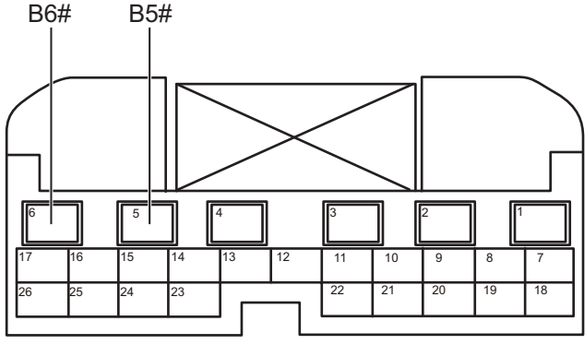
Standard value

Detector connection	Detection conditions	Specified state
DDCU connector B5# -body GND	Always connected	10 KΩ or greater
DDCU connector B6# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check rear left power window regulator harness and connector for circuit shorted to power supply**



DDCU connector

ED63211RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DDCU connector B5# -body GND	The ignition switch is set to "ON"	Less than 1 V
DDCU connector B6# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the rear left power window regulator (See page ED-20)**

(a) Replace the rear left power window regulator.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the DDCU (See page ED-32)**

OK

5	**End**

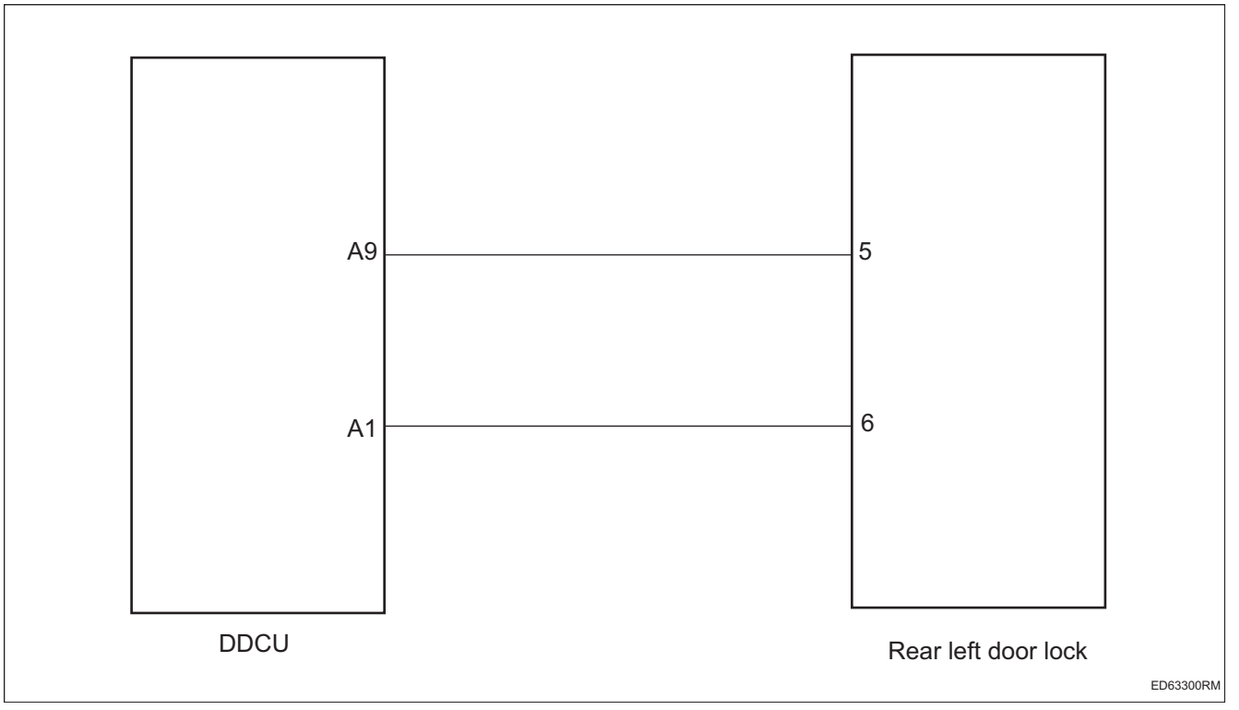
DTC	**B118618**	**Left rear central lock motor unlocking undercurrent**
DTC	**B118619**	**Left rear central lock motor unlocking overcurrent**
DTC	**B118718**	**Left rear central lock motor locking undercurrent**
DTC	**B118719**	**Left rear central lock motor locking overcurrent**

Description

When the working current of the rear left door lock exceeds the normal range, the DDCU records the DTC.

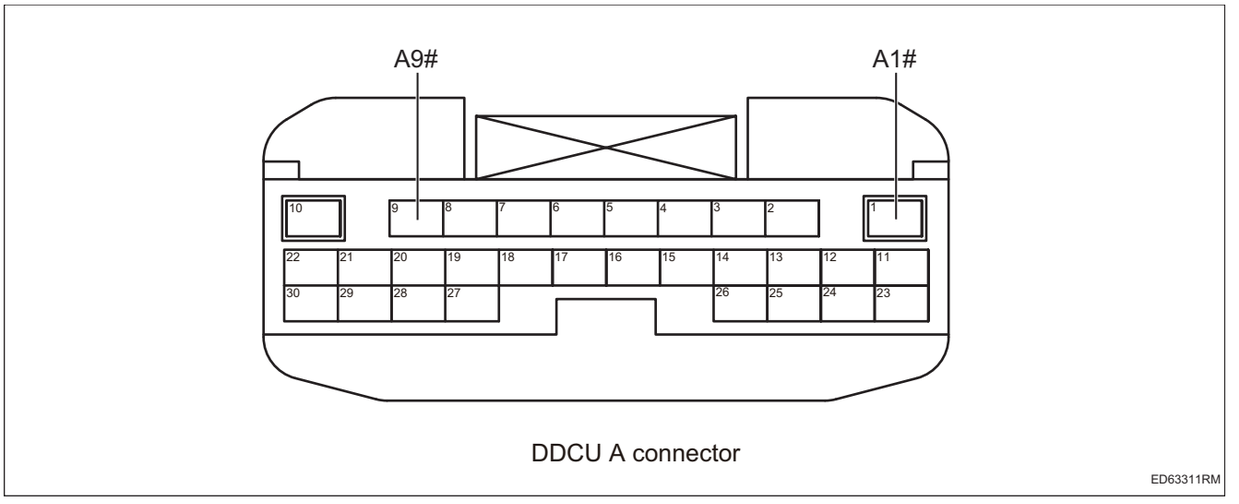
DTC	DTC detection conditions	Faulty location
B118618	(a) Left rear central lock motor unlocking undercurrent.	• DDCU • Harness and connector • Rear left door lock
B118619	(a) Left rear central lock motor unlocking overcurrent.	• DDCU • Harness and connector • Rear left door lock
B118718	(a) Left rear central lock motor locking undercurrent.	• DDCU • Harness and connector • Rear left door lock
B118719	(a) Left rear central lock motor locking overcurrent.	• DDCU • Harness and connector • Rear left door lock

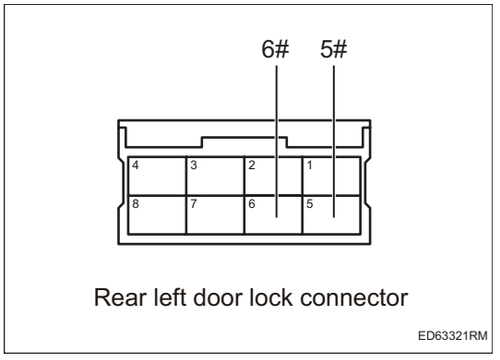
Circuit diagram



Inspection procedure

1	**Check rear left door lock harness and connector for open circuit**





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DDCU connector.

(d) Disconnect the rear left door lock connector.

(e) Measure the resistance according to the values in the table below.

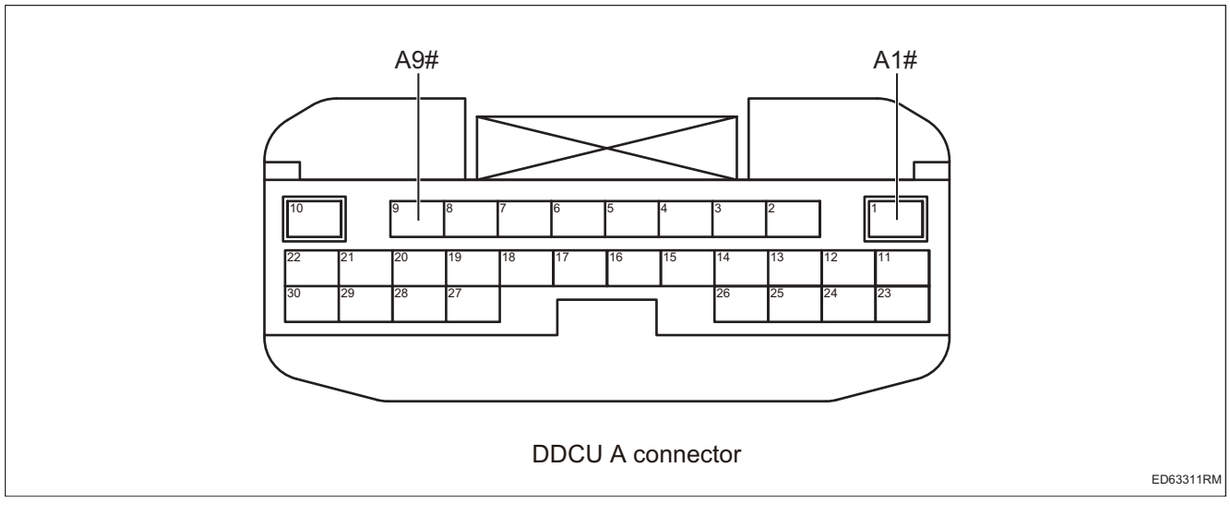
Standard value

Detector connection	Detection conditions	Specified state
DDCU connector A9# -rear left door lock connector 5#	Always connected	Less than 1Ω
DDCU connector A1# -rear left door lock connector 6#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check rear left door lock harness and connector for circuit shorted to ground**



DDCU A connector

ED63311RM

(a) Measure the resistance according to the values in the table below.

Standard value

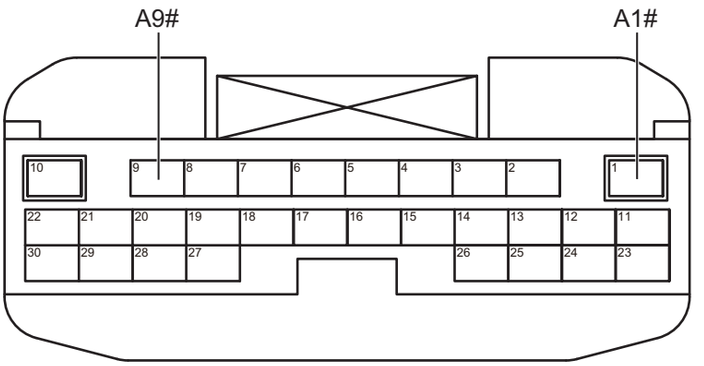
Detector connection	Detection conditions	Specified state
DDCU connector A9# -body GND	Always connected	10 KΩ or greater
DDCU connector A1# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check rear left door lock harness and connector for circuit shorted to power supply**

ED



DDCU A connector

ED63311RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DDCU connector A9# -body GND	The ignition switch is set to "ON"	Less than 1 V
DDCU connector A1# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

ED

4	**Replace rear left door lock (See page DL-12)**

(a) Replace the rear left door lock.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the DDCU (See page ED-32)**

OK

5	**End**

DTC	**U002888**	**Comfort CAN bus off**
DTC	**U014687**	**GW node lost**
DTC	**U014087**	**BCM 1 node lost**
DTC	**U024687**	**SCCU node lost**
DTC	**U020287**	**Rear right door module node lost**
DTC	**U016487**	**A/C control unit node lost**
DTC	**U112187**	**ESP message lost**
DTC	**U115187**	**ACU message lost**
DTC	**U124387**	**ADV message lost**
DTC	**U115587**	**Instrument cluster control unit message lost**
DTC	**U123287**	**LCDA message lost**
DTC	**U110087**	**ECM message lost**
DTC	**U114687**	**GW message lost**
DTC	**U129387**	**HCU message lost**

Description

When the communication between the DDCU and other systems is abnormal or interrupted, the DDCU will record the DTC.

DTC	DTC detection conditions	Faulty location
U002888	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U024687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U020287	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U016487	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U112187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

DTC	DTC detection conditions	Faulty location
U124387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U123287	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U129387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

Front right door control system

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Warning:

Be sure to carefully read the Maintenance Instructions and Precautions in the introduction before repairing the high voltage system or near the high voltage system components!

2. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

3. when the battery cable is disconnected and reconnected, some systems require initialization.

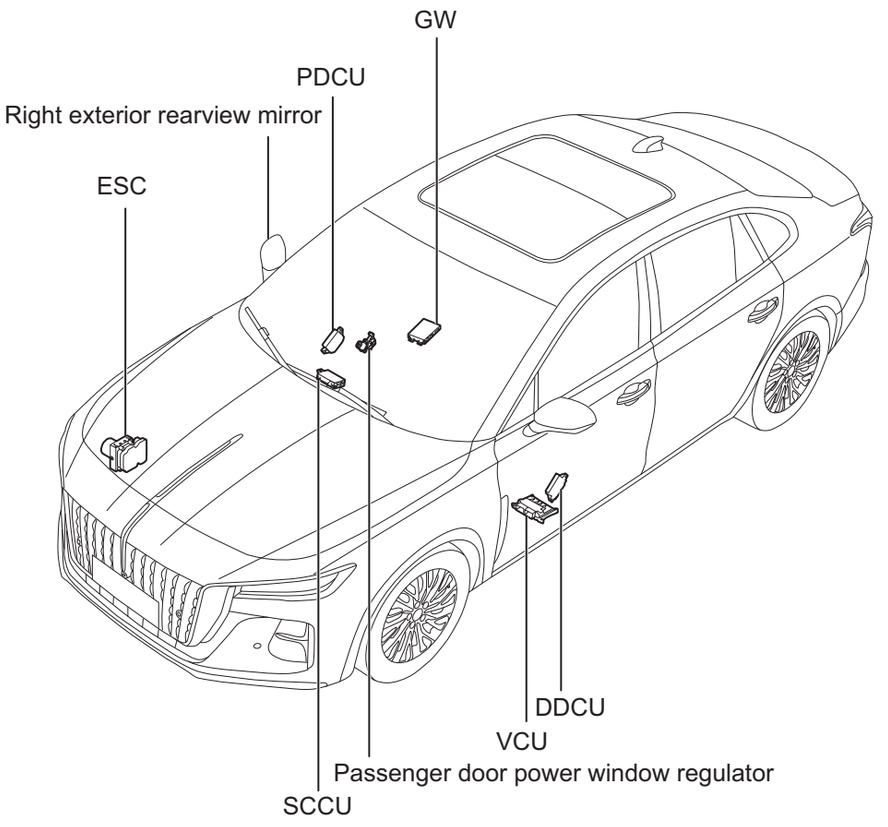
4. General repair instructions

(a) When checking the passenger door control system, it may affect the airbag work. Therefore, before carrying out maintenance work, be sure to carefully read and confirm the precautions for airbag.

(b) When parts need to be replaced or the connector needs to be disconnected during maintenance of passenger door control system, the battery negative cable shall be disconnected.

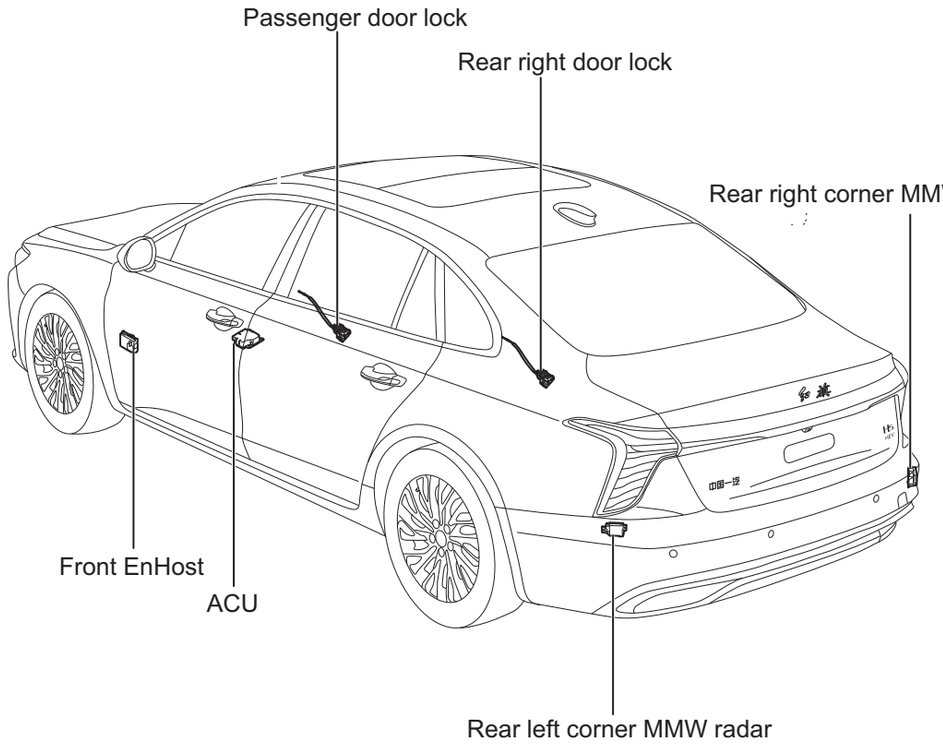
(c) The passenger door control system needs to be initialized after reconnecting the battery. And use the HQ-VDS to "clear the DTC" for all electronic control systems.

Location of parts



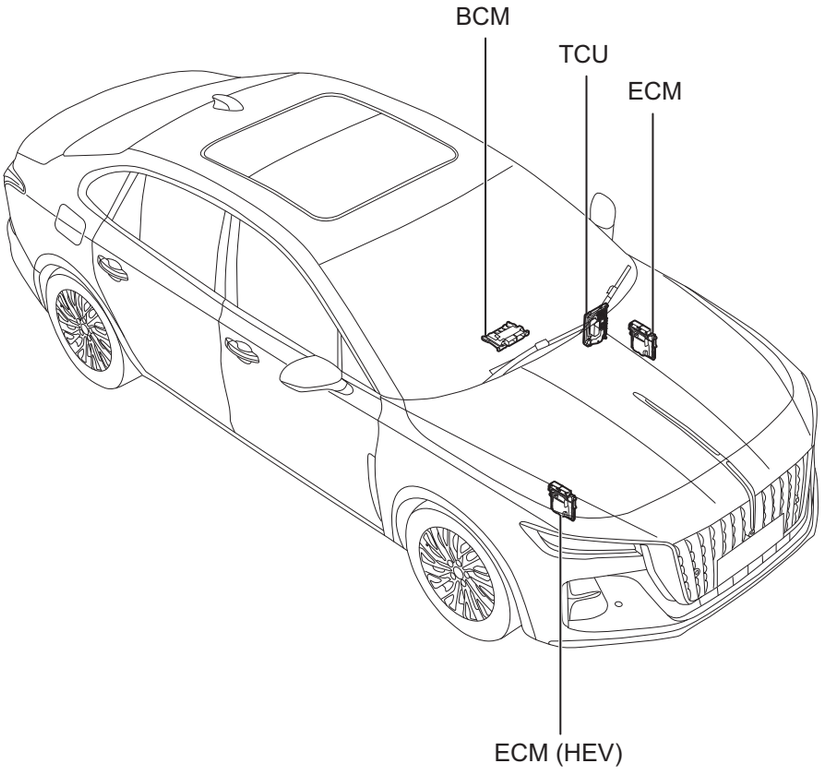
ED00120RM

Location of parts



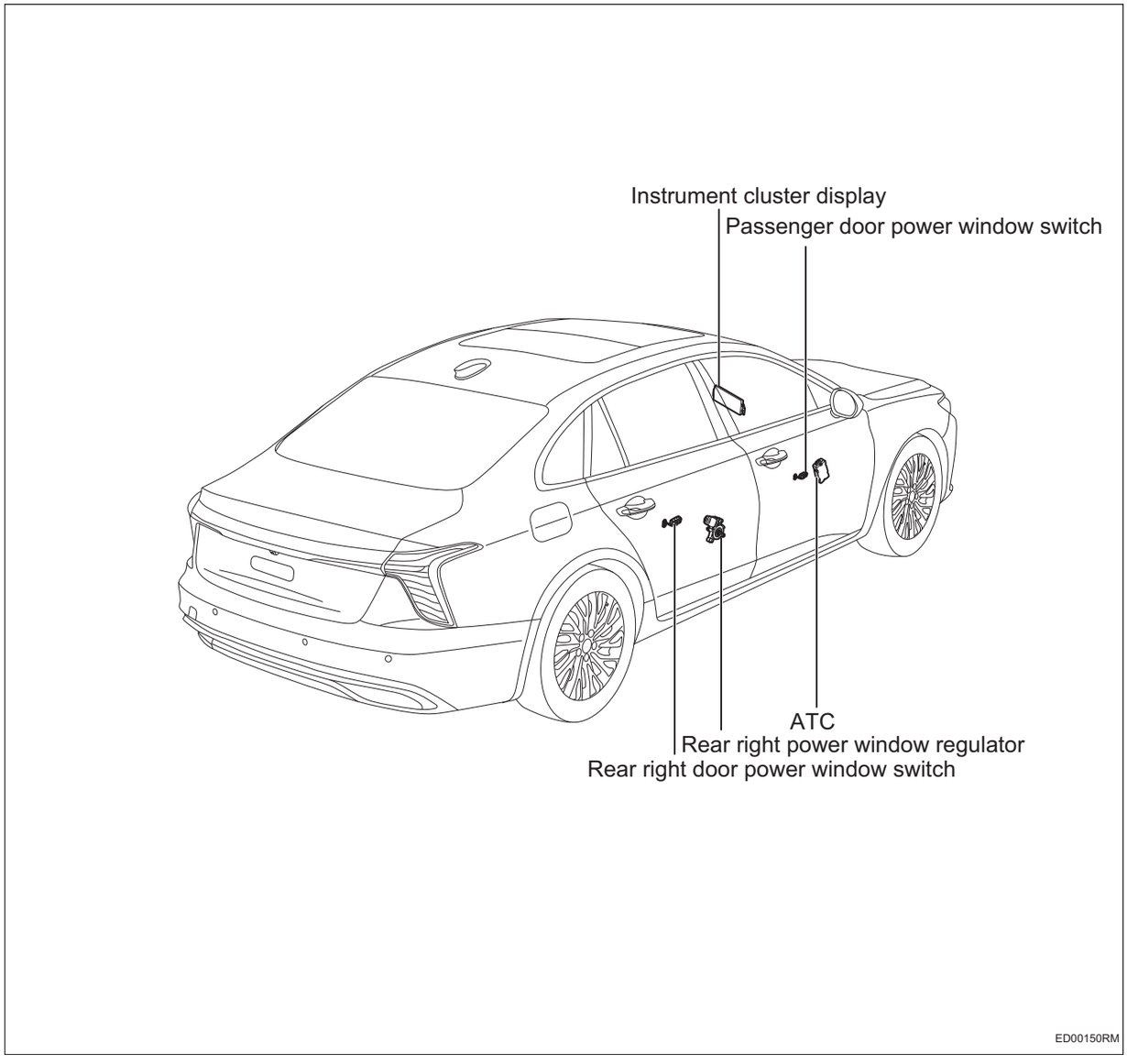
ED00130RM

Location of parts



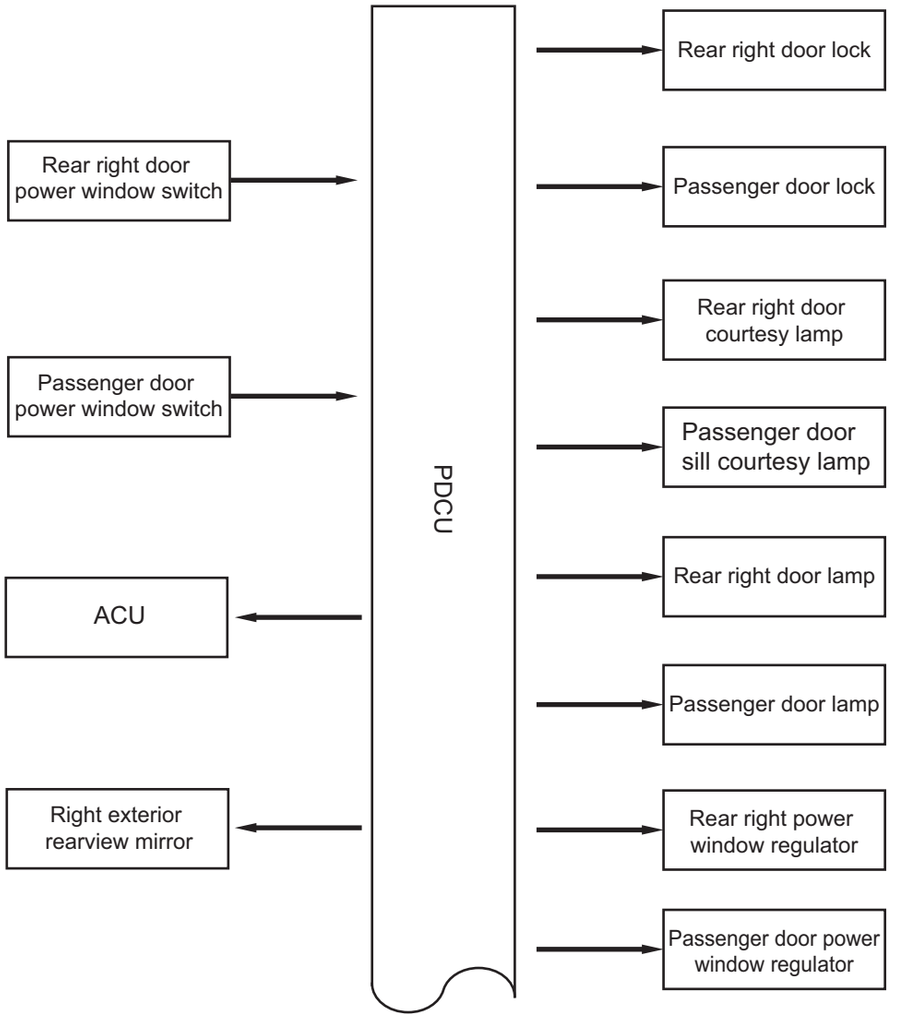
ED00140RM

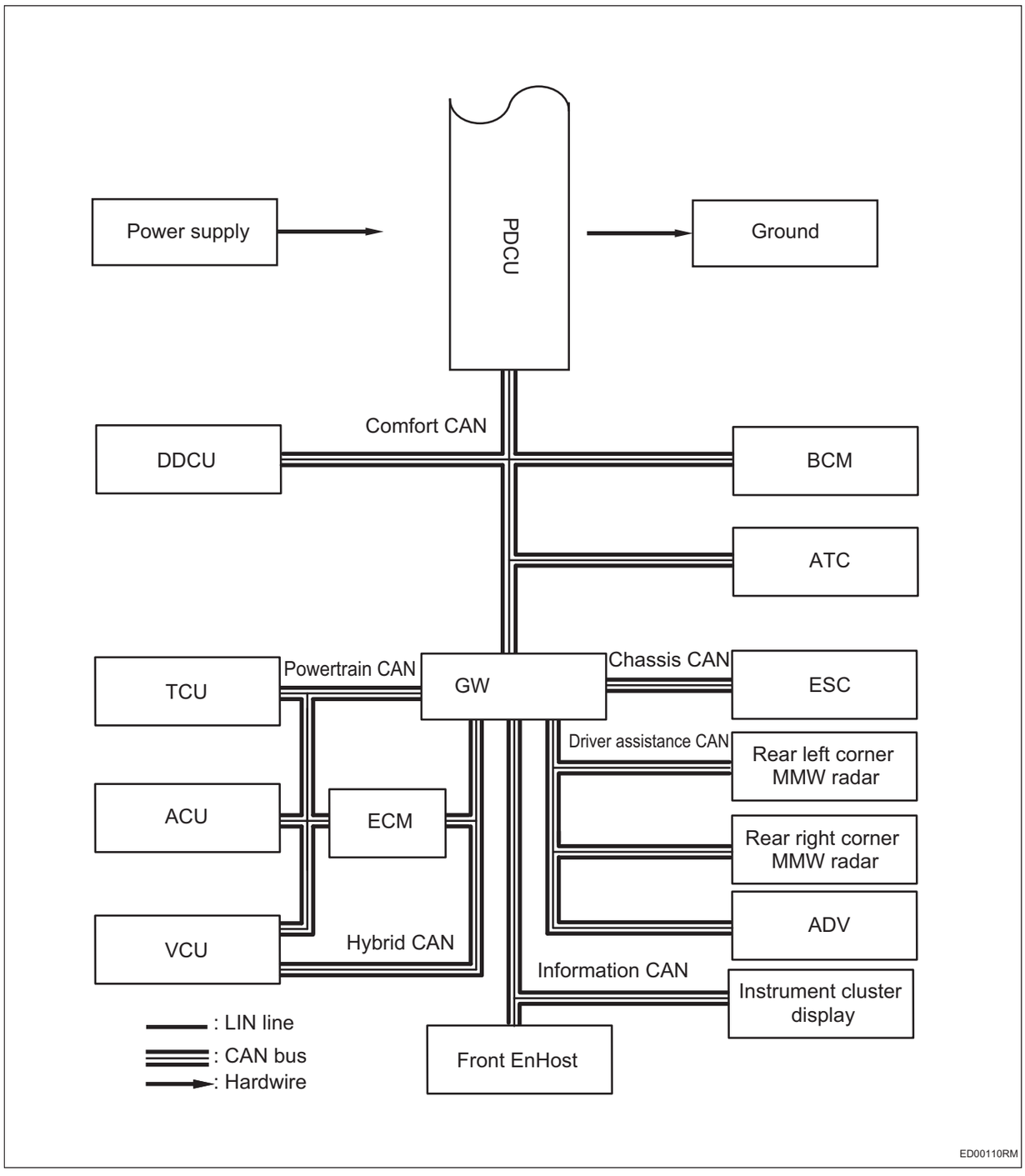
Location of parts



System diagram

PDCU


Rear right door lock
Rear right door power window switch
Passenger door lock
Rear right door courtesy lamp
Passenger door power window switch
Passenger door sill courtesy lamp
PDCU
Rear right door lamp
ACU
Passenger door lamp
Right exterior rearview mirror
Rear right power window regulator
Passenger door power window regulator
: LIN line
: CAN bus
: Hardwire
ED00100RM


Power supply
PDCU
Ground
Comfort CAN
DDCU
BCM
ATC
TCU
Powertrain CAN
GW
Chassis CAN
ESC
Driver assistance CAN
Rear left corner MMW radar
ACU
ECM
Rear right corner MMW radar
ADV
VCU
Hybrid CAN
Information CAN
Instrument cluster display
: LIN line
: CAN bus
: Hardwire
Front EnHost
ED00110RM

ED

System description

1. PDCU

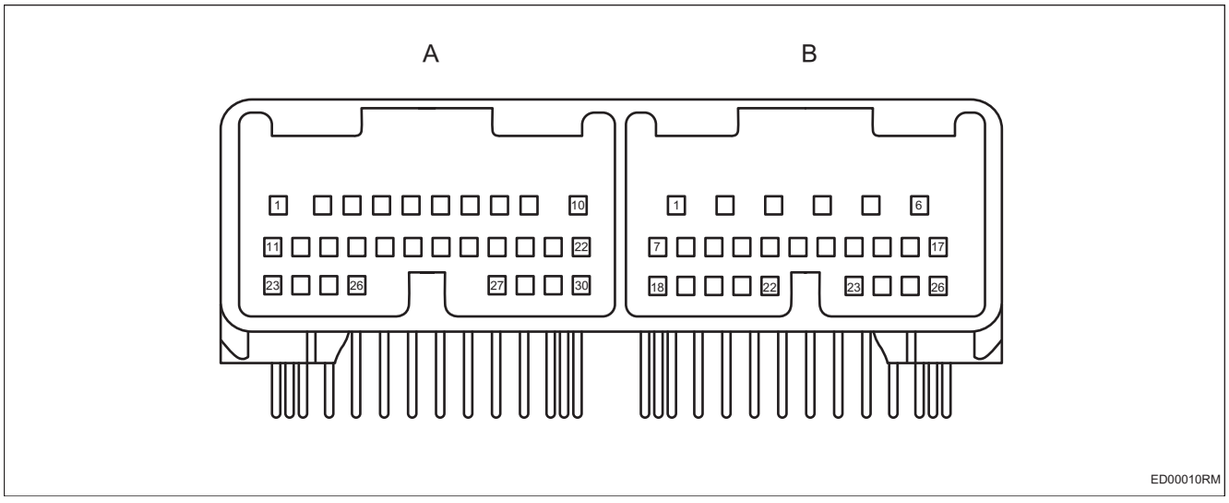
(a) The PDCU mainly realizes the detection of windows, door lock, rearview mirrors, door status and lock status, and the driving of door lamps.

Symptom chart

Fault	Possible location
Window lifting/lowering abnormity	• Power window switch • Related harness and connector • DCU • Power window regulator • Battery
Abnormal exterior rearview mirror operation	• Driver door power window switch • Exterior rearview mirror • DCU • Related harness and connector • Battery
Door unlocking abnormity	• Central locking switch • Related harness and connector • DCU • Door lock • Battery

ECU terminal

PDCU



PDCU A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Passenger door lock/rear right door locking output	16	-
2	-	17	Passenger door locking signal
3	BSD status indicator lamp	18	Hardwired impact signal
4	-	19	Rear right door status switch
5	-	20	-
6	-	21	-
7	-	22	-
8	Passenger door unlocking output	23	Rear door unlocking signal
9	Rear right door unlocking output	24	Rear door locking signal
10	-	25	-
11	Passenger door unlocking signal	26	CAN-H
12	-	27	Switch backlight output (right front + left rear + right rear)
13	Passenger door status switch	28	Rear right seat heater switch
14	CAN-L	29	-
15	-	30	Passenger side right rear window switch

PDCU B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Power supply	14	-
2	Power GND	15	Passenger side right front window switch
3	Right front window lifting	16	-
4	Passenger door window lowering	17	-

PDCU B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
5	Rear right window lifting	18	Passenger door lamp/door sill trim strip LED lamp
6	Rear right door window lowering	19	Right exterior rearview mirror unfolding
7	Right exterior rearview mirror left/ upward adjustment/folding	20	Right front rearview mirror heater
8	Right exterior rearview mirror right adjustment	21	-
9	Right exterior rearview mirror downward adjustment	22	Switch simulation GND (rearview mirror memory ground)
10	Rear right door lamp	23	Rear right seat heater indicator lamp
11	Rearview mirror position memory power supply	24	Right exterior rearview mirror upper/ lower position memory signal
12	-	25	-
13	-	26	Right exterior rearview mirror left and right position memory signal

DTC chart

PDCU

DTC	Description	Reference page
B114017	Battery overvoltage	(See page ED-78)
B114016	Battery undervoltage	(See page ED-78)
B114111	Passenger door window Up button stuck	(See page ED-81)
B114211	Passenger door window Down button stuck	(See page ED-81)
B11C111	Rear right door window Up button stuck	(See page ED-102)
B11C311	Rear right door window Down button stuck	(See page ED-102)
B114318	Passenger door window motor output current low	(See page ED-85)
B114319	Passenger door window motor output current high	(See page ED-85)
B11C518	Rear right door window motor output current low	(See page ED-107)
B11C519	Rear right door window motor output current high	(See page ED-107)
B114419	Rearview mirror upper adjustment output overcurrent	(See page ED-89)
B114519	Rearview mirror lower adjustment output overcurrent	(See page ED-89)
B114619	Rearview mirror left adjustment output overcurrent	(See page ED-89)

DTC	Description	Reference page
B114719	Rearview mirror right adjustment overcurrent	(See page ED-89)
B114818	Right front central lock motor unlocking undercurrent	(See page ED-94)
B114819	Right front central lock motor unlocking overcurrent	(See page ED-94)
B114918	Right front central lock motor locking undercurrent	(See page ED-94)
B114919	Right front central lock motor locking overcurrent	(See page ED-94)
B11C618	Right rear central lock motor unlocking undercurrent	(See page ED-111)
B11C619	Right rear central lock motor unlocking overcurrent	(See page ED-111)
B11C718	Right rear central lock motor locking undercurrent	(See page ED-111)
B11C719	Right rear central lock motor locking overcurrent	(See page ED-111)
B114A11	BSD lamp short circuit	(See page ED-99)
U002888	Comfort CAN bus off	(See page ED-116)
U014687	GW node lost	(See page ED-116)
U014087	BCM 1 node lost	(See page ED-116)
U016487	A/C control unit node lost	(See page ED-116)
U019987	Driver door module node lost	(See page ED-116)
U024687	SCCU node lost	(See page ED-116)
U124387	ADV message lost	(See page ED-116)
U112187	ESP message lost	(See page ED-116)
U115187	ACU message lost	(See page ED-116)
U124587	EnHost/IVI message lost	(See page ED-116)
U123287	LCDA message lost	(See page ED-116)
U110187	TCU message lost	(See page ED-116)
U110087	ECM message lost	(See page ED-116)
U114687	GW message lost	(See page ED-116)
U115587	Instrument cluster control unit message lost	(See page ED-116)
U129387	HCU message lost	(See page ED-116)

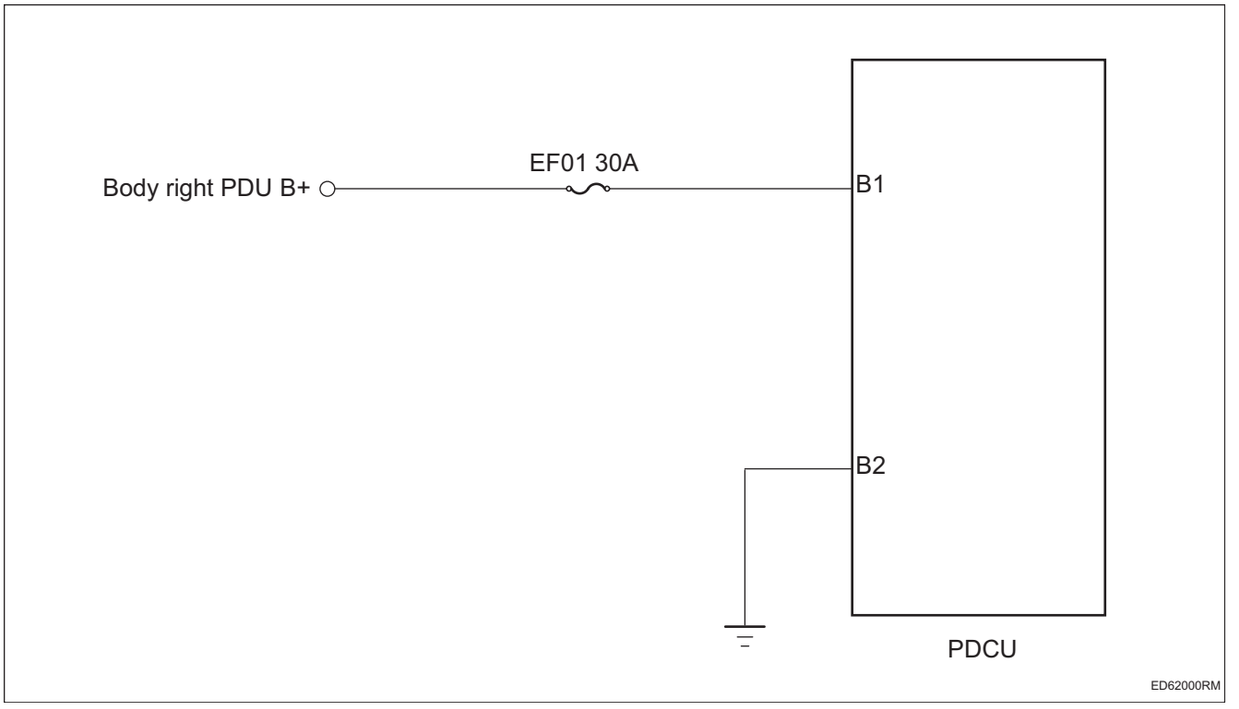
DTC	B114017	Battery overvoltage
DTC	B114016	Battery undervoltage

Description

When the PDCU power supply voltage exceeds the normal operating range, the PDCU records the DTC.

DTC	DTC detection conditions	Faulty location
B114017	(a) Battery overvoltage.	• PDCU • Harness and connector • Charging system
B114016	(a) Battery undervoltage.	• PDCU • Fuse • Harness and connector • Charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2	**Check PDCU fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the PDCU fuse.

(d) Measure the resistance according to the values in the table below.

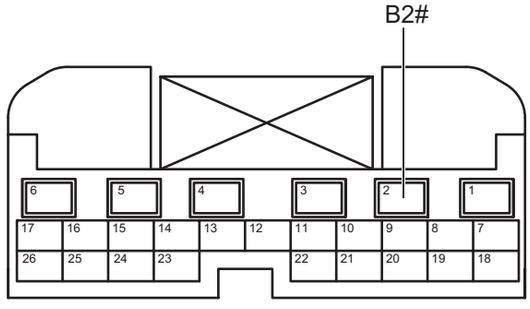
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3	**Check PDCU ground**



PDCU B connector

ED62010RM

(a) Disconnect the PDCU connector.

(b) Measure the resistance according to the values in the table below.

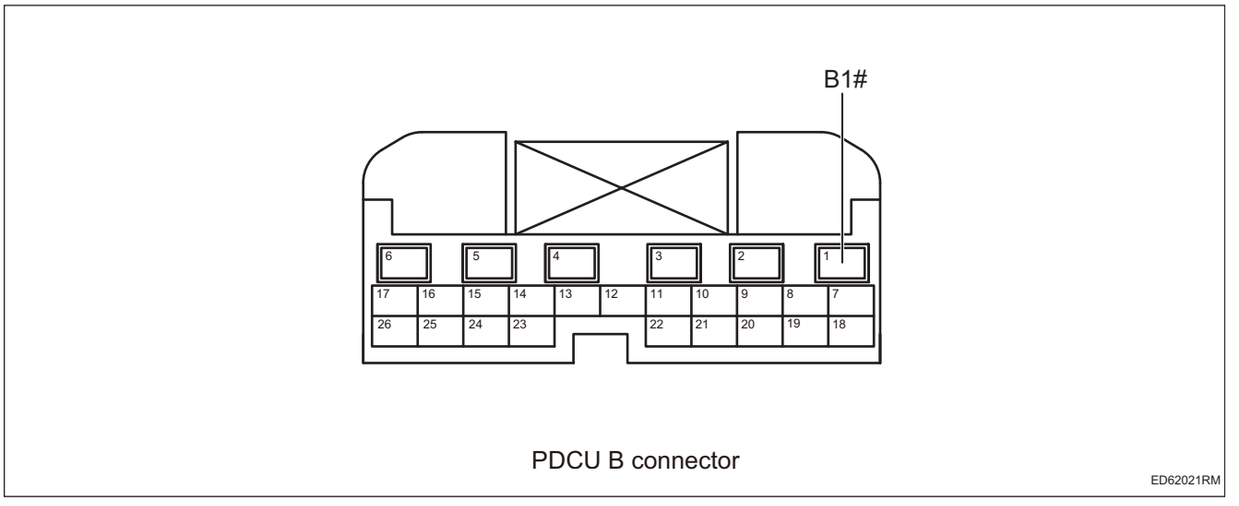
Standard value

Detector connection	Detection conditions	Specified state
PDCU connector B2# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check PDCU power supply**



PDCU B connector

ED62021RM

(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PDCU connector B1# -body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace PDCU (See page ED-32)**

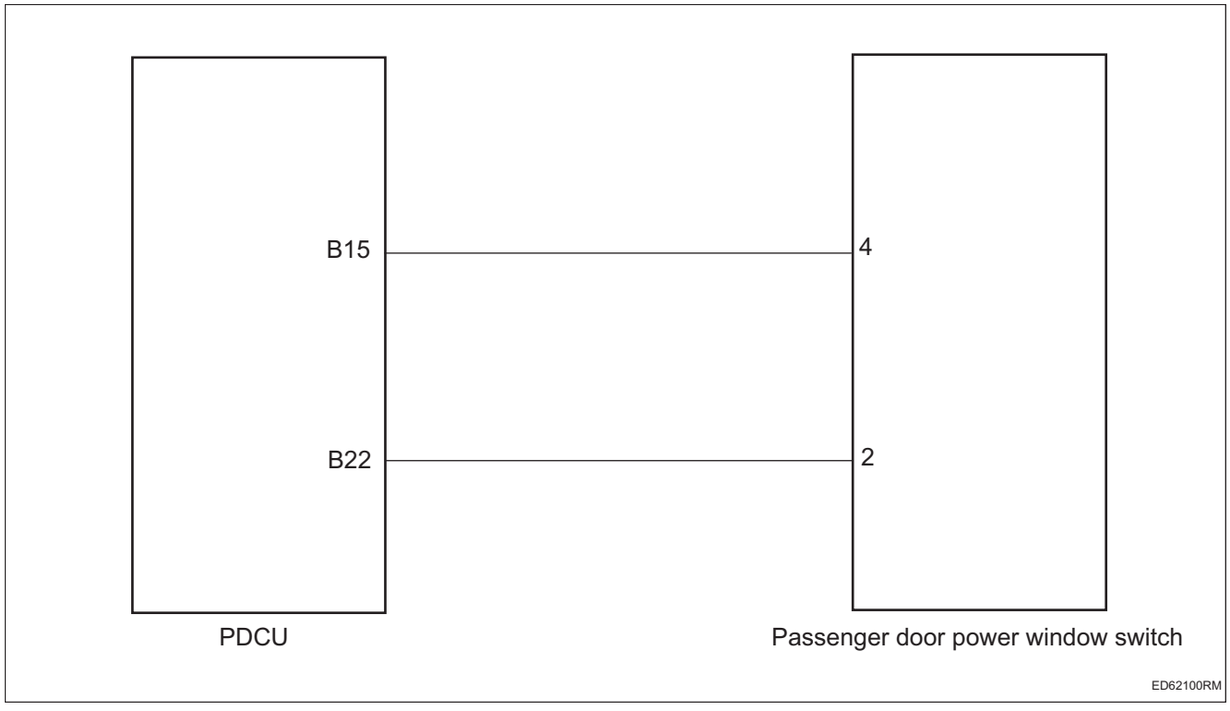
DTC	B114111	Passenger door window Up button stuck
DTC	B114211	Passenger door window Down button stuck

Description

When the passenger door power window switch fails, PDCU records the DTC.

DTC	DTC detection conditions	Faulty location
B114111	(a) Passenger door window Up button stuck.	• PDCU • Harness and connector • Passenger door power window switch
B114211	(a) Passenger door window Down button stuck.	• PDCU • Harness and connector • Passenger door power window switch

Circuit diagram



Inspection procedure

1	Check passenger door power window switch

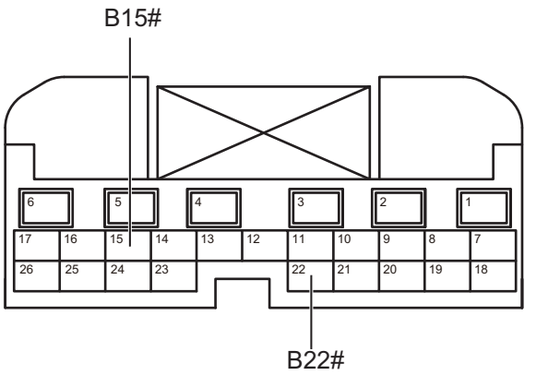
(a) Check the passenger door power window regulator for foreign matter.

(b) Check whether the passenger door power window switch is stuck.

NG	Repair according to the fault

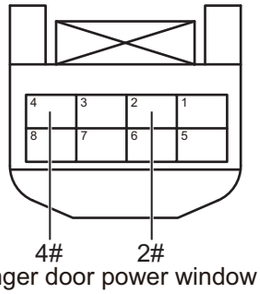
OK

2	**Check passenger door power window switch harness and connector for open circuit**



PDCU B connector

ED62111RM



Passenger door power window switch connector

ED62120RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDCU connector.

(d) Disconnect the passenger door power window switch connector.

(e) Measure the resistance according to the values in the table below.

Standard value

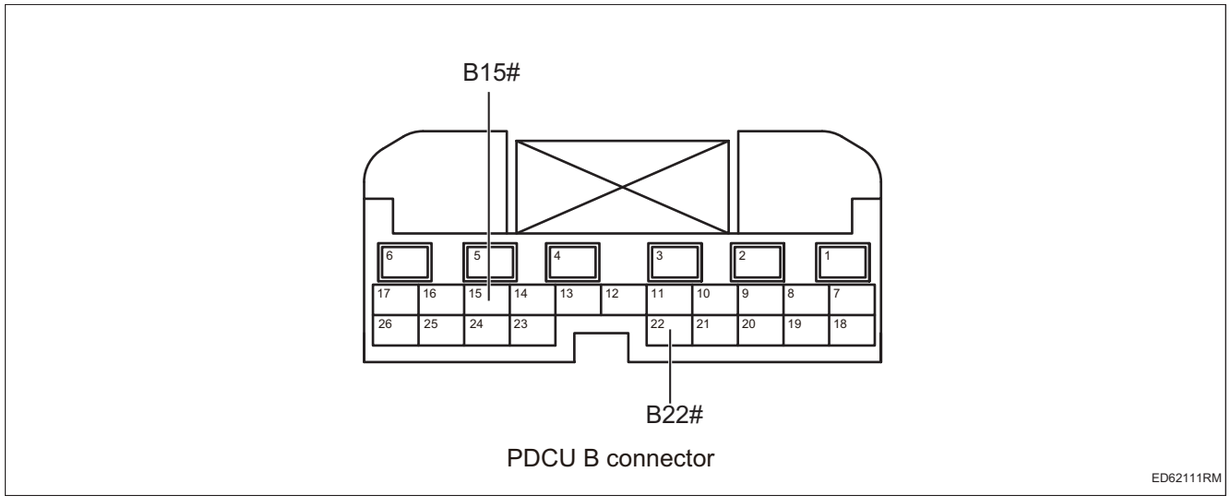
Detector connection	Detection conditions	Specified state
PDCU connector B15# -right front power window switch connector 4#	Always connected	Less than 1Ω
PDCU connector B22# - passenger door power window switch connector 2#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	**Check passenger door power window switch harness and connector for circuit shorted to ground**

ED



(a) Measure the resistance according to the values in the table below.

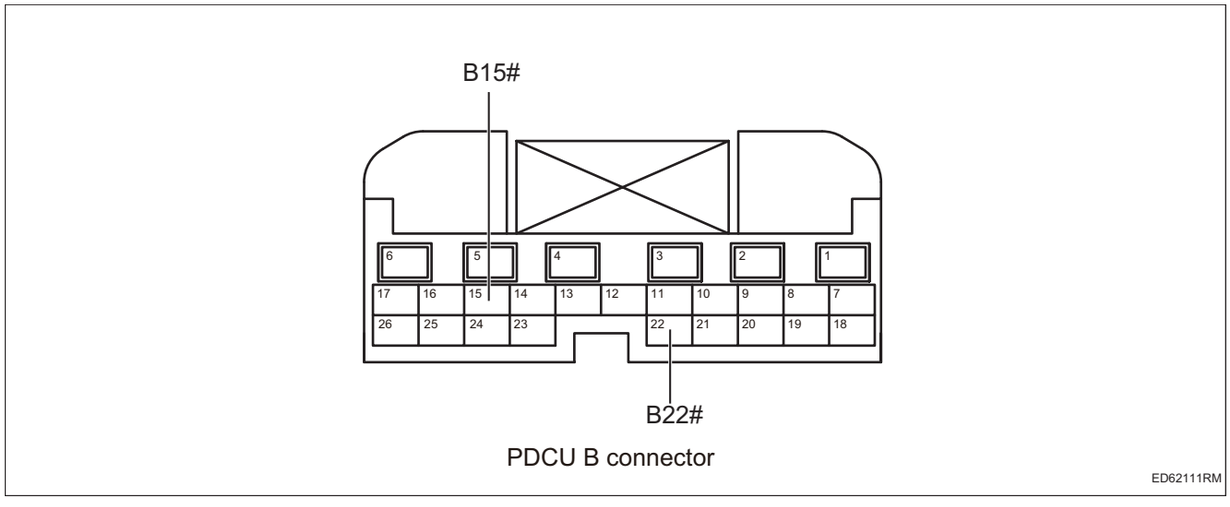
Standard value

Detector connection	Detection conditions	Specified state
PDCU connector B15# -body GND	Always connected	10 KΩ or greater
PDCU connector B22# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check passenger door power window switch harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PDCU connector B15# -body GND	The ignition switch is set to "ON"	Less than 1 V
PDCU connector B22# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the passenger door power window switch (See page IR-6)**

(a) Replace the right front power window switch.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace PDCU (See page ED-32)**

OK

ED

6	**End**

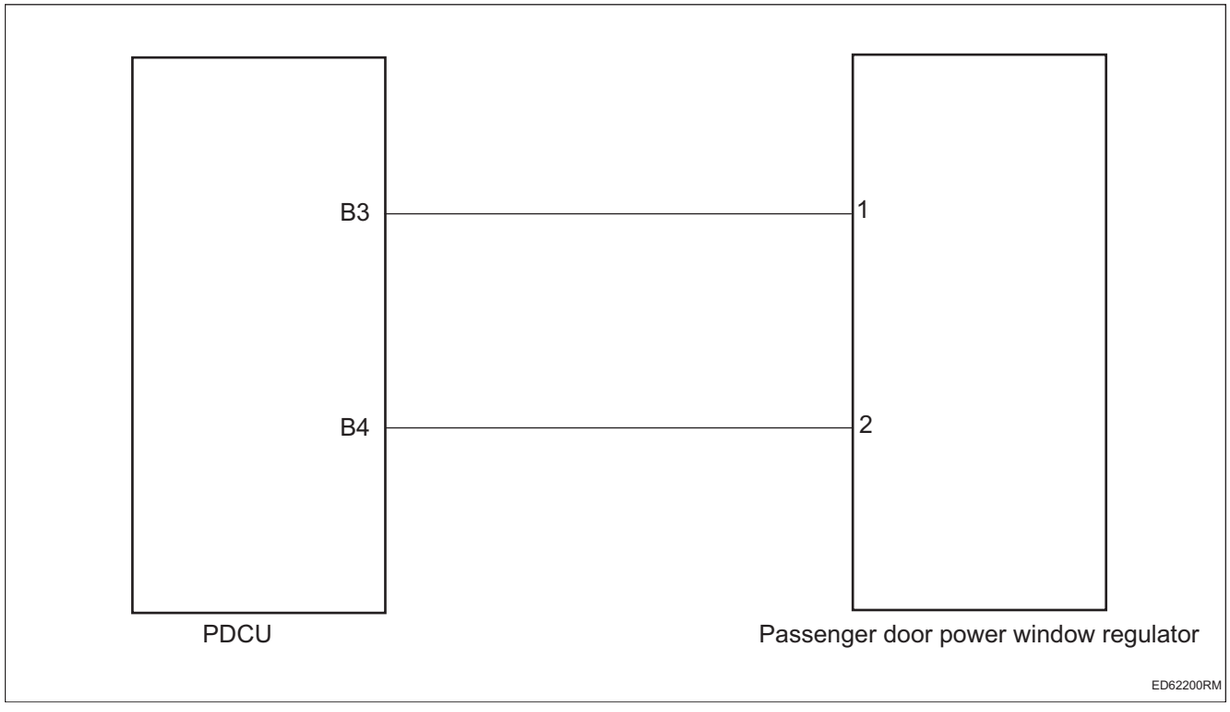
DTC	**B114318**	**Passenger door window motor output current low**
DTC	**B114319**	**Passenger door window motor output current high**

Description

When the passenger door power window regulator output current is abnormal, the PDCU will record the DTC.

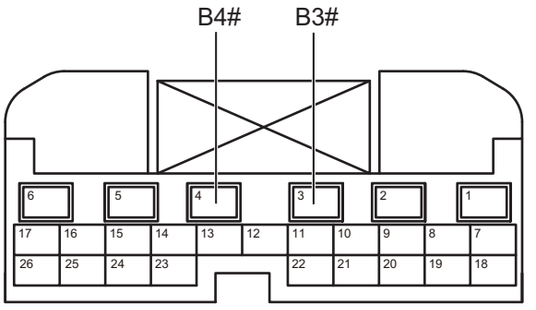
DTC	DTC detection conditions	Faulty location
B114318	(a) Passenger door window motor output undercurrent.	• PDCU • Harness and connector • Passenger door power window regulator
B114319	(a) Passenger door window motor output current high.	• PDCU • Harness and connector • Passenger door power window regulator

Circuit diagram



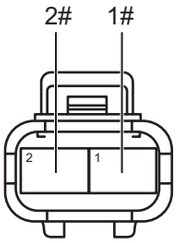
Inspection procedure

1	**Check passenger door power window regulator harness and connector for open circuit**



PDCU B connector

ED62211RM



Passenger door power window regulator connector

ED62220RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDCU connector.

(d) Disconnect the passenger door power window regulator connector.

(e) Measure the resistance according to the values in the table below.

Standard value

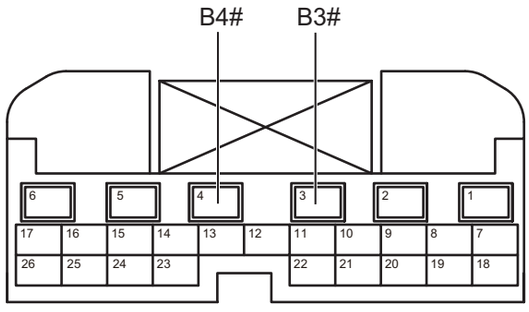
Detector connection	Detection conditions	Specified state
PDCU connector B3# -passenger door power window regulator connector 1#	Always connected	Less than 1Ω
PDCU connector B4# -passenger door power window regulator connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

ED

OK

2	**Check passenger door power window regulator harness and connector for circuit shorted to ground**



PDCU B connector

ED62211RM

(a) Measure the resistance according to the values in the table below.

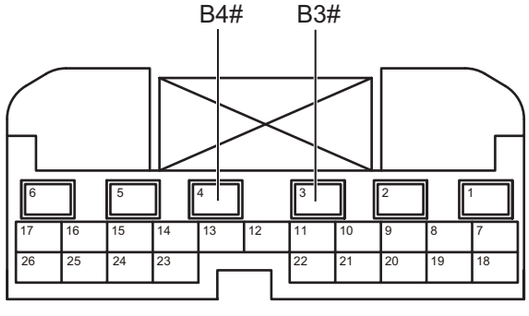
Standard value

Detector connection	Detection conditions	Specified state
PDCU connector B3# -body GND	Always connected	10 KΩ or greater
PDCU connector B4# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check passenger door power window regulator harness and connector for circuit shorted to power supply**



PDCU B connector

ED62211RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PDCU connector B3# -body GND	The ignition switch is set to "ON"	Less than 1 V
PDCU connector B4# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace passenger door power window regulator (See page ED-9)**

(a) Replace the passenger door power window regulator.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace PDCU (See page ED-32)**

OK

5	**End**

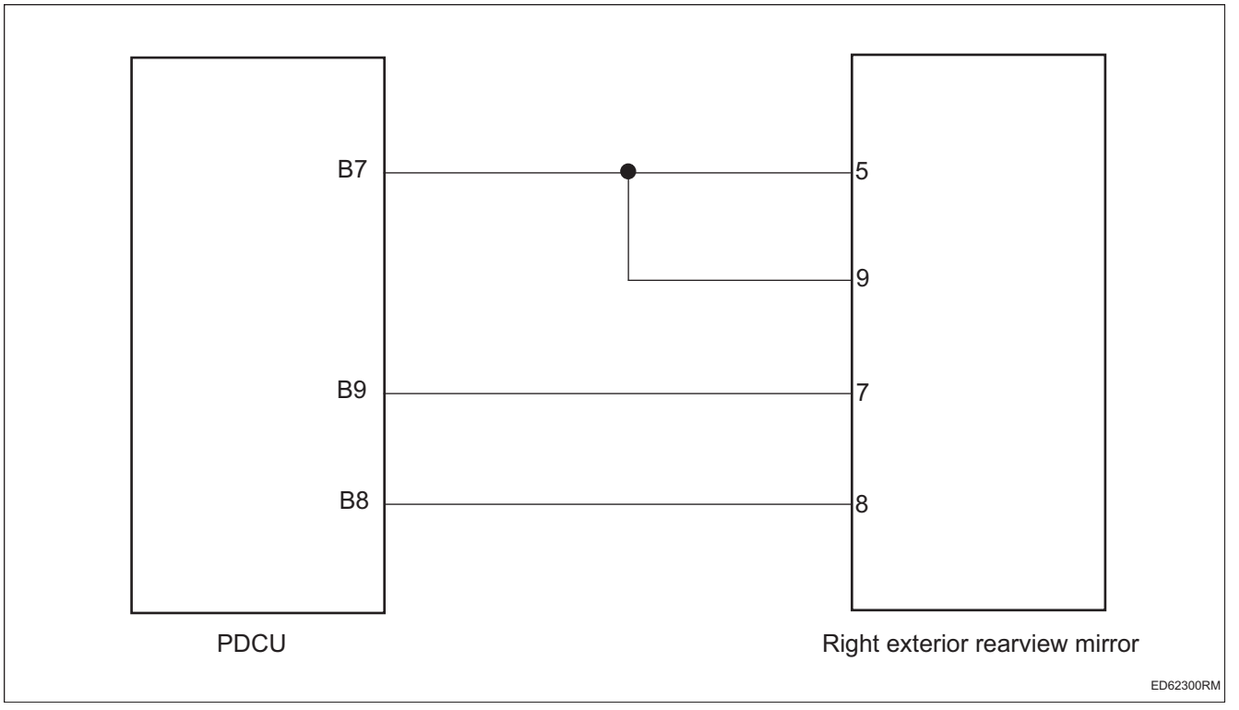
DTC	**B114419**	**Rearview mirror upper adjustment output overcurrent**
DTC	**B114519**	**Rearview mirror lower adjustment output overcurrent**
DTC	**B114619**	**Rearview mirror left adjustment output overcurrent**
DTC	**B114719**	**Rearview mirror right adjustment overcurrent**

Description

When the adjustment output current of the right exterior rearview mirror exceeds the normal range, the PDCU records the DTC.

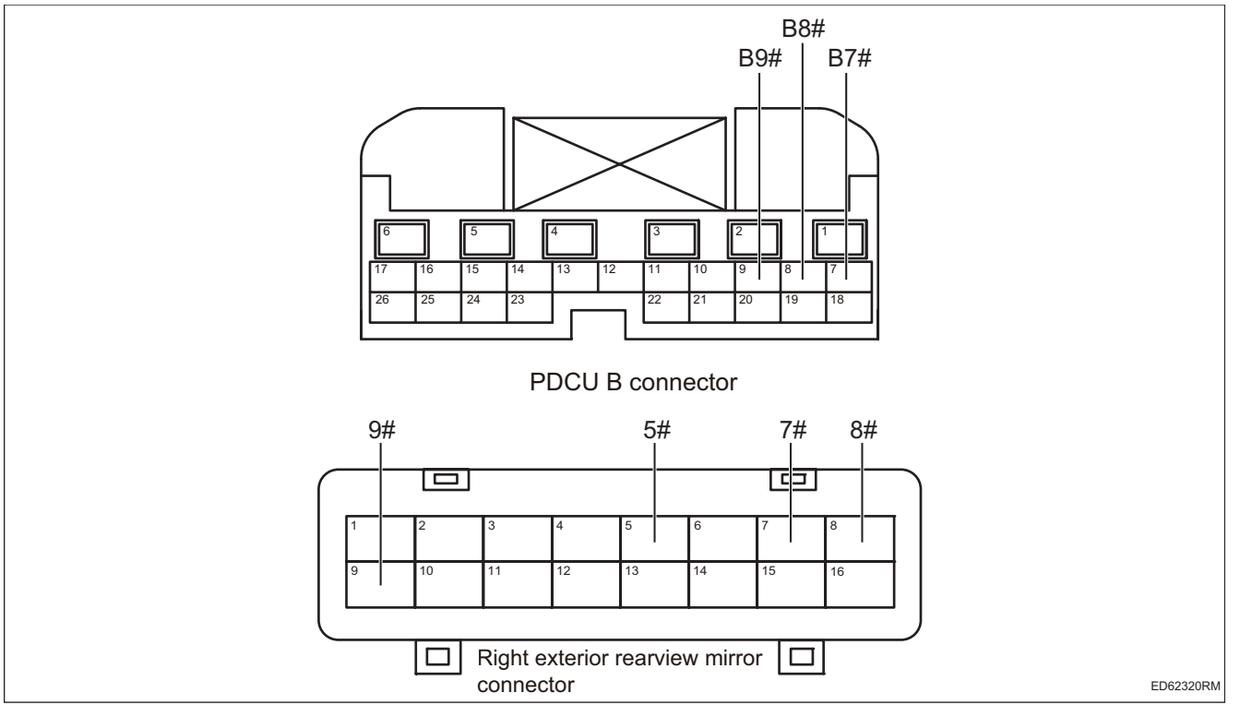
DTC	DTC detection conditions	Faulty location
B114419	(a) Rearview mirror upward adjustment output current high.	• PDCU • Harness and connector • Right exterior rearview mirror
B114519	(a) Rearview mirror downward adjustment output current high.	• PDCU • Harness and connector • Right exterior rearview mirror
B114619	(a) Rearview mirror left adjustment output current high.	• PDCU • Harness and connector • Right exterior rearview mirror
B114719	(a) Rearview mirror right adjustment output current high.	• PDCU • Harness and connector • Right exterior rearview mirror

Circuit diagram



Inspection procedure

1	**Check right exterior rearview mirror harness and connector for open circuit**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDCU connector.

(d) Disconnect the right exterior rearview mirror connector.

(e) Measure the resistance according to the values in the table below.

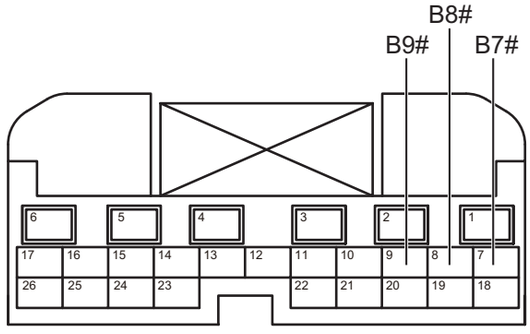
Standard value

Detector connection	Detection conditions	Specified state
PDCU connector B7# - right exterior rearview mirror connector 5#	Always connected	Less than 1Ω
PDCU connector B7# -right exterior rearview mirror connector 9#	Always connected	Less than 1Ω
PDCU connector B9# -right exterior rearview mirror connector 7#	Always connected	Less than 1Ω
PDCU connector B8# -right exterior rearview mirror connector 8#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check right exterior rearview mirror harness and connector for circuit shorted to ground**



PDCU B connector

ED62311RM

(a) Measure the resistance according to the values in the table below.

Standard value

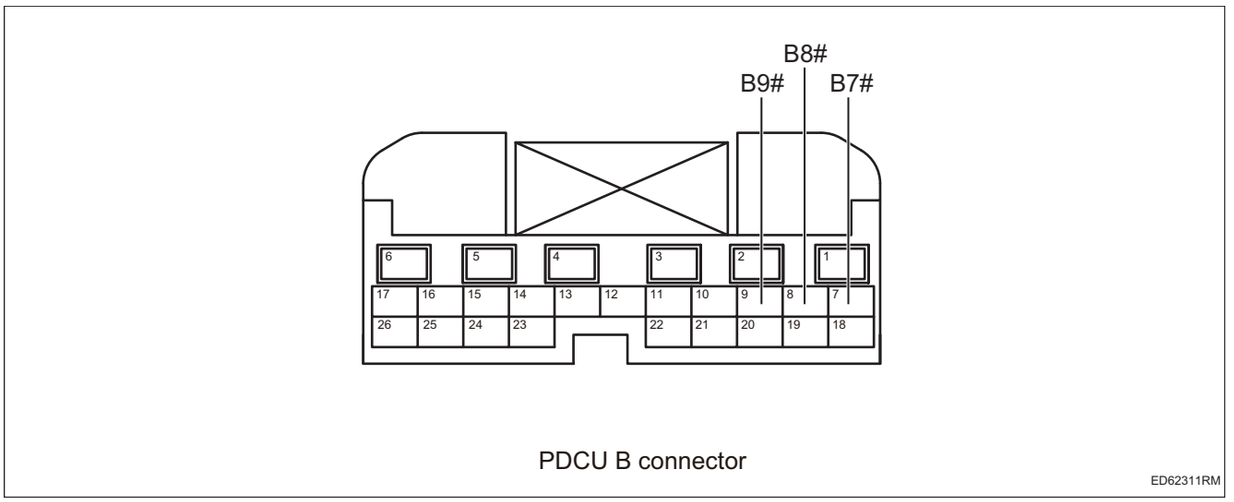
Detector connection	Detection conditions	Specified state
PDCU connector B7# -body GND	Always connected	10 KΩ or greater
PDCU connector B9# -body GND	Always connected	10 KΩ or greater

Detector connection	Detection conditions	Specified state
PDCU connector B8# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check right exterior rearview mirror harness and connector for circuit shorted to power supply**



PDCU B connector

ED62311RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PDCU connector B7# -body GND	The ignition switch is set to "ON"	Less than 1 V
PDCU connector B9# -body GND	The ignition switch is set to "ON"	Less than 1 V
PDCU connector B8# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

ED

OK

4	**Replace the right exterior rearview mirror (See page IM-3)**

(a) Replace the right exterior rearview mirror.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace PDCU (See page ED-32)**

OK

5	**End**

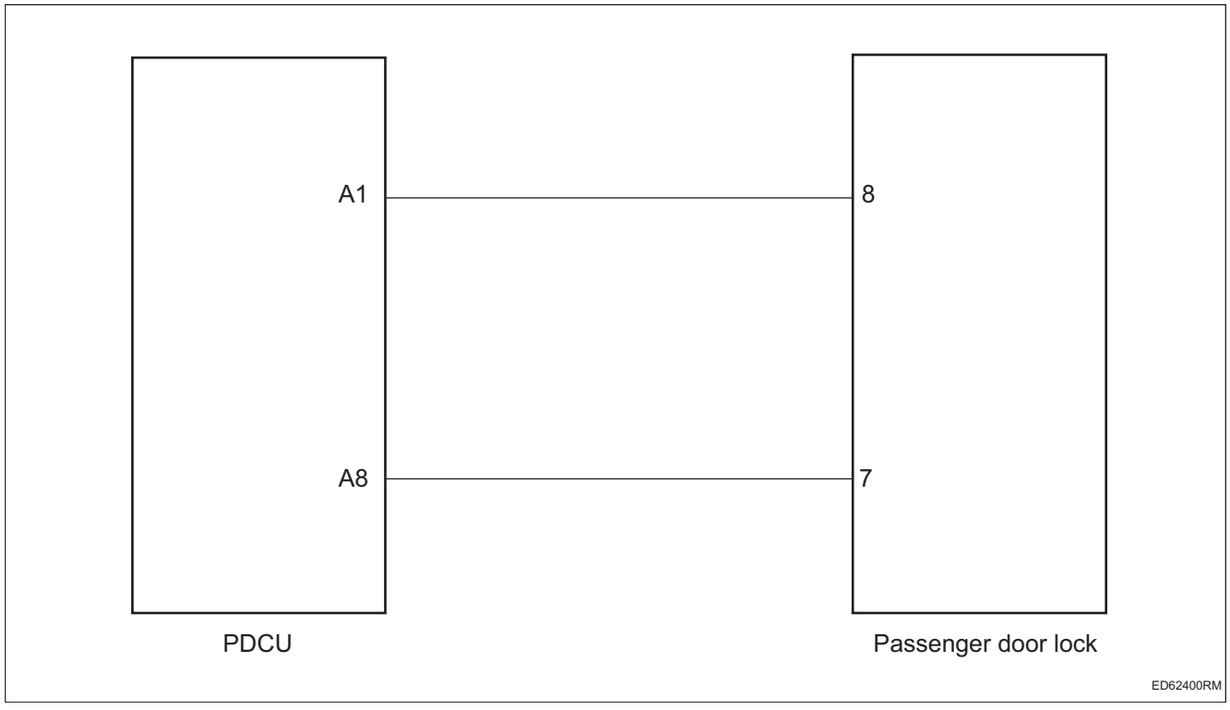
DTC	**B114818**	**Right front central lock motor unlocking undercurrent**
DTC	**B114819**	**Right front central lock motor unlocking overcurrent**
DTC	**B114918**	**Right front central lock motor locking undercurrent**
DTC	**B114919**	**Right front central lock motor locking overcurrent**

Description

When the working current of the passenger door lock exceeds the normal range, the PDCU records the DTC.

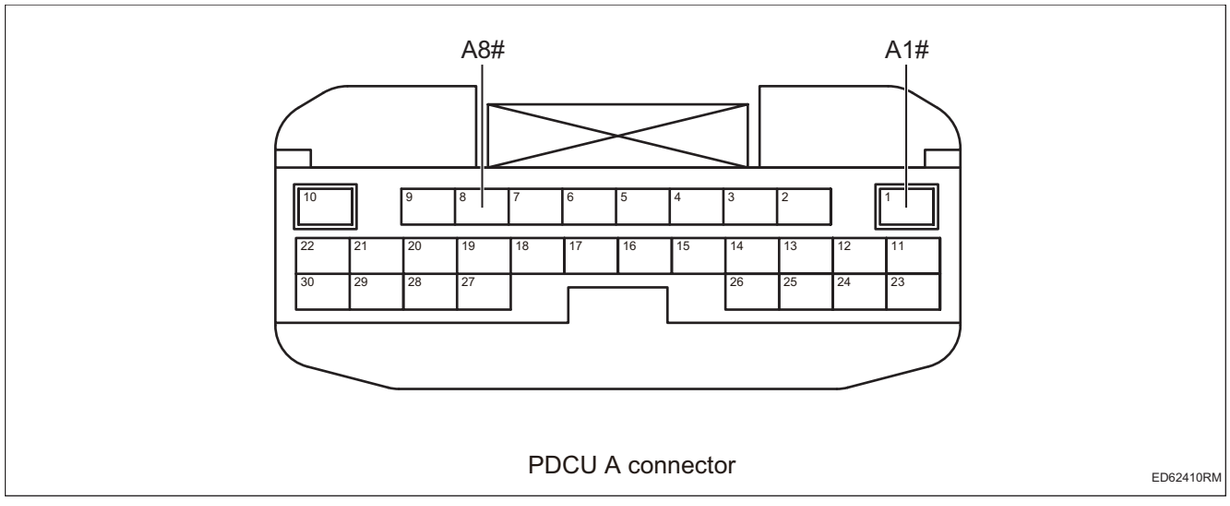
DTC	DTC detection conditions	Faulty location
B114818	(a) Right front central lock motor unlocking undercurrent.	• PDCU • Harness and connector • Passenger door lock
B114819	(a) Right front central lock motor unlocking overcurrent.	• PDCU • Harness and connector • Passenger door lock
B114918	(a) Right front central lock motor locking current low.	• PDCU • Harness and connector • Passenger door lock
B114919	(a) Right front central lock motor locking current high.	• PDCU • Harness and connector • Passenger door lock

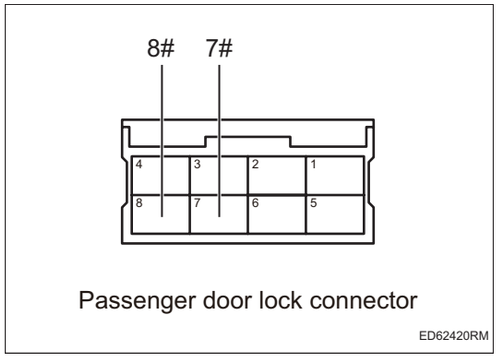
Circuit diagram



Inspection procedure

1	Check passenger door lock harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDCU connector.

(d) Disconnect the passenger door lock connector.

(e) Measure the resistance according to the values in the table below.

Standard value

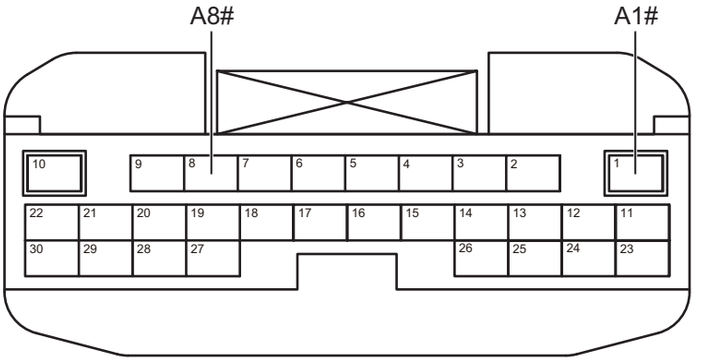
ED

Detector connection	Detection conditions	Specified state
PDCU connector A1# -passenger door lock connector 8#	Always connected	Less than 1Ω
PDCU connector A8# -passenger door lock connector 7#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check passenger door lock harness and connector for circuit shorted to ground**



PDCU A connector

ED62410RM

(a) Measure the resistance according to the values in the table below.

Standard value

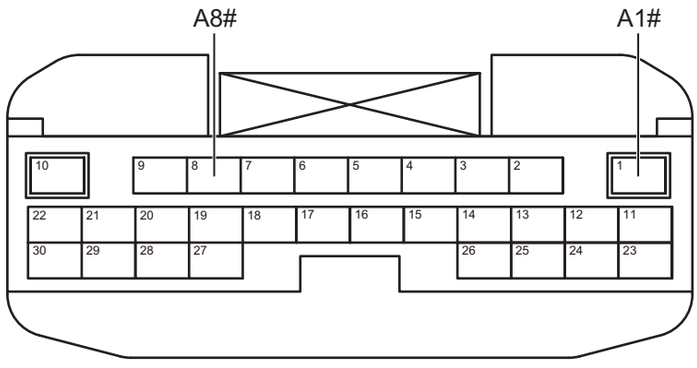
Detector connection	Detection conditions	Specified state
PDCU connector A1# -body GND	Always connected	10 KΩ or greater
PDCU connector A8# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check passenger door lock harness and connector for circuit shorted to power supply**

ED



PDCU A connector

ED62410RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PDCU connector A1# -body GND	The ignition switch is set to "ON"	Less than 1 V
PDCU connector A8# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace passenger door lock (See page DL-12)**

(a) Replace the passenger door lock.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace PDCU (See page IM-3)**

ED

OK

5	**End**

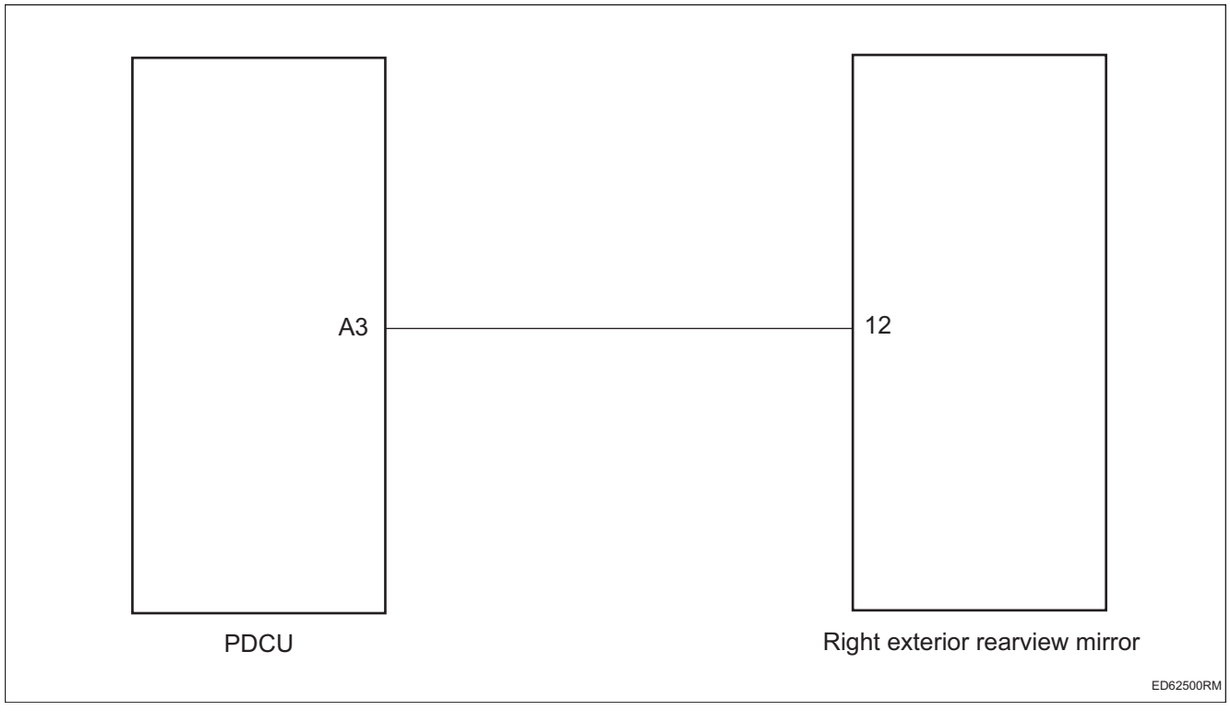
DTC	B114A11	BSD lamp short circuit

Description

When the circuit of right rearview mirror BSD lamp is shorted, the PDCU records the DTC.

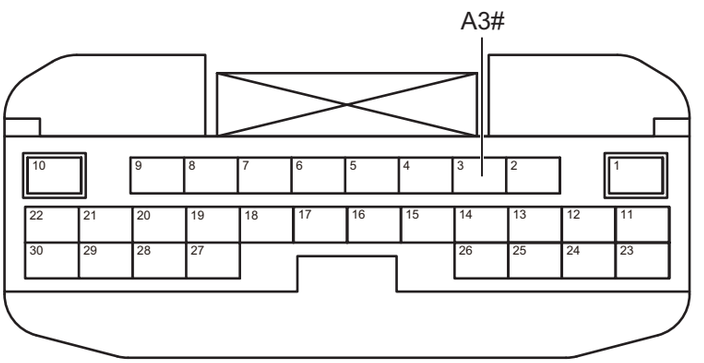
DTC	DTC detection conditions	Faulty location
B114A11	(a) BSD lamp short circuit.	• PDCU • Harness and connector • Right exterior rearview mirror

Circuit diagram



Inspection procedure

1	**Check right exterior rearview mirror harness and connector for circuit shorted to ground**



PDCU A connector

ED62511RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDCU connector.

(d) Disconnect the right exterior rearview mirror connector.

(e) Measure the resistance according to the values in the table below.

Standard value

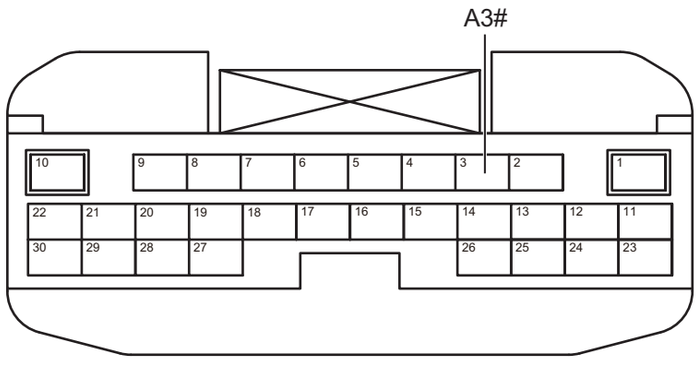
Detector connection	Detection conditions	Specified state
PDCU connector A3# -body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

ED

OK

2	**Check right exterior rearview mirror harness and connector for circuit shorted to power supply**



PDCU A connector

ED62511RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PDCU connector A3# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

3	**Replace the right exterior rearview mirror (See page IM-3)**

(a) Replace the right exterior rearview mirror.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace PDCU (See page ED-32)**

OK

4	**End**

ED

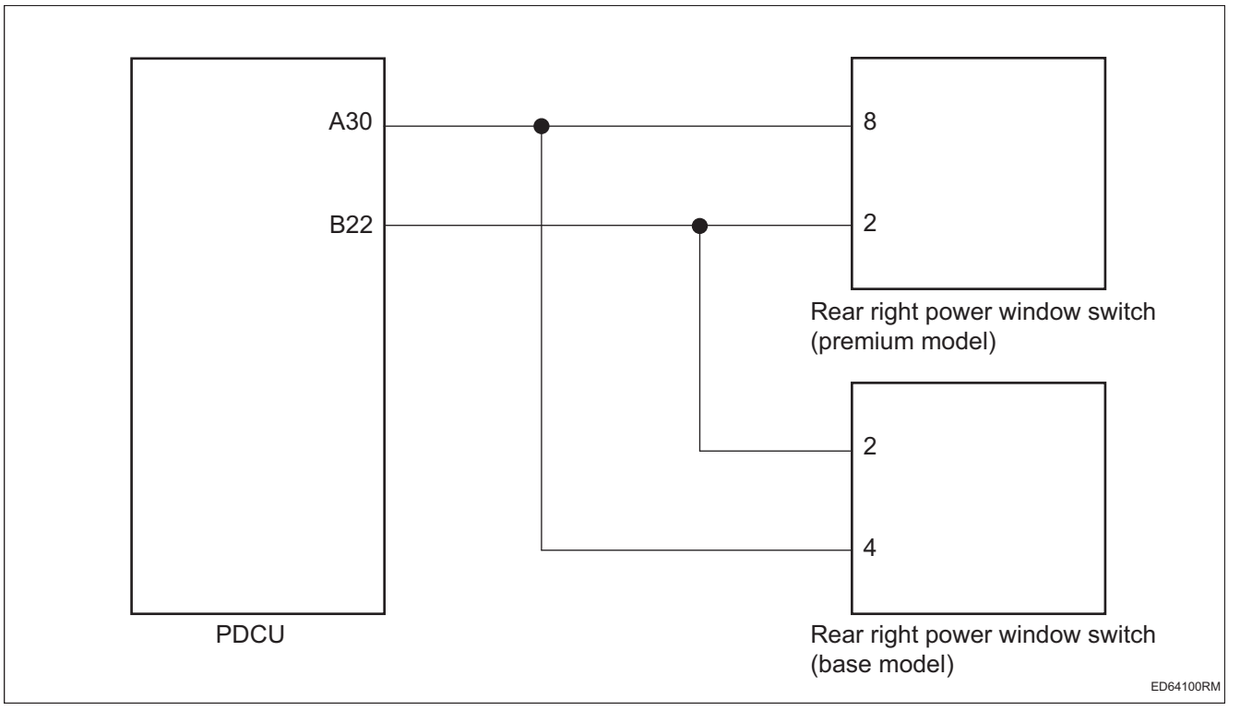
DTC	B11C111	Rear right door window Up button stuck
DTC	B11C311	Rear right door window Down button stuck

Description

When the rear right power window switch fails, PDCU records the DTC.

DTC	DTC detection conditions	Faulty location
B11C111	(a) Rear right door window Up button stuck.	• PDCU • Harness and connector • Rear right power window switch
B11C311	(a) Rear right door window Down button stuck.	• PDCU • Harness and connector • Rear right power window switch

Circuit diagram



Inspection procedure

1	Check rear right power window switch

(a) Check the rear right power window switch for foreign matter.

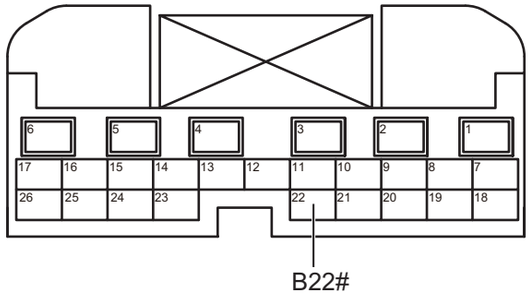
(b) Check whether the rear right power window switch is stuck.

NG	Repair according to the fault

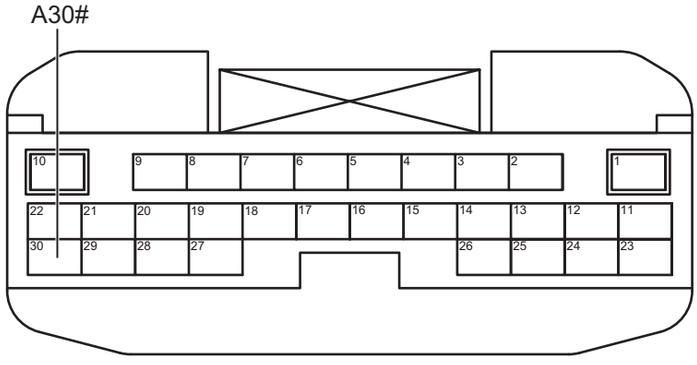
ED

OK

2	Check rear right power window switch harness and connector for open circuit

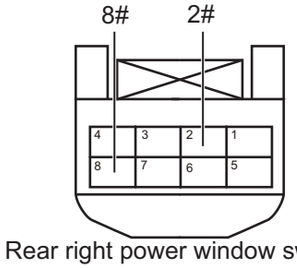


PDCU B connector

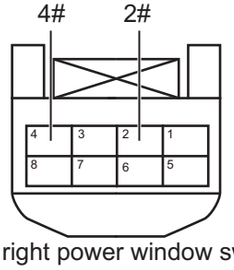


PDCU A connector

ED64111RM



Rear right power window switch (premium model) connector



Rear right power window switch (base model) connector

ED64120RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDCU connector.

(d) Disconnect the rear right power window switch connector.

(e) Measure the resistance according to the values in the table below.

Standard value

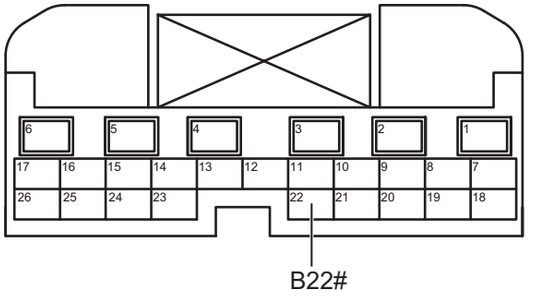
Detector connection	Detection conditions	Specified state
PDCU connector A30# - rear right power window switch (premium model) connector 8#	Always connected	Less than 1Ω
PDCU connector B22# - rear right power window switch (premium model) connector 2#	Always connected	Less than 1Ω
PDCU connector A30# - rear right power window switch (base model) connector 4#	Always connected	Less than 1Ω
PDCU connector B22# - rear right power window switch (base model) connector 2#	Always connected	Less than 1Ω

ED

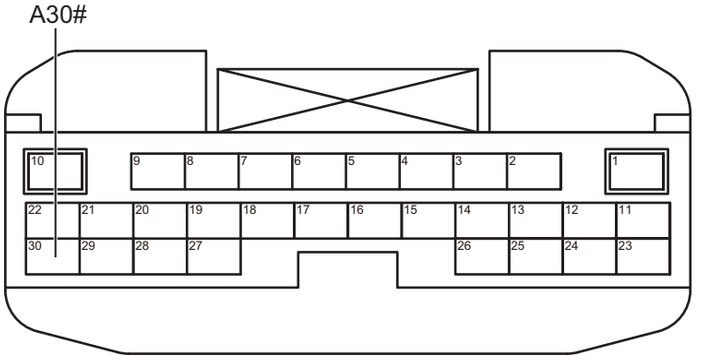
NG → **Repair or replace the harness and connector**

OK

3	**Check rear right power window switch harness and connector for circuit shorted to ground**



PDCU B connector



PDCU A connector

ED64111RM

ED

(a) Measure the resistance according to the values in the table below.

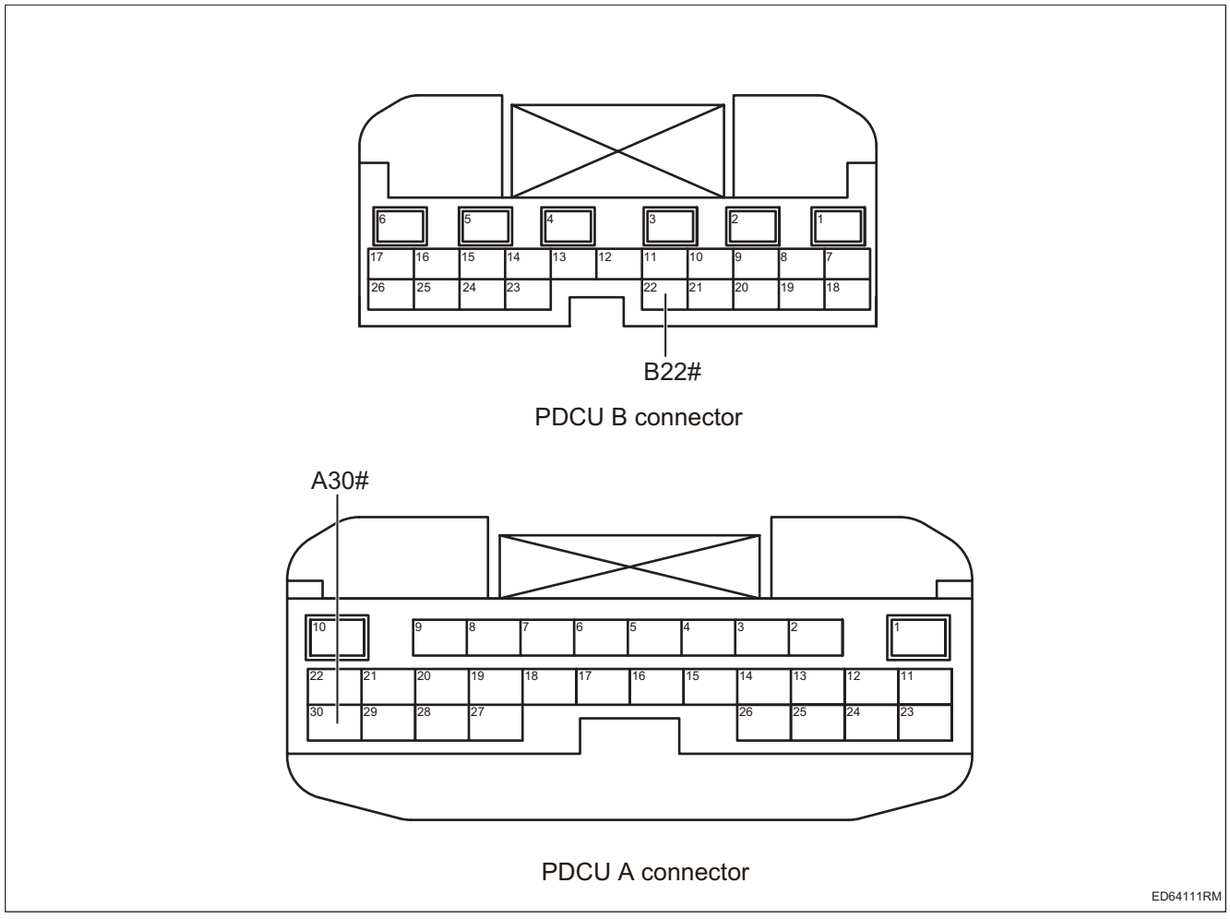
Standard value

Detector connection	Detection conditions	Specified state
PDCU connector B22# -body GND	Always connected	10 KΩ or greater
PDCU connector A30# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check rear right power window switch harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PDCU connector B22# -body GND	The ignition switch is set to "ON"	Less than 1 V
PDCU connector A30# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG **Repair or replace the harness and connector**

ED

OK

5	**Replace the rear right power window switch (See page IR-18)**

(a) Replace the rear right power window switch.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace PDCU (See page ED-32)**

OK

6	**End**

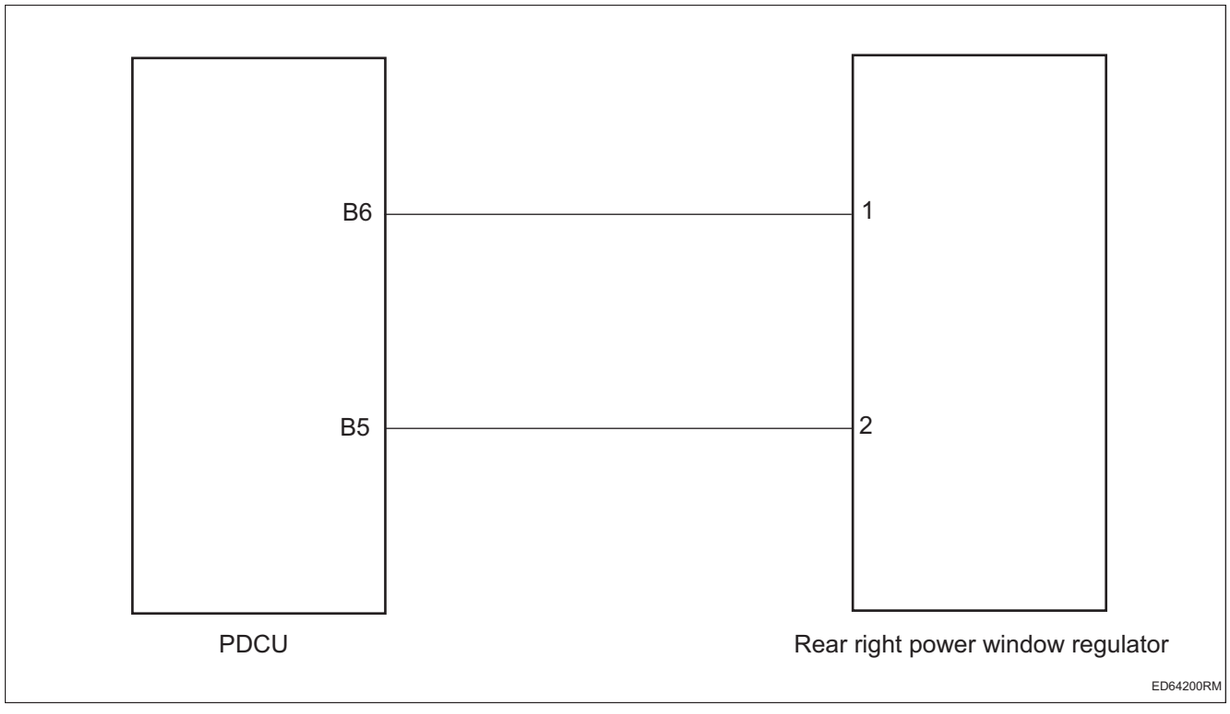
DTC	**B11C518**	**Rear right door window motor output current low**
DTC	**B11C519**	**Rear right door window motor output current high**

Description

When the rear right power window regulator output current is abnormal, the PDCU will record the DTC.

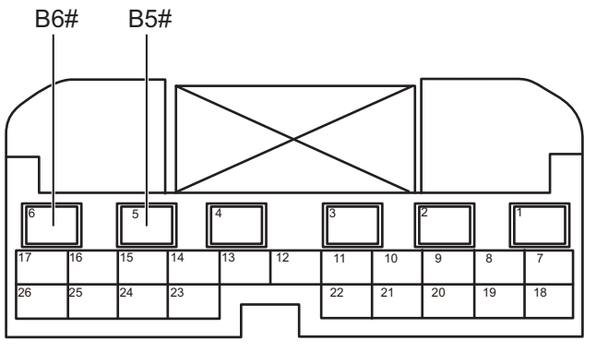
DTC	DTC detection conditions	Faulty location
B11C518	(a) Rear right door window motor output undercurrent.	• PDCU • Harness and connector • Rear right power window regulator
B11C519	(a) Rear right door window motor output current high.	• PDCU • Harness and connector • Rear right power window regulator

Circuit diagram



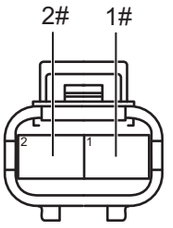
Inspection procedure

1	**Check rear right power window regulator harness and connector for open circuit**



PDCU B connector

ED64211RM



Rear right power window regulator connector

ED64220RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDCU connector.

(d) Disconnect the rear right power window regulator connector.

(e) Measure the resistance according to the values in the table below.

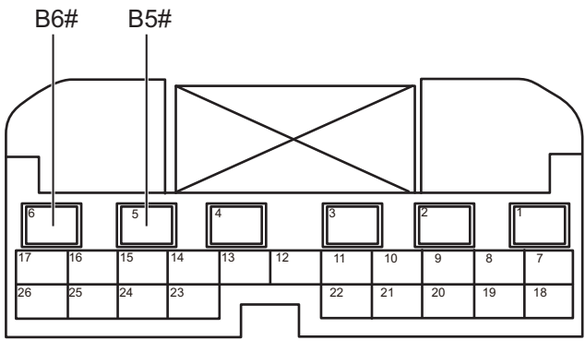
Standard value

Detector connection	Detection conditions	Specified state
PDCU connector B6# -right rear power window regulator connector 1#	Always connected	Less than 1Ω
PDCU connector B5# -right rear power window regulator connector 2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check rear right power window regulator harness and connector for circuit shorted to ground**



PDCU B connector

ED64211RM

(a) Measure the resistance according to the values in the table below.

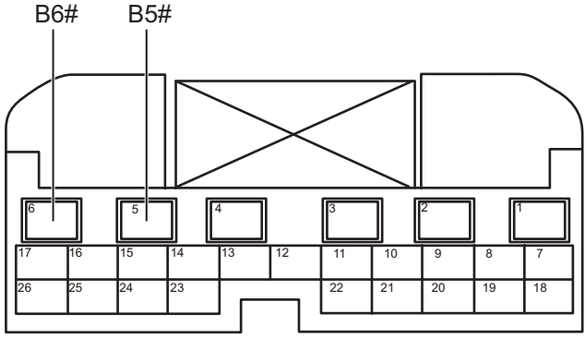
Standard value

Detector connection	Detection conditions	Specified state
PDCU connector B5# -body GND	Always connected	10 KΩ or greater
PDCU connector B6# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check rear right power window regulator harness and connector for circuit shorted to power supply**



PDCU B connector

ED64211RM

(a) Connect the battery negative terminal.

ED

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PDCU connector B5# -body GND	The ignition switch is set to "ON"	Less than 1 V
PDCU connector B6# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the rear right power window regulator (See page ED-20)**

(a) Replace the rear right power window regulator.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace PDCU (See page ED-32)**

OK

5	**End**

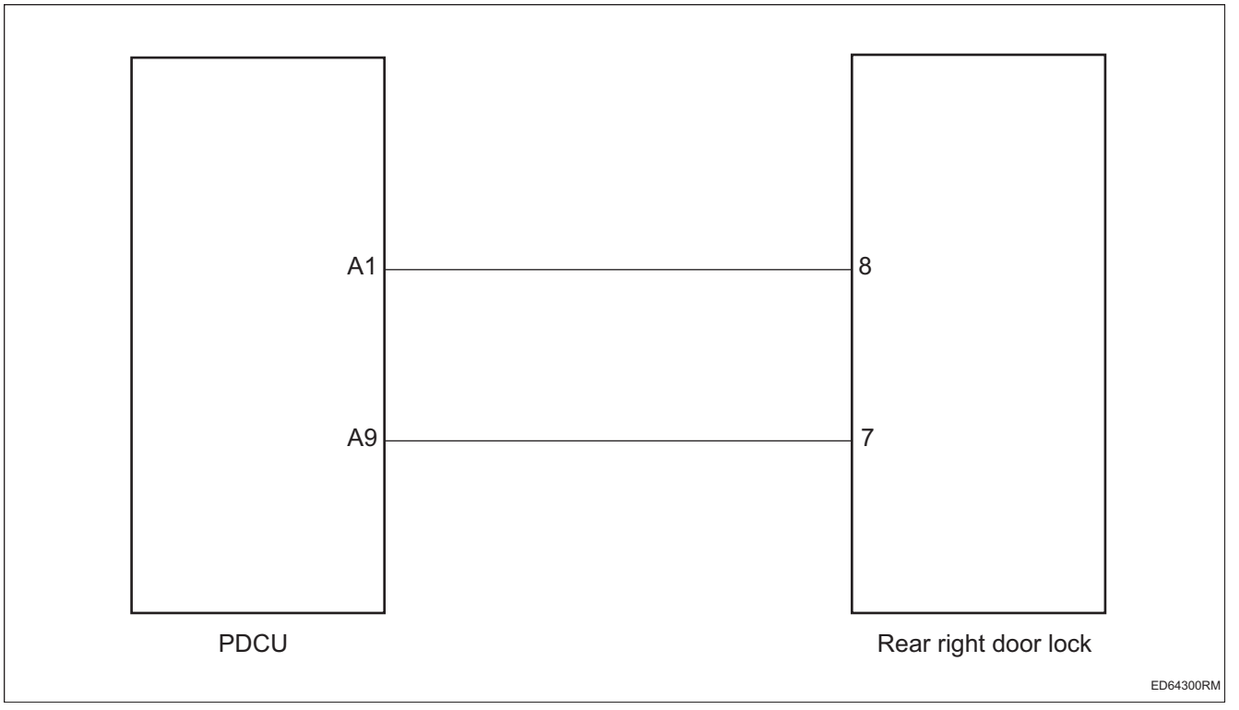
DTC	**B11C618**	**Right rear central lock motor unlocking undercurrent**
DTC	**B11C619**	**Right rear central lock motor unlocking overcurrent**
DTC	**B11C718**	**Right rear central lock motor locking undercurrent**
DTC	**B11C719**	**Right rear central lock motor locking overcurrent**

Description

When the working current of the rear right door lock exceeds the normal range, the PDCU records the DTC.

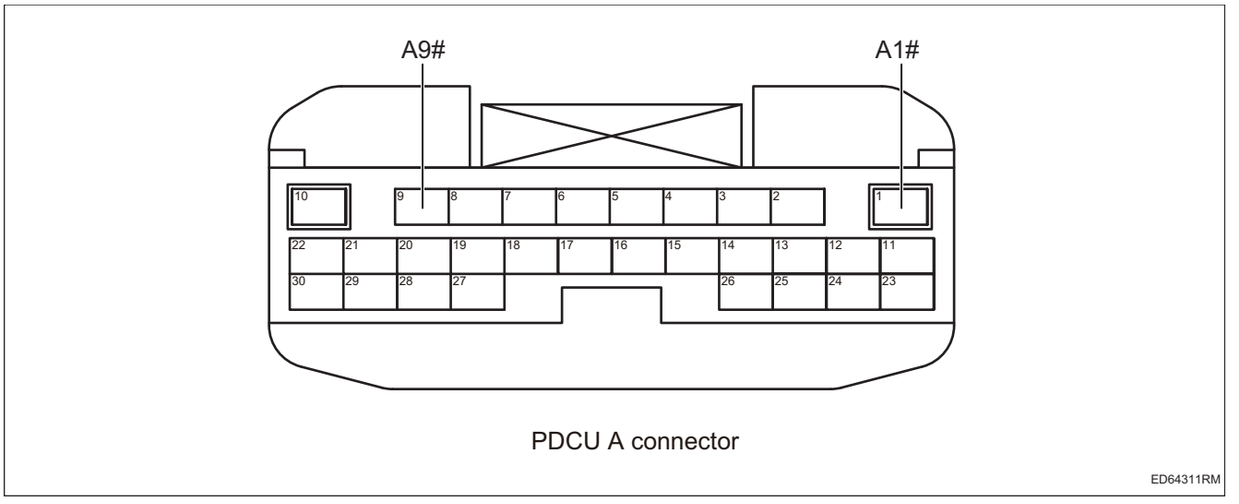
DTC	DTC detection conditions	Faulty location
B11C618	(a) Right rear central lock motor unlocking current low.	• PDCU • Harness and connector • Rear right door lock
B11C619	(a) Right rear central lock motor unlocking current high.	• PDCU • Harness and connector • Rear right door lock
B11C718	(a) Right rear central lock motor locking current low.	• PDCU • Harness and connector • Rear right door lock
B11C719	(a) Right rear central lock motor locking current high.	• PDCU • Harness and connector • Rear right door lock

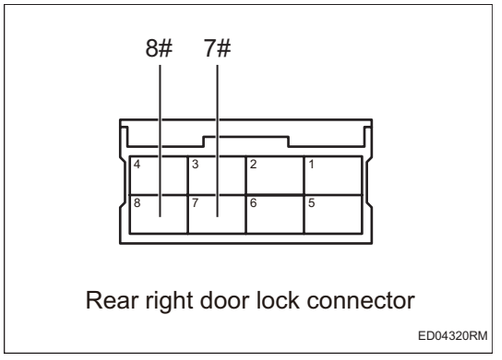
Circuit diagram



Inspection procedure

1	**Check rear right door lock harness and connector for open circuit**





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDCU connector.

(d) Disconnect the rear right door lock connector.

(e) Measure the resistance according to the values in the table below.

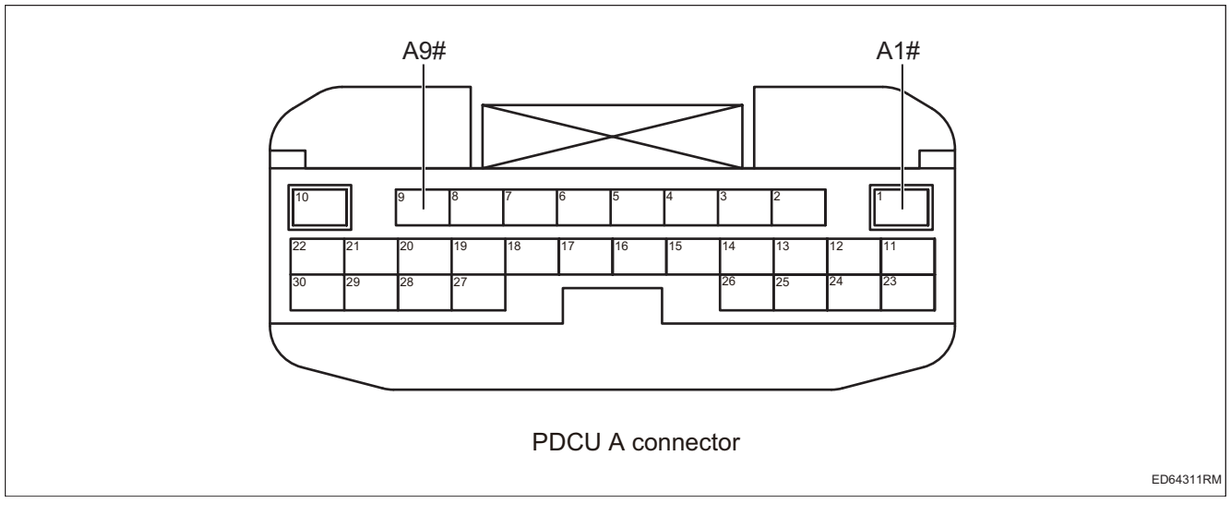
Standard value

Detector connection	Detection conditions	Specified state
PDCU connector A1# -rear right door lock connector 8#	Always connected	Less than 1Ω
PDCU connector A9# -rear right door lock connector 7#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check rear right door lock harness and connector for circuit shorted to ground**



PDCU A connector

ED64311RM

(a) Measure the resistance according to the values in the table below.

Standard value

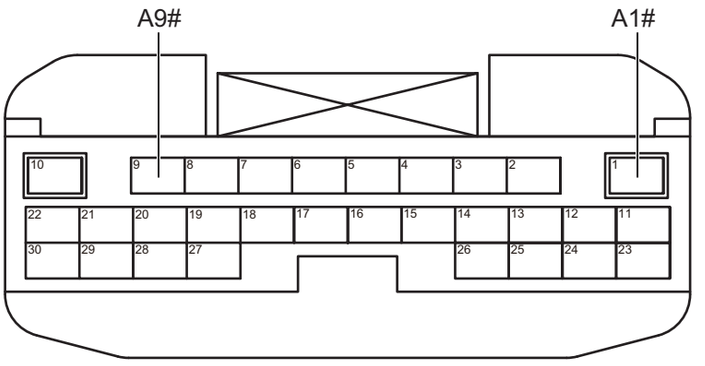
Detector connection	Detection conditions	Specified state
PDCU connector A1# -body GND	Always connected	10 KΩ or greater
PDCU connector A9# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check rear right door lock harness and connector for circuit shorted to power supply**

ED



PDCU A connector

ED64311RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PDCU connector A1# -body GND	The ignition switch is set to "ON"	Less than 1 V
PDCU connector A9# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

ED

4	**Replace rear right door lock (See page DL-12)**

(a) Replace the rear right door lock.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace PDCU (See page ED-32)**

OK

5	**End**

DTC	**U002888**	**Comfort CAN bus off**
DTC	**U014687**	**GW node lost**
DTC	**U014087**	**BCM 1 node lost**
DTC	**U016487**	**A/C control unit node lost**
DTC	**U019987**	**Driver door module node lost**
DTC	**U024687**	**SCCU node lost**
DTC	**U124387**	**ADV message lost**
DTC	**U112187**	**ESP message lost**
DTC	**U115187**	**ACU message lost**
DTC	**U124587**	**EnHost/IVI message lost**
DTC	**U123287**	**LCDA message lost**
DTC	**U110187**	**TCU message lost**
DTC	**U110087**	**ECM message lost**
DTC	**U114687**	**GW message lost**
DTC	**U115587**	**Instrument cluster control unit message lost**
DTC	**U129387**	**HCU message lost**

Description

When the communication between the PDCU and other systems is abnormal or interrupted, the PDCU will record the DTC.

DTC	DTC detection conditions	Faulty location
U002888	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U016487	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U019987	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U112187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

DTC	DTC detection conditions	Faulty location
U124587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U123287	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U129387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U024687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U124387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

Brake control

ESC **BC-1**
Precautions BC-1
Location of parts BC-4
System diagram BC-8
System description BC-9
Maintenance of failure without DTC BC-11
ECU terminal BC-12
DTC chart BC-13
C190004 ..... BC-19
C190104 ..... BC-19
C1901FC BC-19
C002004 ..... BC-23
C0020FC BC-23
C003108 ..... BC-27
C003208 ..... BC-27
C003408 ..... BC-27
C003508 ..... BC-27
C003708 ..... BC-27
C003808 ..... BC-27
C003A08 ..... BC-27
C003B08 ..... BC-27
C00A900 ..... BC-27
C00AA00 ..... BC-27
C00AB00 ..... BC-27
C00AC00 ..... BC-27
C109904 ..... BC-27
C109908 ..... BC-27
C1099FC BC-27
C003200 ..... BC-34
C003500 ..... BC-34
C003800 ..... BC-34
C003B00 ..... BC-34
C00A000 ..... BC-34
C00A100 ..... BC-34
C00A200 ..... BC-34
C00A300 ..... BC-34
C00A400 ..... BC-34
C00A500 ..... BC-34
C00A600 ..... BC-34

C00A700 .....BC-34
C00B900 .....BC-34
C00BA00 .....BC-34
C00BB00 .....BC-34
C00BC00 .....BC-34
C004008 .....BC-40
C004460 .....BC-40
C0044FC BC-40
C004510 .....BC-40
C006B06 .....BC-46
C006BFC BC-46
C007204 .....BC-46
C007208 .....BC-48
C0072FC BC-48
C046008 .....BC-49
C006108 .....BC-54
C006208 .....BC-54
C006308 .....BC-54
C00A800 .....BC-54
C104C04 .....BC-56
C108C08 .....BC-57
C10AD08 .....BC-59
C10AD09 .....BC-59
C10AD10 .....BC-59
C121208 .....BC-64
C154604 .....BC-65
C154700 .....BC-65
C154800 .....BC-65
C154900 .....BC-65
C154A00 .....BC-65
C155512 .....BC-65
C155C00 .....BC-65
C155D45 .....BC-65
C15611E BC-65
C156600 .....BC-65
C156601 .....BC-65
C1566FC BC-65
C156700 .....BC-65
C156701 .....BC-65
C1567FC BC-65
C156800 .....BC-65
C156801 .....BC-65
C15681D BC-65

C1568FC BC-65
C156900 ..... BC-65
C156901 ..... BC-65
C15691D BC-66
C1569FC BC-66
C156B00 ..... BC-66
C156BFC BC-66
C156C00 ..... BC-66
C156C92 ..... BC-66
C156D62 ..... BC-66
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C011596 ..... BC-66
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C011796 ..... BC-66
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C100047 ..... BC-74
C1000FC BC-74
C100104 ..... BC-74
C101008 ..... BC-74
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U043986 ..... BC-86
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U042082 ..... BC-86
U042083 ..... BC-86
U042084 ..... BC-86
U042086 ..... BC-86
U042386 ..... BC-86
U042486 ..... BC-86
U054686 ..... BC-86
U011404 ..... BC-86
U011408 ..... BC-86
U162208 ..... BC-86
ESC unit assembly BC-90
Parts BC-90
Removal BC-92
Installation BC-92
Front wheel speed sensor BC-93
Parts BC-93
Removal BC-94
Installation BC-94
Rear wheel speed sensor BC-95
Parts BC-95
Removal BC-96
Installation BC-96

ESC

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Warning:

Before repairing the high voltage system or adjacent high voltage system components, be sure to carefully read the "Instructions and precautions for maintenance work" in the introduction carefully!

2. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

3. When checking and replacing electronic components, make sure to disconnect the battery - to repair the system.

4. The door control system needs to be initialized after reconnecting the battery. And use the HQ-VDS to "clear DTC" for all electronic control systems.

5. Operation precautions

(a) The ESP must be repaired by technicians who has been professionally trained and has maintenance skills, and only the original part shall be used for replacement.

(b) Unless otherwise specified in the inspection procedure, make sure that the ignition switch is placed in the OFF position and the battery negative terminal is disconnected when the ESC and sensor etc are removed and installed.

(c) If the ESC or sensor has been removed and installed, it is necessary to check whether there is a failure in the system after reassembling the parts.

(d) After repairing the ESC electrical components, it is necessary to accelerate the vehicle to more than 40 km/h for ESP dynamic self-test.

6. Troubleshooting precautions

(a) In case of poor terminal contact or parts installation failure, the removal and installation of suspicious parts may restore the system to normal state completely or temporarily.

(b) Since the system will be affected by other non-ESP faults, be sure to check the faults in other systems before confirming the maintenance plan.

(c) After replacing brake system parts (such as brake fluid, brake line and hydraulic units), or when the brake pedal is soft, exhausting must be carried out.

7. Fault detection precautions

(a) A fault is detected in ESP when the following two conditions occur:

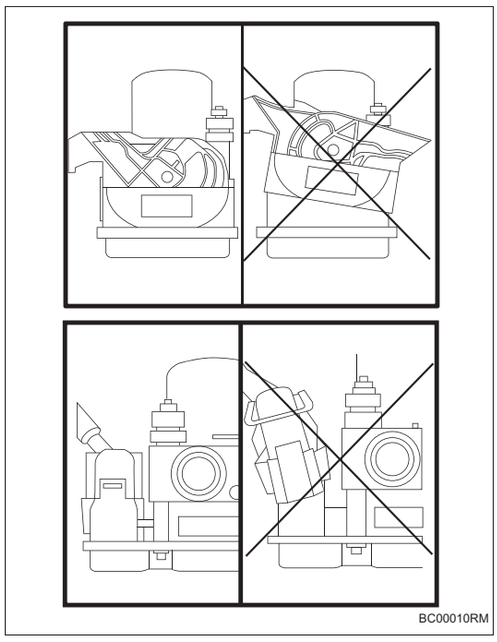
(1) Switch the ignition switch to the ON position, the system self test is completed, and the warning lamp remains on.

(2) The warning lamp stays on during driving.

(b) After the system detects a fault, the driver can perform normal braking, but the applied braking force must be reduced as much as possible to prevent wheel lock.

Caution:

After the warning lamp is on, be sure to drive carefully and go to the dealership for inspection and repair immediately to prevent more failures and traffic accidents.



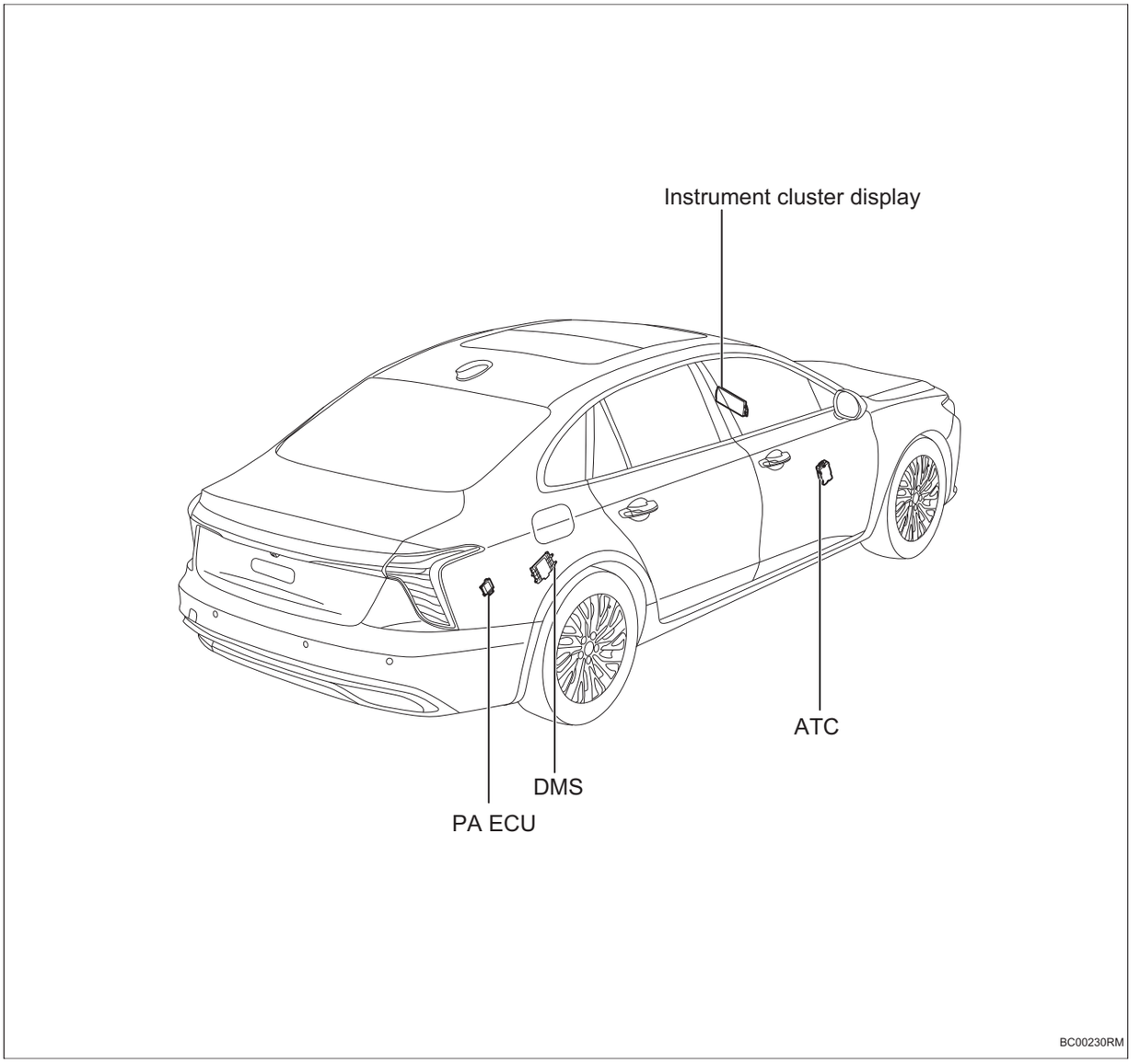
8. Precautions for plugging and unplugging ESC and sensor harness

(a) Before plugging and unplugging the ESC harness and sensor harness, the ignition switch must be turned off and the battery negative terminal must be disconnected.

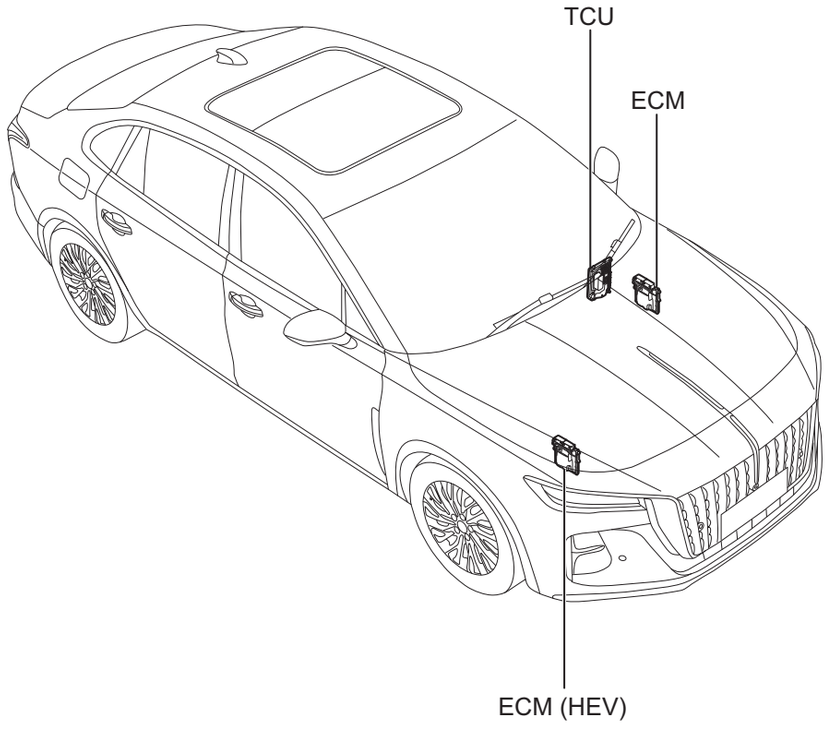
(b) Ensure that the connector is dry and clean to avoid any foreign matter entering the connector.

(c) The ESC harness connector must be installed in place in the horizontal and vertical directions to avoid damage to the connector.

Location of parts

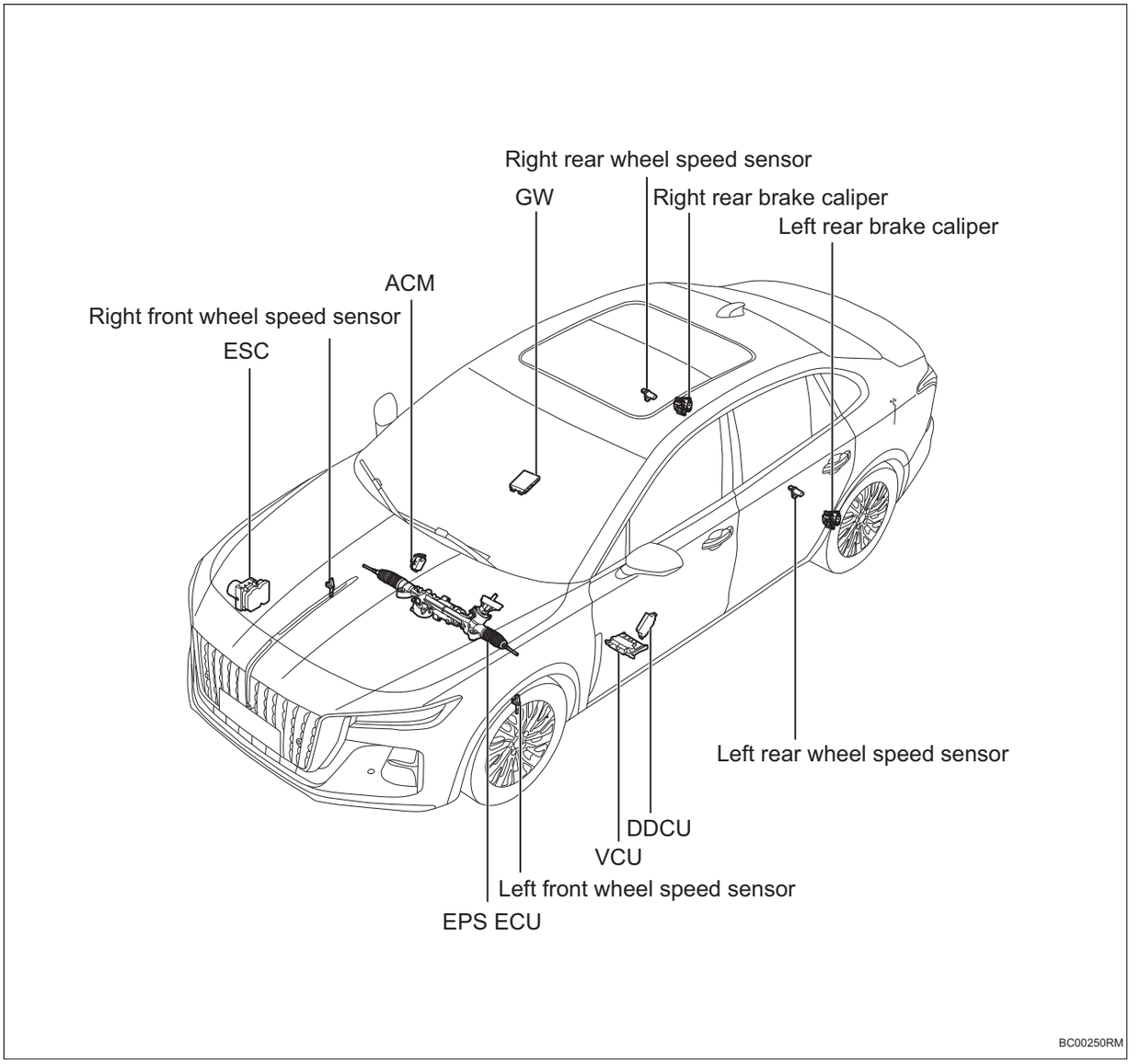


Location of parts

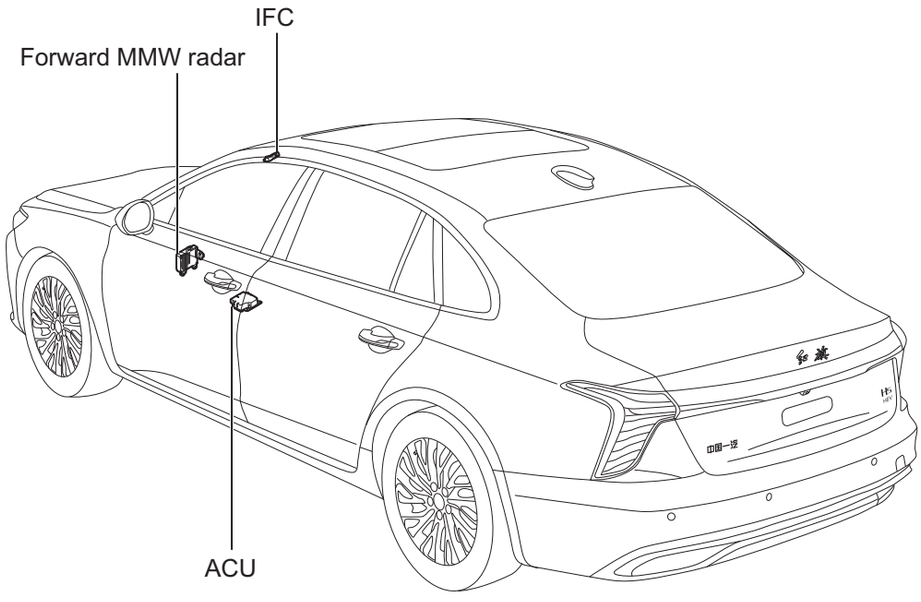


BC00240RM

Location of parts

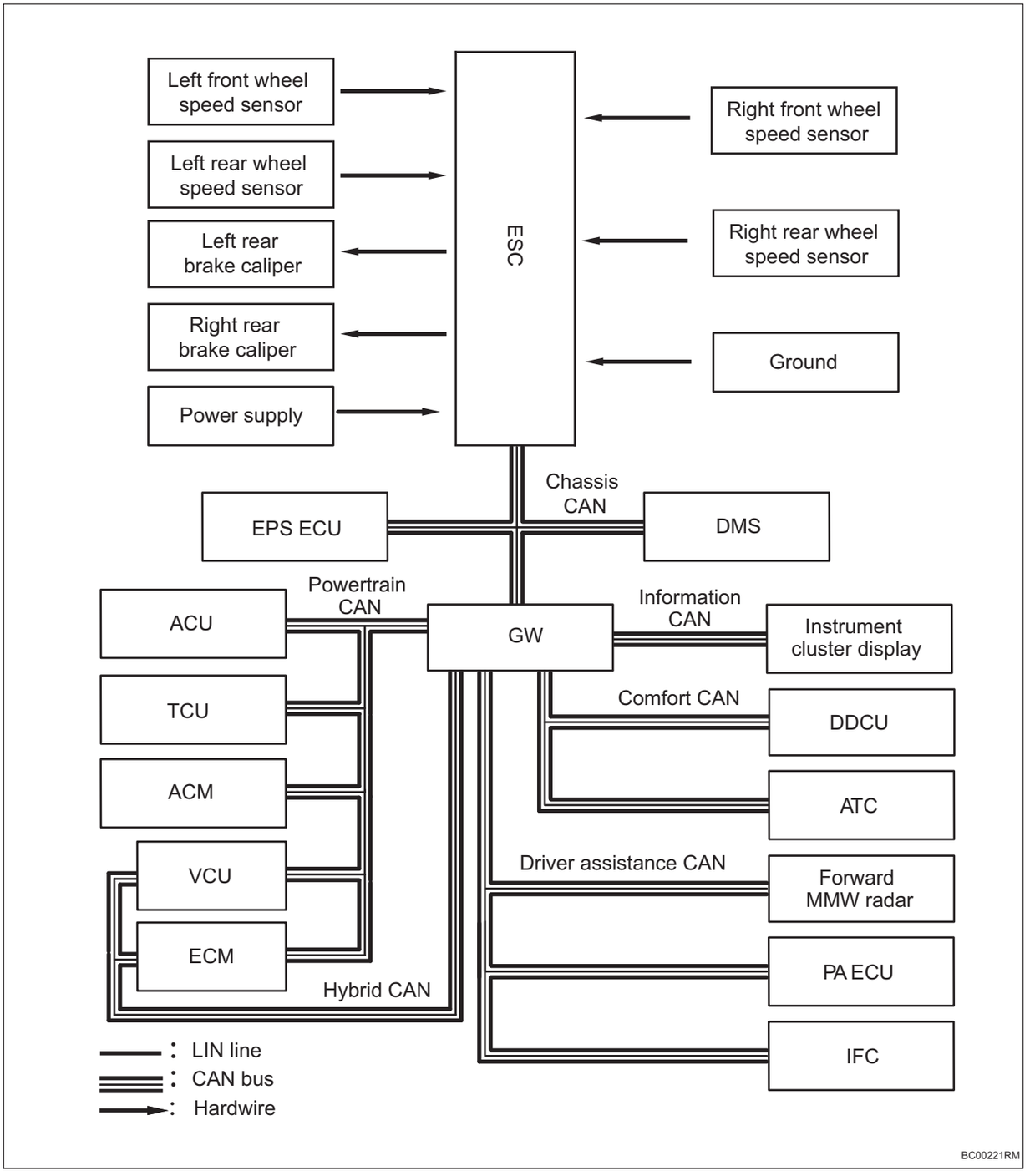


Location of parts

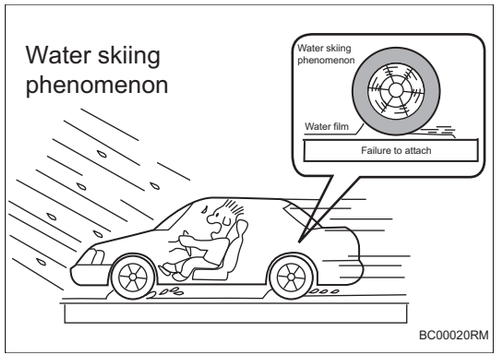


BC00260RM

System diagram



System description



1. System overview

(a) ESP is an active safety system. Its main function is to maximize the use of ground adhesion and maintain vehicle maneuverability and driving stability.

Caution:

When exceeding physical limits or driving at high speeds on slippery roads, the electronic stability control system cannot completely prevent the vehicle from slipping.

Hint:

Before diagnosing the ESP, check the parts that may cause ESP failure and are easily accessible. Visual inspection can quickly identify certain faults, making further diagnosis unnecessary.

2. Initial check

(a) Check the vehicle tire to ensure that tires and hubs of the recommended size must be installed. Coaxial tires must have the same tread pattern and depth.

(b) Check the hydraulic regulator, brake line and connections of the ESP for leaks.

(c) Check the fuses of the ESP to ensure that they are not blown and are of the correct type.

(d) Measure the battery voltage to check whether the battery wiring terminal is corroded or loose.

(e) Check whether the ground point of the ESP ground wire is loose and whether the ground position is changed.

Warning:

The ESP ground wire must be well sealed to prevent water and moisture from penetrating into the connector of the electronic stability control unit through the holes in the harness and causing functional failure.

(f) Perform visual inspection on the following electrical components:

(1) Check whether the harness and connector of related ESP parts are properly connected or damaged.

(2) Check if the harness is too close to high-voltage or highcurrent devices, such as high-voltage components, after-sales retrofitted stereo amplifier, etc.

Caution:

High voltage or high current devices may cause the circuit to generate induced waves, which may interfere with the normal operation of the circuit.

(3) ESP components are sensitive to electromagnetic interference (EMI). If a intermittent failure is suspected, check whether the anti-theft device, lamp or mobile phone installed after sales is installed correctly.

(g) If the ESP noise is excessive, check the following causes:

(1) The connection between the ESP assembly and the ESC bracket is loose.

(2) The connection between the ESP bracket and the body is loose.

(3) The rubber washer on the ESP bracket is missing or damaged.

(4) Brake line deformation, bump and interference.

(5) Brake line bracket clip damage.

(h) Check vehicle driving conditions. If the physical limit is exceeded or when driving at high speed on wet and slippery roads, the ESP cannot completely prevent the vehicle from slipping.

(i) Before troubleshooting the electrical equipment, check whether the fuse is normal.

Maintenance of failure without DTC

Hint:

If there is a fault in the brake system, but the ESC does not store a DTC, such a fault is called a fault without DTC.

1. Maintenance of failure without DTC

(a) The failure without DTC is generally caused by the failure of the foundation brake system, and occurs in the following situations:

(1) Brake fluid leakage;

(2) Inferior brake fluid is used;

(3) Air in brake line;

(4) Brake line blockage;

(5) Excessive brake disc wear;

(6) Booster system failure;

(7) Brake line connection error.

(b) If the warning lamp is always on but there is no DTC, it may be due to power supply failure or abnormal interruption of power supply of ESC.

Hint:

Correct the fault by checking the corresponding components for the fault phenomenon.

2. Maintenance of random failure

(a) In electronic systems, there may be transient poor contact between electrical circuits and places where signals are input and output, resulting in random failure. Sometimes the random failure will disappear on its own, so it is not easy to find out what the problem is. When the random failure occurs, the fault can be simulated in the following way to check whether the fault will recur.

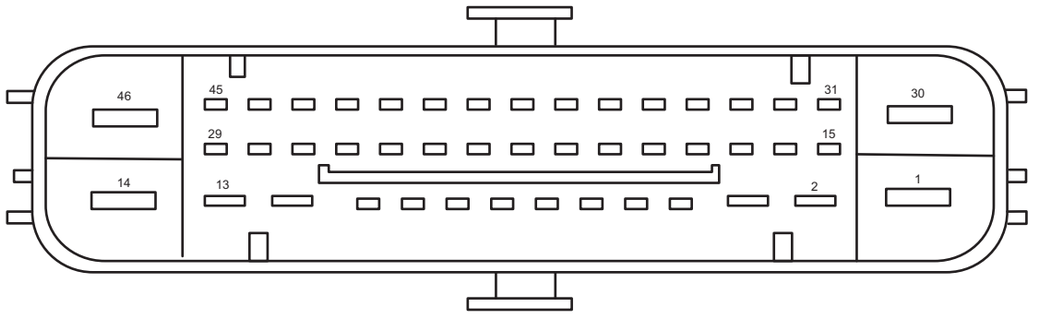
BC

Fault	Possible location
When shock may be the main cause	• Gently shake the ESC connector up and down, left and right • Gently shake the ESC harness up and down, left and right • Gently shake the sensor up and down, left and right • Gently shake other moving parts (such as wheel bearings)
When high electrical load may be the main cause	• Turn on all electrical equipment, including headlamps and wipers, to make the vehicle power supply work under high load

Hint:

If the fault does not reoccur at this time, wait until the fault reoccurs next time before performing a diagnostic repair. In general, random fault will gradually become reoccuring fault without being self-eliminated.

ECU terminal



ESC

BC00210RM

ESC			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Motor power supply terminal (positive)	24	Wheel speed sensor power supply terminal (left front)
2	Right motor positive	25	-
3	Right motor negative	26	Wheel speed sensor signal terminal (right front)
4	-	27	-
5	CAN-H	28	-
6	-	29	-
7	Wheel speed sensor signal terminal (left front)	30	Valve relay power supply terminal
8	-	31	EPB switch S3
9	-	32	EPB switch S1
10	-	33	-
11	-	34	-
12	Left motor negative	35	-
13	Left motor positive	36	Power supply terminal of ECU (ignition power cable)
14	Motor ground terminal	37	Wheel speed sensor signal terminal (rear right)
15	EPB switch S4	38	Brake lamp switch
16	EPB switch S2	39	Wheel speed sensor power supply terminal (left rear)
17	-	40	-
18	EPB indicator lamp	41	-
19	CAN-L	42	-
20	-	43	-
21	Wheel speed sensor power supply terminal (right front)	44	-

ESC			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
22	Wheel speed sensor power supply terminal (right rear)	45	-
23	Wheel speed sensor signal terminal (left rear)	46	ECU ground terminal

DTC chart

DTC	Description	Reference page
U000500	CAN Bus overvoltage alternative error	(See page BC-74)
U000700	CAN Bus undervoltage alternative error	(See page BC-74)
C1901FC	ECU power supply voltage low	(See page BC-19)
C190104	ECU power supply voltage low	(See page BC-19)
C190004	ECU power supply voltage high	(See page BC-19)
C156D62	EPB position unknown or EPB motor abnormal	(See page BC-66)
C1567FC	Lower right caliper passive test failure	(See page BC-66)
C156701	Right caliper passive test failure	(See page BC-66)
C156700	Right caliper polarity error	(See page BC-66)
C1566FC	Left caliper passive test failure	(See page BC-66)
C156601	Abnormal rotation of the left caliper	(See page BC-66)
C15611E	Left caliper actuator fault: short circuit or coupling	(See page BC-66)
C155D45	Failure to perform operation requested by PBC to read and write NVM	(See page BC-66)
C155C00	The button is pressed or damaged	(See page BC-66)
C154A00	Left caliper motor or piston stalling during release	(See page BC-66)
C154900	Caliper right motor stalling or overcurrent	(See page BC-66)
C154800	Right caliper internal hardware failure	(See page BC-66)
C121208	Variant error	(See page BC-64)
C10AD08	Vacuum sensor error	(See page BC-59)
C1099FC	Lower wheel speed sensor signal error (multiple wheel speed sensors)	(See page BC-27)
C109908	Wheel speed sensor direction error	(See page BC-27)
C109904	Abnormal multiple wheel speed sensor signals	(See page BC-27)
C108C08	Reverse gear signal change failure	(See page BC-57)
C104C04	After power-on, the PATA button is continuously pressed for more than 10 s	(See page BC-56)
C1000FC	APBMI chip module damaged or APBMI software error	(See page BC-73)
C00AC00	Right rear wheel speed sensor: undefined failure (the exact cause of failure cannot be detected)	(See page BC-27)

DTC	Description	Reference page
C00AB00	Left rear wheel speed sensor: undefined failure (the exact cause of failure cannot be detected)	(See page BC-27)
C00AA00	Right front wheel speed sensor: undefined failure (the exact cause of failure cannot be detected)	(See page BC-27)
C00A900	Left front wheel speed sensor: undefined failure (the exact cause of failure cannot be detected)	(See page BC-27)
C00A800	Inertial sensor calibration failure	(See page BC-54)
C00A700	Right rear wheel speed sensor signal harness shorted to power supply	(See page BC-35)
C00A600	Right rear wheel speed sensor power cable shorted to GND	(See page BC-35)
C00A500	Left rear wheel speed sensor signal harness shorted to power supply	(See page BC-35)
C00A400	Left rear wheel speed sensor power cable shorted to GND	(See page BC-35)
C00A300	Right front wheel speed sensor signal harness shorted to power supply	(See page BC-35)
C00A200	Right front wheel speed sensor power cable shorted to GND	(See page BC-35)
C00A100	Left front wheel speed sensor signal harness shorted to power supply	(See page BC-35)
C00A000	Left front wheel speed sensor power cable shorted to GND	(See page BC-35)
C00BC00	Right rear wheel test failure, and wheel speed sensor shorted to power supply or ground wire or other wheel speed sensor harnesses	(See page BC-35)
C00BB00	Left rear wheel test failure, and wheel speed sensor shorted to power supply or ground wire or other wheel speed sensor harnesses	(See page BC-35)
C00BA00	Right front wheel test failure, and wheel speed sensor shorted to power supply or ground wire or other wheel speed sensor harnesses	(See page BC-35)
C00B900	Left front wheel test failure, and wheel speed sensor shorted to power supply or ground wire or other wheel speed sensor harnesses	(See page BC-35)
C0072FC	General valve failures: overheat protection, invalid signal, hardware failure	(See page BC-48)
C007204	Brake disc overtemperature	(See page BC-46)
C006BFC	ABS control implausible	(See page BC-46)
C010196	PBC error 1	(See page BC-66)
C010296	PBC error 2	(See page BC-66)
C010396	PBC error 3	(See page BC-66)
C010496	PBC error 4	(See page BC-66)
C010596	PBC error 5	(See page BC-66)
C010696	PBC error 6	(See page BC-66)

DTC	Description	Reference page
C010796	PBC error 7	(See page BC-66)
C010896	PBC error 8	(See page BC-66)
C010996	PBC error 9	(See page BC-66)
C011096	PBC error 10	(See page BC-66)
C011196	PBC error 11	(See page BC-66)
C011296	PBC error 12	(See page BC-66)
C011396	PBC error 13	(See page BC-66)
C011496	PBC error 14	(See page BC-66)
C011596	PBC error 15	(See page BC-66)
C011696	PBC error 16	(See page BC-66)
C011796	PBC error 17	(See page BC-66)
C006B06	ABS control implausible	(See page BC-46)
C006308	Yaw rate sensor signal error	(See page BC-54)
C006208	Longitudinal acceleration sensor signal error	(See page BC-54)
C006108	Lateral acceleration sensor signal error	(See page BC-54)
C004460	Master cylinder pressure sensor hardware fault	(See page BC-40)
C004008	BLS implausible	(See page BC-40)
C003B08	Wheel speed sensor direction error	(See page BC-27)
C003B00	Right rear wheel speed sensor circuit open	(See page BC-35)
C003A08	Right rear wheel speed sensor: (signal fault) out of range, missing, noise, intermittent error	(See page BC-27)
C003808	Wheel speed sensor direction error	(See page BC-27)
C003800	Left rear wheel speed sensor circuit open	(See page BC-35)
C003708	Wheel speed sensor signal lost	(See page BC-27)
C003508	Wheel speed sensor signal interference	(See page BC-27)
C003500	Right front wheel speed sensor circuit open	(See page BC-35)
C003408	Abnormal right front wheel speed sensor signal	(See page BC-27)
C003208	Left front wheel speed sensor direction error	(See page BC-27)
C003200	Left front wheel speed sensor circuit open	(See page BC-35)
C003108	Left front wheel speed sensor: (signal failure) out of range, missing, noise, intermittent	(See page BC-27)
C0044FC	Master cylinder pressure sensor hardware fault	(See page BC-40)
C007208	Valve circuit failure or valve body failure	(See page BC-48)
C100047	An illegal event detected by main control chip memory unit	(See page BC-73)
C0020FC	Oil return pump failure	(See page BC-23)
C004510	Master cylinder pressure sensor signal line circuit shorted or open	(See page BC-40)

DTC	Description	Reference page
C156901	Right caliper motor H-bridge deactivation test failure	(See page BC-66)
C15691D	Right caliper motor H bridge overcurrent at MOSFET	(See page BC-66)
C156900	Inconsistency between initialization test APB enable signal and expectation	(See page BC-66)
C1569FC	Inconsistency between periodic monitoring APB enable signal and expectation	(See page BC-66)
C156801	Right caliper motor H-bridge deactivation test failure	(See page BC-66)
C15681D	Right caliper motor H bridge overcurrent at MOSFET	(See page BC-66)
C156800	Inconsistency between initialization test APB enable signal and expectation	(See page BC-66)
C1568FC	Inconsistency between periodic monitoring APB enable signal and expectation	(See page BC-66)
C156600	Left caliper motor operating voltage and current out of limit	(See page BC-66)
C156B00	APB ASIC hardware fault	(See page BC-66)
C156BFC	Chip internal pin overcurrent	(See page BC-66)
C155512	APB BUTTON harness connection fault	(See page BC-66)
C154700	Left caliper current sampling failure	(See page BC-66)
C154604	Inconsistent left and right caliper power supply voltage	(See page BC-66)
C100004	Internal chip failure	(See page BC-73)
C100104	Network timeout caused by hardware fault	(See page BC-73)
C156C92	Suspicious memory failure during caliper movement	(See page BC-66)
C156C00	GPIO pin overtemperature of APB ASIC chip	(See page BC-66)
C10AD09	Vacuum sensor low vacuum related fault	(See page BC-59)
C10AD10	Vacuum sensor low vacuum HBC off related fault	(See page BC-59)
C002004	Related faults of ESP pump	(See page BC-23)
C101008	ECU software failure	(See page BC-73)
U006488	CAN bus off error	(See page BC-84)
U040186	Engine network signal invalid (via CAN)	(See page BC-84)
U040286	Gear signal invalid	(See page BC-84)
U129187	ACM (15 T) network timeout	(See page BC-84)
U110287	ACM (20 T) network timeout	(See page BC-84)
U124587	HU message lost	(See page BC-84)
U124387	APA network timeout	(See page BC-84)
U123587	IFC message lost	(See page BC-84)
U119987	DDCU message lost	(See page BC-84)
U116487	ATC message lost	(See page BC-84)

DTC	Description	Reference page
U115587	IC message lost	(See page BC-84)
U115187	YAW message lost	(See page BC-84)
U114687	GW message lost	(See page BC-84)
U110187	TCU timeout	(See page BC-84)
U110087	EMS timeout	(See page BC-84)
U113887	DMS timeout	(See page BC-84)
U059284	ACM (15 T) message length error	(See page BC-84)
U059283	ACM (15 T) checksum algorithm error	(See page BC-84)
U059282	ACM (15 T) count error	(See page BC-84)
U059286	ACM (15 T) signal error	(See page BC-84)
U040384	ACM (20 T) message length error	(See page BC-84)
U040383	ACM (20 T) checksum algorithm error	(See page BC-84)
U040382	ACM count error	(See page BC-84)
U040386	ACM (20 T) signal error	(See page BC-84)
U054684	HU message length error	(See page BC-84)
U054683	HU checksum algorithm error	(See page BC-84)
U054682	HU count error	(See page BC-84)
U054484	APA message length error	(See page BC-84)
U054483	APA checksum algorithm error	(See page BC-84)
U054482	APA count error	(See page BC-84)
U054486	APA signal error	(See page BC-84)
U049A84	DDCU message length error	(See page BC-84)
U045286	YAW sensor signal invalid	(See page BC-84)
U045284	YAW message length error	(See page BC-84)
U045283	YAW checksum algorithm error	(See page BC-84)
U045282	YAW count error	(See page BC-84)
U044784	GW message length error	(See page BC-84)
U044786	GW signal error	(See page BC-84)
U043384	IFC message length error	(See page BC-84)
U043383	IFC checksum algorithm error	(See page BC-84)
U043382	IFC count error	(See page BC-84)
U043386	IFC signal error	(See page BC-84)
U042886	SAS network signal invalid (via CAN)	(See page BC-84)
U042884	SAS message length error	(See page BC-84)
U042883	SAS checksum algorithm error	(See page BC-84)
U042882	SAS count error	(See page BC-84)
U042484	ATC message length error	(See page BC-84)
U161408	ATC signal error	(See page BC-84)
U042384	IC message length error	(See page BC-84)

DTC	Description	Reference page
U040284	TCU message length error	(See page BC-84)
U040283	TCU checksum algorithm error	(See page BC-84)
U040282	TCU count error	(See page BC-84)
U040184	EMS message length error	(See page BC-84)
U040183	EMS checksum algorithm error	(See page BC-84)
U040182	EMS count error	(See page BC-84)
U043984	DMS message length error	(See page BC-84)
U043983	DMS checksum algorithm error	(See page BC-84)
U043982	DMS count error	(See page BC-84)
U043986	DMS signal error	(See page BC-84)
U013187	SAS message lost	(See page BC-84)
U042082	SAS count error	(See page BC-84)
U042083	SAS checksum algorithm error	(See page BC-84)
U042084	SAS message length error	(See page BC-84)
U042086	SAS signal invalid	(See page BC-84)
U042386	IC signal error	(See page BC-84)
U042486	IC invalid error	(See page BC-84)
U054686	HU signal error	(See page BC-84)
U011404	TOD message timeout	(See page BC-84)
U011408	TOD message length error	(See page BC-84)
U162208	AWD network signal invalid (via CAN)	(See page BC-84)

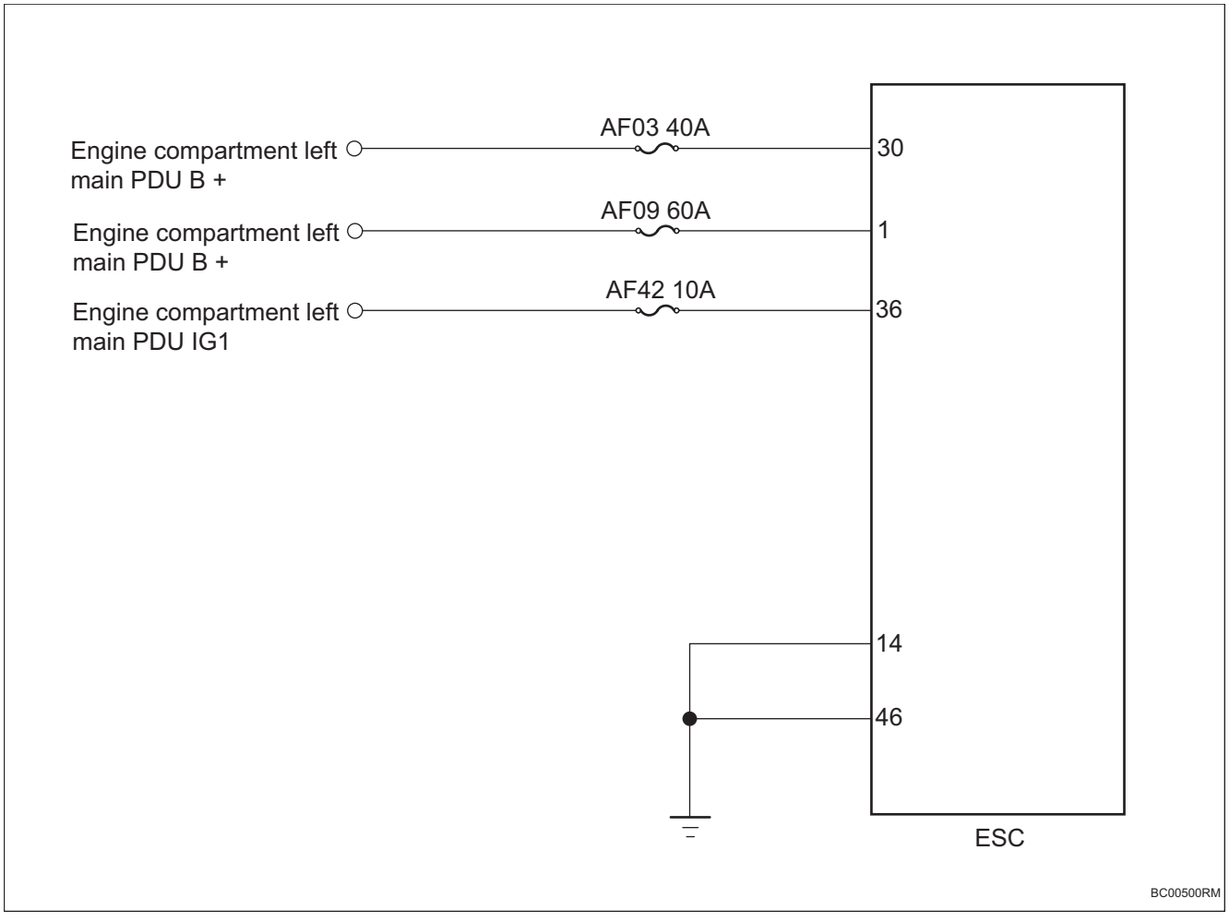
DTC	C190004	ECU power supply voltage high
DTC	C190104	ECU power supply voltage low
DTC	C1901FC	ECU power supply voltage low

Description

When the ESC power supply voltage exceeds the normal range, the ESC records the DTC.

DTC	DTC detection conditions	Faulty location
C190004	(a) ECU power supply voltage high.	• ESC • Harness and connector • Battery/charging system
C190104	(a) ECU supply voltage low.	• ESC • Harness and connector • Battery/charging system • Fuse
C1901FC	(a) ECU supply voltage low.	• ESC • Harness and connector • Battery/charging system • Fuse

Circuit diagram



BC

Inspection procedure

1	**Check the battery voltage**

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2	**Check the ESC fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the ESC fuse.

(d) Measure the resistance according to the values in the table below.

Standard value

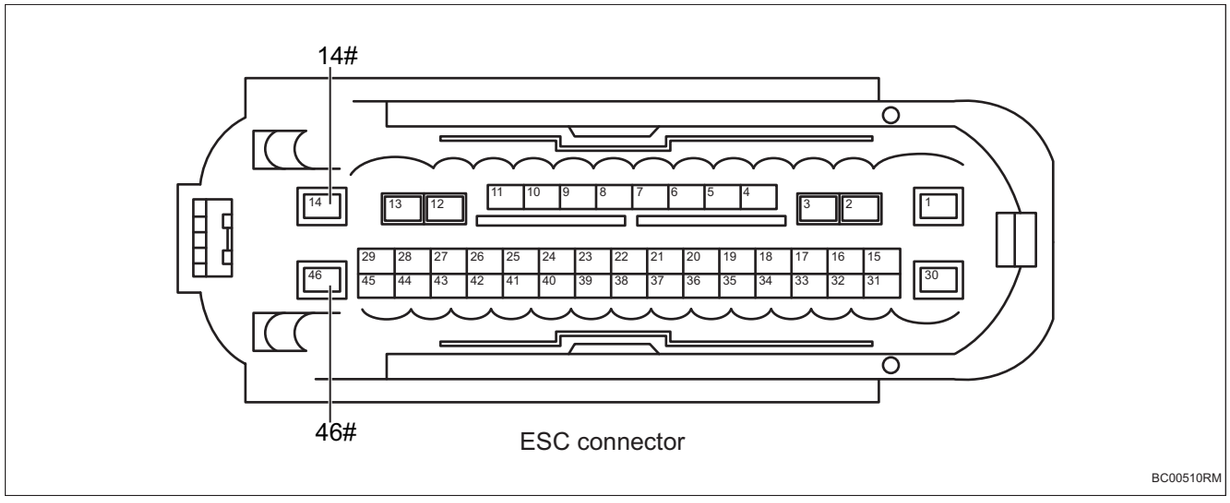
Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

BC

3	**Check ESC ground**



(a) Measure the resistance according to the values in the table below.

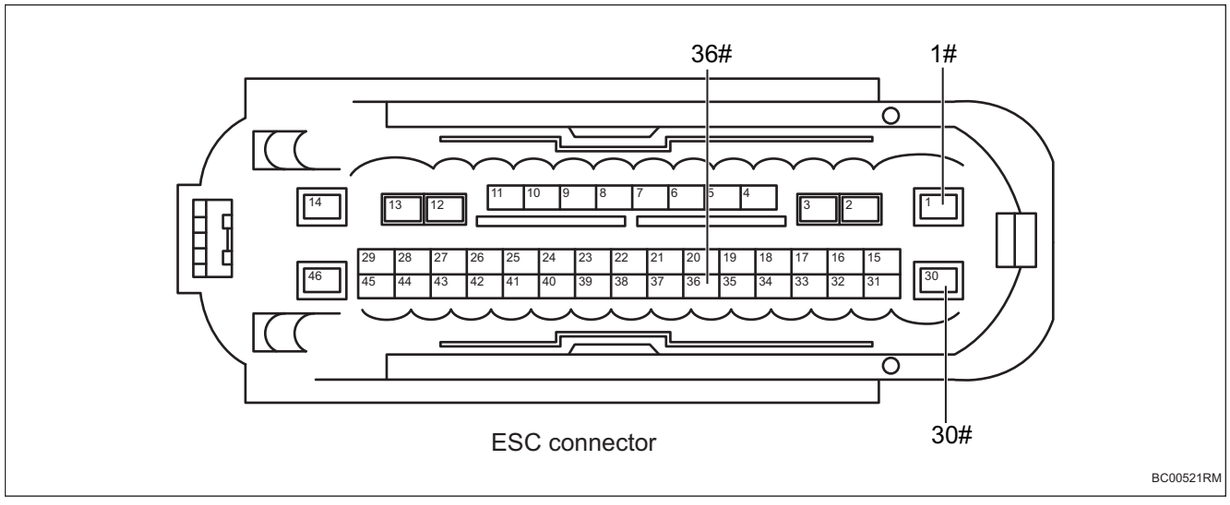
Standard value

Detector connection	Detection conditions	Specified state
ESC connector 14# - body GND	Always connected	Less than 1Ω
ESC connector 46# - body GND	Always connected	Less than 1Ω

NG → **Repair and replace harness or connector**

OK

4	**Check the ESC power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ESC connector 1# - body GND	Set the ignition switch to "ON"	Battery voltage
ESC connector 30# - body GND	Set the ignition switch to "ON"	Battery voltage
ESC connector 36# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair and replace harness or connector**

OK

5	**Replace ESC (See page BC-87)**

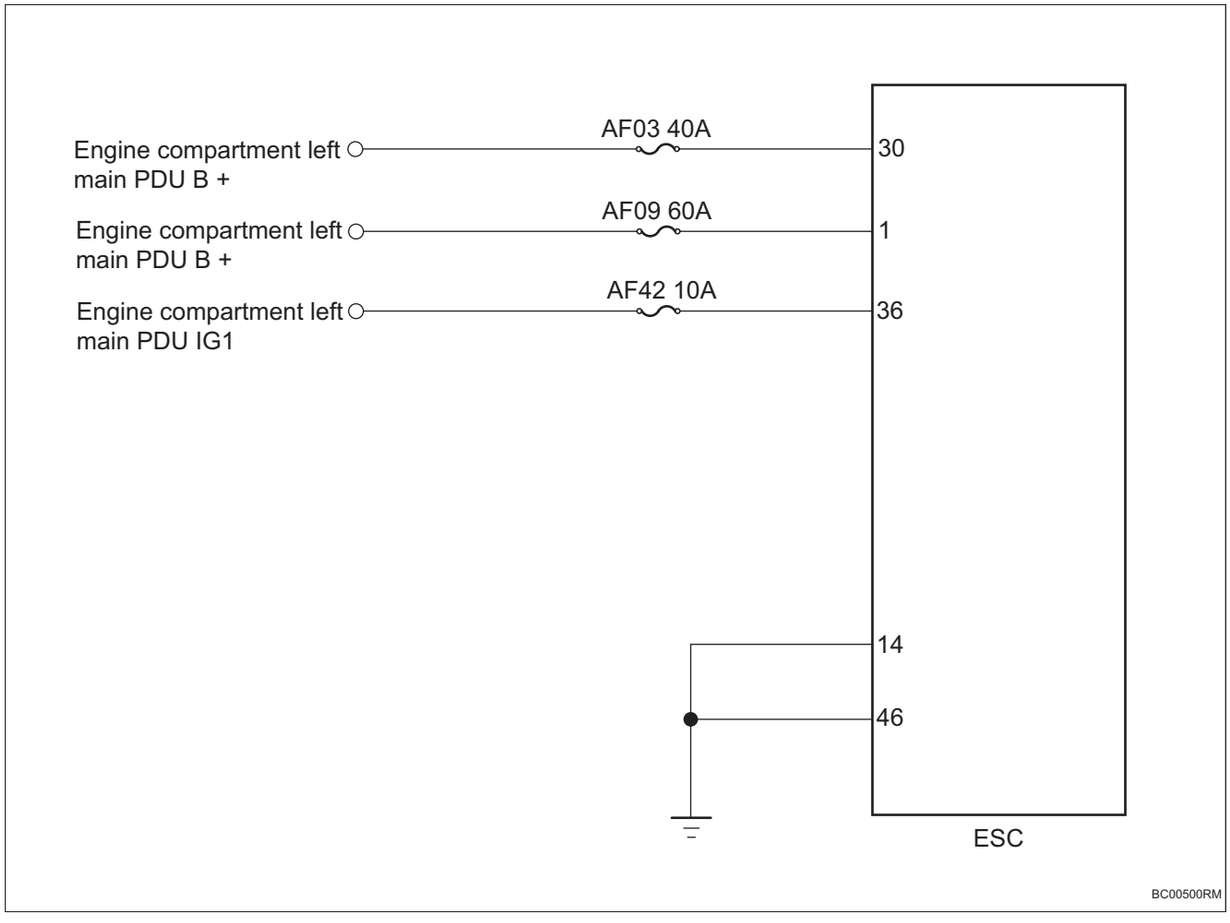
DTC	C002004	Related faults of ESP pump
DTC	C0020FC	Oil return pump failure

Description

When the reflux pump fails, the ESC records the DTC.

DTC	DTC detection conditions	Faulty location
C002004	(a) Related faults of ESP pump.	• ESC • Harness and connector • Battery/charging system
C0020FC	(a) Return pump failure.	• ESC • Ambient temperature

Circuit diagram



Inspection procedure

1	Check whether the operating temperature of the system is normal

(a) Check if the system temperature is too high.

NG	Repair according to the fault

BC

OK

2	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

3	Check the ESC fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the ESC fuse.

(d) Measure the resistance according to the values in the table below.

Standard value

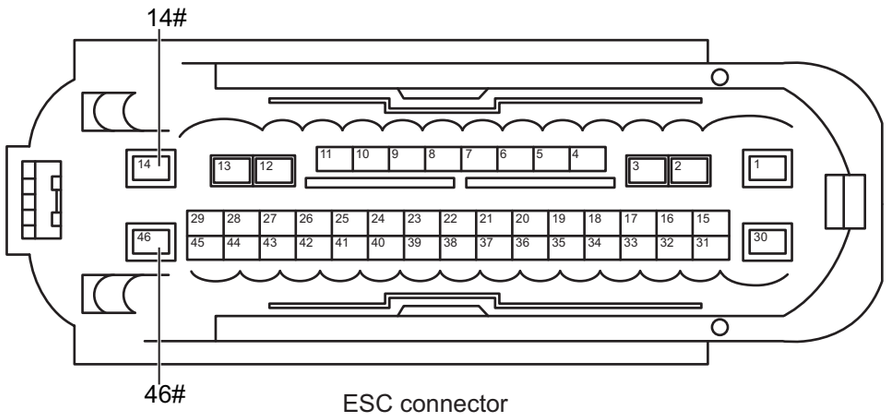
Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

BC

4	Check ESC ground



(a) Measure the resistance according to the values in the table below.

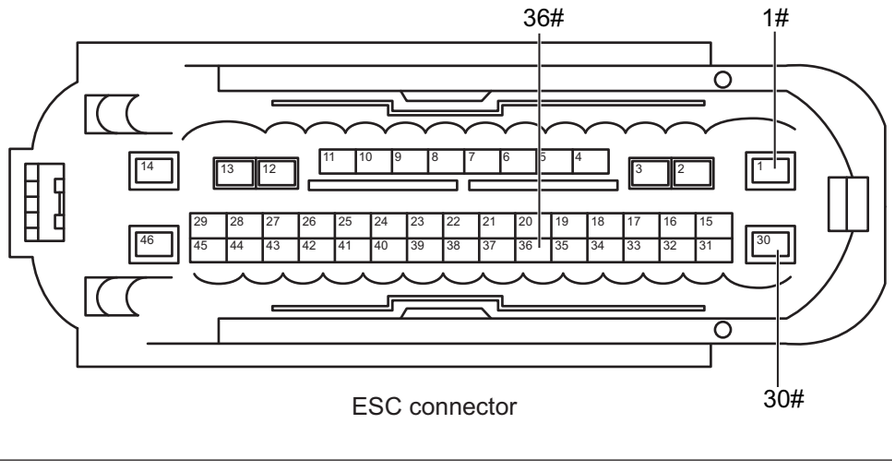
Standard value

Detector connection	Detection conditions	Specified state
ESC connector 14# - body GND	Always connected	Less than 1Ω
ESC connector 46# - body GND	Always connected	Less than 1Ω

NG → **Repair and replace harness or connector**

OK

5	**Check the ESC power supply**



(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ESC connector 1# - body GND	Set the ignition switch to "ON"	Battery voltage
ESC connector 30# - body GND	Set the ignition switch to "ON"	Battery voltage
ESC connector 36# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair and replace harness or connector**

OK

6	**ESC dynamic self-test**

(a) Accelerate the vehicle above 40 km/h for system dynamic self-test.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace ESC (See page BC-87)**

OK

7	**End**

DTC	C003108	Left front wheel speed sensor: (signal failure) out of range, missing, noise, intermittent
DTC	C003208	Left front wheel speed sensor direction error
DTC	C003408	Abnormal right front wheel speed sensor signal
DTC	C003508	Wheel speed sensor signal interference
DTC	C003708	Wheel speed sensor signal lost
DTC	C003808	Wheel speed sensor direction error
DTC	C003A08	Right rear wheel speed sensor: (signal fault) out of range, missing, noise, intermittent error
DTC	C003B08	Wheel speed sensor direction error
DTC	C00A900	Left front wheel speed sensor: undefined failure (the exact cause of failure cannot be detected)
DTC	C00AA00	Right front wheel speed sensor: undefined failure (the exact cause of failure cannot be detected)
DTC	C00AB00	Left rear wheel speed sensor: undefined failure (the exact cause of failure cannot be detected)
DTC	C00AC00	Right rear wheel speed sensor: undefined failure (the exact cause of failure cannot be detected)
DTC	C109904	Abnormal multiple wheel speed sensor signals
DTC	C109908	Wheel speed sensor direction error
DTC	C1099FC	Lower wheel speed sensor signal error (multiple wheel speed sensors)

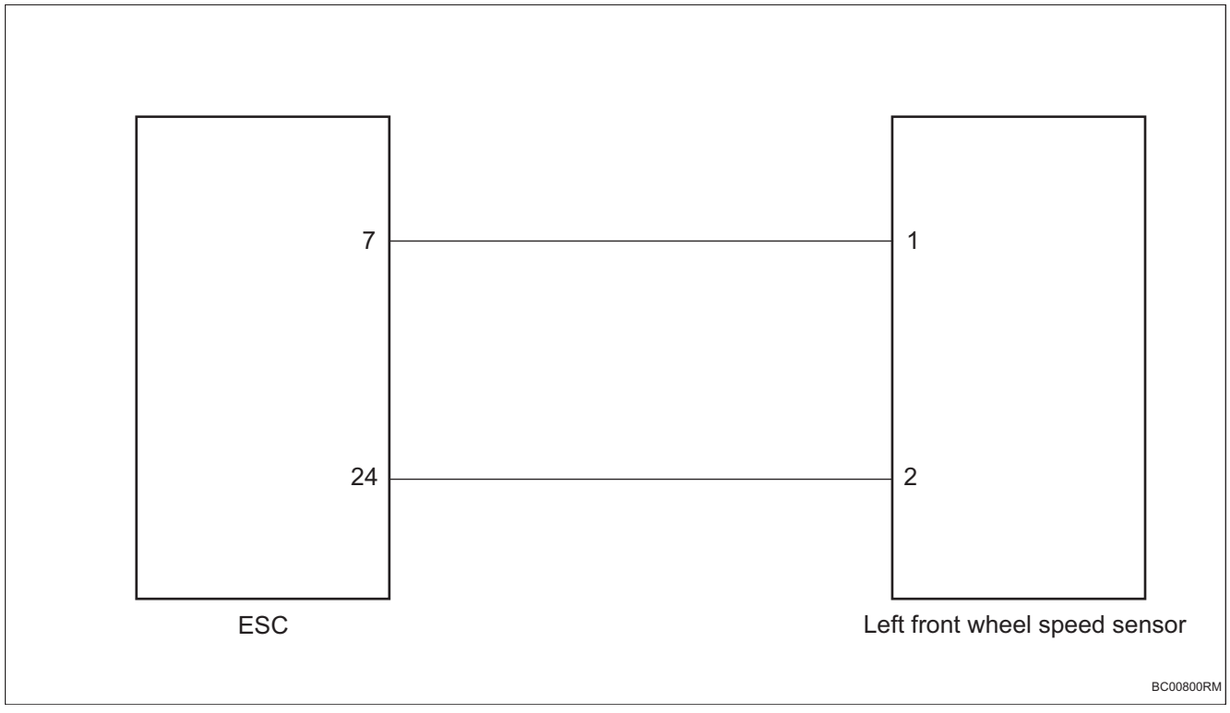
Description

When there is a short circuit or open circuit or sensor signal error in the wheel speed sensor line, the ESC records the DTC.

DTC	DTC detection conditions	Faulty location
C003108	(a) Left front wheel speed sensor: (signal failure) out of range, missing, noise, intermittent.	• Harness and connector • Left front wheel speed sensor • ESC
C003208	(a) Left front wheel speed sensor direction error.	• Harness and connector • Left front wheel speed sensor • ESC
C003408	(a) Right front wheel speed sensor direction error.	• Harness and connector • Right front wheel speed sensor • ESC
C003508	(a) The wheel speed sensor signal is disturbed.	• Harness and connector • Left rear wheel speed sensor • ESC
C003708	(a) Wheel speed sensor signal lost.	• Harness and connector • Left rear wheel speed sensor • ESC
C003808	(a) Wheel speed sensor direction error.	• Harness and connector • Left rear wheel speed sensor • ESC
C003A08	(a) Right rear wheel speed sensor: (signal failure) out of range, missing, noise, intermittent error.	• Harness and connector • Right rear wheel speed sensor • ESC
C003B08	(a) Wheel speed sensor direction error.	• Harness and connector • Left rear wheel speed sensor • ESC
C00A900	(a) Left front wheel speed sensor: undefined failure (the exact cause of the fault cannot be detected).	• Harness and connector • Left front wheel speed sensor • ESC
C00AA00	(a) Right front wheel speed sensor: undefined failure (the exact cause of the fault cannot be detected).	• Harness and connector • Right front wheel speed sensor • ESC
C00AB00	(a) Left rear wheel speed sensor: undefined failure (the exact cause of the fault cannot be detected).	• Harness and connector • Left rear wheel speed sensor • ESC
C00AC00	(a) Right rear wheel speed sensor: undefined failure (the exact cause of the fault cannot be detected).	• Harness and connector • Right rear wheel speed sensor • ESC
C109904	(a) Multiple wheel speed sensor signals are abnormal.	• Harness and connector • Wheel speed sensor • ESC
C109908	(a) Wheel speed sensor direction error.	• Harness and connector • Wheel speed sensor • ESC

DTC	DTC detection conditions	Faulty location
C1099FC	(a) Lower wheel speed sensor signal error (multiple wheel speed sensors).	• Harness and connector • Wheel speed sensor • ESC

Circuit diagram



Inspection procedure

Note: The analysis steps take the left front wheel speed sensor fault as an example. The analysis steps of right front, left rear and right rear wheel speed sensors are similar to this.

1	Read data flow

(a) Connect the HQ-VDS.

(b) Read the wheel speed sensor data flow.

(c) Check whether a wheel speed continues to be high or low.

NG → **Repair according to the fault**

OK

2	Check vehicle tire

(a) Check whether the tire air pressure is insufficient.

(b) Check whether the tire size meets the specification.

(c) Check whether the tires are seriously worn.

NG → **Troubleshooting**

OK

3	**Check the wheel speed sensor signal ring gear**

(a) Check whether the gap between wheel speed sensor and ring gear is correct.

(b) Check the wheel speed sensor ring gear for dirt and foreign matter, demagnetization and eccentricity.

(c) Check whether the wheel speed sensor ring gear is fitted or missing.

(d) Check whether the number of ring gear teeth is correct.

NG → **Troubleshooting**

OK

4	**Check wheel speed sensor**

(a) Check whether the wheel speed sensor is secured correctly.

NG → **Repair according to the fault**

OK

5	**Check wheel speed sensor harness and connector**

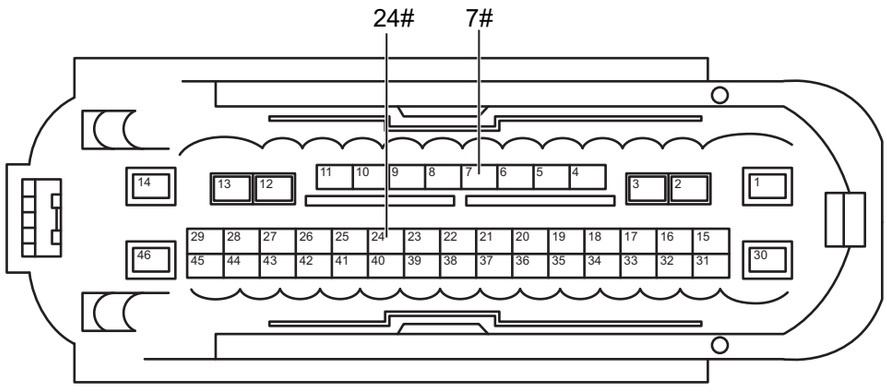
(a) Check whether the wheel speed sensor harness and connector are short circuited.

(b) Check whether the wheel speed sensor signal and power cables are reversely connected.

NG → **Repair and replace harness or connector**

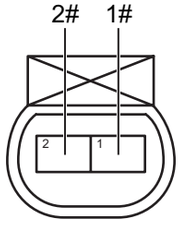
OK

6	**Check left front wheel speed sensor harness and connector for open circuit**



ESC connector

BC00811RM



Left front wheel speed sensor connector

BC00820RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ESC connector.

(d) Disconnect the left front wheel speed sensor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

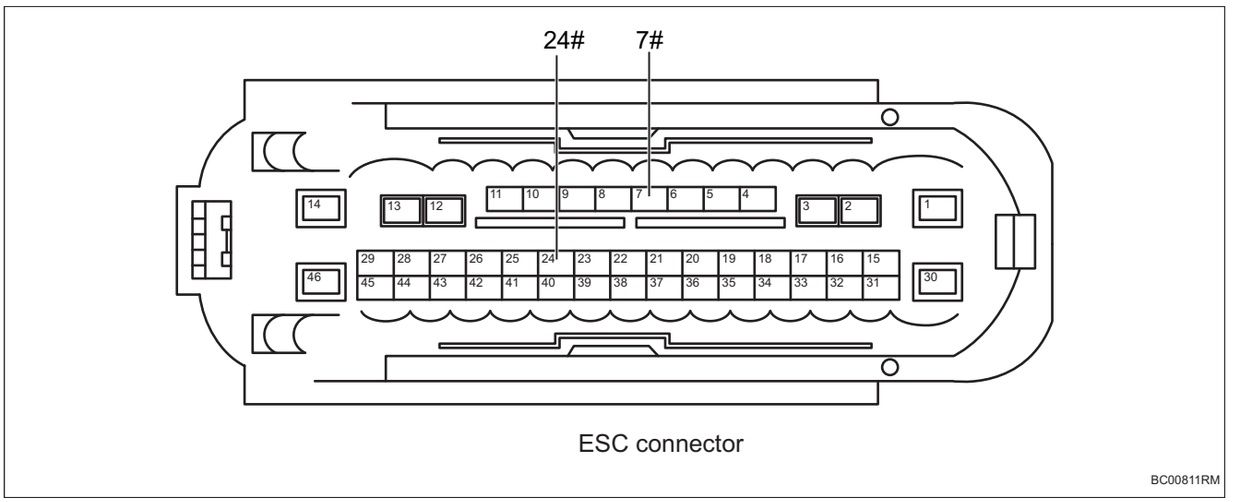
Detector connection	Detection conditions	Specified state
Left front wheel speed sensor connector 1# - ESC connector 7#	Always connected	Less than 1Ω
Left front wheel speed sensor connector 2# - ESC connector 24#	Always connected	Less than 1Ω

NG → **Repair and replace harness or connector**

OK

7	**Check left front wheel speed sensor harness and connector for circuit shorted to ground**

BC



ESC connector

(a) Measure the resistance according to the values in the table below.

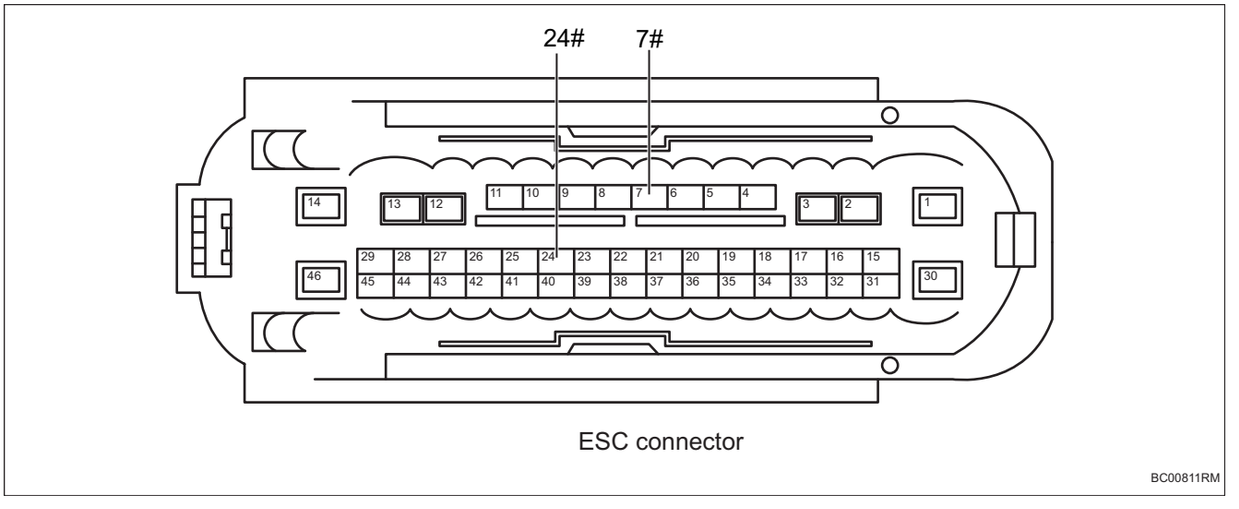
Standard value

Detector connection	Detection conditions	Specified state
ESC connector 7# -body GND	Always connected	10 KΩ or greater
ESC connector 24# -body GND	Always connected	10 KΩ or greater

NG → **Repair and replace harness or connector**

OK

8	**Check left front wheel speed sensor harness and connector for circuit shorted to power supply**



ESC connector

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

BC

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ESC connector 7# -body GND	Set the ignition switch to "ON"	Less than 1 V
ESC connector 24# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair and replace harness or connector**

OK

9	**Replace the left front wheel speed sensor (See page BC-90)**

(a) Replace the left front wheel speed sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Driving test (vehicle speed more than 40 Km/h).

(e) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace ESC (See page BC-87)**

OK

10	**End**

DTC	C003200	Left front wheel speed sensor circuit open
DTC	C003500	Right front wheel speed sensor circuit open
DTC	C003800	Left rear wheel speed sensor circuit open
DTC	C003B00	Right rear wheel speed sensor circuit open
DTC	C00A000	Left front wheel speed sensor power cable shorted to GND
DTC	C00A100	Left front wheel speed sensor signal harness shorted to power supply
DTC	C00A200	Right front wheel speed sensor power cable shorted to GND
DTC	C00A300	Right front wheel speed sensor signal harness shorted to power supply
DTC	C00A400	Left rear wheel speed sensor power cable shorted to GND
DTC	C00A500	Left rear wheel speed sensor signal harness shorted to power supply
DTC	C00A600	Right rear wheel speed sensor power cable shorted to GND
DTC	C00A700	Right rear wheel speed sensor signal harness shorted to power supply
DTC	C00B900	Left front wheel test failure, and wheel speed sensor shorted to power supply or ground wire or other wheel speed sensor harnesses
DTC	C00BA00	Right front wheel test failure, and wheel speed sensor shorted to power supply or ground wire or other wheel speed sensor harnesses
DTC	C00BB00	Left rear wheel test failure, and wheel speed sensor shorted to power supply or ground wire or other wheel speed sensor harnesses
DTC	C00BC00	Right rear wheel test failure, and wheel speed sensor shorted to power supply or ground wire or other wheel speed sensor harnesses

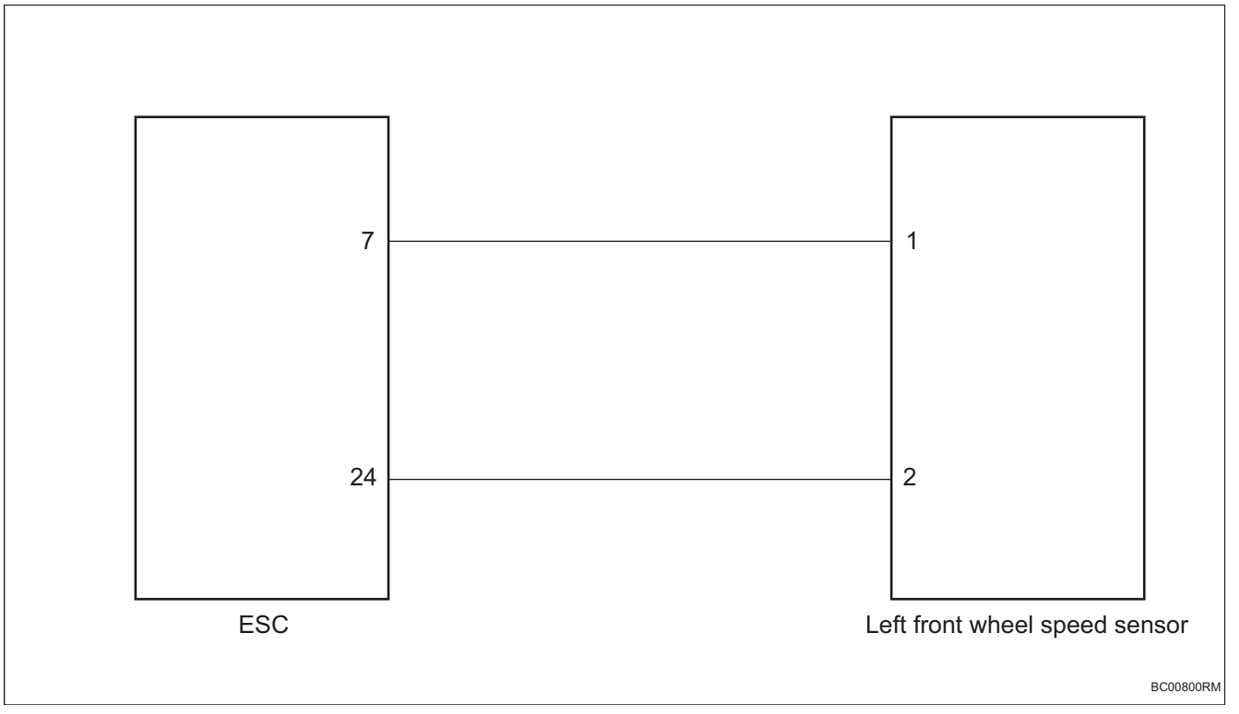
Description

When there is a short circuit or open circuit in the wheel speed sensor, ESC records the DTC.

DTC	DTC detection conditions	Faulty location
C003200	(a) Left front wheel speed sensor circuit open.	• Left front wheel speed sensor • Harness and connector • ESC
C003500	(a) Right front wheel speed sensor circuit open.	• Right front wheel speed sensor • Harness and connector • ESC
C003800	(a) Left rear wheel speed sensor circuit open.	• Left rear wheel speed sensor • Harness and connector • ESC
C003B00	(a) Right rear wheel speed sensor circuit open.	• Right rear wheel speed sensor • Harness and connector • ESC
C00A000	(a) Left front wheel speed sensor power cable shorted to GND.	• Left front wheel speed sensor • Harness and connector • ESC
C00A100	(a) Left front wheel speed sensor signal harness shorted to power supply.	• Left front wheel speed sensor • Harness and connector • ESC
C00A200	(a) Right front wheel speed sensor power cable shorted to GND.	• Right front wheel speed sensor • Harness and connector • ESC
C00A300	(a) Right front wheel speed sensor signal harness shorted to power supply.	• Right front wheel speed sensor • Harness and connector • ESC
C00A400	(a) Left rear wheel speed sensor power cable shorted to GND.	• Left rear wheel speed sensor • Harness and connector • ESC
C00A500	(a) Left rear wheel speed sensor signal harness shorted to power supply.	• Left rear wheel speed sensor • Harness and connector • ESC
C00A600	(a) Right rear wheel speed sensor power cable shorted to GND.	• Right rear wheel speed sensor • Harness and connector • ESC
C00A700	(a) Right rear wheel speed sensor signal harness shorted to power supply.	• Right rear wheel speed sensor • Harness and connector • ESC
C00B900	(a) Left front wheel test failure, and wheel speed sensor shorted to power supply or ground wire or other wheel speed sensor harnesses.	• Left front wheel speed sensor • Harness and connector • ESC

DTC	DTC detection conditions	Faulty location
C00BA00	(a) Right front wheel test failure, and wheel speed sensor shorted to power supply or ground wire or other wheel speed sensor harnesses.	• Right front wheel speed sensor • Harness and connector • ESC
C00BB00	(a) Left rear wheel test failure, and wheel speed sensor shorted to power supply or ground wire or other wheel speed sensor harnesses.	• Left front wheel speed sensor • Harness and connector • ESC
C00BC00	(a) Right rear wheel test failure, and wheel speed sensor shorted to power supply or ground wire or other wheel speed sensor harnesses.	• Right front wheel speed sensor • Harness and connector • ESC

Circuit diagram



Inspection procedure

BC

Note: The analysis steps take the left front wheel speed sensor fault as an example. The analysis steps of right front, left rear and right rear wheel speed sensors are similar to this.

1	**Check wheel speed sensor harness and connector**

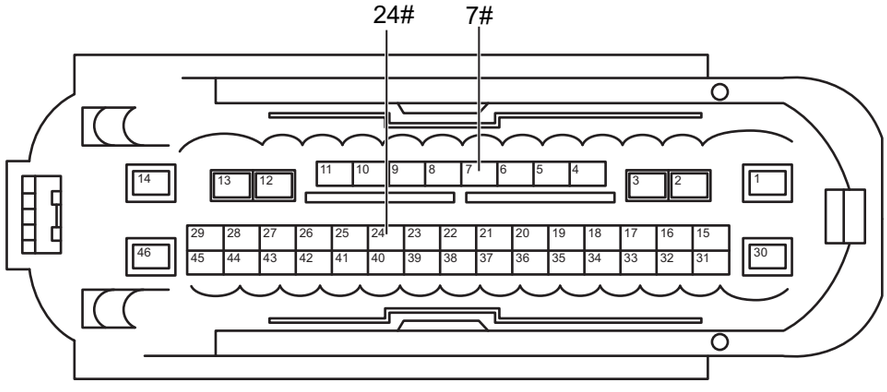
(a) Check whether the wheel speed sensor harness and connector are short circuited.

(b) Check whether the wheel speed sensor signal and power cables are reversely connected.

NG → **Repair and replace harness or connector**

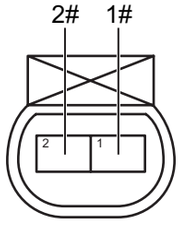
OK

2	Check left front wheel speed sensor harness and connector for open circuit



ESC connector

BC00811RM



Left front wheel speed sensor connector

BC00820RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ESC connector.

(d) Disconnect the left front wheel speed sensor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

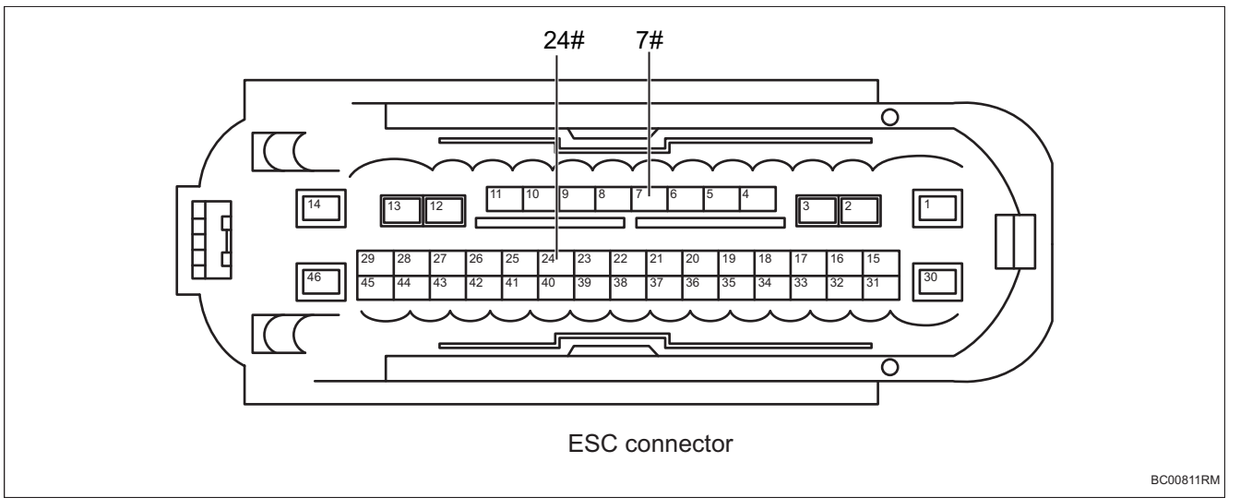
Detector connection	Detection conditions	Specified state
Left front wheel speed sensor connector 1# - ESC connector 7#	Always connected	Less than 1Ω
Left front wheel speed sensor connector 2# - ESC connector 24#	Always connected	Less than 1Ω

NG **Repair and replace harness or connector**

BC

OK

3	Check left front wheel speed sensor harness and connector for circuit shorted to ground



ESC connector

(a) Measure the resistance according to the values in the table below.

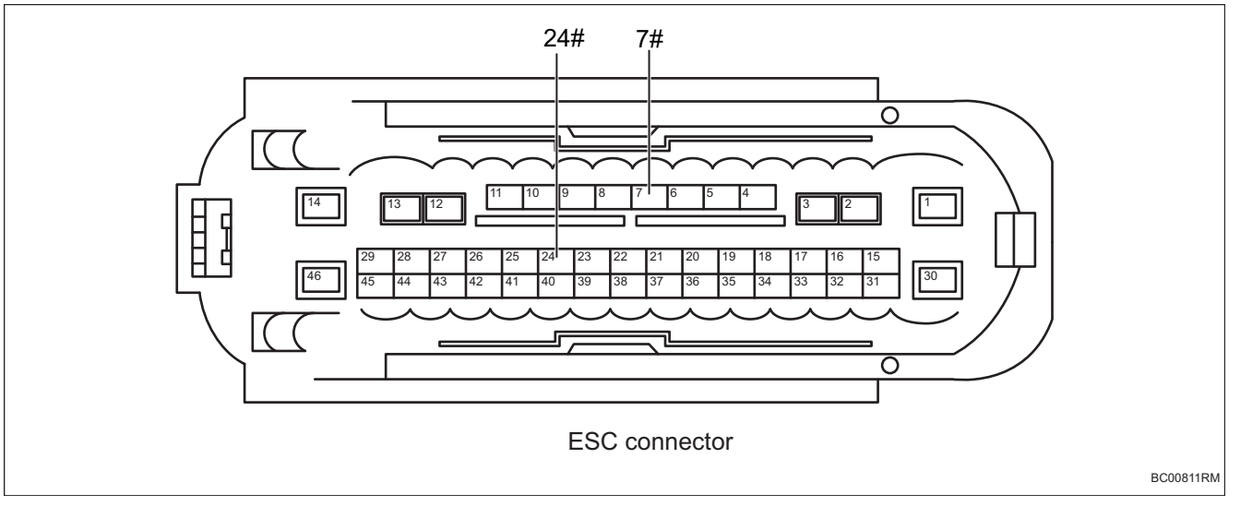
Standard value

Detector connection	Detection conditions	Specified state
ESC connector 7# -body GND	Always connected	10 KΩ or greater
ESC connector 24# -body GND	Always connected	10 KΩ or greater

NG → **Repair and replace harness or connector**

OK

4	**Check left front wheel speed sensor harness and connector for circuit shorted to power supply**



ESC connector

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

BC

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ESC connector 7# -body GND	Set the ignition switch to "ON"	Less than 1 V
ESC connector 24# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair and replace harness or connector**

OK

5	**Replace the left front wheel speed sensor (See page BC-90)**

(a) Replace the left front wheel speed sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Driving test (vehicle speed more than 40 Km/h).

(e) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace ESC (See page BC-87)**

OK

6	**End**

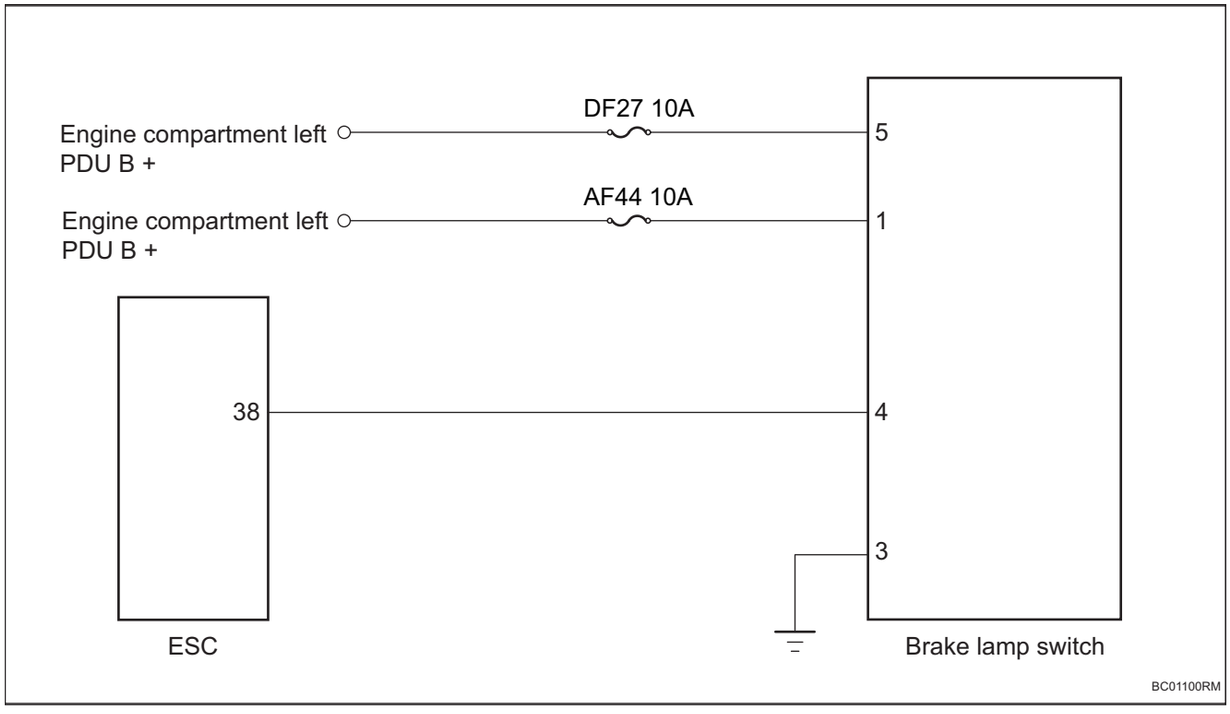
DTC	**C004008**	**BLS implausible**
DTC	**C004460**	**Master cylinder pressure sensor hardware fault**
DTC	**C0044FC**	**Master cylinder pressure sensor hardware fault**
DTC	**C004510**	**Master cylinder pressure sensor signal line circuit shorted or open**

Description

The brake pressure sensor is integrated in the ESC, and when the brake pressure sensor signal conflicts with the brake lamp switch signal, the ESC records the DTC.

DTC	DTC detection conditions	Faulty location
C004008	(a) BLS implausible.	• Brake lamp switch • Harness and connector • ESC
C004460	(a) Master cylinder pressure sensor hardware fault.	• Brake lamp switch • Harness and connector • ESC
C0044FC	(a) Master cylinder pressure sensor hardware fault.	• Brake lamp switch • Harness and connector • ESC
C004510	(a) Master cylinder pressure sensor signal line short circuit or open circuit.	• Brake lamp switch • Harness and connector • ESC

Circuit diagram



Inspection procedure

1	**Check brake lamp switch**

(a) Check whether the brake lamp switch is damaged.

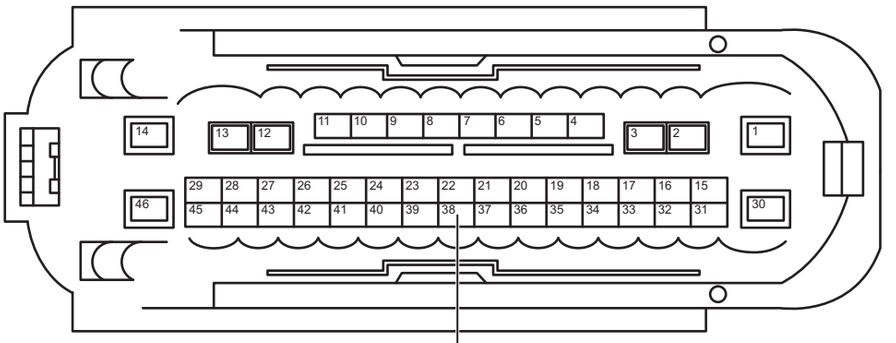
(b) Check whether the brake lamp switch is installed correctly.

NG → **Repair according to the fault phenomenon**

OK

2	**Check brake lamp switch harness and connector for open circuit**

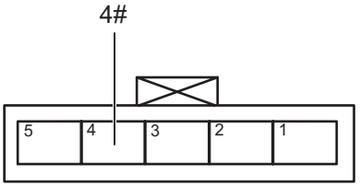
BC



38#

ESC connector

BC01111RM



Brake lamp switch connector

BC01121RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the brake lamp switch connector.

(d) Measure the resistance according to the values in the table below.

Standard value

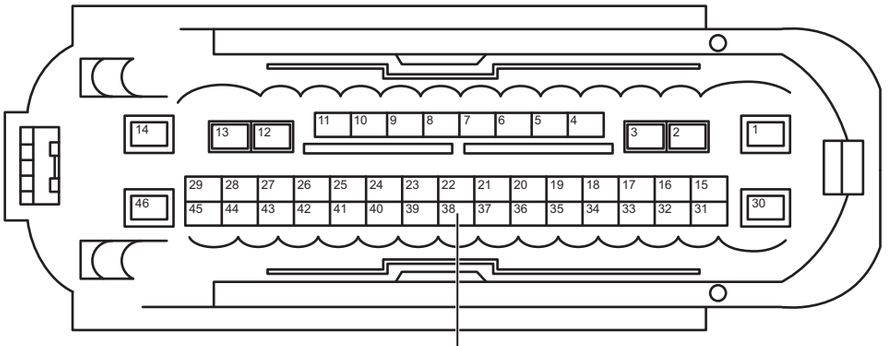
Detector connection	Detection conditions	Specified state
ESC connector 38# -brake lamp switch connector 4#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check brake lamp switch harness and connector for circuit shorted to ground**

BC



38#

ESC connector

BC01111RM

(a) Measure the resistance according to the values in the table below.

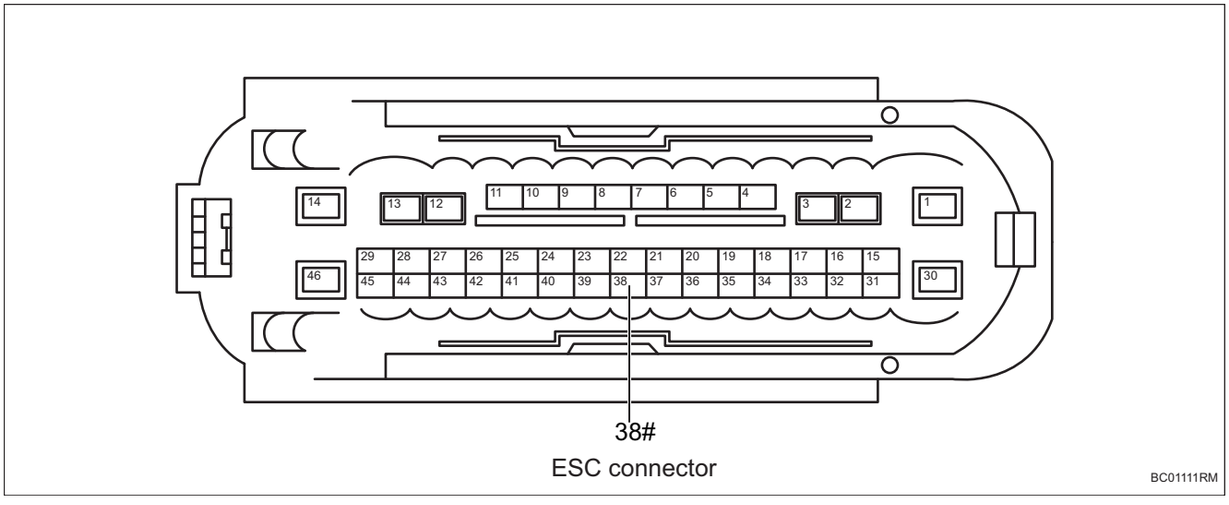
Standard value

Detector connection	Detection conditions	Specified state
ESC connector 38# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check brake lamp switch harness and connector for circuit shorted to power supply



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

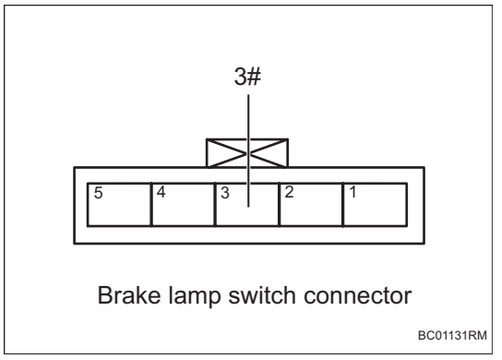
Detector connection	Detection conditions	Specified state
ESC connector 38# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

BC

OK

5	Check brake lamp switch ground



(a) Measure the resistance according to the values in the table below.

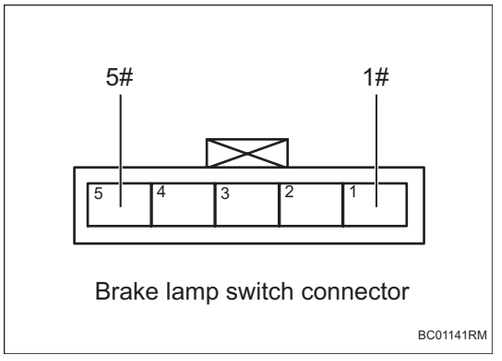
Standard value

Detector connection	Detection conditions	Specified state
Brake lamp switch connector 3# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

6	Check brake lamp switch power supply



(a) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Brake lamp switch connector 1# - body GND	The ignition switch is set to "ON"	Battery voltage
Brake lamp switch connector 5# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

BC

OK

7	Replace brake lamp switch (See page BR-3)

(a) Replace the brake lamp switch.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → Replace ESC (See page BC-87)

OK

8	End

DTC	C006B06	ABS control implausible
DTC	C006BFC	ABS control implausible
DTC	C007204	Brake disc overtemperature

Description

When the brake control system is operated for too long or the brake system is overheated, ESC will record DTC.

DTC	DTC detection conditions	Faulty location
C006B06	(a) ABS control implausible.	• ESC
C006BFC	(a) ABS control implausible.	• ESC
C007204	(a) Brake disc overtemperature.	• ESC

Inspection procedure

1	Read data flow

(a) Connect the HQ-VDS.

(b) Read the wheel speed sensor data flow.

(c) Check whether a wheel speed continues to be high or low.

NG → **Repair according to the fault**

OK

2	Read ESC for other DTC output

(a) Run the vehicle for 8-shaped test drive, and turn the steering wheel to the limit on both sides during the test.

(b) Connect the HQ-VDS.

(c) Set the ignition switch to "ON".

(d) Re-read the DTC.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

NG → **Repair according to the fault**

OK

3	Check the ESC

BC

(a) Check whether the installation position of the ESC is horizontal.

(b) Check whether the ESC is installed securely.

(c) Check ESC and fixing bracket for additional equipment.

NG → **Repair according to the fault**

OK

4	**Clear DTC**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace ESC (See page BC-87)**

OK

5	**End**

DTC	C007208	Valve circuit failure or valve body failure
DTC	C0072FC	General valve failures: overheat protection, invalid signal, hardware failure

Description

When the ESC detects that its own temperature is too high, it will record the DTC.

DTC	DTC detection conditions	Faulty location
C007208	(a) Valve circuit failure or valve body failure.	• ESC
C0072FC	(a) General valve failures: overheat protection, invalid signal, hardware failure	• ESC

Inspection procedure

1	Clear DTC

(a) Condition the vehicle to normal operating temperature.

(b) Connect the HQ-VDS.

(c) Set the ignition switch to "ON".

(d) Clear the DTC.

(e) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace ESC (See page BC-87)**

OK

2	End

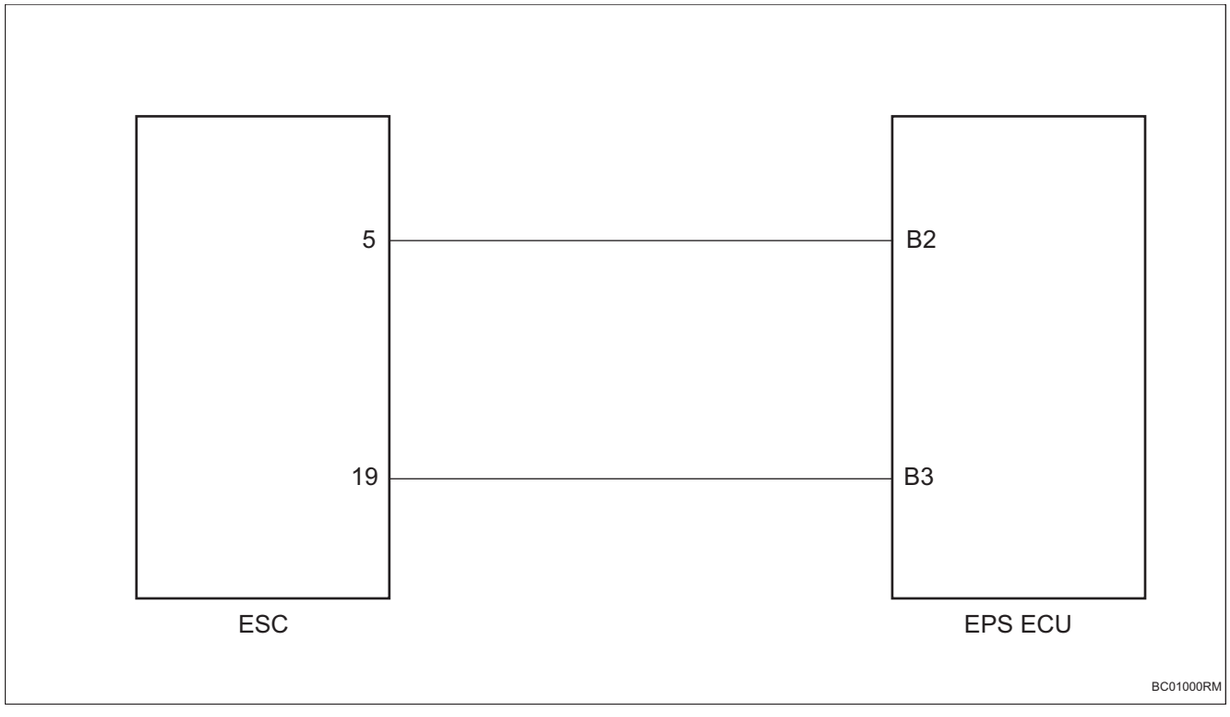
DTC	C046008	Steering angle sensor signal invalid

Description

When the steering angle sensor is not calibrated correctly or the signal is abnormal, the ESC records the DTC.

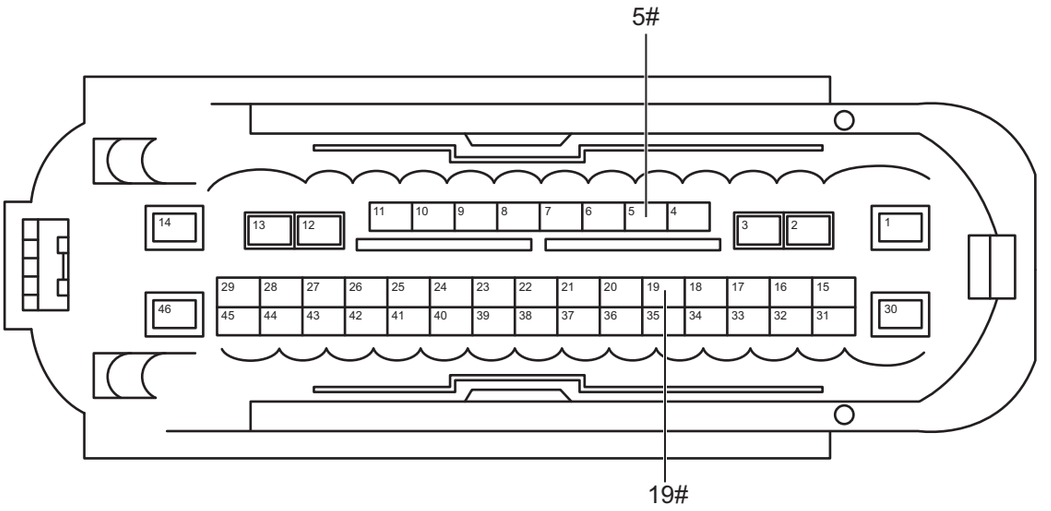
DTC	DTC detection conditions	Faulty location
C046008	(a) Steering angle sensor signal is invalid.	• EPS ECU • Harness and connector • ESC

Circuit diagram



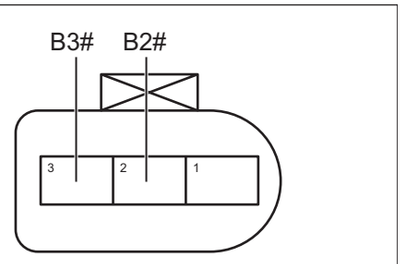
Inspection procedure

1	Check chassis CAN bus for open circuit (EPS ECU-ESC)



ESC connector

CA06111RM



EPS ECU B connector

CA01121RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the chassis CAN bus.

(d) Measure the resistance according to the values in the table below.

Standard value

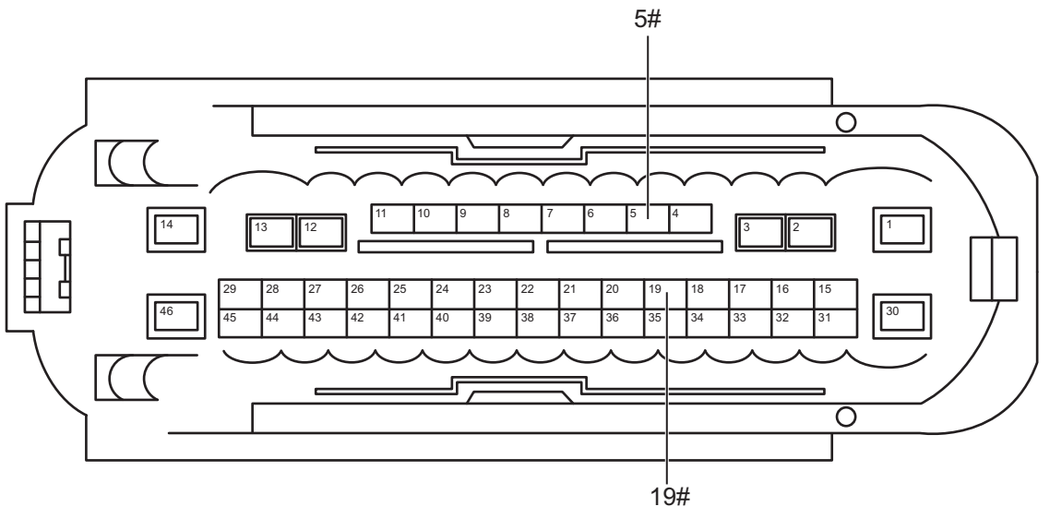
Detector connection	Detection conditions	Specified state
ESC connector 5# -EPS ECU connector B2#	Always connected	Less than 1Ω
ESC connector 19# -EPS ECU connector B3#	Always connected	Less than 1Ω

BC

NG → **Repair or replace the harness and connector**

OK

2	**Check chassis CAN bus for circuit shorted to ground**



ESC connector

CA06111RM

(a) Measure the resistance according to the values in the table below.

Standard value

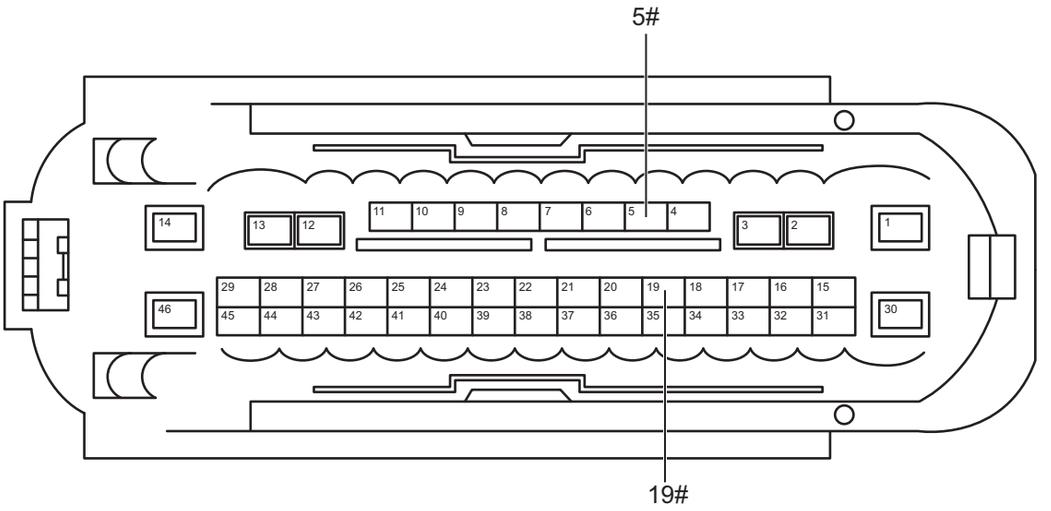
Detector connection	Detection conditions	Specified state
ESC connector 5# - body GND	Always connected	10 KΩ or greater
ESC connector 19# - body GND	Always connected	10 KΩ or greater

NG	Repair or replace the harness and connector

OK

3	Check chassis CAN bus for circuit shorted to power supply

BC



ESC connector

CA06111RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ESC connector 5# - body GND	Set the ignition switch to "ON"	Less than 1 V
ESC connector 19# - body GND	Set the ignition switch to "ON"	Less than 1 V

BC

NG **Repair or replace the harness and connector**

OK

4	**Recalibrate the steering wheel SAS**

(a) Calibrate the SAS.

(b) Connect the HQ-VDS.

(c) Set the ignition switch to "ON".

(d) Clear the DTC.

(e) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the EPS ECU (See page PS-25)**

OK

5	**Replace ESC (See page BC-87)**

DTC	C006108	Lateral acceleration sensor signal error
DTC	C006208	Longitudinal acceleration sensor signal error
DTC	C006308	Yaw rate sensor signal error
DTC	C00A800	Inertial sensor calibration failure

Description

The yaw rate sensor is integrated in the ESC. The yaw rate sensor contains three signals: lateral acceleration, longitudinal acceleration and yaw rate. When the sensor fails, the ESC records the DTC.

DTC	DTC detection conditions	Faulty location
C006108	(a) Lateral acceleration sensor signal error.	• ESC
C006208	(a) Longitudinal acceleration sensor signal error.	• ESC
C006308	(a) Yaw rate sensor signal error.	• ESC
C00A800	(a) Inertial sensor calibration failure.	• ESC

Inspection procedure

1	**Check yaw rate sensor**

(a) Check whether the installation position of the yaw rate sensor is horizontal.

(b) Check whether the yaw rate sensor installation is tight.

(c) Check yaw rate sensor and fixing bracket for bending and wear.

NG → **Repair according to the fault**

OK

BC

2	**Recalibrate yaw rate sensor**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Recalibrate the yaw rate sensor.

(d) Clear the DTC.

(e) Driving test (vehicle speed more than 40 Km/h).

(f) Re-read the DTC.

Criteria:

No DTC is output

NG	Replace ESC (See page RS-218)

OK

3	End

DTC	C104C04	After power-on, the PATA button is continuously pressed for more than 10 s

Description

When the ESC OFF switch fails, ESC records the DTC.

DTC	DTC detection conditions	Faulty location
C104C04	(a) After power-on, the PATA button is continuously pressed for more than 10 s.	• Central control panel • Harness and connector • ESC

Inspection procedure

1	Check central control panel harness and connector

(a) Check whether the central control panel harness and connector are well connected.

(b) Check the central control panel harness and connector for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

2	Replace the central control panel

(a) Replace the central control panel.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace ESC (See page BC-87)**

OK

3	End

DTC	C108C08	Reverse gear signal change failure

Description

When the MCP signal and brake lamp switch signal are abnormal, the ESC records the DTC.

DTC	DTC detection conditions	Faulty location
C108C08	(a) Reverse gear signal change failure.	• Brake lamp switch • MCP • ESC • Harness and connector

Inspection procedure

1	Check whether the TCU has DTC output

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Read the DTC.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

NG → **Repair according to the DTC**

OK

2	Check brake lamp switch harness and connector

(a) Check whether the brake lamp switch harness and connector are properly connected.

(b) Check the brake lamp switch harness and connector for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

3	Check MCP harness and connector

(a) Check whether the MCP harness and connector are properly connected.

(b) Check the MCP harness and connector for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

4	**Replace the brake lamp switch/MCP (see BR-3) (See page BR-3) (See page IP-15)**

(a) Replace the brake switch/MCP.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace ESC (See page BC-87)**

OK

5	**End**

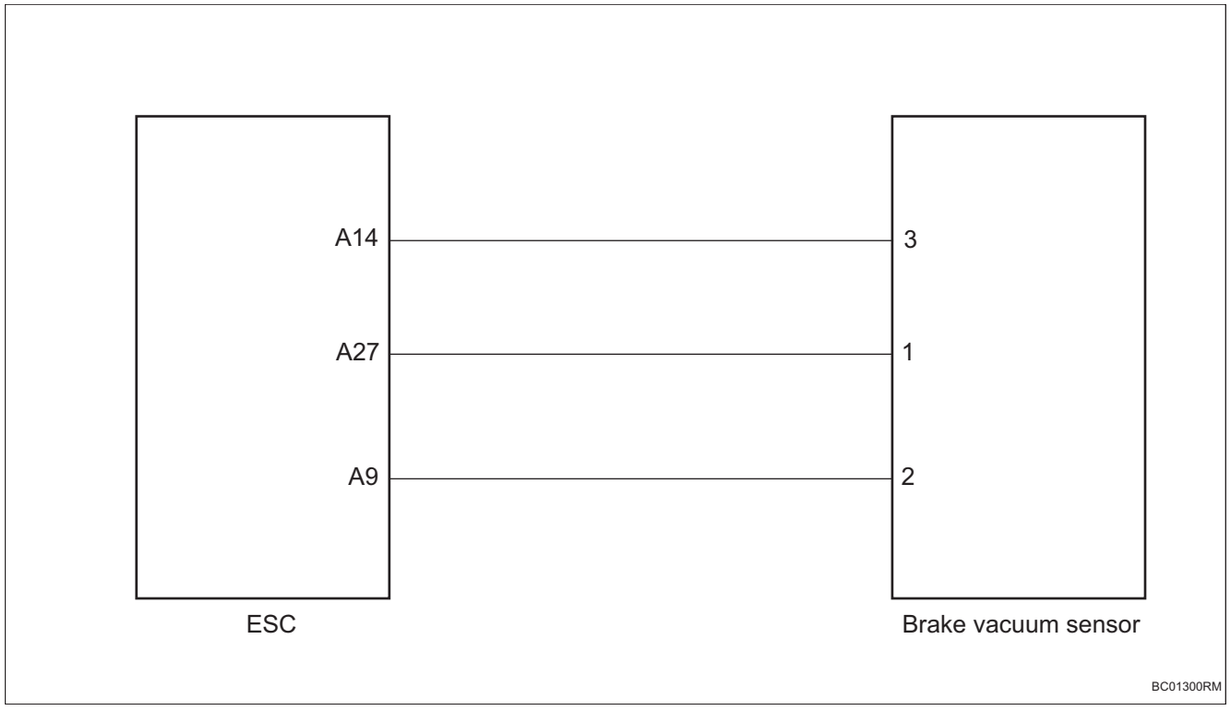
DTC	C10AD08	Vacuum sensor error
DTC	C10AD09	Vacuum sensor low vacuum related fault
DTC	C10AD10	Vacuum sensor low vacuum HBC off related fault

Description

When the brake vacuum sensor fails or the signal is abnormal, ESC records the DTC.

DTC	DTC detection conditions	Faulty location
C10AD08	(a) Vacuum sensor error.	• Harness and connector • Brake vacuum sensor • ESC
C10AD09	(a) Vacuum sensor low vacuum related fault.	• Vacuum pump • Harness and connector • Brake vacuum sensor • ESC
C10AD10	(a) Vacuum sensor low vacuum HBC off related fault.	• Vacuum pump • Harness and connector • Brake vacuum sensor • ESC

Circuit diagram



Inspection procedure

1	Check vacuum pump line

BC

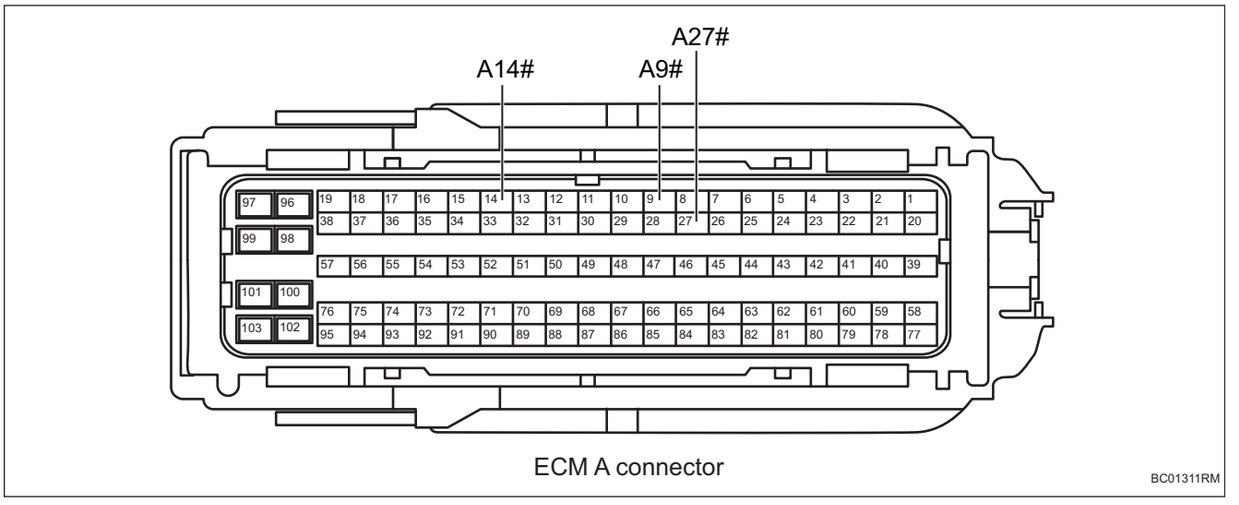
(a) Check whether the vacuum pump line is well connected.

(b) Check whether the vacuum pump line is damaged or leaking.

NG → **Repair according to the fault phenomenon**

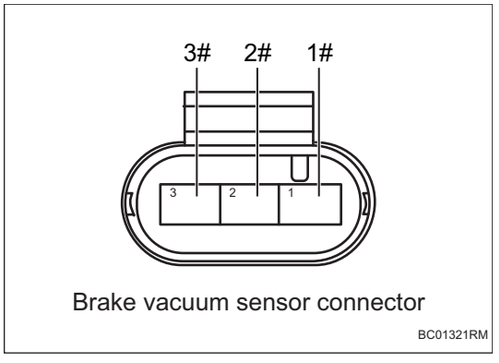
OK

2	**Check brake vacuum sensor harness and connector (for open circuit)**



ECM A connector

BC01311RM



Brake vacuum sensor connector

BC01321RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ECM connector.

(d) Disconnect the brake vacuum sensor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

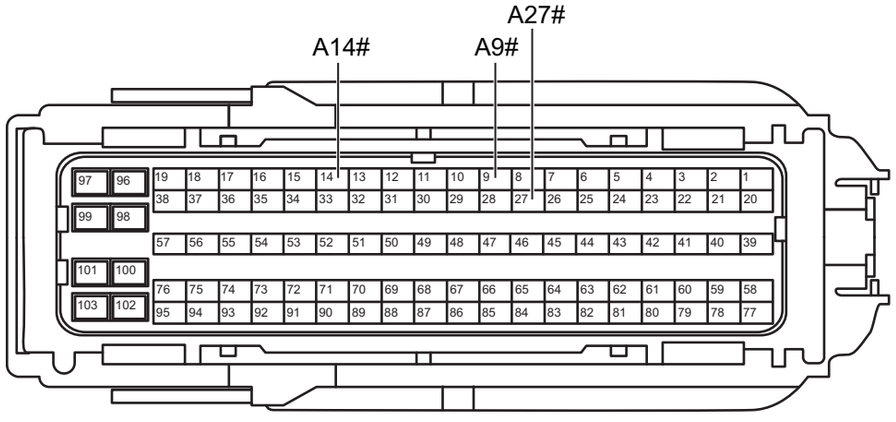
Detector connection	Detection conditions	Specified state
ECM connector A9# -brake vacuum sensor connector 2#	Always connected	Less than 1Ω
ECM connector A14# -brake vacuum sensor connector 3#	Always connected	Less than 1Ω
ECM connector A27# -Brake vacuum sensor connector 1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

BC

OK

3	Check brake vacuum sensor harness and connector (circuit shorted to ground)



ECM A connector

BC01311RM

(a) Measure the resistance according to the values in the table below.

Standard value

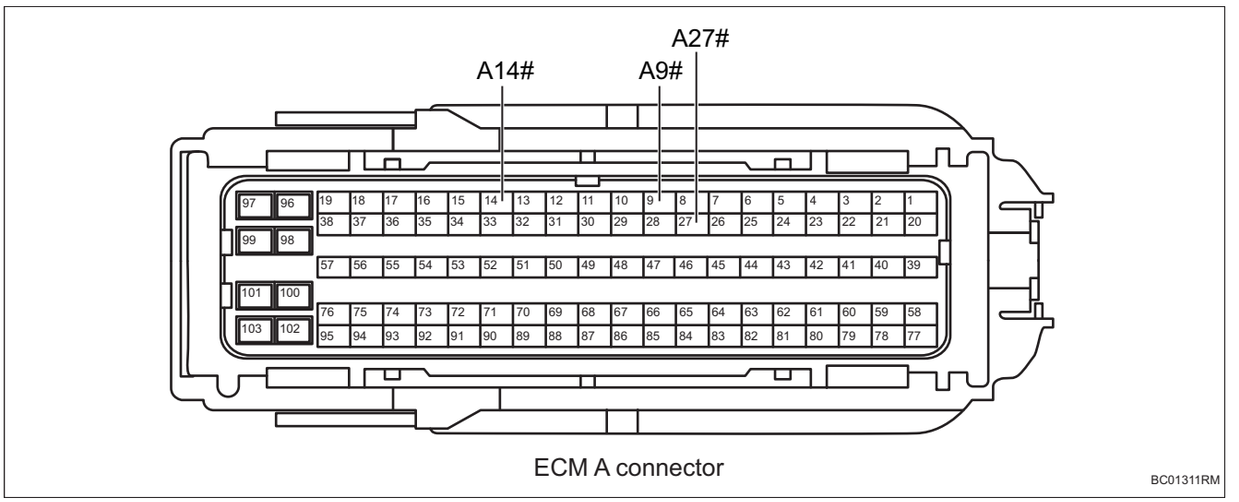
Detector connection	Detection conditions	Specified state
ECM connector A9# - body GND	Always connected	10 KΩ or greater
ECM connector A27# - body GND	Always connected	10 KΩ or greater
ECM connector A14# - body GND	Always connected	10 KΩ or greater

NG → **Repair and replace harness or connector**

OK

4	Check brake vacuum sensor harness and connector (circuit shorted to power supply)

BC



ECM A connector

BC01311RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM connector A9# - body GND	The ignition switch is set to "ON"	Less than 1 V
ECM connector A27# - body GND	The ignition switch is set to "ON"	Less than 1 V
ECM connector A14# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair and replace harness or connector**

OK

BC

5	**Replace brake vacuum sensor (See page BR-21)**

(a) Replace the brake vacuum sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace vacuum pump (See page BR-21)**

OK

6	ESC (See page BC-87)

DTC	C121208	Variant error

Description

When there is a code error in ESC, ESC records the DTC.

DTC	DTC detection conditions	Faulty location
C121208	(a) Variant error.	• ESC.

Inspection procedure

1	ESC executes automatic configuration module program

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) ESC executes automatic configuration module program.

(d) Clear the DTC.

(e) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace ESC (See page BC-87)**

OK

2	End

DTC	C154604	Inconsistent left and right caliper power supply voltage
DTC	C154700	Left caliper current sampling failure
DTC	C154800	Right caliper internal hardware failure
DTC	C154900	Caliper right motor stalling or overcurrent
DTC	C154A00	Left caliper motor or piston stalling during release
DTC	C155512	APB BUTTON harness connection fault
DTC	C155C00	The button is pressed or damaged
DTC	C155D45	Failure to perform operation requested by PBC to read and write NVM
DTC	C15611E	Left caliper actuator fault: short circuit or coupling
DTC	C156600	Left caliper motor operating voltage and current out of limit
DTC	C156601	Abnormal rotation of the left caliper
DTC	C1566FC	Left caliper passive test failure
DTC	C156700	Right caliper polarity error
DTC	C156701	Right caliper passive test failure
DTC	C1567FC	Lower right caliper passive test failure
DTC	C156800	Inconsistency between initialization test APB enable signal and expectation
DTC	C156801	Right caliper motor H-bridge deactivation test failure
DTC	C15681D	Right caliper motor H bridge overcurrent at MOSFET
DTC	C1568FC	Inconsistency between periodic monitoring APB enable signal and expectation
DTC	C156900	Inconsistency between initialization test APB enable signal and expectation
DTC	C156901	Right caliper motor H-bridge deactivation test failure

DTC	C15691D	Right caliper motor H bridge overcurrent at MOSFET
DTC	C1569FC	Inconsistency between periodic monitoring APB enable signal and expectation
DTC	C156B00	APB ASIC hardware fault
DTC	C156BFC	Chip internal pin overcurrent
DTC	C156C00	GPIO pin overtemperature of APB ASIC chip
DTC	C156C92	Suspicious memory failure during caliper movement
DTC	C156D62	EPB position unknown or EPB motor abnormal
DTC	C010196	PBC error 1
DTC	C010296	PBC error 2
DTC	C010396	PBC error 3
DTC	C010496	PBC error 4
DTC	C010596	PBC error 5
DTC	C010696	PBC error 6
DTC	C010796	PBC error 7
DTC	C010896	PBC error 8
DTC	C010996	PBC error 9
DTC	C011096	PBC error 10
DTC	C011196	PBC error 11
DTC	C011296	PBC error 12
DTC	C011396	PBC error 13
DTC	C011496	PBC error 14
DTC	C011596	PBC error 15
DTC	C011696	PBC error 16
DTC	C011796	PBC error 17

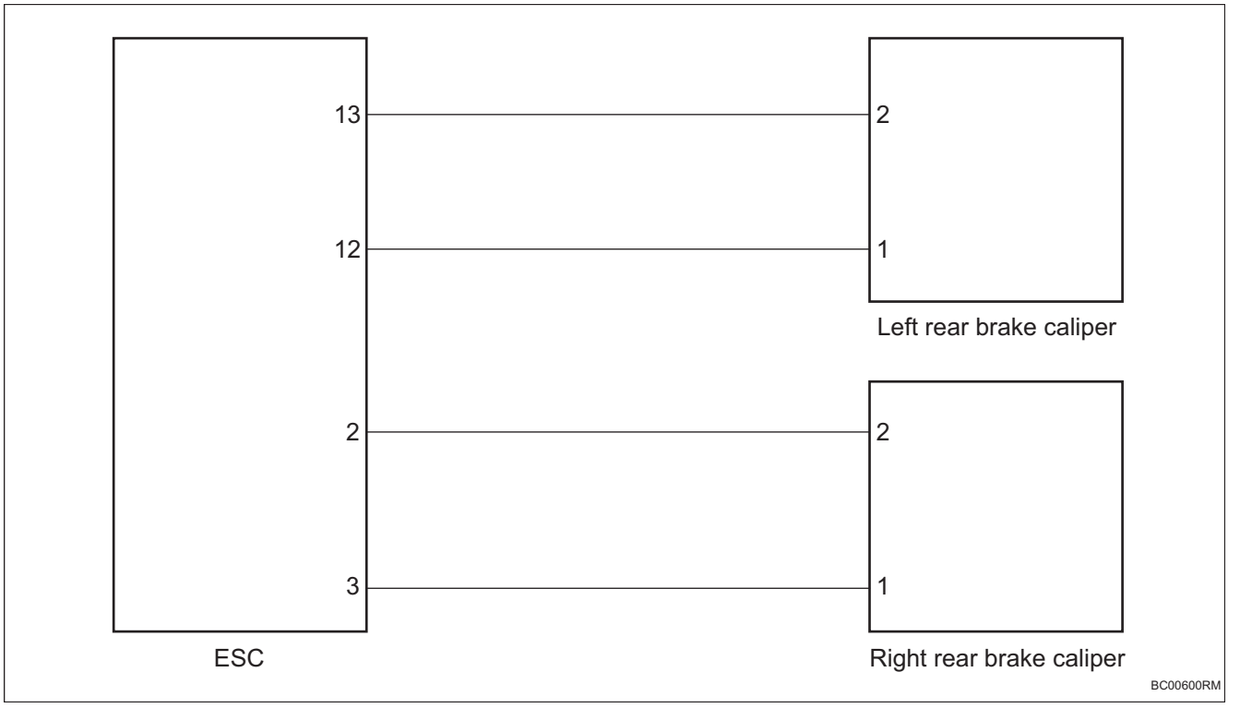
Description

When the rear brake caliper works abnormally or there is a fault inside the control unit, ESC records the DTC.

DTC	DTC detection conditions	Faulty location
C154604	(a) Inconsistent left and right caliper power supply voltage.	• Harness and connector • Left rear brake caliper • Right rear brake caliper • ESC
C154700	(a) left caliper current sampling failure.	
C154800	(a) Right caliper internal hardware failure.	
C154900	(a) Caliper right motor stalling or overcurrent.	
C154A00	(a) Left caliper motor or piston stalling during release.	
C155512	(a) APB BUTTON harness connection failure.	
C155C00	(a) The button is pressed or damaged.	
C155D45	(a) Failure to perform operation requested by PBC to read and write NVM.	
C15611E	(a) Left caliper actuator fault: short circuit or coupling.	
C156600	(a) Left caliper motor operating voltage and current out of limit.	
C156601	(a) Abnormal rotation of the left caliper.	
C1566FC	(a) Left caliper passive test failure.	
C156700	(a) Right caliper polarity error.	
C156701	(a) Right caliper passive test failure.	
C1567FC	(a) Lower right caliper passive test failure.	
C156800	(a) Inconsistency between initialization test APB enable signal and expectation.	
C156801	(a) Right caliper motor H-bridge deactivation test failure.	
C15681D	(a) Right caliper motor H bridge overcurrent at MOSFET.	
C1568FC	(a) Inconsistency between periodical monitoring APB enable signal and expectation.	
C156900	(a) Inconsistency between initialization test APB enable signal and expectation.	
C156901	(a) Right caliper motor H-bridge deactivation test failure.	
C15691D	(a) Right caliper motor H bridge overcurrent at MOSFET.	
C1569FC	(a) Inconsistency between periodical monitoring APB enable signal and expectation.	
C156B00	(a) APB ASIC hardware fault.	
C156BFC	(a) Chip internal pin overcurrent.	
C156C00	(a) GPIO pin overtemperature of APB ASIC chip.	
C156C92	(a) Suspicious memory failure during caliper movement.	
C156D62	(a) EPB position unknown or EPB motor abnormal.	
C010196	(a) PBC error 1.	

DTC	DTC detection conditions	Faulty location
C010296	(a) PBC error 2.	• Harness and connector • Left rear brake caliper • Right rear brake caliper • ESC
C010396	(a) PBC error 3.	
C010496	(a) PBC error 4.	
C010596	(a) PBC error 5.	
C010696	(a) PBC error 6.	
C010796	(a) PBC error 7.	
C010896	(a) PBC error 8.	
C010996	(a) PBC error 9.	
C011096	(a) PBC error 10.	
C011196	(a) PBC error 11.	
C011296	(a) PBC error 12.	
C011396	(a) PBC error 13.	
C011496	(a) PBC error 14.	
C011596	(a) PBC error 15.	
C011696	(a) PBC error 16.	
C011796	(a) PBC error 17.	

Circuit diagram



Inspection procedure

1	Check both rear brake calipers

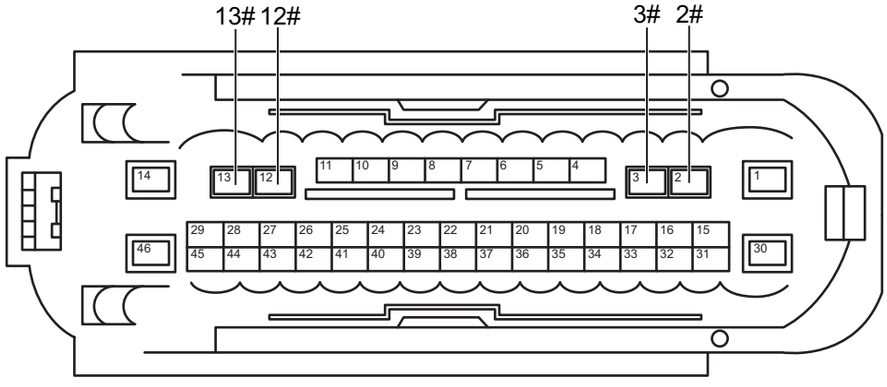
(a) Check whether the appearance of the brake caliper of the two rear wheels is normal.

(b) Check the brake caliper pipelines of the two rear wheels for leakage.

NG → **Repair according to the fault phenomenon**

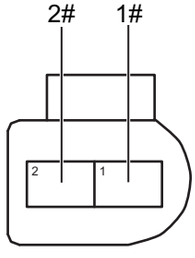
OK

2	**Check left/right rear brake caliper harness and connector for open circuit**



ESC connector

BC00611RM



Left/right rear brake caliper connector

BC00621RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the ESC connector.

(d) Disconnect the left/right rear brake caliper connector.

(e) Measure the resistance according to the values in the table below.

Standard value

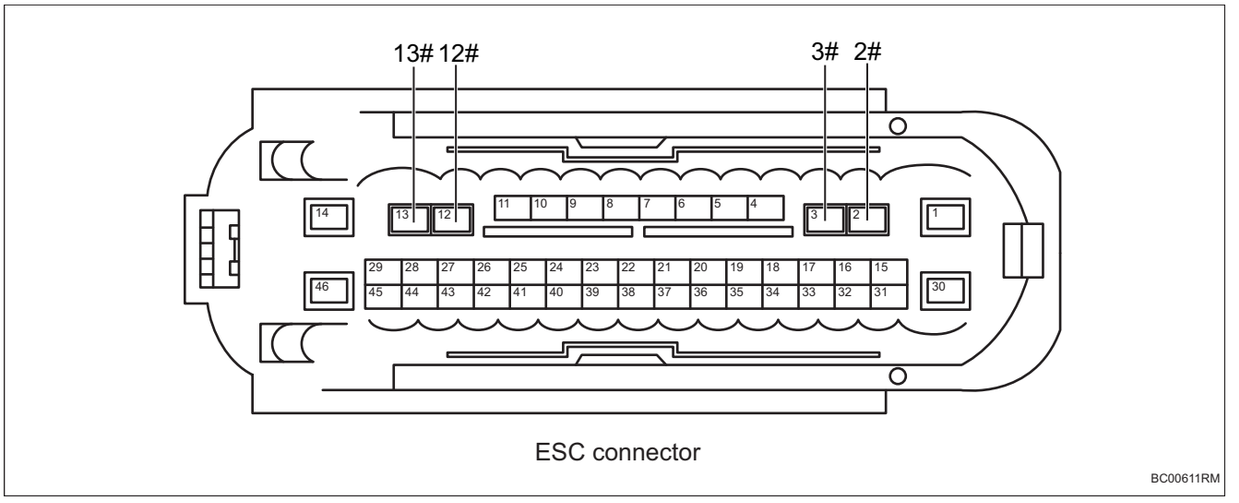
Detector connection	Detection conditions	Specified state
Left rear brake caliper connector 2# -ESC connector 13#	Always connected	Less than 1Ω
Left rear brake caliper connector 1# -ESC connector 12#	Always connected	Less than 1Ω
Right rear brake caliper connector 2# -ESC connector 2#	Always connected	Less than 1Ω
Right rear brake caliper connector 1# -ESC connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

BC

OK

3	Check left/right rear brake caliper harness and connector for circuit shorted to ground



ESC connector

(a) Measure the resistance according to the values in the table below.

Standard value

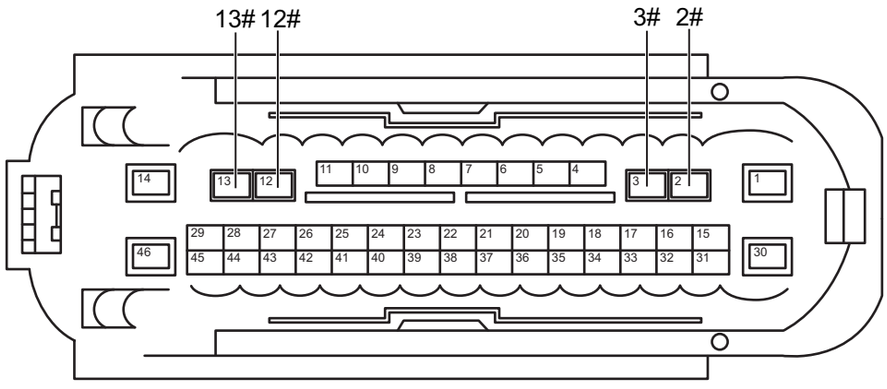
Detector connection	Detection conditions	Specified state
ESC connector 12# - body GND	Always connected	10 KΩ or greater
ESC connector 13# - body GND	Always connected	10 KΩ or greater
ESC connector 2# - body GND	Always connected	10 KΩ or greater
ESC connector 3# - body GND	Always connected	10 KΩ or greater

NG → **Repair and replace harness or connector**

BC

OK

4	Check left/right rear brake caliper harness and connector for circuit shorted to power supply



ESC connector

BC00611RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ESC connector 12# - body GND	The ignition switch is set to "ON"	Less than 1 V
ESC connector 13# - body GND	The ignition switch is set to "ON"	Less than 1 V
ESC connector 2# - body GND	The ignition switch is set to "ON"	Less than 1 V
ESC connector 3# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair and replace harness or connector**

BC

OK

5	**Replace left/right rear brake caliper (See page BR-18)**

(a) Replace the left/right rear brake caliper.

(b) Connect the HQ-VDS.

(c) Set the ignition switch to "ON".

(d) Clear the DTC.

(e) Driving test (vehicle speed more than 40 Km/h).

(f) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace ESC (See page BC-87)**

OK

6	**End**

DTC	C100004	Internal chip failure
DTC	C100047	An illegal event detected by main control chip memory unit
DTC	C1000FC	APBMI chip module damaged or APBMI software error
DTC	C100104	Network timeout caused by hardware fault
DTC	C101008	ECU software error

Description

When the ESC internal data error or hardware failure occurs, ESC records the DTC.

DTC	DTC detection conditions	Faulty location
C100004	(a) Internal chip failure.	• ESC
C100047	(a) An illegal event was detected by main control chip memory unit.	• ESC
C1000FC	(a) APBMI chip module damaged or APBMI software error	• ESC
C100104	(a) Network timeout caused by hardware fault.	• ESC
C101008	(a) ECU software error.	• ESC

Inspection procedure

1	**ESC executes automatic configuration module program**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) ESC executes automatic configuration module program.

(d) Clear the DTC.

(e) Driving test (vehicle speed more than 40 Km/h).

(f) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace ESC (See page BC-87)**

OK

2	**End**

BC

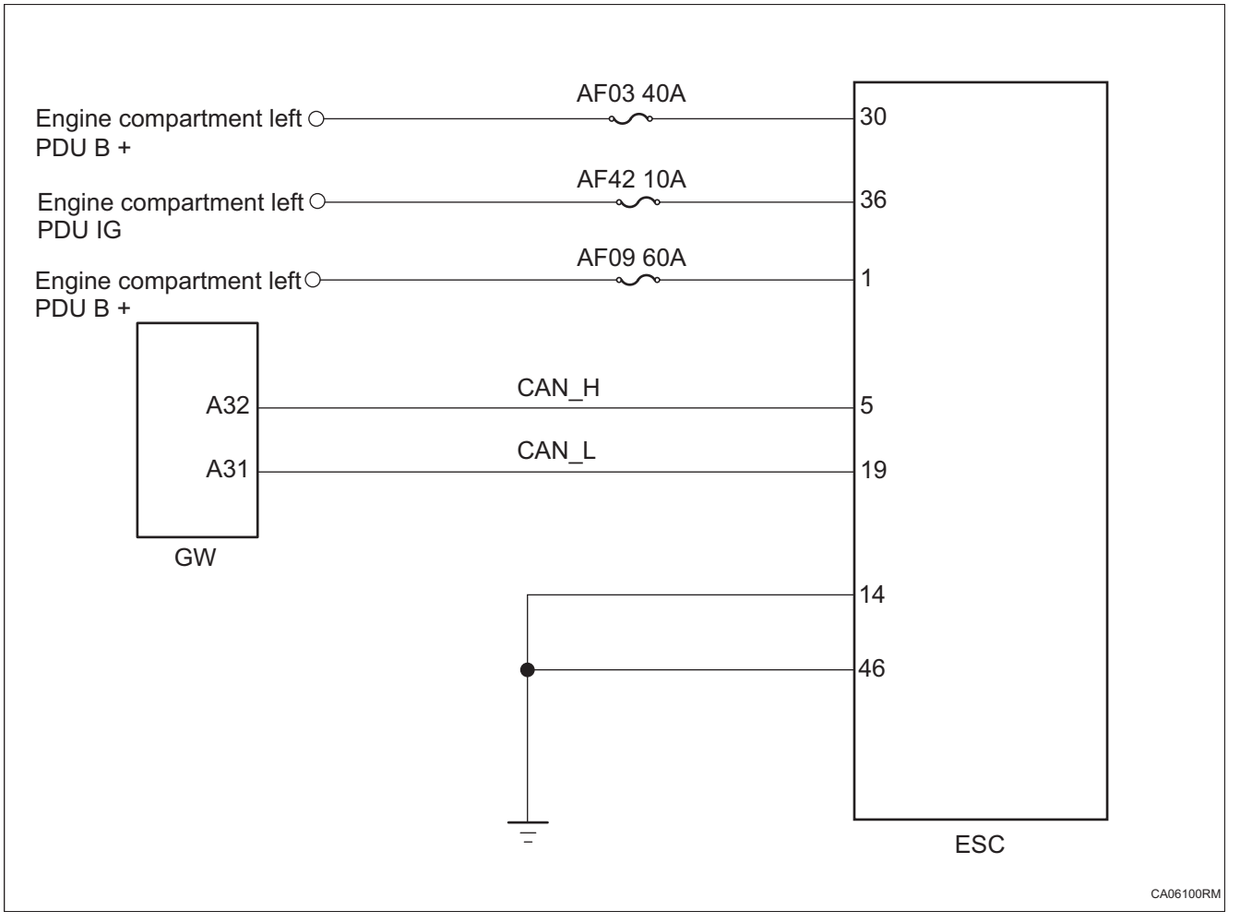
DTC	U000500	CAN Bus overvoltage alternative error
DTC	U000700	CAN Bus undervoltage alternative error

Description

When the ESC detects CAN bus communication abnormality or error, it will record DTC.

DTC	DTC detection conditions	Faulty location
U000500	(a) CAN Bus overvoltage alternative error.	• ESC • Harness and connector • GW • Charging system
U000700	(a) CAN Bus undervoltage alternative error.	• ESC • Harness and connector • GW • Charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

BC

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2 Check other control units for DTC output

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

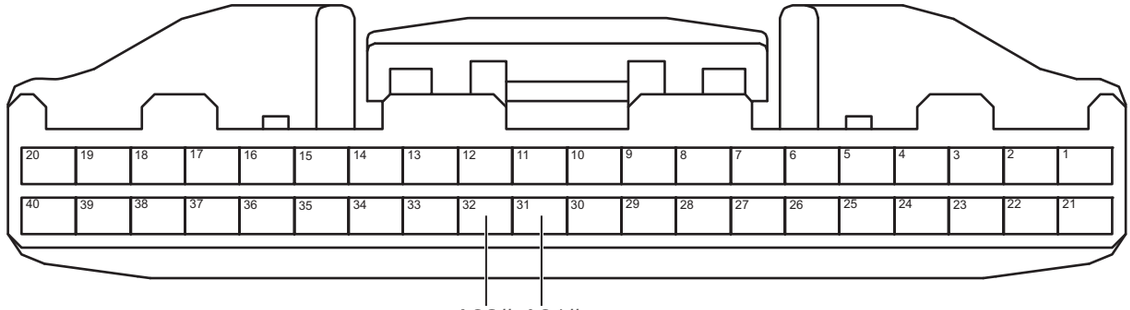
(c) Read the DTC.

Results	Go to
There is a DTC	Abnormal
No DTC	Normal

NG → **Repair according to the DTC**

OK

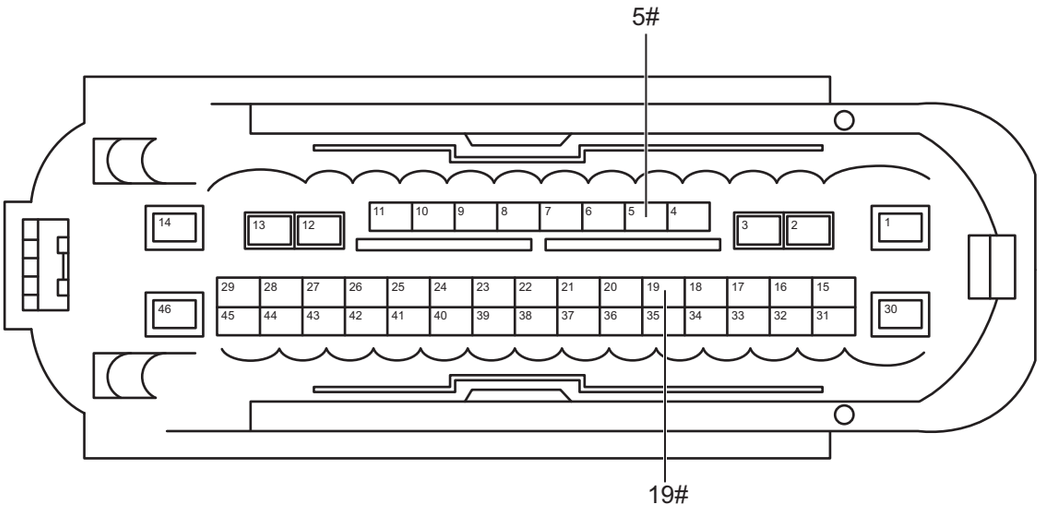
3 Check chassis CAN bus for open circuit (GW-ESC)



GW A connector

CA01111RM

BC



ESC connector

CA06111RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the chassis CAN bus.

(d) Measure the resistance according to the values in the table below.

Standard value

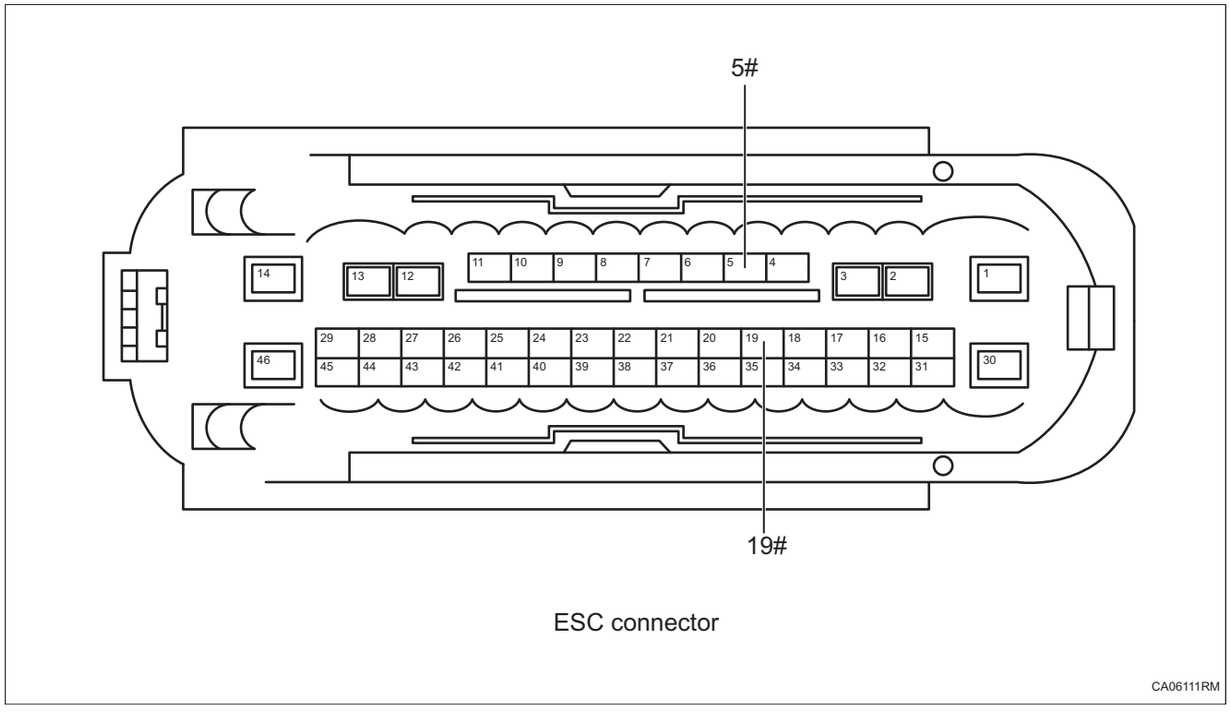
Detector connection	Detection conditions	Specified state
GW connector A32# -ESC connector 5#	Always connected	Less than 1Ω
GW connector A31# -ESC connector 19#	Always connected	Less than 1Ω

BC

NG → **Repair and replace harness or connector**

OK

4	**Check chassis CAN bus for circuit shorted to ground (GW-ESC)**



ESC connector

(a) Measure the resistance according to the values in the table below.

Standard value

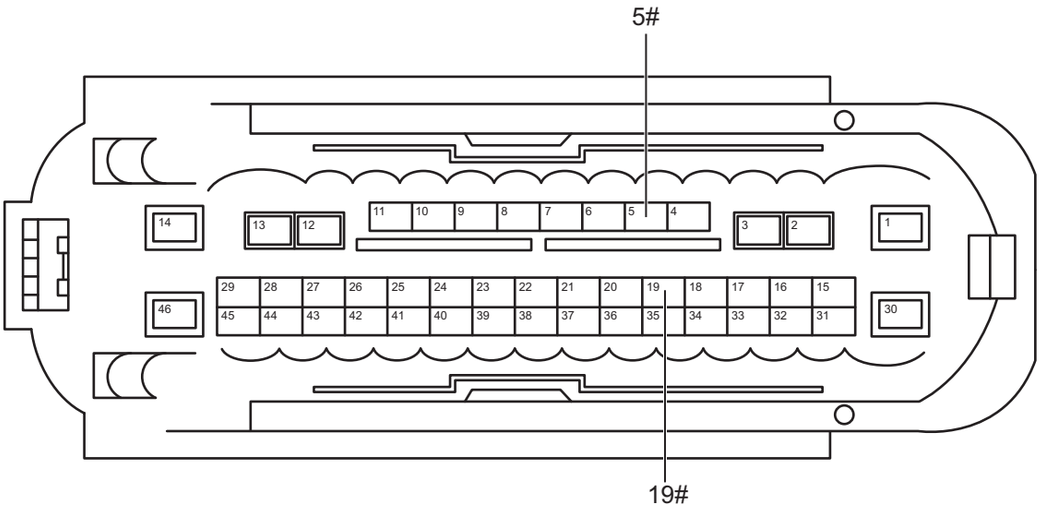
Detector connection	Detection conditions	Specified state
ESC connector 5# - body GND	Always connected	10 KΩ or greater
ESC connector 19# - body GND	Always connected	10 KΩ or greater

NG → **Repair and replace harness or connector**

OK

5	**Check chassis CAN bus for circuit shorted to power supply (GW-ESC)**

BC



ESC connector

CA06111RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

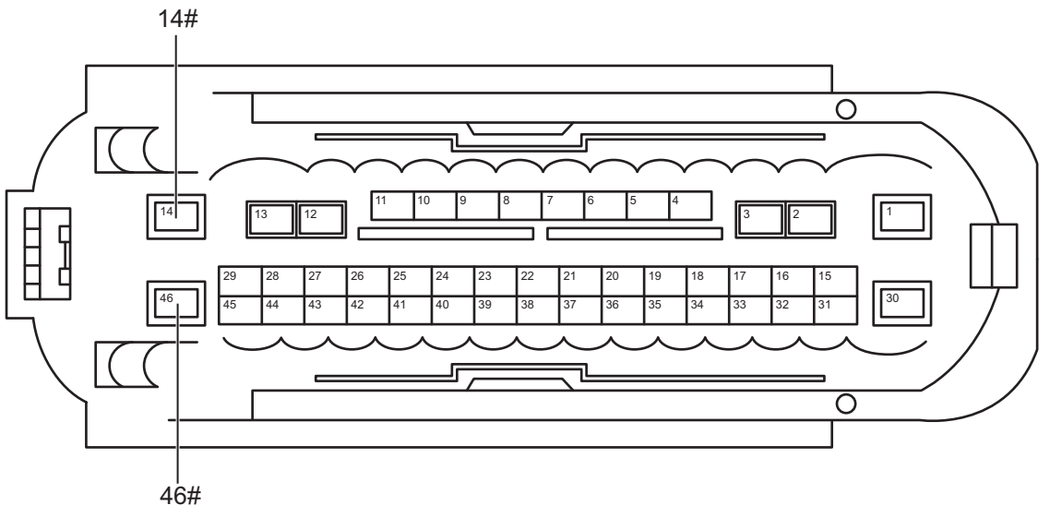
Detector connection	Detection conditions	Specified state
ESC connector 5# - body GND	Set the ignition switch to "ON"	Less than 1 V
ESC connector 19# - body GND	Set the ignition switch to "ON"	Less than 1 V

BC

NG → **Repair or replace the harness and connector**

OK

6	**Check ESC ground**



ESC connector

CA06121RM

(a) Measure the resistance according to the values in the table below.

Standard value

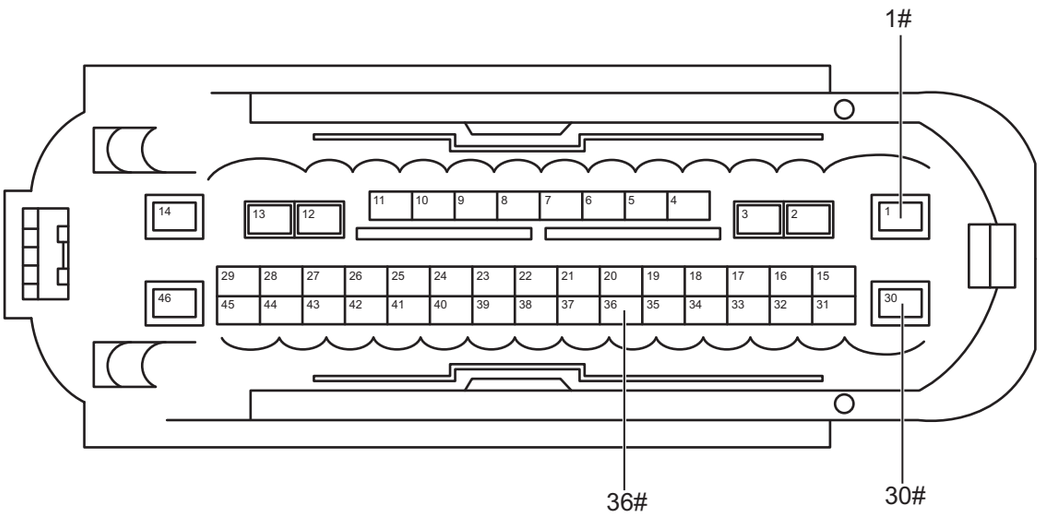
Detector connection	Detection conditions	Specified state
ESC connector 14# - body GND	Always connected	Less than 1Ω
ESC connector 46# - body GND	Always connected	Less than 1Ω

NG → **Repair and replace harness or connector**

OK

7	**Check the ESC power supply**

BC



ESC connector

CA06131RM

(a) Measure the voltage according to the values in the table below.

Standard value

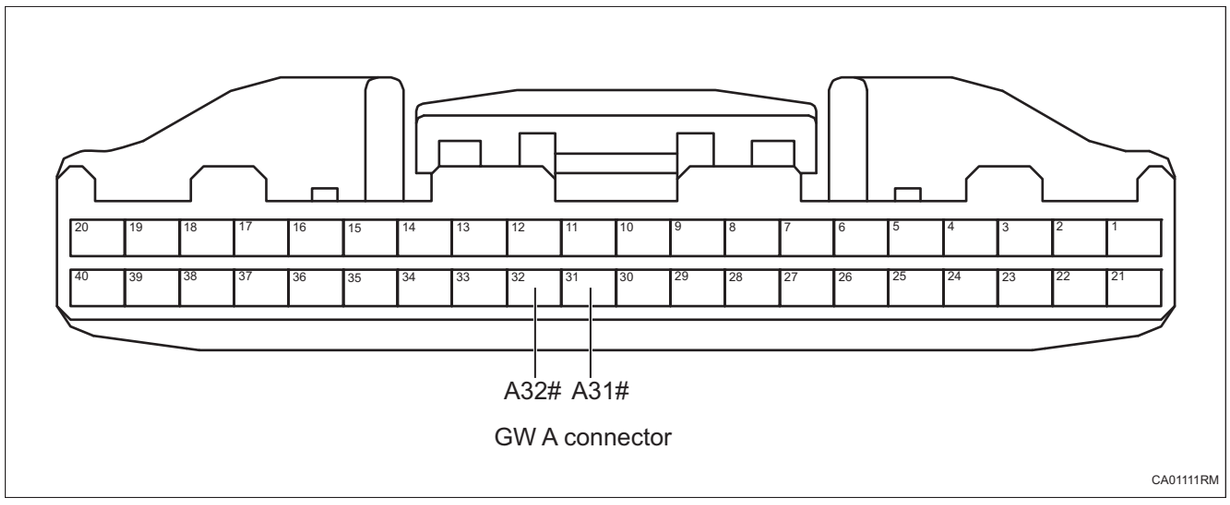
Detector connection	Detection conditions	Specified state
ESC connector 1# - body GND	Set the ignition switch to "ON"	Battery voltage
ESC connector 30# - body GND	Set the ignition switch to "ON"	Battery voltage
ESC connector 36# - body GND	Set the ignition switch to "ON"	Battery voltage

BC

NG → **Repair and replace harness or connector**

OK

8	**Check GW terminal resistor**



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
GW A31#- GW A32#	Always connected	About 120 Ω

NG → **Replace GW (See page CA-256)**

OK

9	**Replace ESC (See page BC-87)**

DTC	U006488	CAN bus off error
DTC	U040186	Engine network signal invalid (via CAN)
DTC	U040286	Gear signal invalid
DTC	U129187	ACM (15 T) network timeout
DTC	U110287	ACM (20 T) network timeout
DTC	U124587	HU message lost
DTC	U124387	APA network timeout
DTC	U123587	IFC message lost
DTC	U119987	DDCU message lost
DTC	U116487	ATC message lost
DTC	U115587	IC message lost
DTC	U115187	YAW message lost
DTC	U114687	GW message lost
DTC	U110187	TCU timeout
DTC	U110087	EMS timeout
DTC	U113887	DMS timeout
DTC	U059284	ACM (15 T) message length error
DTC	U059283	ACM (15 T) checksum algorithm error
DTC	U059282	ACM (15 T) count error
DTC	U059286	ACM (15 T) signal error
DTC	U040384	ACM (20 T) message length error
DTC	U040383	ACM (20 T) checksum algorithm error
DTC	U040382	ACM count error
DTC	U040386	ACM (20 T) signal error
DTC	U054684	HU message length error
DTC	U054683	HU checksum algorithm error
DTC	U054682	HU count error
DTC	U054484	APA message length error
DTC	U054483	APA checksum algorithm error

DTC	U054482	APA count error
DTC	U054486	APA signal error
DTC	U049A84	DDCU message length error
DTC	U045286	YAW sensor signal invalid
DTC	U045284	YAW message length error
DTC	U045283	YAW checksum algorithm error
DTC	U045282	YAW count error
DTC	U044784	GW message length error
DTC	U044786	GW signal error
DTC	U043384	IFC message length error
DTC	U043383	IFC checksum algorithm error
DTC	U043382	IFC count error
DTC	U043386	IFC signal error
DTC	U042886	SAS network signal invalid (via CAN)
DTC	U042884	SAS message length error
DTC	U042883	SAS checksum algorithm error
DTC	U042882	SAS count error
DTC	U042484	ATC message length error
DTC	U161408	ATC signal error
DTC	U042384	IC message length error
DTC	U040284	TCU message length error
DTC	U040283	TCU checksum algorithm error
DTC	U040282	TCU count error
DTC	U040184	EMS message length error
DTC	U040183	EMS checksum algorithm error
DTC	U040182	EMS count error
DTC	U043984	DMS message length error
DTC	U043983	DMS checksum algorithm error
DTC	U043982	DMS count error

DTC	U043986	DMS signal error
DTC	U013187	SAS message lost
DTC	U042082	SAS count error
DTC	U042083	SAS checksum algorithm error
DTC	U042084	SAS message length error
DTC	U042086	SAS signal invalid
DTC	U042386	IC signal error
DTC	U042486	IC invalid error
DTC	U054686	HU signal error
DTC	U011404	TOD message timeout
DTC	U011408	TOD message length error
DTC	U162208	AWD network signal invalid (via CAN)

Description

When the communication between the ESC and other systems is abnormal or interrupted, the ESC records the DTC.

DTC	DTC detection conditions	Faulty location
U006488	(a) Abnormal or interrupted communication.	• Associated system control units • Harness and connector
U040186	(a) Abnormal or interrupted communication.	
U040286	(a) Abnormal or interrupted communication.	
U129187	(a) Abnormal or interrupted communication.	
U110287	(a) Abnormal or interrupted communication.	
U124587	(a) Abnormal or interrupted communication.	
U124387	(a) Abnormal or interrupted communication.	
U123587	(a) Abnormal or interrupted communication.	
U119987	(a) Abnormal or interrupted communication.	
U116487	(a) Abnormal or interrupted communication.	
U115587	(a) Abnormal or interrupted communication.	
U115187	(a) Abnormal or interrupted communication.	
U114687	(a) Abnormal or interrupted communication.	
U110187	(a) Abnormal or interrupted communication.	
U110087	(a) Abnormal or interrupted communication.	
U113887	(a) Abnormal or interrupted communication.	
U059284	(a) Abnormal or interrupted communication.	
U059283	(a) Abnormal or interrupted communication.	
U059282	(a) Abnormal or interrupted communication.	

DTC	DTC detection conditions	Faulty location
U059286	(a) Abnormal or interrupted communication.	• Associated system control units • Harness and connector
U040384	(a) Abnormal or interrupted communication.	
U040383	(a) Abnormal or interrupted communication.	
U040382	(a) Abnormal or interrupted communication.	
U040386	(a) Abnormal or interrupted communication.	
U054684	(a) Abnormal or interrupted communication.	
U054683	(a) Abnormal or interrupted communication.	
U054682	(a) Abnormal or interrupted communication.	
U054484	(a) Abnormal or interrupted communication.	
U054483	(a) Abnormal or interrupted communication.	
U054482	(a) Abnormal or interrupted communication.	
U054486	(a) Abnormal or interrupted communication.	
U049A84	(a) Abnormal or interrupted communication.	
U045286	(a) Abnormal or interrupted communication.	
U045284	(a) Abnormal or interrupted communication.	
U045283	(a) Abnormal or interrupted communication.	
U045282	(a) Abnormal or interrupted communication.	
U044784	(a) Abnormal or interrupted communication.	
U044786	(a) Abnormal or interrupted communication.	
U043384	(a) Abnormal or interrupted communication.	
U043383	(a) Abnormal or interrupted communication.	
U043382	(a) Abnormal or interrupted communication.	
U043386	(a) Abnormal or interrupted communication.	
U042886	(a) Abnormal or interrupted communication.	
U042884	(a) Abnormal or interrupted communication.	
U042883	(a) Abnormal or interrupted communication.	
U042882	(a) Abnormal or interrupted communication.	
U042484	(a) Abnormal or interrupted communication.	
U161408	(a) Abnormal or interrupted communication.	
U042384	(a) Abnormal or interrupted communication.	
U040284	(a) Abnormal or interrupted communication.	
U040283	(a) Abnormal or interrupted communication.	
U040282	(a) Abnormal or interrupted communication.	
U040184	(a) Abnormal or interrupted communication.	
U040183	(a) Abnormal or interrupted communication.	
U040182	(a) Abnormal or interrupted communication.	
U043984	(a) Abnormal or interrupted communication.	
U043983	(a) Abnormal or interrupted communication.	
U043982	(a) Abnormal or interrupted communication.	

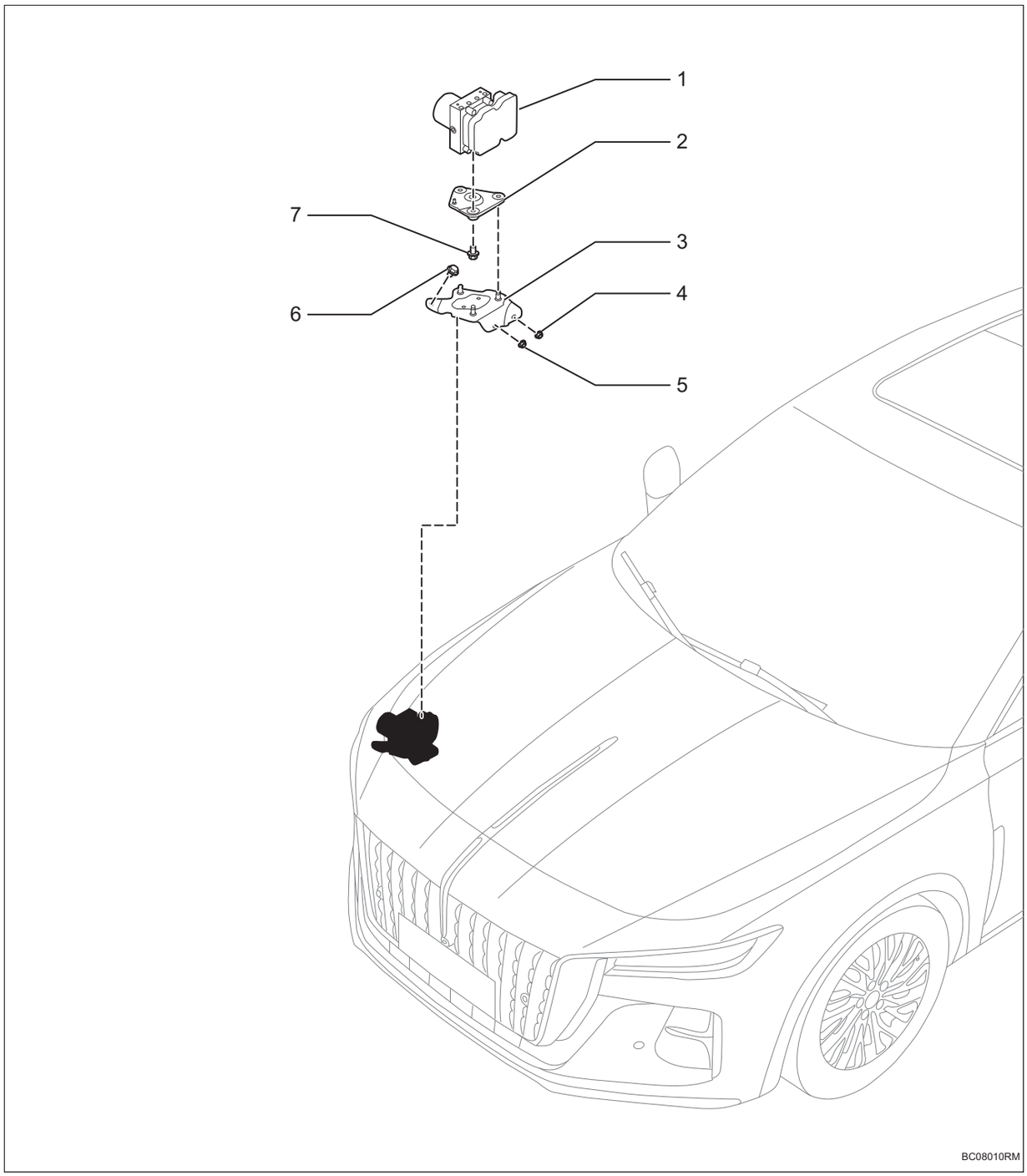
DTC	DTC detection conditions	Faulty location
U043986	(a) Abnormal or interrupted communication.	• Associated system control units • Harness and connector
U013187	(a) Abnormal or interrupted communication.	
U042082	(a) Abnormal or interrupted communication.	
U042083	(a) Abnormal or interrupted communication.	
U042084	(a) Abnormal or interrupted communication.	
U042086	(a) Abnormal or interrupted communication.	
U042386	(a) Abnormal or interrupted communication.	
U042486	(a) Abnormal or interrupted communication.	
U054686	(a) Abnormal or interrupted communication.	
U011404	(a) Abnormal or interrupted communication.	
U011408	(a) Abnormal or interrupted communication.	
U162208	(a) Abnormal or interrupted communication.	

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

ESC unit assembly

Parts

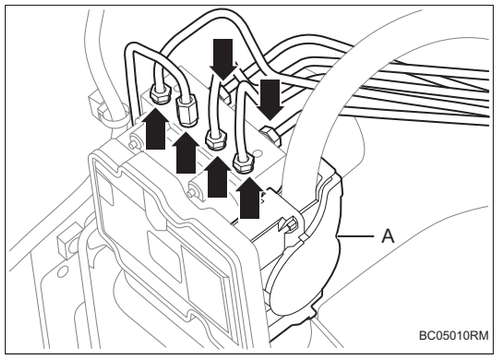


1. **ESC unit assembly**
2. **ESC bracket assembly I**
3. **ESC bracket assembly II**
4. **Hexagon flange nut**
   - Torque: 18.6~22.5 N · m

5. **Hexagon flange nut**
   - Torque: 18.6~22.5 N · m
6. **Hexagon flange bolt**
   - Torque: 18.6~22.5 N · m
7. **Hexagon flange bolt**
   - Torque: 25~29 N · m

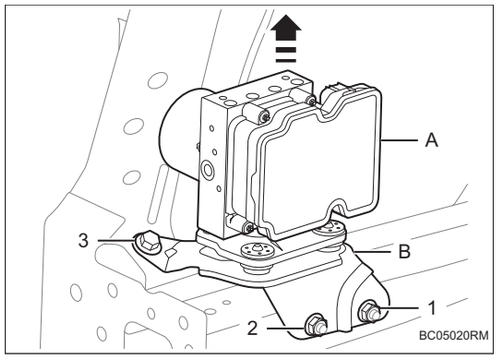
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Drain brake fluid (See page BR-1)**
3. **Remove ESC unit assembly**



(a) Disconnect the harness connector-A-.

(b) Disconnect the oil pipe nut as arrowed on the ESC unit assembly.



(c) Pull up the ESC unit assembly -A- along the direction of - arrow- as shown in the figure.

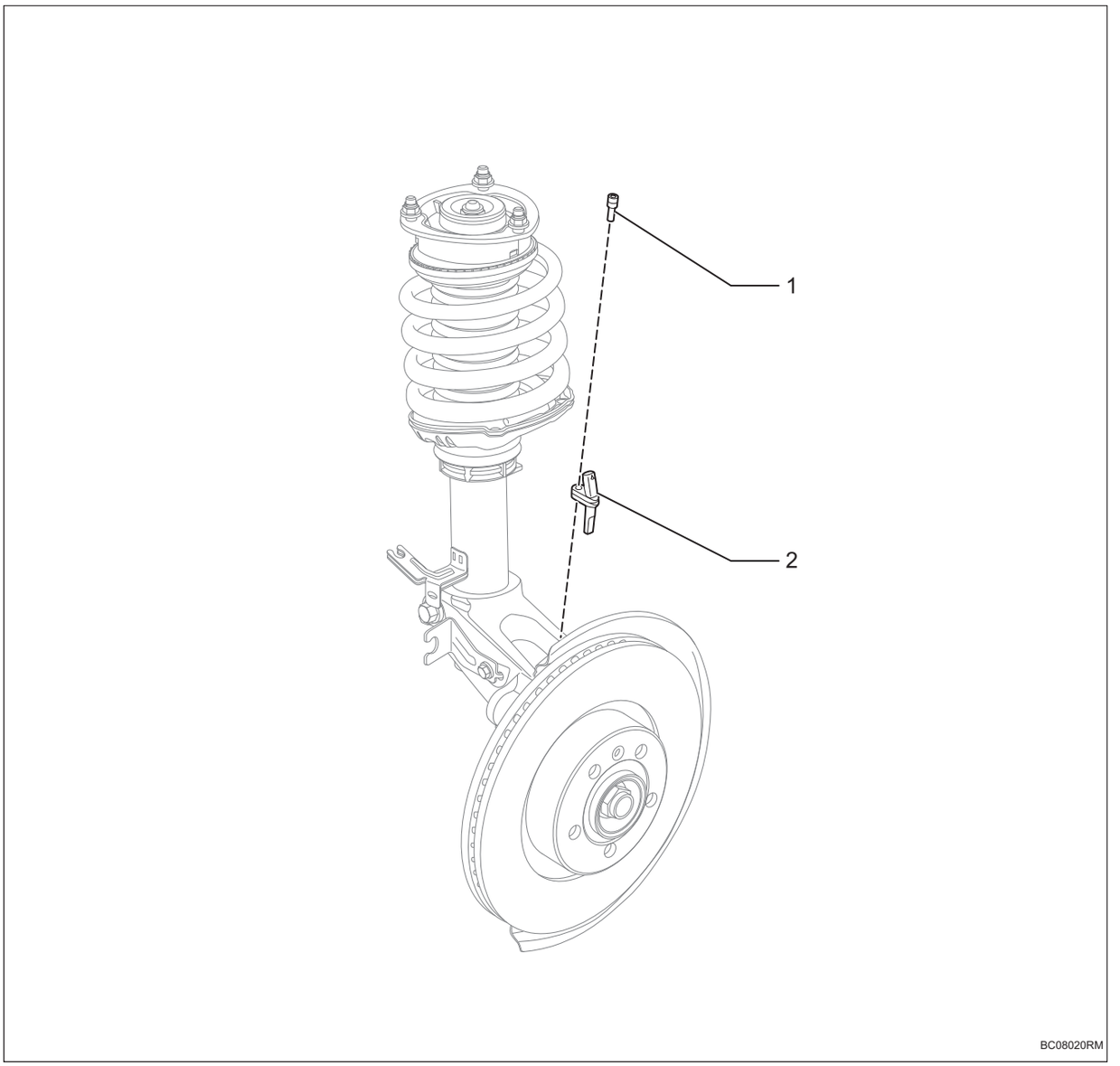
(d) Remove bolt -3- and nut -1-2-, and remove ESC unit bracket - B-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Front wheel speed sensor

Parts



1. **Hexagon socket head cap screw**
   - Torque: 8~10 N · m
2. **Front wheel speed sensor assembly**

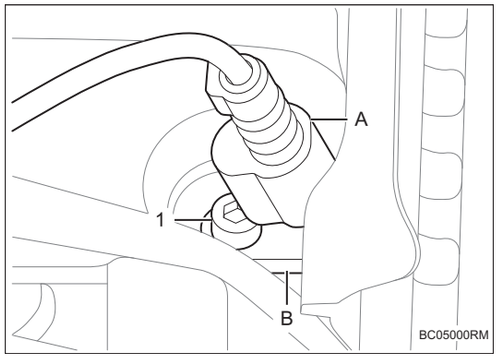
Removal

Hint:

The removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the front wheel (See page TW-3)**
3. **Remove front wheel speed sensor**



(a) Disconnect the harness connector-A-.

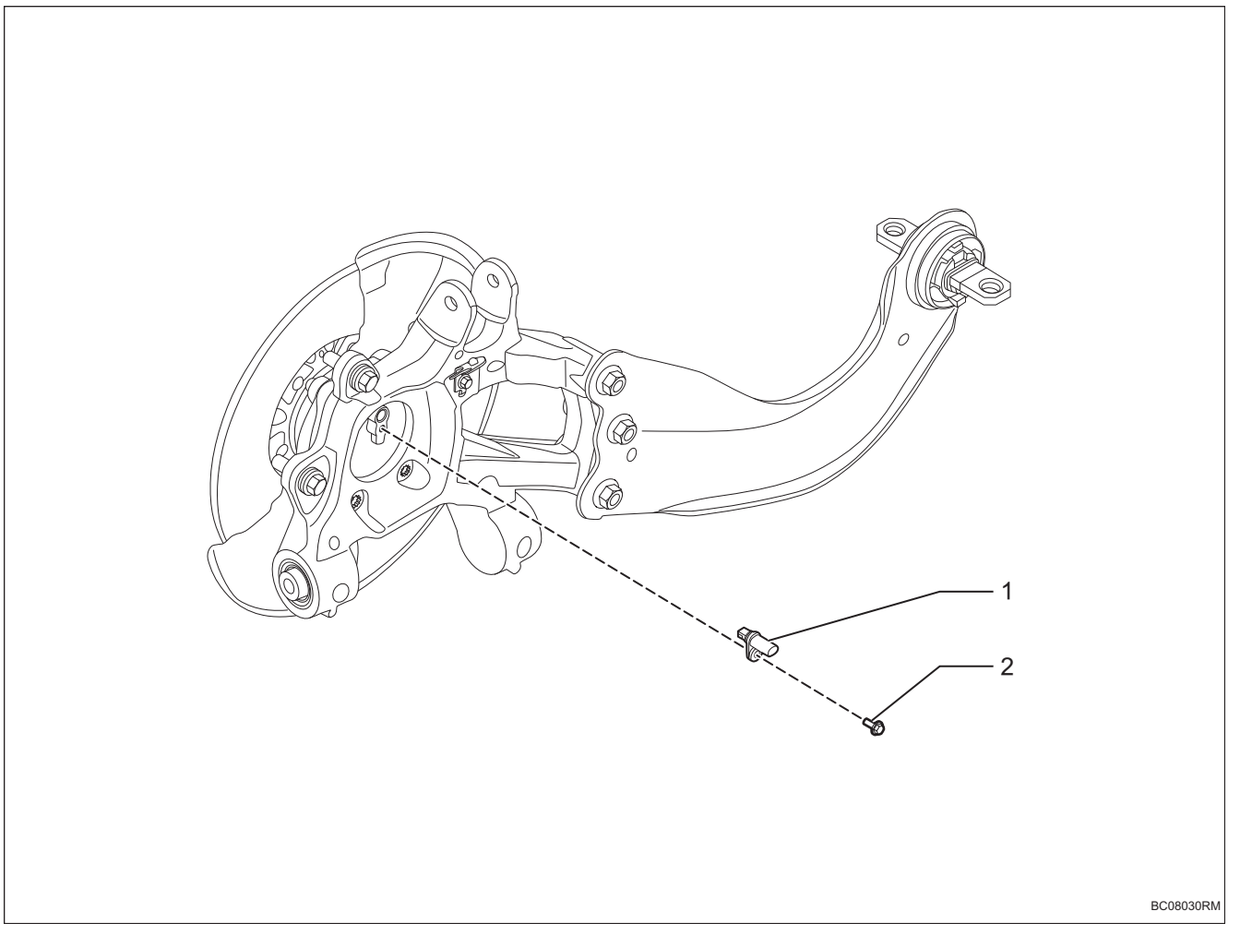
(b) Remove the bolt -1- and remove the front wheel speed sensor-B-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Rear wheel speed sensor

Parts



1. **Rear wheel speed sensor assembly**
2. **Hexagon flange bolt**
   - Torque: 8~10 N · m

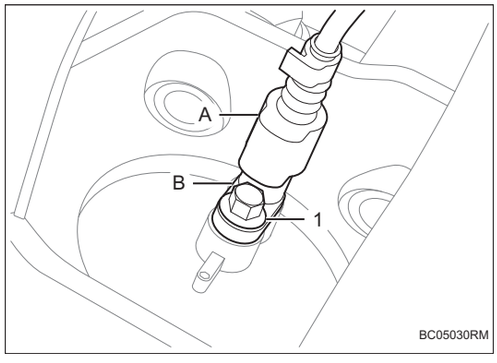
Removal

Hint:

The removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove rear wheel (See page TW-3)**
3. **Remove rear wheel speed sensor**



(a) Disconnect the harness connector-A-.

(b) Remove the bolt -1- and remove the rear wheel speed sensor- B-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Brake control (HEV)

IBC (HEV) BC-1
Precautions BC-1
Location of parts BC-3
System diagram BC-7
System description BC-7
Fault pretreatment BC-9
ECU terminal BC-10
DTC chart BC-11
C000100 ..... BC-20
C000300 ..... BC-20
C001400 ..... BC-20
C001800 ..... BC-20
C001500 ..... BC-20
C001500 ..... BC-20
C001900 ..... BC-20
C001C00 ..... BC-20
C001000 ..... BC-20
C000200 ..... BC-20
C002400 ..... BC-20
C053B00 ..... BC-20
C05D500 ..... BC-20
C001100 ..... BC-20
C001C00 ..... BC-20
C001D00 ..... BC-20
C062D00 ..... BC-20
C000400 ..... BC-20
C0072FC BC-20
C007208 ..... BC-20
C003100 ..... BC-28
C003400 ..... BC-28
C003700 ..... BC-28
C003A00 ..... BC-28
C00B900 ..... BC-28
C050000 ..... BC-28
C0500FC BC-28
C050200 ..... BC-28
C050300 ..... BC-28
C055500 ..... BC-28
C00BA00 ..... BC-28

C050600 .....BC-28
C0506FC BC-28
C050800 .....BC-28
C050900 .....BC-28
C055600 .....BC-28
C00BB00 .....BC-28
C050C00 .....BC-28
C050CFC BC-28
C050E00 .....BC-28
C050F00 .....BC-28
C055700 .....BC-28
C00BC00 .....BC-28
C051200 .....BC-28
C0512FC BC-28
C051400 .....BC-28
C051500 .....BC-28
C055800 .....BC-28
C003b08 .....BC-29
C003B00 .....BC-29
C003a08 .....BC-29
C051600 .....BC-29
C003808 .....BC-29
C003800 .....BC-29
C003708 .....BC-29
C051000 .....BC-29
C003508 .....BC-29
C003500 .....BC-29
C003408 .....BC-29
C050A00 .....BC-29
C003208 .....BC-29
C003200 .....BC-29
C003108 .....BC-29
C050400 .....BC-29
C1099FC BC-29
C053CFC BC-29
C109908 .....BC-29
C109904 .....BC-29
C053C00 .....BC-30
C004900 .....BC-42
C006108 .....BC-47
C006208 .....BC-47
C006308 .....BC-49
C006B06 .....BC-51

C007200 ..... BC-51
C007204 ..... BC-51
C0072FB BC-51
C056300 ..... BC-51
C006BFC BC-51
C059800 ..... BC-51
C054300 ..... BC-56
C054200 ..... BC-56
C053F00 ..... BC-56
C053E00 ..... BC-56
C053D00 ..... BC-56
C007500 ..... BC-56
C056C00 ..... BC-56
C004510 ..... BC-56
C0044FC BC-56
C055E00 ..... BC-62
C055F00 ..... BC-65
C055FFB BC-65
C059700 ..... BC-65
C055F92 ..... BC-68
C05B000 ..... BC-68
C0595FC BC-71
C059500 ..... BC-71
C058900 ..... BC-71
C058800 ..... BC-71
C058AFC BC-71
C059000 ..... BC-71
C0590FC BC-71
C059100 ..... BC-71
C0591FC BC-71
C059100 ..... BC-71
C0591FC BC-71
C059200 ..... BC-71
C0592FC BC-71
C059300 ..... BC-71
C0593FC BC-71
C059400 ..... BC-71
C059592 ..... BC-71
C058A00 ..... BC-71
C108C08 ..... BC-78
C121208 ..... BC-79
C156D62 ..... BC-80
C1567FC BC-80

C156701 .....BC-80
C156700 .....BC-80
C1566FC BC-80
C156601 .....BC-80
C156600 .....BC-80
C15611E BC-80
C155D45 .....BC-80
C155C00 .....BC-80
C154A00 .....BC-80
C154900 .....BC-80
C154800 .....BC-80
C154700 .....BC-80
C154604 .....BC-80
C155512 .....BC-80
C156800 .....BC-80
C156801 .....BC-80
C156801 .....BC-80
C15681D BC-80
C1568FC BC-80
C156900 .....BC-81
C156901 .....BC-81
C15691D BC-81
C1569FC BC-81
C156B00 .....BC-81
C156BFC BC-81
C156C00 .....BC-81
C156C92 .....BC-81
C013976 .....BC-81
C013776 .....BC-81
C013696 .....BC-81
C013596 .....BC-81
C013496 .....BC-81
C013396 .....BC-81
C013296 .....BC-81
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C013096 .....BC-81
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C012796 .....BC-81
C012696 .....BC-81
C012596 .....BC-81
C012496 .....BC-81
C012396 .....BC-81

C012296 ..... BC-81
C012196 ..... BC-81
C012096 ..... BC-81
C011996 ..... BC-82
C011896 ..... BC-82
C011796 ..... BC-82
C011696 ..... BC-82
C011596 ..... BC-82
C011496 ..... BC-82
C011396 ..... BC-82
C011296 ..... BC-82
C011196 ..... BC-82
C011096 ..... BC-82
C010996 ..... BC-82
C010896 ..... BC-82
C010796 ..... BC-82
C010696 ..... BC-82
C010596 ..... BC-82
C010496 ..... BC-82
C010396 ..... BC-82
C010296 ..... BC-82
C010196 ..... BC-82
C010096 ..... BC-82
C156000 ..... BC-82
C156100 ..... BC-82
C200004 ..... BC-93
C2A1700 ..... BC-94
C055FFC BC-94
P000000 ..... BC-97
P25C700 ..... BC-98
P25C600 ..... BC-98
C057A00 ..... BC-98
C057900 ..... BC-98
C054100 ..... BC-98
C059900 ..... BC-98
P060B00 ..... BC-98
P06B800 ..... BC-98
P06B8FC BC-98
P060400 ..... BC-98
P060500 ..... BC-98
P060600 ..... BC-98
P057B00 ..... BC-98
P057C00 ..... BC-98

P057D00 .....BC-98
P057E00 .....BC-98
P05DD00 .....BC-98
P05DE00 .....BC-98
P05DF00 .....BC-98
P05E000 .....BC-98
P05E009 .....BC-99
P060200 .....BC-99
P062C00 .....BC-99
C057E00 .....BC-99
C05C200 .....BC-99
C05C24B BC-99
C05C300 .....BC-99
C061900 .....BC-99
C061A00 .....BC-99
C1000FC BC-99
C102001 .....BC-99
P05FF00 .....BC-99
P05FF09 .....BC-99
P05FF03 .....BC-99
P0606FC BC-99
C100004 .....BC-99
C101008 .....BC-99
P05CB00 .....BC-99
C100104 .....BC-99
C100047 .....BC-99
U006488 .....BC-108
U007300 .....BC-108
U129387 .....BC-108
U1293F7 .....BC-108
U1100F7 .....BC-108
U113887 .....BC-108
U124587 .....BC-108
U123587 .....BC-108
U119987 .....BC-108
U116487 .....BC-108
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U114687 .....BC-108
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U059484 .....BC-108
U059483 .....BC-108
U059482 .....BC-108

U0594F6 ..... BC-108
U0594F4 ..... BC-108
U0594F3 ..... BC-108
U0594F2 ..... BC-108
U0401F4 ..... BC-108
U043986 ..... BC-108
U043984 ..... BC-108
U043983 ..... BC-108
U043982 ..... BC-108
U054686 ..... BC-108
U054684 ..... BC-108
U054683 ..... BC-108
U054682 ..... BC-109
U049A84 ..... BC-109
U045286 ..... BC-109
U045284 ..... BC-109
U045283 ..... BC-109
U045282 ..... BC-109
U044786 ..... BC-109
U044784 ..... BC-109
U043386 ..... BC-109
U043384 ..... BC-109
U043383 ..... BC-109
U043382 ..... BC-109
C046008 ..... BC-109
U042086 ..... BC-109
U042084 ..... BC-109
U042083 ..... BC-109
U042082 ..... BC-109
U042484 ..... BC-109
U042486 ..... BC-109
U042386 ..... BC-109
U042384 ..... BC-109
U013187 ..... BC-109
U000700 ..... BC-109
U000400 ..... BC-109
U000500 ..... BC-109
P056024 ..... BC-113
P056300 ..... BC-113
P056200 ..... BC-113
P0562FC BC-113
P056023 ..... BC-113
C190004 ..... BC-113

C190104 .....BC-113
C1901FC BC-113
IBC assembly BC-118
Parts BC-118
Removal BC-120
Installation BC-121

IBC (HEV)

Precautions

1. ENGINE START/STOP button (ignition switch) representation:

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

2. Disconnect the cable from the battery negative terminal

Notice:

The initialization is required for some systems when the battery cable is disconnected and reconnected.

3. The IBC is a safety-related component. Therefore, in addition to general safety and precautions, the following diagnostic precautions must be observed when performing maintenance and diagnosis on it.

4. Operation precautions

(a) The IBC system must be repaired by technicians who has been professionally trained and has maintenance skills, and only the original part shall be used for replacement.

(b) Unless otherwise specified in the inspection procedure, make sure that the ignition switch is placed in the OFF position and the battery negative terminal is disconnected when the IBC electronic control unit and sensor etc are removed and installed.

(c) Hold the IBC with both hands during handling. It is forbidden to grasp the oil reservoir, push rod, control unit plug and other vulnerable parts.

5. IBC diagnosis and manual bleeding procedure

(a) Connect the HQ-VDS and establish communication.

(b) Ensure that the system is in installation mode.

(c) Foundation brake exhausting.

(d) Connect the brake fluid pressurization device to a remote oi reservoir to provide an external pressure of 2 bar. Fill the brake system with brake fluid through the remote fluid reservoir, and pay attention to the filling speed to avoid the brake fluid spilling into the engine compartment and contaminating other spare parts.

(e) Pedal at a certain pace and perform the base brake bleeding for all wheels from left rear, to left front, right front and right rear.

(f) Turn off the power supply of the liquid filling, bleeding and pressurizing device.

(g) Verify the leakage results: carry out IBC leakage and air detection (see the filling and bleeding document for details).

(h) Evaluate the results of IBC leakage and air monitoring.

(i) Remove external brake fluid pressurization equipment after venting

Note:

It is recommended to be performed 10 minutes later after adding liquid and venting.

(j) Perform VCP calibration procedure.

(k) Write the correct configuration word.

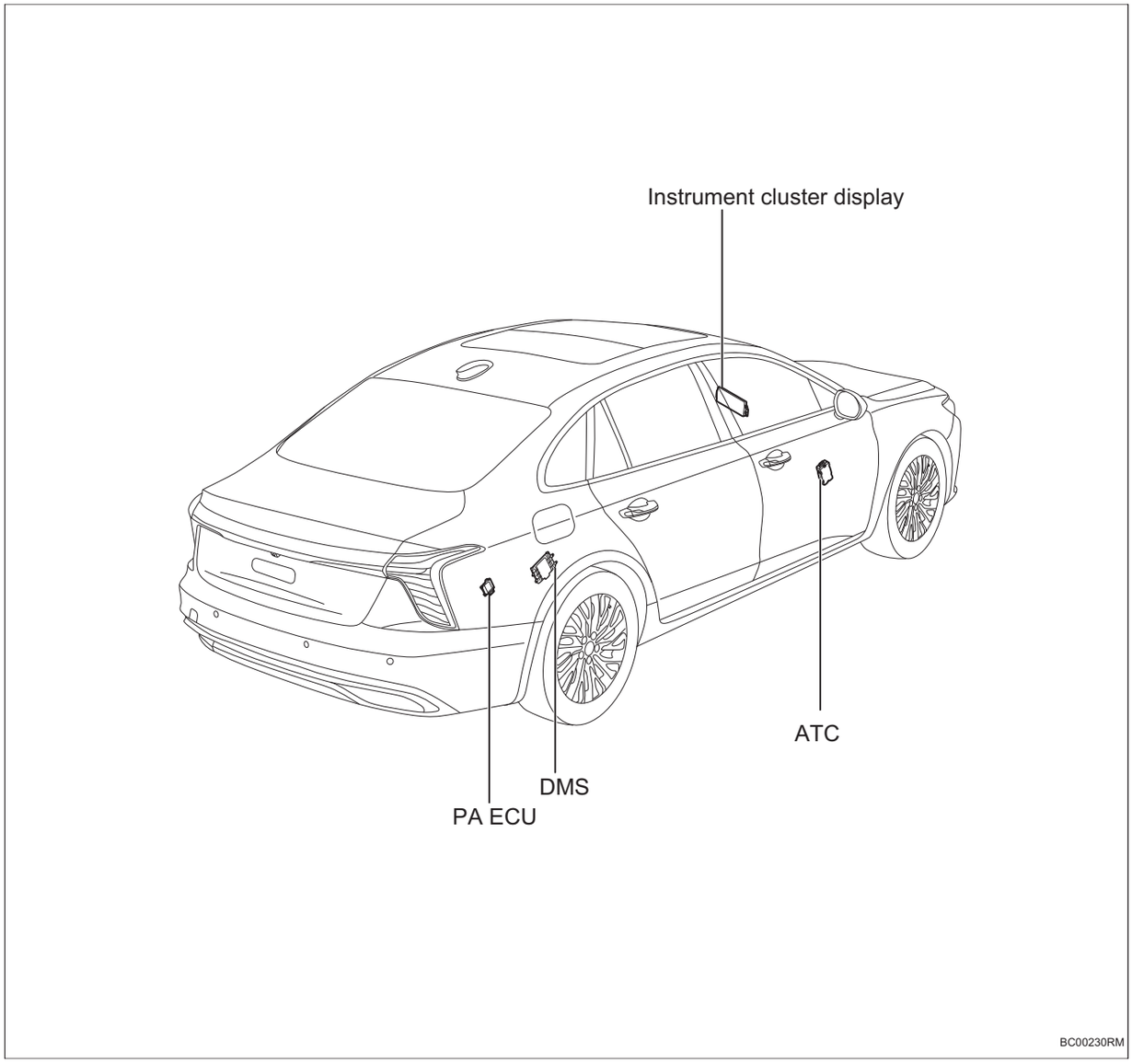
(l) Calibrate steering angle sensor.

(m) Turn off the IBC transport mode.

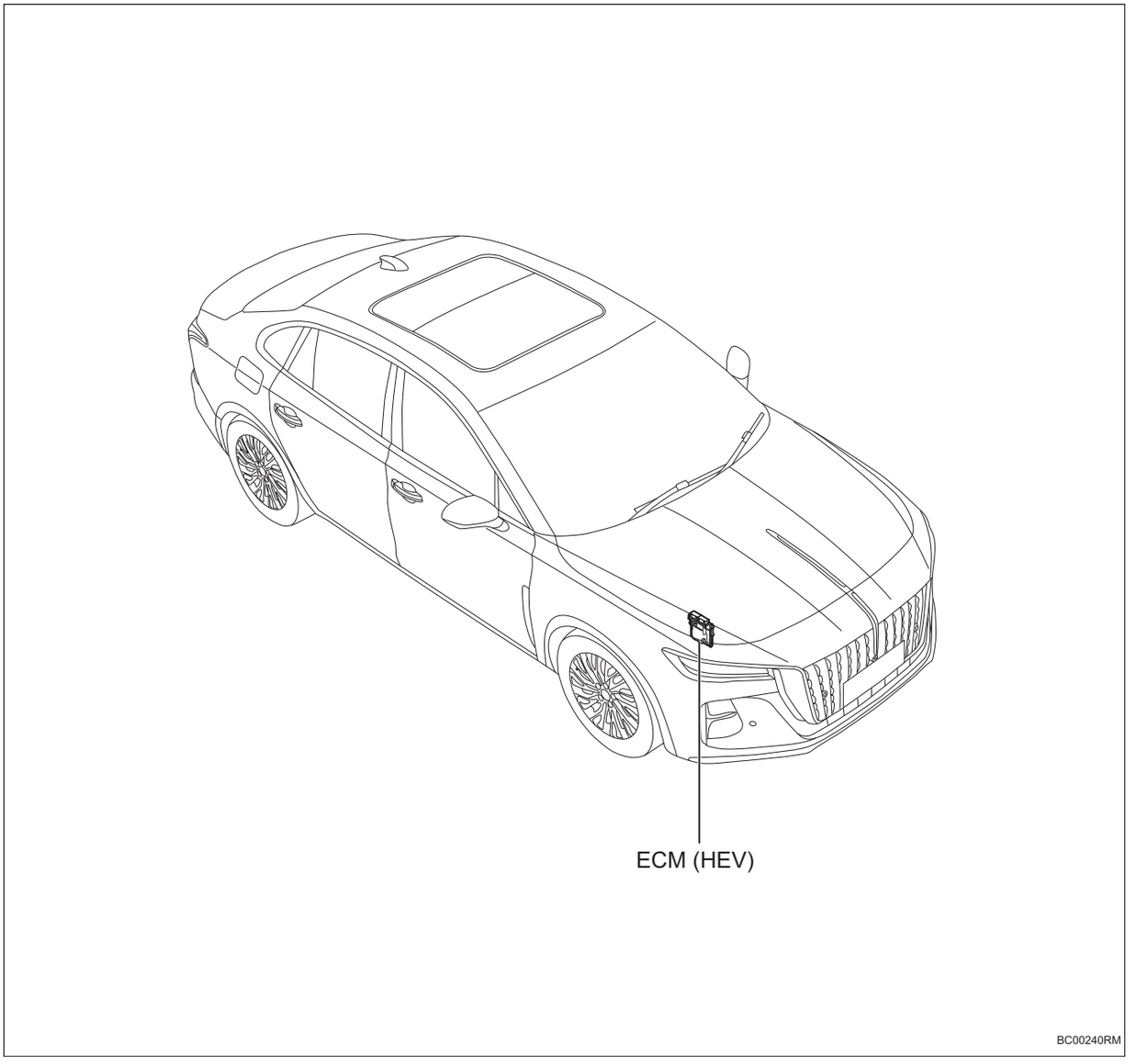
(n) Use the HQ-VDS to send a command to reset the ECU.

(o) Power on again and re-ignite, and check whether all warning lamps go out.

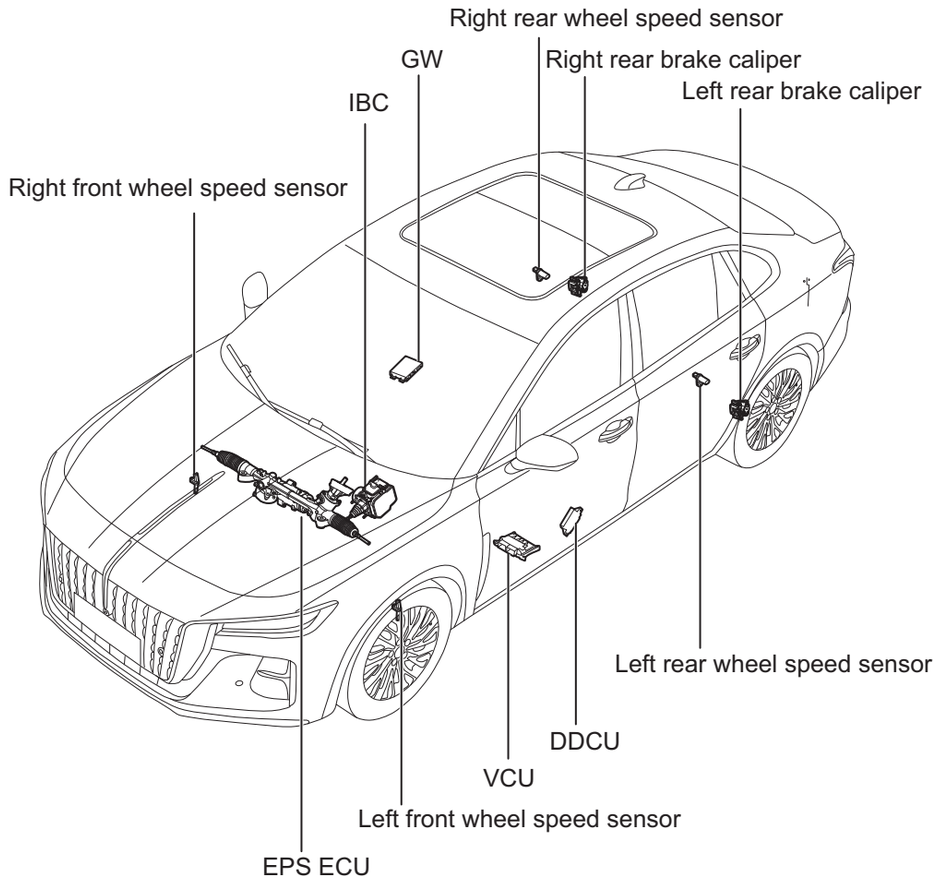
Location of parts



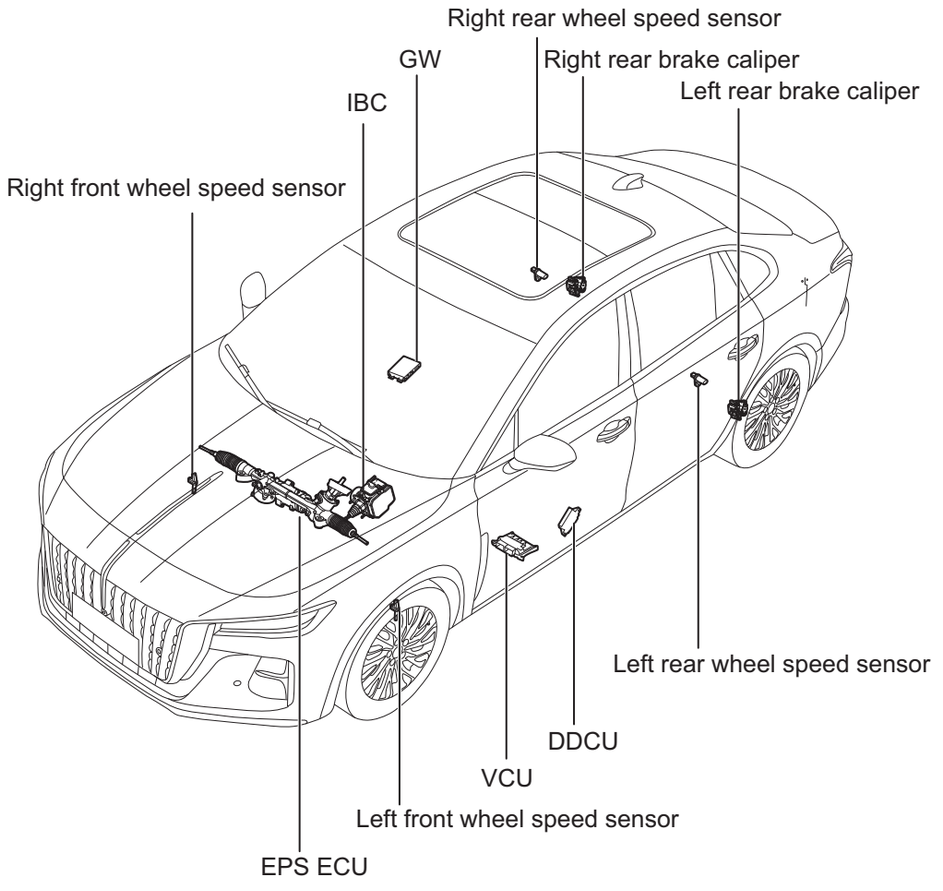
Location of parts



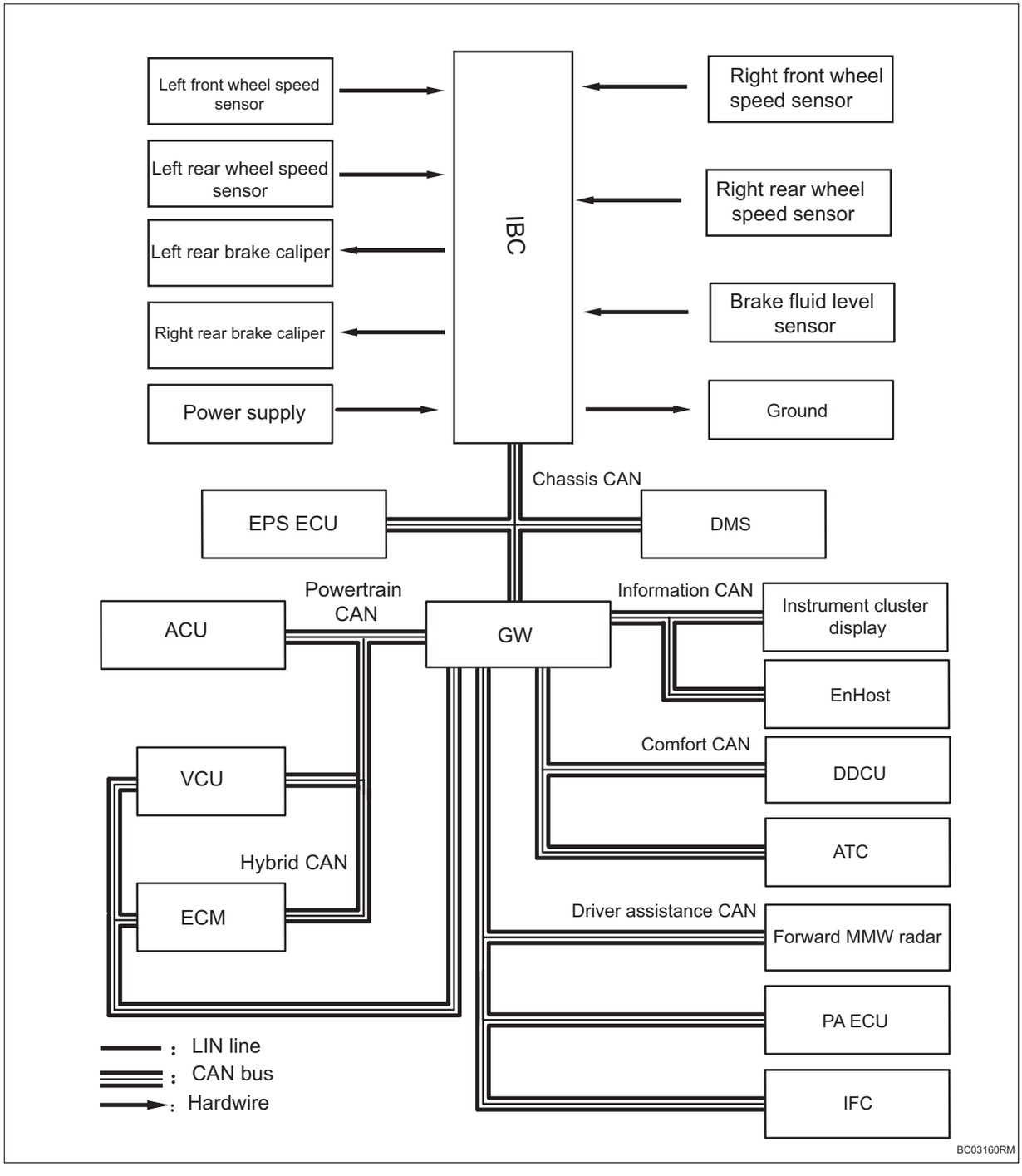
Location of parts



Location of parts



System diagram



System description

1. System overview

(a) The IBC assembly consists of small oil reservoir with level sensor, mounting plate, push rod, control unit and hydraulic unit.

BC

(b) The IBC is in a decoupled state under normal working mode, and the brake pedal feeling is simulated by PFS (pedal feel simulator).

(c) If the IBC pedal sense is degraded to the mechanical backup mode (non-decoupling), the TMC brake circuit is directly connected to the brake wheel cylinder; The braking deceleration at this time is directly controlled by the driver.

Fault pretreatment

1. Faulty vehicle handling procedure

(a) After the vehicle enters the maintenance shop, the following information should be collected:

(1) The operation behavior before and after the fault occurs.

(2) Check whether there is a text prompt or the fault warning lamp lights up when the fault occurs.

(3) What is the frequency of fault and whether it is recovered after re-ignition.

(b) Establish the diagnosis and analyze the diagnostic results:

(1) Connect the HQ-VDS.

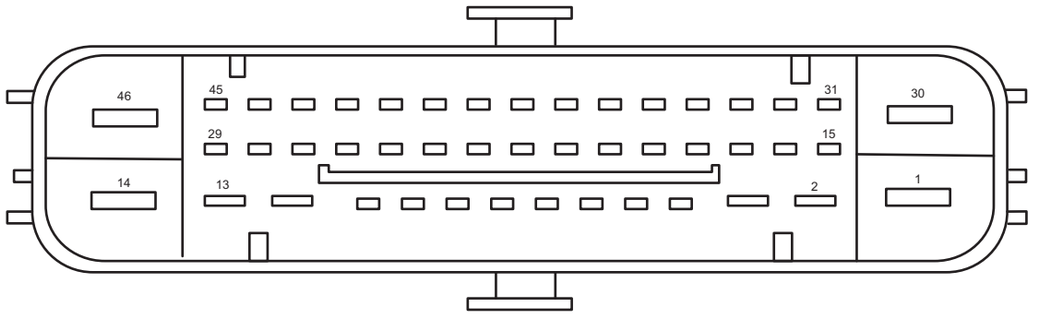
(2) The self-test of the vehicle ends.

(3) Establish communication to read and store DTC.

(4) Analyze whether the DTC is current fault or historical fault.

(5) Query the solution according to the DTC.

ECU terminal



IBC

BC03151RM

IBC			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Ground	24	—
2	Right rear brake caliper (+)	25	—
3	Right rear brake caliper (-)	26	Right front wheel speed sensor (signal ground)
4	—	27	—
5	CAN_H	28	S3 (pin of EPB switch)
6		29	—
7	Left front wheel speed sensor (signal ground)	30	Ground
8	—	31	—
9	—	32	EPB switch indicator lamp
10	—	33	—
11	—	34	—
12	Left rear brake caliper (-)	35	—
13	Left rear brake caliper (+)	36	IG (wake-up circuit input)
14	B + (power supply of solenoid valve)	37	Right rear wheel speed sensor (signal ground)
15	S4 (pin of EPB switch)	38	Fluid (level sensor)
16	—	39	Left rear wheel speed sensor (power supply)
17	S2 (pin of EPB switch)	40	—
18	—	41	—
19	CAN_L	42	Right front wheel speed sensor (power supply)
20	Right rear wheel speed sensor (power supply)	43	—
21	Left front wheel speed sensor (power supply)	44	S1 (pin of EPB switch) button

IBC			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
22	—	45	—
23	Left rear wheel speed sensor (signal ground)	46	B + (motor power supply)

DTC chart

DTC	Description	Reference page
C2A1700	Air in hydraulic brake circuit	(See page BC-94)
C055FFC	IPB system related hydraulic valve mechanical failure (OBD)	(See page BC-94)
C006B06	ABS control implausible	(See page BC-51)
C007200	Brake overtemperature	(See page BC-51)
C007204	Brake disc overtemperature	(See page BC-51)
C0072FB	Excessive pressure during hydraulic valve dynamic test	(See page BC-51)
C056300	ABS control implausible (OBD)	(See page BC-51)
C006BFC	ABS control implausible	(See page BC-51)
C059800	FW_RBUEXSOvertemperature	(See page BC-51)
C055E00	Brake line leakage	(See page BC-62)
C055F00	BSCM/EBBC hydraulic function failure (OBD)	(See page BC-65)
C055FFB	IPB system related hydraulic valve mechanical failure	(See page BC-65)
C059700	IPB not installed	(See page BC-65)
C055F92	BSCM/EBBC hydraulic function failure	(See page BC-68)
C05B000	Brake line hydraulic circuit leakage	(See page BC-68)
C000100	Internal valve error (OBD)	(See page BC-20)
C000300	Internal valve error (OBD)	(See page BC-20)
C001400	Right front wheel internal valve error (OBD)	(See page BC-20)
C001800	Left rear wheel internal valve error (OBD)	(See page BC-20)
C001500	Left rear wheel internal valve error (OBD)	(See page BC-20)
C001500	Right front wheel internal valve error (OBD)	(See page BC-20)
C001900	Left rear wheel internal valve error (OBD)	(See page BC-20)
C001C00	Right rear wheel internal valve error (OBD)	(See page BC-20)
C001000	Left front wheel internal valve error (OBD)	(See page BC-20)
C000200	Internal valve error (OBD)	(See page BC-20)
C002400	Internal valve error (OBD)	(See page BC-20)
C053B00	Valve power supply failure	(See page BC-20)
C05D500	Internal valve error (OBD)	(See page BC-20)
C001100	Left front wheel internal valve error (OBD)	(See page BC-20)
C001C00	Right rear wheel internal valve error (OBD)	(See page BC-20)

DTC	Description	Reference page
C001D00	Right rear wheel internal valve error (OBD)	(See page BC-20)
C062D00	Internal valve error (OBD)	(See page BC-20)
C000400	Internal valve error (OBD)	(See page BC-20)
C0072FC	Valve failures: overheat protection, invalid signal, hardware failure	(See page BC-20)
C007208	Valve failures: overheat protection, invalid signal, hardware failure	(See page BC-20)
C108C08	Reverse gear signal change failure	(See page BC-78)
C156D62	EPB position unknown or EPB motor abnormal	(See page BC-82)
C1567FC	Right caliper harness failure	(See page BC-82)
C156701	Right caliper harness failure	(See page BC-82)
C156700	Right caliper polarity error	(See page BC-82)
C1566FC	Left caliper harness failure	(See page BC-82)
C156601	Left caliper harness failure	(See page BC-82)
C156600	Left caliper polarity error	(See page BC-82)
C15611E	Coupling between left and right caliper harnesses	(See page BC-82)
C155D45	Failure to perform operation requested by PBC to read and write NVM	(See page BC-82)
C155C00	Time for pulling up or pressing down APB button out of limit	(See page BC-82)
C154A00	Left caliper motor or piston stalling during release	(See page BC-82)
C154900	Right caliper motor or piston stalling during release	(See page BC-82)
C154800	Abnormal right caliper current	(See page BC-82)
C154700	Excessive current difference between both ends of left caliper	(See page BC-82)
C154604	Excessive current difference between both ends of the right caliper	(See page BC-82)
C155512	APB BUTTON circuit power supply undervoltage	(See page BC-82)
C156800	During initialization test, the left caliper enable line detects undesired voltage level	(See page BC-82)
C156801	During initialization test, the left caliper enable line detects undesired voltage level	(See page BC-82)
C156801	Left caliper mofet deactivation test failure	(See page BC-82)
C15681D	Left caliper short circuit	(See page BC-82)
C1568FC	Left caliper internal LS side control failure	(See page BC-82)
C156900	During initialization test, the right caliper enable line detects undesired voltage level	(See page BC-82)
C156901	Right caliper mofet deactivation test failure	(See page BC-82)
C15691D	Right caliper short circuit	(See page BC-82)
C1569FC	Right caliper internal LS side control failure	(See page BC-82)

DTC	Description	Reference page
C156B00	Initialization phase APB MIC CRC error	(See page BC-82)
C156BFC	Periodic monitoring of APB MIC CRC error	(See page BC-82)
C156C00	MICAPBGPIO overtemperature	(See page BC-82)
C156C92	Caliper control affected by implausible memory data	(See page BC-82)
C013976	PBC fault39	(See page BC-82)
C013776	PBC fault37	(See page BC-82)
C013696	PBC fault36	(See page BC-82)
C013596	PBC fault35	(See page BC-82)
C013496	PBC fault34	(See page BC-82)
C013396	PBC fault33	(See page BC-82)
C013296	PBC fault32	(See page BC-82)
C013196	PBC fault31	(See page BC-82)
C013096	PBC fault30	(See page BC-82)
C012996	PBC fault29	(See page BC-82)
C012896	PBC fault28	(See page BC-82)
C012796	PBC fault27	(See page BC-82)
C012696	PBC fault26	(See page BC-82)
C012596	PBC fault25	(See page BC-82)
C012496	PBC fault24	(See page BC-82)
C012396	PBC fault23	(See page BC-82)
C012296	PBC fault22	(See page BC-82)
C012196	PBC fault21	(See page BC-82)
C012096	PBC fault20	(See page BC-82)
C011996	PBC fault19	(See page BC-82)
C011896	PBC fault18	(See page BC-82)
C011796	PBC fault17	(See page BC-82)
C011696	PBC fault16	(See page BC-82)
C011596	PBC fault15	(See page BC-82)
C011496	PBC fault14	(See page BC-82)
C011396	PBC fault13	(See page BC-82)
C011296	PBC fault12	(See page BC-82)
C011196	PBC fault11	(See page BC-82)
C011096	PBC fault10	(See page BC-82)
C010996	PBC fault9	(See page BC-82)
C010896	PBC fault8	(See page BC-82)
C010796	PBC fault7	(See page BC-82)
C010696	PBC fault6	(See page BC-82)
C010596	PBC fault5	(See page BC-82)

DTC	Description	Reference page
C010496	PBC fault4	(See page BC-82)
C010396	PBC fault3	(See page BC-82)
C010296	PBC fault2	(See page BC-82)
C010196	PBC fault1	(See page BC-82)
C010096	PBC fault0	(See page BC-82)
C156000	Left EPB actuator electronic fault	(See page BC-82)
C156100	Left EPB actuator electronic fault	(See page BC-82)
C0595FC	Brushless motor initialization timeout	(See page BC-71)
C059500	Brushless motor drive chip not in working mode (OBD)	(See page BC-71)
C058900	Position sensor failure	(See page BC-71)
C058800	Position sensor failure	(See page BC-71)
C058AFC	Brake booster motor "A" position sensor	(See page BC-71)
C059000	Brake booster motor phase overcurrent (OBD)	(See page BC-71)
C0590FC	Brake booster motor phase overcurrent (OBD)	(See page BC-71)
C059100	Brake booster motor phase undercurrent (OBD)	(See page BC-71)
C0591FC	Brake booster motor phase undercurrent (OBD)	(See page BC-71)
C059100	Brake booster motor phase undercurrent (OBD)	(See page BC-71)
C0591FC	Brake booster motor phase undercurrent (OBD)	(See page BC-71)
C059200	Brake booster motor "B" phase overcurrent (OBD)	(See page BC-71)
C0592FC	Brake booster motor "B" phase overcurrent (OBD)	(See page BC-71)
C059300	Brake booster motor "B" phase undercurrent (OBD)	(See page BC-71)
C0593FC	Brake booster motor "B" phase undercurrent (OBD)	(See page BC-71)
C059400	Brake booster motor "A" fault	(See page BC-71)
C059592	Brushless motor drive chip not in working mode	(See page BC-71)
C058A00	Angular acceleration value measured by motor position sensor implausible	(See page BC-71)
C003100	Left front wheel speed mode error	(See page BC-30)
C003400	Right front wheel speed mode error	(See page BC-30)
C003700	Left rear wheel speed mode error	(See page BC-30)
C003A00	Right rear wheel speed mode error	(See page BC-30)
C00B900	Left front wheel speed test failure	(See page BC-30)
C050000	Left front wheel speed test failure (OBD)	(See page BC-30)
C0500FC	Left front wheel speed failure (OBD)	(See page BC-30)

DTC	Description	Reference page
C050200	Left front wheel speed failure (OBD)	(See page BC-30)
C050300	Left front wheel speed failure (OBD)	(See page BC-30)
C055500	Left front wheel speed sensor type error	(See page BC-30)
C00BA00	Right front wheel speed test failure	(See page BC-30)
C050600	Right front wheel speed test failure (OBD)	(See page BC-30)
C0506FC	Right front wheel speed failure (OBD)	(See page BC-30)
C050800	Right front wheel speed failure (OBD)	(See page BC-30)
C050900	Right front wheel speed failure (OBD)	(See page BC-30)
C055600	Right front wheel speed sensor type error	(See page BC-30)
C00BB00	Left rear wheel speed test failure	(See page BC-30)
C050C00	Left rear wheel speed test failure (OBD)	(See page BC-30)
C050CFC	Left rear wheel speed failure (OBD)	(See page BC-30)
C050E00	Left rear wheel speed failure (OBD)	(See page BC-30)
C050F00	Left rear wheel speed failure (OBD)	(See page BC-30)
C055700	Left rear wheel speed sensor type error	(See page BC-30)
C00BC00	Right rear wheel speed test failure	(See page BC-30)
C051200	Right rear wheel speed test failure (OBD)	(See page BC-30)
C0512FC	Right rear wheel speed failure (OBD)	(See page BC-30)
C051400	Right rear wheel speed failure (OBD)	(See page BC-30)
C051500	Right rear wheel speed failure (OBD)	(See page BC-30)
C055800	Right rear wheel speed sensor type error	(See page BC-30)
C003b08	Right rear wheel speed sensor direction error	(See page BC-30)
C003B00	Right rear wheel speed sensor shorted to GND	(See page BC-30)
C003a08	Right rear wheel speed sensor signal error	(See page BC-30)
C051600	Right rear wheel speed sensor signal error (OBD)	(See page BC-30)
C003808	Left rear wheel speed sensor direction error	(See page BC-30)
C003800	Left rear wheel speed sensor shorted to GND	(See page BC-30)
C003708	Left rear wheel speed sensor signal lost	(See page BC-30)
C051000	Left rear wheel speed sensor signal lost (OBD)	(See page BC-30)
C003508	Right front wheel speed sensor direction error	(See page BC-30)
C003500	Right front wheel sensor shorted to GND	(See page BC-30)
C003408	Right front wheel sensor direction/signal error	(See page BC-30)
C050A00	Right front wheel sensor direction/signal error (OBD)	(See page BC-30)
C003208	Left front wheel speed sensor direction error	(See page BC-30)

DTC	Description	Reference page
C003200	Left front wheel speed sensor shorted to GND	(See page BC-30)
C003108	Left front wheel wheel speed sensor signal abnormal	(See page BC-30)
C050400	Abnormal left front wheel speed sensor signal (OBD)	(See page BC-30)
C1099FC	Multiple wheel speed sensor errors	(See page BC-30)
C053CFC	Multiple wheel speed sensor errors (OBD)	(See page BC-30)
C109908	Wheel speed sensor direction error	(See page BC-30)
C109904	Abnormal multiple wheel speed sensor signals	(See page BC-30)
C053C00	Multiple wheel speed sensor signals abnormal (OBD)	(See page BC-30)
C004900	Level sensor failure	(See page BC-42)
C006108	Lateral acceleration sensor signal compensation error	(See page BC-47)
C006208	Longitudinal acceleration sensor signal error	(See page BC-47)
C006308	Yaw rate sensor signal error	(See page BC-49)
C054300	Pressure sensor failure: line overvoltage (OBD)	(See page BC-56)
C054200	Pressure sensor failure: line undervoltage (OBD)	(See page BC-56)
C053F00	Plunger internal pressure low	(See page BC-56)
C053E00	Pressure sensor failure: line undervoltage (OBD)	(See page BC-56)
C053D00	Pressure sensor failure	(See page BC-56)
C007500	Lips ID transmission timeout	(See page BC-56)
C056C00	Pressure sensor internal failure (OBD)	(See page BC-56)
C004510	Pressure sensor circuit failure	(See page BC-56)
C0044FC	Pressure sensor internal failure	(See page BC-56)
C121208	Variant error	(See page BC-79)
C200004	Misuse hub mode	(See page BC-93)
P000000	System failure to sleep normally	(See page BC-97)
P25C700	Internal hardware error (OBD)	(See page BC-99)
P25C600	Internal hardware error (OBD)	(See page BC-99)
C057A00	Brake booster temperature sensor "B" circuit undervoltage (OBD)	(See page BC-99)
C057900	Brake booster temperature sensor "B" circuit undervoltage (OBD)	(See page BC-99)
C054100	Pressure sensor failure	(See page BC-99)
C059900	Incompatible RPS calibration software version	(See page BC-99)
P060B00	ECU internal error (OBD)	(See page BC-99)
P06B800	Lips ID value read failure	(See page BC-99)

DTC	Description	Reference page
P06B8FC	RPS NVM value read fairure	(See page BC-99)
P060400	RAM fault (OBD)	(See page BC-99)
P060500	ROM fault	(See page BC-99)
P060600	ECU internal error (OBD)	(See page BC-99)
P057B00	Brake pedal position sensor circuit internal fault	(See page BC-99)
P057C00	Brake pedal position sensor circuit under-voltage	(See page BC-99)
P057D00	Brake pedal position sensor circuit overvolt-age	(See page BC-99)
P057E00	Brake pedal position sensor circuit intermit-tent failure	(See page BC-99)
P05DD00	Brake pedal position sensor circuit under-voltage	(See page BC-99)
P05DE00	Brake pedal position sensor circuit overvolt-age	(See page BC-99)
P05DF00	Brake pedal position sensor circuit intermit-tent failure	(See page BC-99)
P05E000	Brake pedal displacement sensor measure-ment error (OBD)	(See page BC-99)
P05E009	Brake pedal displacement sensor measure-ment error	(See page BC-99)
P060200	ECU internal error (OBD)	(See page BC-99)
P062C00	Wheel speed sensor IC test failure	(See page BC-99)
C057E00	Brake pedal position sensor circuit intermit-tent failure (OBD)	(See page BC-99)
C05C200	Booster motor overtemperature (OBD)	(See page BC-99)
C05C24B	Booster motor overtemperature	(See page BC-99)
C05C300	Brake booster motor "A" power supply circuit	(See page BC-99)
C061900	Travel sensor 1 correction value incorrect	(See page BC-99)
C061A00	Travel sensor 2 correction value incorrect	(See page BC-99)
C1000FC	APBMI software and hardware error	(See page BC-99)
C102001	ECU internal hardware, control unit error (OBD)	(See page BC-99)
P05FF00	BSM related error, brake pedal hard (OBD)	(See page BC-99)
P05FF09	BSM related error, brake pedal hard/soft	(See page BC-99)
P05FF03	Brake master cylinder pressure applied by the driver greater than expected	(See page BC-99)
P0606FC	ECU internal error (OBD)	(See page BC-99)
C100004	ECU internal fault	(See page BC-99)
C101008	ECU internal error (OBD)	(See page BC-99)
P05CB00	Vehicle hardware mismatch	(See page BC-99)
C100104	Network timeout caused by hardware fault	(See page BC-99)
C100047	ECU internal error (OBD)	(See page BC-99)

DTC	Description	Reference page
P056024	UBB power supply lost	(See page BC-113)
P056300	ECU power supply overvoltage	(See page BC-113)
P056200	Low voltage causes ECU number of consecutive restarts out of limit (OBD)	(See page BC-113)
P0562FC	Power supply undervoltage	(See page BC-113)
P056023	UBVR power supply lost	(See page BC-113)
C190004	Power supply voltage greater than voltage threshold	(See page BC-113)
C190104	Low voltage causes ECU number of consecutive restarts out of limit	(See page BC-113)
C1901FC	Power supply undervoltage	(See page BC-113)
U006488	CAN bus off	(See page BC-109)
U007300	CAN bus off (OBD)	(See page BC-109)
U129387	HCU message lost	(See page BC-109)
U1293F7	HCU message lost (OBD)	(See page BC-109)
U1100F7	EMS message lost (OBD)	(See page BC-109)
U113887	DMS message lost	(See page BC-109)
U124587	HU message lost	(See page BC-109)
U123587	IFC message lost	(See page BC-109)
U119987	DDCU message lost	(See page BC-109)
U116487	ATC message lost	(See page BC-109)
U115587	IC message lost	(See page BC-109)
U115187	YAW message lost	(See page BC-109)
U114687	GW message lost	(See page BC-109)
U059486	HCU signal error	(See page BC-109)
U059484	HCU message length error	(See page BC-109)
U059483	HCU message checksum error	(See page BC-109)
U059482	HCU count error	(See page BC-109)
U0594F6	HCU signal error (OBD)	(See page BC-109)
U0594F4	HCU message length error (OBD)	(See page BC-109)
U0594F3	HCU check error (OBD)	(See page BC-109)
U0594F2	HCU count error (OBD)	(See page BC-109)
U0401F4	EMS message length error (OBD)	(See page BC-109)
U043986	DMS signal error	(See page BC-109)
U043984	DMS message length error	(See page BC-109)
U043983	DMS check error	(See page BC-109)
U043982	DMS count error	(See page BC-109)
U054686	HU signal error	(See page BC-109)
U054684	HU message length error	(See page BC-109)
U054683	HU check error	(See page BC-109)

DTC	Description	Reference page
U054682	HU message count error	(See page BC-109)
U049A84	DDCU message length error	(See page BC-109)
U045286	YAW signal error	(See page BC-109)
U045284	YAW message length	(See page BC-109)
U045283	YAW message checksum error	(See page BC-109)
U045282	YAW message count error	(See page BC-109)
U044786	GW signal error	(See page BC-109)
U044784	GW message length error	(See page BC-109)
U043386	IFC signal error	(See page BC-109)
U043384	IFC message length error	(See page BC-109)
U043383	IFC message checksum error	(See page BC-109)
U043382	IFC message count error	(See page BC-109)
C046008	SAS signal invalid	(See page BC-109)
U042086	SAS signal error	(See page BC-109)
U042084	SAS message length error	(See page BC-109)
U042083	SAS message checksum error	(See page BC-109)
U042082	SAS message count error	(See page BC-109)
U042484	ATC message length error	(See page BC-109)
U042486	ATC signal error	(See page BC-109)
U042386	IC signal error	(See page BC-109)
U042384	IC message length error	(See page BC-109)
U013187	SAS message lost	(See page BC-109)
U000700	CAN undervoltage	(See page BC-109)
U000400	CAN undervoltage (OBD)	(See page BC-109)
U000500	CAN overvoltage	(See page BC-109)

DTC	**C000100**	**Internal valve error (OBD)**
DTC	**C000300**	**Internal valve error (OBD)**
DTC	**C001400**	**Right front wheel internal valve error (OBD)**
DTC	**C001800**	**Left rear wheel internal valve error (OBD)**
DTC	**C001500**	**Left rear wheel internal valve error (OBD)**
DTC	**C001500**	**Right front wheel internal valve error (OBD)**
DTC	**C001900**	**Left rear wheel internal valve error (OBD)**
DTC	**C001C00**	**Right rear wheel internal valve error (OBD)**
DTC	**C001000**	**Left front wheel internal valve error (OBD)**
DTC	**C000200**	**Internal valve error (OBD)**
DTC	**C002400**	**Internal valve error (OBD)**
DTC	**C053B00**	**Valve power supply failure**
DTC	**C05D500**	**Internal valve error (OBD)**
DTC	**C001100**	**Left front wheel internal valve error (OBD)**
DTC	**C001C00**	**Right rear wheel internal valve error (OBD)**
DTC	**C001D00**	**Right rear wheel internal valve error (OBD)**
DTC	**C062D00**	**Internal valve error (OBD)**
DTC	**C000400**	**Internal valve error (OBD)**
DTC	**C0072FC**	**Valve failures: overheat protection, invalid signal, hardware failure**
DTC	**C007208**	**Valve failures: overheat protection, invalid signal, hardware failure**

Description

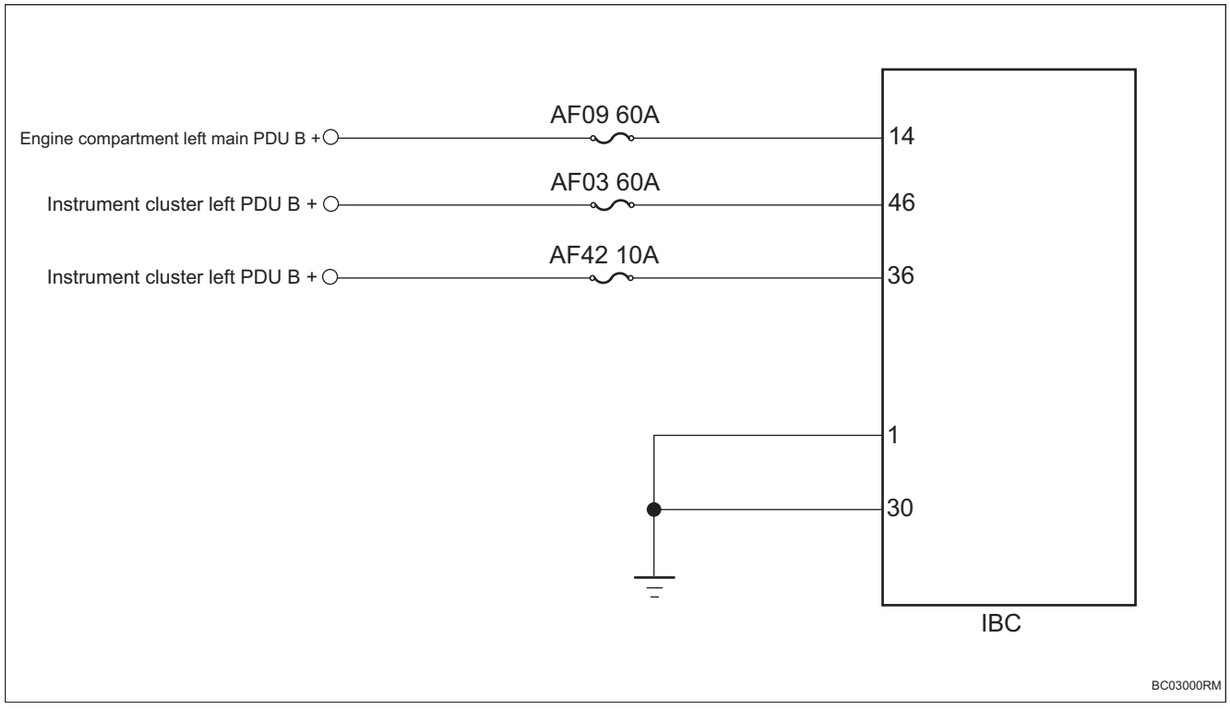
When the internal valve of IBC fails, the IBC records the DTC.

DTC	DTC detection conditions	Faulty location
C000100	(a) Internal valve error	• IBC • Harness and connector • Fuse • Charging system

DTC	DTC detection conditions	Faulty location
C000300	(a) Internal valve error	• IBC • Harness and connector • Fuse • Charging system
C001400	(a) Right front wheel internal valve error	• IBC • Harness and connector • Fuse • Charging system
C001800	(a) Left rear wheel internal valve error	• IBC • Harness and connector • Fuse • Charging system
C001500	(a) Left rear wheel internal valve error	• IBC • Fuse • Harness and connector • Charging system
C001500	(a) Right front wheel internal valve error	• IBC • Harness and connector • Fuse • Charging system
C001900	(a) Left rear wheel internal valve error	• IBC • Fuse • Harness and connector • Charging system
C001C00	(a) Right rear wheel internal valve error	• IBC • Harness and connector • Fuse • Charging system
C001000	(a) Left front wheel internal valve error	• IBC • Harness and connector • Fuse • Charging system
C000200	(a) Internal valve error	• IBC • Harness and connector • Fuse • Charging system
C002400	(a) Internal valve error	• IBC • Harness and connector • Fuse • Charging system
C053B00	(a) Valve power supply failure	• IBC • Harness and connector • Fuse • Charging system

DTC	DTC detection conditions	Faulty location
C05D500	(a) Internal valve error	• IBC • Harness and connector • Fuse • Charging system
C001100	(a) Left front wheel internal valve error	• IBC • Harness and connector • Fuse • Charging system
C001C00	(a) Right rear wheel internal valve error	• IBC • Harness and connector • Fuse • Charging system
C001D00	(a) Right rear wheel internal valve error	• IBC • Harness and connector • Fuse • Charging system
C062D00	(a) Internal valve error	• IBC • Harness and connector • Fuse • Charging system
C000400	(a) Internal valve error	• IBC • Harness and connector • Fuse • Charging system
C0072FC	(a) Valve failures: overheat protection, invalid signal, hardware failure	• IBC • Harness and connector • Fuse • Charging system
C007208	(a) Valve failures: overheat protection, invalid signal, hardware failure	• IBC • Harness and connector • Fuse • Charging system

Circuit diagram



Inspection procedure

1	**Perform preliminary inspection**

(a) Confirm whether the fault warning lamp is on when the fault occurs.

(b) Confirm the frequency of failure and whether it is random failure, etc.

(c) Confirm the working condition, vehicle speed, accelerator/brake pedal status, etc. when the fault occurs.

(d) Check whether the vehicle has been in an accident or repaired.

(e) Check whether the vehicle power supply system is normal (such as whether the battery terminal is normal and whether the IBC fuse is damaged).

(f) Check the IBC for bump or impact marks.

(g) Check whether the IBC is installed correctly, check the brake fluid reservoir hose for leakage and check its grounding status.

(h) Check the IBC connector connection status and check the connector for rust, false connection, water ingress, etc.

(i) Check and repair according to the problems checked out.

(j) Connect the HQ-VDS.

(k) Set the ignition switch to "ON".

(l) Read and store DTC.

(m) Clear the DTC and power on and off again.

(n) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

OK → **End**

NG

2	Cool down the IBC

(a) Cool the vehicle for 5 minutes (cool the IBC to normal temperature).

(b) Check whether the fault is eliminated.

Results:

Results	Go to
Troubleshooting	Normal
Fault is not eliminated	Abnormal

OK → **End**

NG

3	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

4	Check harness and connector

BC

(a) Check whether the harness and connector are connected tightly.

(b) Check whether the harness and connector are damaged or aged.

NG → **Repair or replace the harness and connector**

OK

5	**Check the IBC fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the IBC fuse.

(d) Measure the resistance according to the values in the table below.

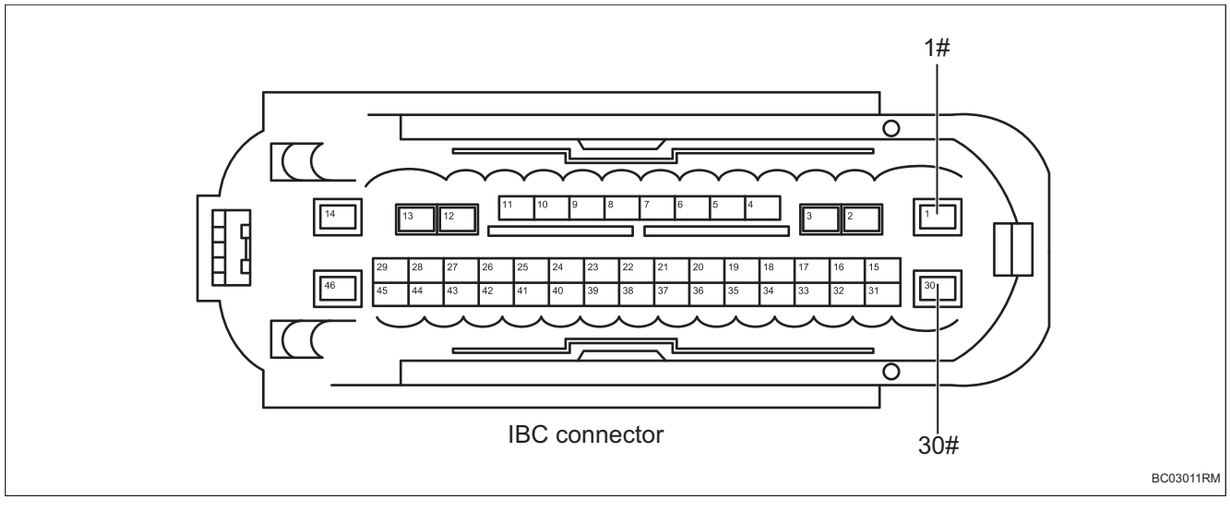
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

6	**Check the IBC ground**



(a) Disconnect the IBC connector.

(b) Measure the resistance according to the values in the table below.

BC

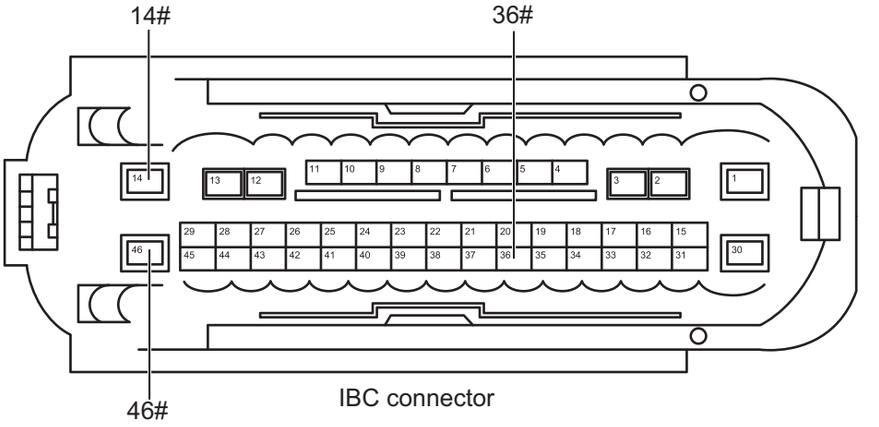
Standard value

Detector connection	Detection conditions	Specified state
IBC connector 1# - body GND	Always connected	Less than 1Ω
IBC connector 30# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

7 **Check the IBC power supply**



(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
IBC connector 14# - body GND	The ignition switch is set to "ON"	Battery voltage
IBC connector 46# - body GND	The ignition switch is set to "ON"	Battery voltage
IBC connector 36# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

BC

OK

8	**Replace the IBC (See page BC-118) (after the replacement, accelerate the vehicle to 15 km/h and stop. Then diagnose the vehicle again to confirm whether the fault reappears)**

DTC	C003100	Left front wheel speed mode error
DTC	C003400	Right front wheel speed mode error
DTC	C003700	Left rear wheel speed mode error
DTC	C003A00	Right rear wheel speed mode error
DTC	C00B900	Left front wheel speed test failure
DTC	C050000	Left front wheel speed test failure (OBD)
DTC	C0500FC	Left front wheel speed failure (OBD)
DTC	C050200	Left front wheel speed failure (OBD)
DTC	C050300	Left front wheel speed failure (OBD)
DTC	C055500	Left front wheel speed sensor type error
DTC	C00BA00	Right front wheel speed test failure
DTC	C050600	Right front wheel speed test failure (OBD)
DTC	C0506FC	Right front wheel speed failure (OBD)
DTC	C050800	Right front wheel speed failure (OBD)
DTC	C050900	Right front wheel speed failure (OBD)
DTC	C055600	Right front wheel speed sensor type error
DTC	C00BB00	Left rear wheel speed test failure
DTC	C050C00	Left rear wheel speed test failure (OBD)
DTC	C050CFC	Left rear wheel speed failure (OBD)
DTC	C050E00	Left rear wheel speed failure (OBD)
DTC	C050F00	Left rear wheel speed failure (OBD)
DTC	C055700	Left rear wheel speed sensor type error
DTC	C00BC00	Right rear wheel speed test failure
DTC	C051200	Right rear wheel speed test failure (OBD)
DTC	C0512FC	Right rear wheel speed failure (OBD)
DTC	C051400	Right rear wheel speed failure (OBD)
DTC	C051500	Right rear wheel speed failure (OBD)
DTC	C055800	Right rear wheel speed sensor type error

DTC	C003b08	Right rear wheel speed sensor direction error
DTC	C003B00	Right rear wheel speed sensor shorted to GND
DTC	C003a08	Right rear wheel speed sensor signal error
DTC	C051600	Right rear wheel speed sensor signal error (OBD)
DTC	C003808	Left rear wheel speed sensor direction error
DTC	C003800	Left rear wheel speed sensor shorted to GND
DTC	C003708	Left rear wheel speed sensor signal lost
DTC	C051000	Left rear wheel speed sensor signal lost (OBD)
DTC	C003508	Right front wheel speed sensor direction error
DTC	C003500	Right front wheel sensor shorted to GND
DTC	C003408	Right front wheel sensor direction/signal error
DTC	C050A00	Right front wheel sensor direction/signal error (OBD)
DTC	C003208	Left front wheel speed sensor direction error
DTC	C003200	Left front wheel speed sensor shorted to GND
DTC	C003108	Left front wheel wheel speed sensor signal abnormal
DTC	C050400	Abnormal left front wheel speed sensor signal (OBD)
DTC	C1099FC	Multiple wheel speed sensor errors
DTC	C053CFC	Multiple wheel speed sensor errors (OBD)
DTC	C109908	Wheel speed sensor direction error
DTC	C109904	Abnormal multiple wheel speed sensor signals

DTC	C053C00	Multiple wheel speed sensor signals abnormal (OBD)

Description

When the IBC detects a wheel speed sensor related fault, the IBC records the DTC.

DTC	DTC detection conditions	Faulty location
C003100	(a) Left front wheel speed mode error.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C003400	(a) Right front wheel speed mode error.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C003700	(a) Left rear wheel speed mode error.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C003A00	(a) Right rear wheel speed mode error.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C00B900	(a) Left front wheel speed test failure.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C050000	(a) Left front wheel speed test failure.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C0500FC	(a) Left front wheel speed failure.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor

DTC	DTC detection conditions	Faulty location
C050200	(a) Left front wheel speed failure.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C050300	(a) Left front wheel speed failure.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C055500	(a) Left front wheel speed sensor type error.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C00BA00	(a) Right front wheel speed test failure.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C050600	(a) Right front wheel speed test failure.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C0506FC	(a) Right front wheel speed failure.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C050800	(a) Right front wheel speed failure.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C050900	(a) Right front wheel speed failure.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C055600	(a) Right front wheel speed sensor type error.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor

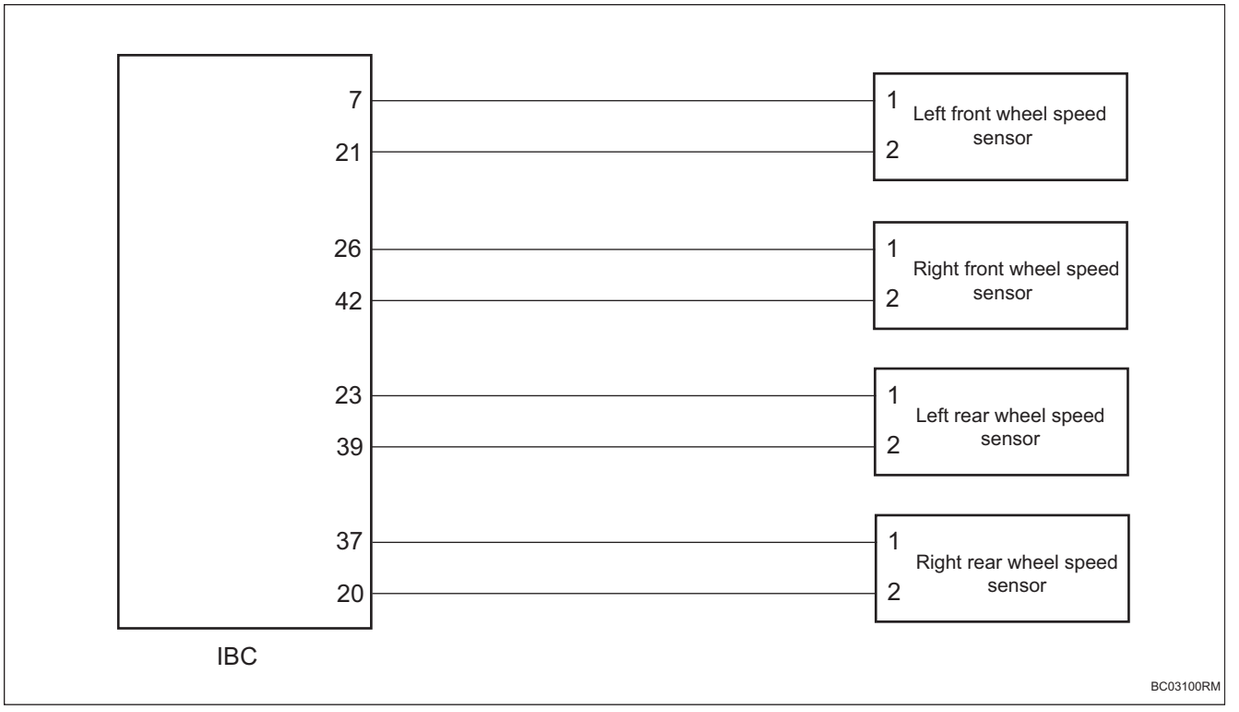
DTC	DTC detection conditions	Faulty location
C00BB00	(a) Left rear wheel speed test failure.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C050C00	(a) Left rear wheel speed test failure.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C050CFC	(a) Left rear wheel speed failure.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C050E00	(a) Left rear wheel speed failure.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C050F00	(a) Left rear wheel speed failure.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C055700	(a) Left rear wheel speed sensor type error.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C00BC00	(a) Right rear wheel speed test failure.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C051200	(a) Right rear wheel speed test failure.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C0512FC	(a) Right rear wheel speed failure.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor

DTC	DTC detection conditions	Faulty location
C051400	(a) Right rear wheel speed failure.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C051500	(a) Right rear wheel speed failure.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C055800	(a) Right rear wheel speed sensor type error.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C003b08	(a) Right rear wheel speed sensor direction error	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C003B00	(a) Right rear wheel speed sensor shorted to GND.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C003a08	(a) Right rear wheel speed sensor signal error.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C051600	(a) Right rear wheel speed sensor signal error.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C003808	(a) Left rear wheel speed sensor direction error.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C003800	(a) Left rear wheel speed sensor shorted to GND.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor

DTC	DTC detection conditions	Faulty location
C003708	(a) Left rear wheel speed sensor signal lost.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C051000	(a) Left rear wheel speed sensor signal lost.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C003508	(a) Right front wheel speed sensor direction error.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C003500	(a) Right front wheel sensor shorted to GND.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C003408	(a) Right front wheel speed sensor direction/ signal error.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C050A00	(a) Right front wheel speed sensor direction/ signal error.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C003208	(a) Left front wheel speed sensor direction error.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C003200	(a) Left front wheel speed sensor shorted to GND.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C003108	(a) Left front wheel speed sensor signal abnormal.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor

DTC	DTC detection conditions	Faulty location
C050400	(a) Left front wheel speed sensor signal abnormal.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C1099FC	(a) Multiple wheel speed sensor errors.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C053CFC	(a) Multiple wheel speed sensor errors.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C109908	(a) Wheel speed sensor direction error.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C109904	(a) Multiple wheel speed sensor signals are abnormal.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor
C053C00	(a) Multiple wheel speed sensor signals are abnormal.	• IBC • Harness and connector • Wheel speed sensor signal ring gear • Tire • Wheel speed sensor

Circuit diagram



Inspection procedure

1	**Perform preliminary inspection**

(a) Confirm whether the fault warning lamp is on when the fault occurs.

(b) Confirm the frequency of failure and whether it is random failure, etc.

(c) Confirm the working condition, vehicle speed, accelerator/brake pedal status, etc. when the fault occurs.

(d) Check whether the vehicle has been in an accident or repaired.

(e) Check whether the vehicle power supply system is normal (such as whether the battery terminal is normal and whether the IBC fuse is damaged).

(f) Check the IBC for bump or impact marks.

(g) Check whether the IBC is installed correctly, check the brake fluid reservoir hose for leakage and check its grounding status.

(h) Check the IBC connector connection status and check the connector for rust, false connection, water ingress, etc.

(i) Check and repair according to the problems checked out.

(j) Connect the HQ-VDS.

(k) Set the ignition switch to "ON".

(l) Read and store DTC.

(m) Clear the DTC and power on and off again.

(n) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

OK → **End**

NG

2	**Check vehicle tire**

(a) Check whether the tire size meets the specification.

NG → **Troubleshooting**

OK

3	**Check the wheel speed sensor signal ring gear**

(a) Check whether the gap between wheel speed sensor and ring gear is correct.

NG → **Troubleshooting**

OK

4	**Check wheel speed sensor**

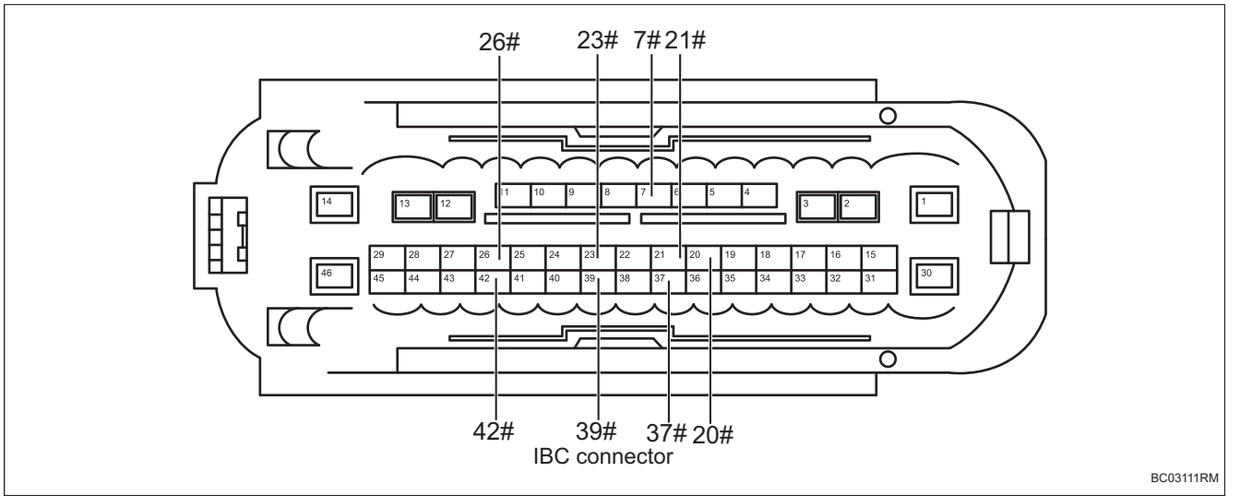
(a) Check whether the wheel speed sensor is secured correctly.

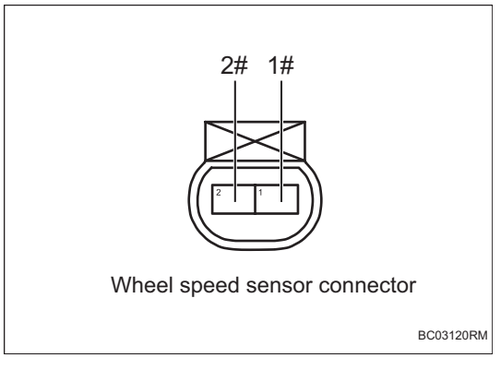
(b) Check whether the wheel speed sensor is disturbed by external magnetic fields.

NG → **Troubleshooting**

OK

5	**Check wheel speed sensor harness and connector for open circuit**





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the IBC connector.

(d) Disconnect the wheel speed sensor connector.

(e) Measure the resistance according to the values in the table below.

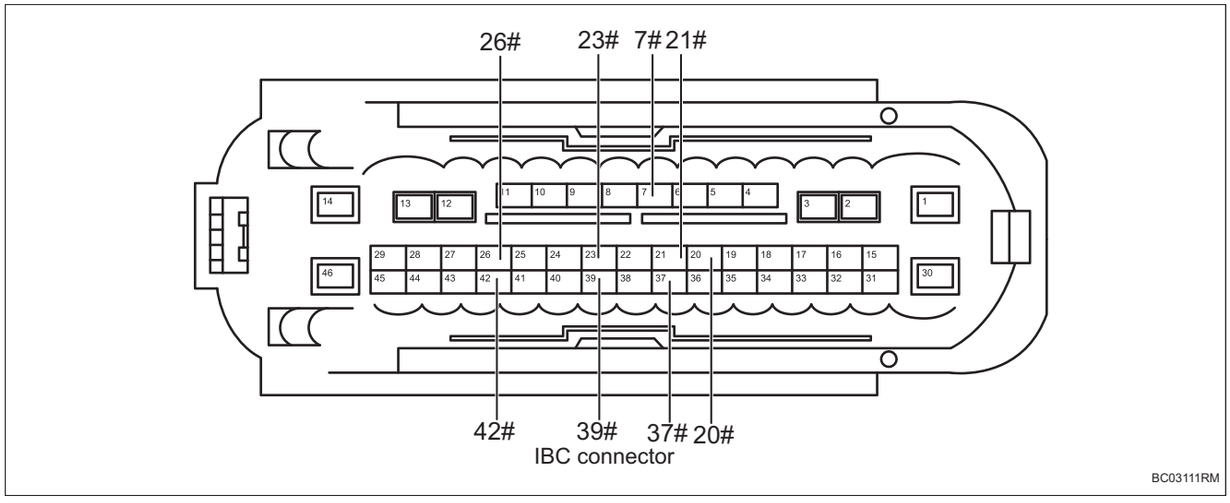
Standard value

Detector connection	Detection conditions	Specified state
Left front wheel speed sensor connector 1# - IBC connector 7#	Always connected	Less than 1Ω
Left front wheel speed sensor connector 2# - IBC connector 21#	Always connected	Less than 1Ω
Right front wheel speed sensor connector 1# - IBC connector 26#	Always connected	Less than 1Ω
Right front wheel speed sensor connector 2# - IBC connector 42#	Always connected	Less than 1Ω
Left rear wheel speed sensor connector 1# - IBC connector 23#	Always connected	Less than 1Ω
Left rear wheel speed sensor connector 2# - IBC connector 39#	Always connected	Less than 1Ω
Right rear wheel speed sensor connector 1# - IBC connector 37#	Always connected	Less than 1Ω
Right rear wheel speed sensor connector 2# - IBC connector 20#	Always connected	Less than 1Ω

NG → **Repair and replace harness or connector**

OK

6	**Check wheel speed sensor harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

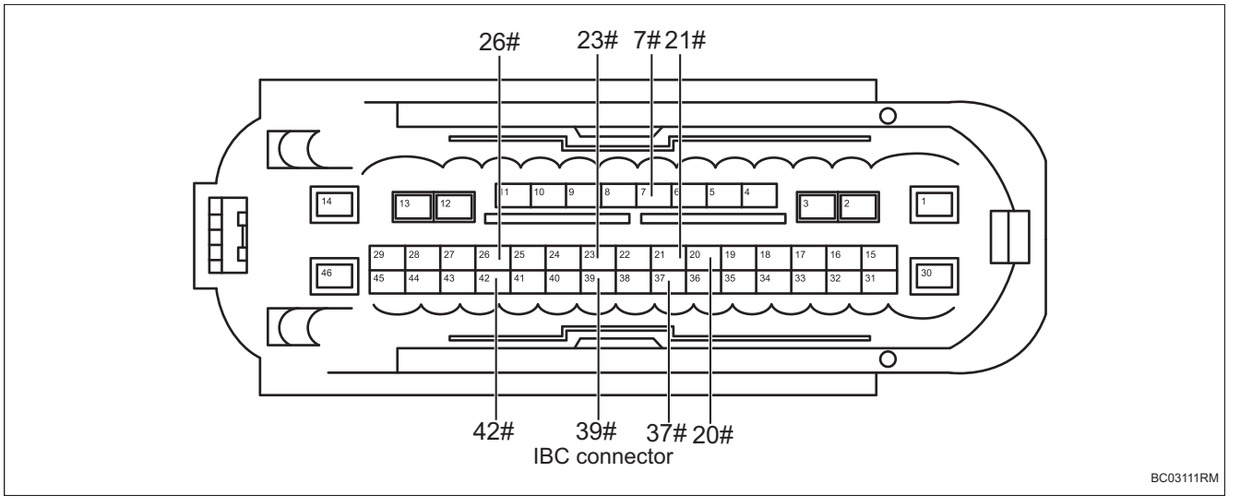
Detector connection	Detection conditions	Specified state
IBC connector 7# -body GND	Always connected	10 KΩ or greater
IBC connector 21# -body GND	Always connected	10 KΩ or greater
IBC connector 26# -body GND	Always connected	10 KΩ or greater
IBC connector 42# -body GND	Always connected	10 KΩ or greater
IBC connector 23# -body GND	Always connected	10 KΩ or greater
IBC connector 39# -body GND	Always connected	10 KΩ or greater
IBC connector 37# -body GND	Always connected	10 KΩ or greater
IBC connector 20# -body GND	Always connected	10 KΩ or greater

NG → **Repair and replace harness or connector**

BC

OK

7	**Check wheel speed sensor harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
IBC connector 7# -body GND	Set the ignition switch to "ON"	Less than 1 V
IBC connector 21# -body GND	Set the ignition switch to "ON"	Less than 1 V
IBC connector 26# -body GND	Set the ignition switch to "ON"	Less than 1 V
IBC connector 42# -body GND	Set the ignition switch to "ON"	Less than 1 V
IBC connector 23# -body GND	Set the ignition switch to "ON"	Less than 1 V
IBC connector 39# -body GND	Set the ignition switch to "ON"	Less than 1 V
IBC connector 37# -body GND	Set the ignition switch to "ON"	Less than 1 V
IBC connector 20# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair and replace harness or connector**

OK

8	**Replace wheel speed sensor (See page BC-90) (See page BC-92)**

(a) Replace the wheel speed sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the IBC (after the replacement, accelerate the vehicle to 15 km/h and stop. Then diagnose the vehicle again to confirm whether the fault reappears.) (See page BC-118)**

OK

9	**End**

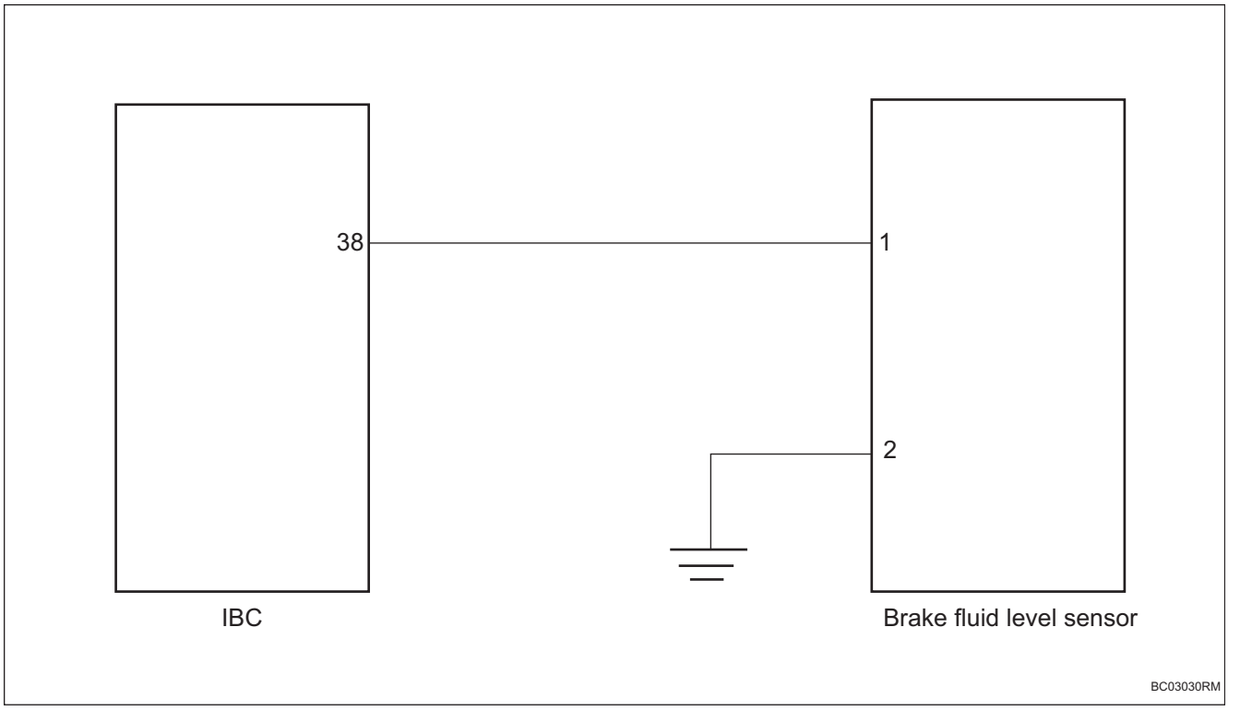
DTC	C004900	Level sensor failure

Description

When the bake fluid level sensor fails, the IBC records the DTC.

DTC	DTC detection conditions	Faulty location
C004900	(a) Level sensor failure.	• Level sensor failure • Harness and connector • IBC

Circuit diagram



Inspection procedure

1	Perform preliminary inspection

(a) Confirm whether the fault warning lamp is on when the fault occurs.

(b) Confirm the frequency of failure and whether it is random failure, etc.

(c) Confirm the working condition, vehicle speed, accelerator/brake pedal status, etc. when the fault occurs.

(d) Check whether the vehicle has been in an accident or repaired.

(e) Check whether the vehicle power supply system is normal (such as whether the battery terminal is normal and whether the IBC fuse is damaged).

(f) Check the IBC for bump or impact marks.

(g) Check whether the IBC is installed correctly, check the brake fluid reservoir hose for leakage and check its grounding status.

(h) Check the IBC connector connection status and check the connector for rust, false connection, water ingress, etc.

(i) Check and repair according to the problems checked out.

(j) Connect the HQ-VDS.

(k) Set the ignition switch to "ON".

(l) Read and store DTC.

(m) Clear the DTC and power on and off again.

(n) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

OK → **End**

NG

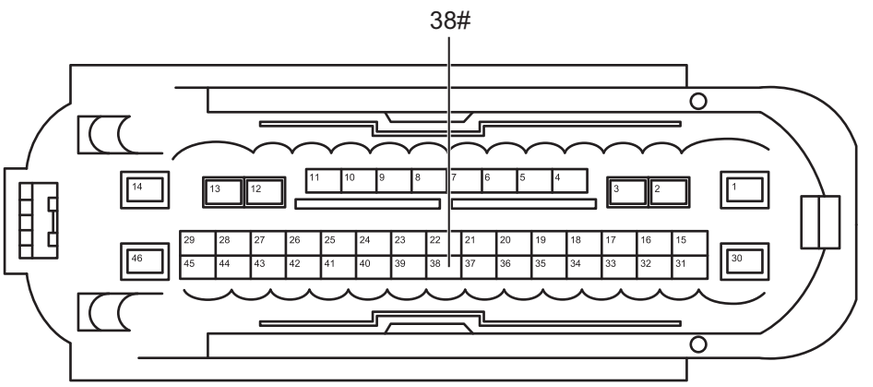
2	Check brake fluid level

(a) Check whether the brake fluid level is within the normal range.

NG → **Repair according to the fault**

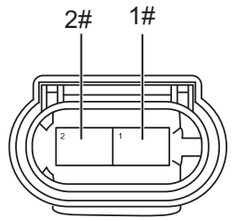
OK

3	Check bake fluid level sensor harness and connector for open circuit



IBC connector

BC03041RM



Brake fluid level sensor connector

BC03050RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the IBC connector.

(d) Disconnect the bake fluid level sensor connector.

(e) Measure the resistance according to the values in the table below.

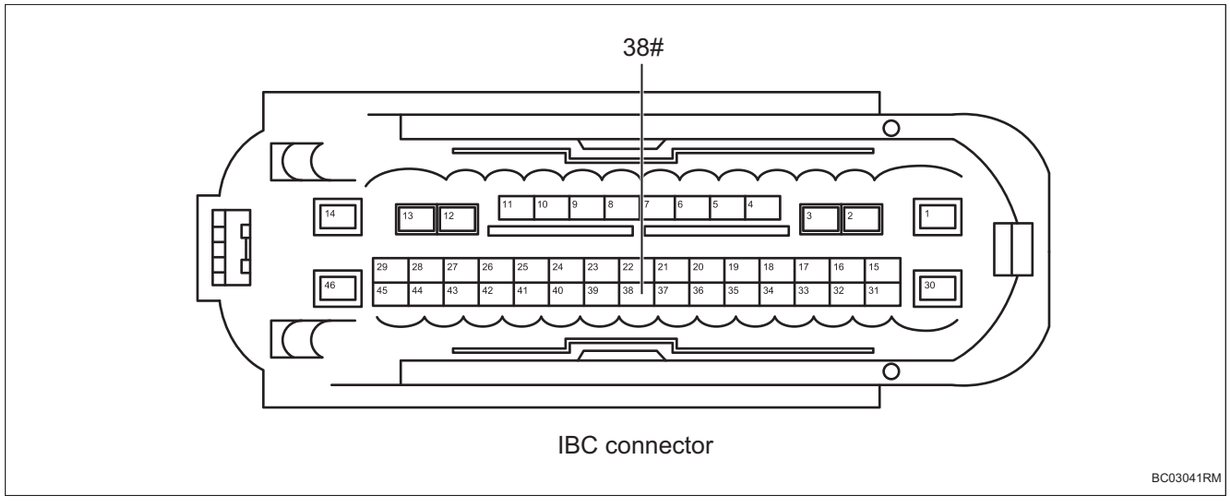
Standard value

Detector connection	Detection conditions	Specified state
Bake fluid level sensor connector 1# -IBC connector 38#	Always connected	Less than 1Ω
Bake fluid level sensor connector 2# - body GND	Always connected	Less than 1Ω

NG → **Repair and replace harness or connector**

OK

4	**Check bake fluid level sensor harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

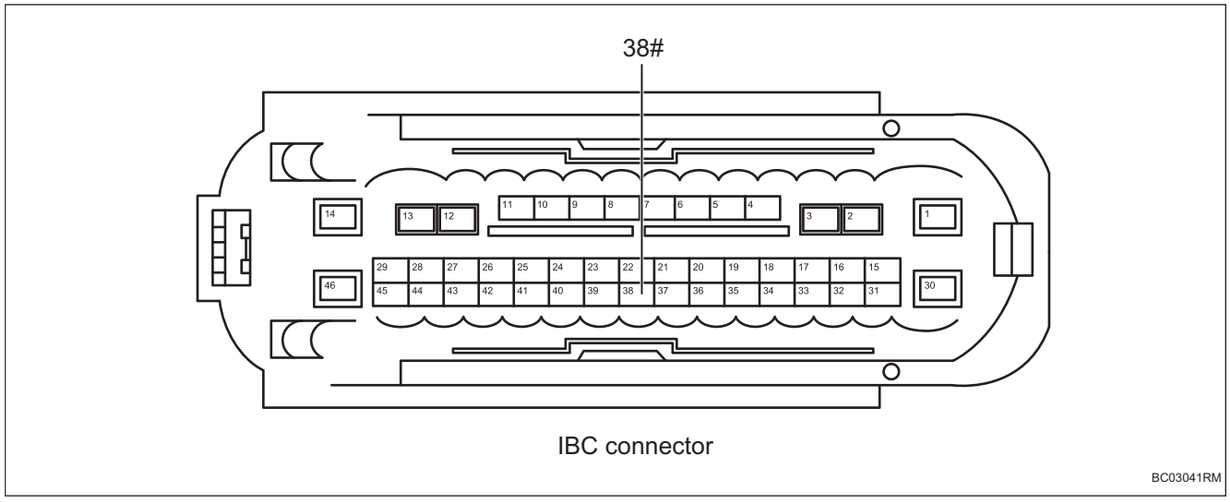
Standard value

Detector connection	Detection conditions	Specified state
IBC connector 38# -body GND	Always connected	10 KΩ or greater

NG → **Repair and replace harness or connector**

OK

5	**Check bake fluid level sensor harness and connector for circuit shorted to power supply**



(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

BC

Standard value

Detector connection	Detection conditions	Specified state
IBC connector 38# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair and replace harness or connector**

OK

6	**Replace bake fluid level sensor (See page BC-118)**

(a) Replace the bake fluid level sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the IBC (See page BC-118)**

OK

7	**End**

DTC	**C006108**	**Lateral acceleration sensor signal compensation error**
DTC	**C006208**	**Longitudinal acceleration sensor signal error**

Description

In case of the horizontal and longitudinal acceleration sensor signal error, the IBC records the DTC.

DTC	DTC detection conditions	Faulty location
C006108	(a) Lateral acceleration sensor signal failure.	• IBC (internal pressure sensor)
C006208	(a) Longitudinal acceleration sensor signal failure.	• IBC (internal pressure sensor)

Inspection procedure

1	**Perform preliminary inspection**

(a) Confirm whether the fault warning lamp is on when the fault occurs.

(b) Confirm the frequency of failure and whether it is random failure, etc.

(c) Confirm the working condition, vehicle speed, accelerator/brake pedal status, etc. when the fault occurs.

(d) Check whether the vehicle has been in an accident or repaired.

(e) Check whether the vehicle power supply system is normal (such as whether the battery terminal is normal and whether the IBC fuse is damaged).

(f) Check the IBC for bump or impact marks.

(g) Check whether the IBC is installed correctly, check the brake fluid reservoir hose for leakage and check its grounding status.

(h) Check the IBC connector connection status and check the connector for rust, false connection, water ingress, etc.

(i) Check and repair according to the problems checked out.

(j) Connect the HQ-VDS.

(k) Set the ignition switch to "ON".

(l) Read and store DTC.

(m) Clear the DTC and power on and off again.

(n) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

NG → **Replace the IBC (See page BC-118)**

OK

2	**End**

DTC	C006308	Yaw rate sensor signal error

Description

In case of yaw rate sensor signal error, the IBC records the DTC.

DTC	DTC detection conditions	Faulty location
C006308	(a) Yaw rate sensor signal error.	• SRS • CAN line and connector • IBC

Inspection procedure

1	Perform preliminary inspection

(a) Confirm whether the fault warning lamp is on when the fault occurs.

(b) Confirm the frequency of failure and whether it is random failure, etc.

(c) Confirm the working condition, vehicle speed, accelerator/brake pedal status, etc. when the fault occurs.

(d) Check whether the vehicle has been in an accident or repaired.

(e) Check whether the vehicle power supply system is normal (such as whether the battery terminal is normal and whether the IBC fuse is damaged).

(f) Check the IBC for bump or impact marks.

(g) Check whether the IBC is installed correctly, check the brake fluid reservoir hose for leakage and check its grounding status.

(h) Check the IBC connector connection status and check the connector for rust, false connection, water ingress, etc.

(i) Check and repair according to the problems checked out.

(j) Connect the HQ-VDS.

(k) Set the ignition switch to "ON".

(l) Read and store DTC.

(m) Clear the DTC and power on and off again.

(n) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

OK → End

NG

2	Check the SRS DTC

(a) Check the SRS for DTC related to yaw rate sensor.

(b) Check the SRS for CAN communication-related DTCs.

Results:

Results	Go to
Present	Abnormal
Not present	Normal

NG → Repair according to the fault

OK

3	Replace the IBC (See page BC-118)(after the replacement, accelerate the vehicle to 15 km/h and stop. Then diagnose the vehicle again to confirm whether the fault reappears.)

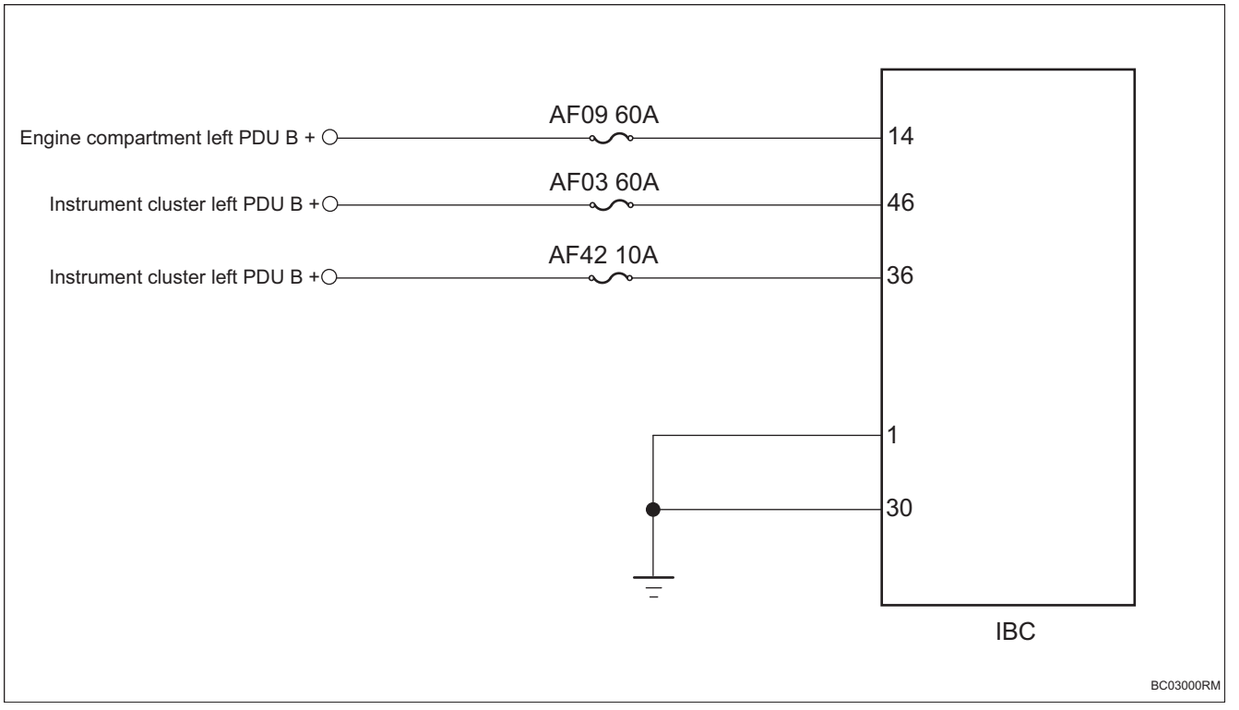
DTC	**C006B06**	**ABS control implausible**
DTC	**C007200**	**Brake overtemperature**
DTC	**C007204**	**Brake disc overtemperature**
DTC	**C0072FB**	**Excessive pressure during hydraulic valve dynamic test**
DTC	**C056300**	**ABS control implausible (OBD)**
DTC	**C006BFC**	**ABS control implausible**
DTC	**C059800**	**FW_RBUEXSOvertemperature**

Description

When it is detected that the braking time is too long or the temperature is too high, the IBC records the DTC.

DTC	DTC detection conditions	Faulty location
C006B06	(a) ABS control implausible	• IBC • Harness and connector
C007200	(a) Brake overtemperature	• IBC • Harness and connector
C007204	(a) Brake disc overtemperature	• IBC • Harness and connector • Fuse
C0072FB	(a) Excessive pressure during hydraulic valve dynamic test	• IBC • Harness and connector
C056300	(a) ABS control implausible (OBD)	• IBC • Harness and connector
C006BFC	(a) ABS control implausible	• IBC • Harness and connector
C059800	(a) FW_RBUEXS overtemperature	• IBC • Harness and connector

Circuit diagram



Inspection procedure

1	**Perform preliminary inspection**

(a) Confirm whether the fault warning lamp is on when the fault occurs.

(b) Confirm the frequency of failure and whether it is random failure, etc.

(c) Confirm the working condition, vehicle speed, accelerator/brake pedal status, etc. when the fault occurs.

(d) Check whether the vehicle has been in an accident or repaired.

(e) Check whether the vehicle power supply system is normal (such as whether the battery terminal is normal and whether the IBC fuse is damaged).

(f) Check the IBC for bump or impact marks.

(g) Check whether the IBC is installed correctly, check the brake fluid reservoir hose for leakage and check its grounding status.

(h) Check the IBC connector connection status and check the connector for rust, false connection, water ingress, etc.

(i) Check and repair according to the problems checked out.

(j) Connect the HQ-VDS.

(k) Set the ignition switch to "ON"

(l) Read and store DTC.

(m) Clear the DTC and power on and off again.

(n) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

OK → **End**

NG

2	Check harness and connector

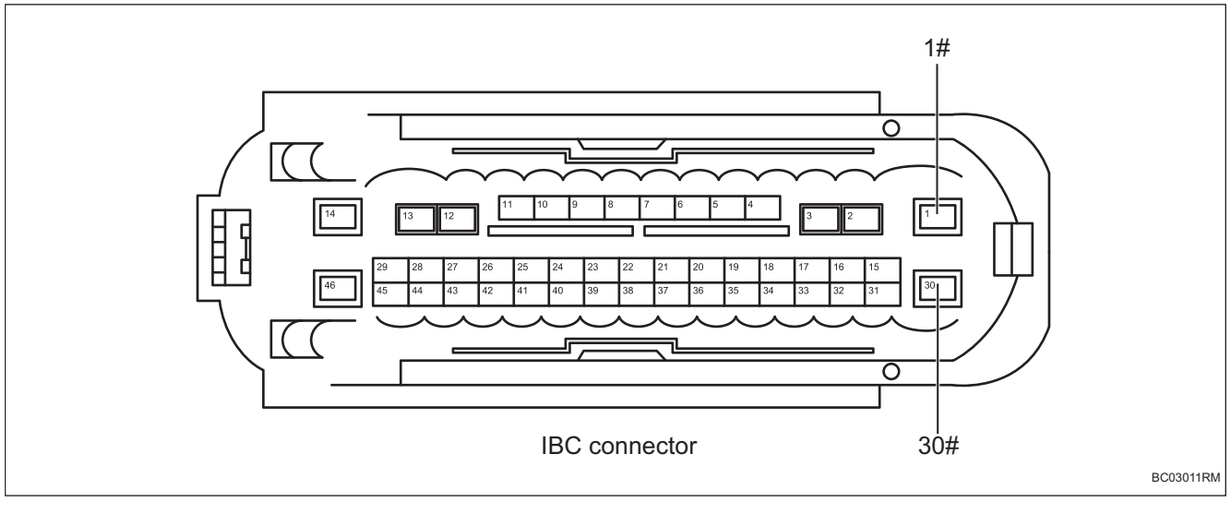
(a) Check whether the harness and connector are connected tightly.

(b) Check whether the harness and connector are damaged or aged.

NG → **Repair or replace the harness and connector**

OK

3	Check the IBC ground



(a) Disconnect the IBC connector.

(b) Measure the resistance according to the values in the table below.

BC

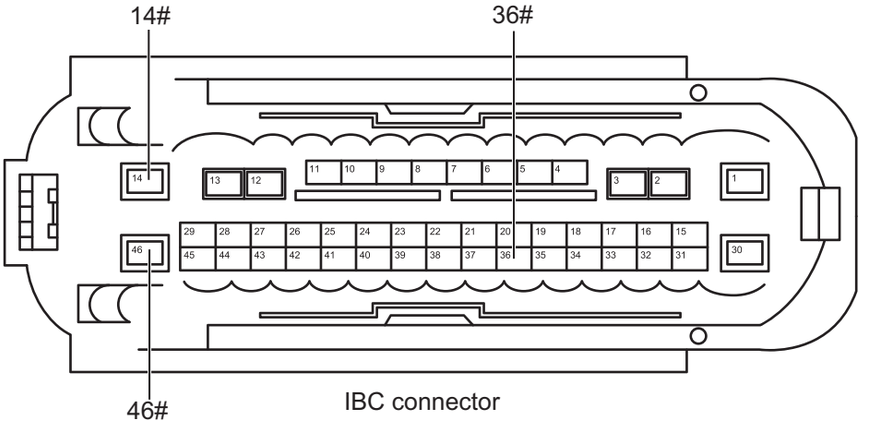
Standard value

Detector connection	Detection conditions	Specified state
IBC connector 1# - body GND	Always connected	Less than 1Ω
IBC connector 30# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check the IBC power supply**



(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
IBC connector 14# - body GND	The ignition switch is set to "ON"	Battery voltage
IBC connector 46# - body GND	The ignition switch is set to "ON"	Battery voltage
IBC connector 36# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Read DTC**

(a) Re-ignite after power-off.

(b) The brake hold is not necessary for more than 30 s.

(c) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

OK → **End**

NG

6	**Read DTC again**

(a) Power off the vehicle and wait for 5 minutes.

(b) Re-ignite and drive at a speed above 30 kph for at least 30 seconds. (c) Stop the vehicle and shut down the engine (set to P gear position and do not apply the parking brake).

(c) Wait for at least 100 s, during which no action is allowed (do not open or close the door, do not turn on any equipment function to avoid disturbing ECU sleep).

(d) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

NG → **Replace the IBC (See page BC-118)**

OK

7	**End**

DTC	**C054300**	**Pressure sensor failure: line overvoltage (OBD)**
DTC	**C054200**	**Pressure sensor failure: line undervoltage (OBD)**
DTC	**C053F00**	**Plunger internal pressure low**
DTC	**C053E00**	**Pressure sensor failure: line undervoltage (OBD)**
DTC	**C053D00**	**Pressure sensor failure**
DTC	**C007500**	**Lips ID transmission timeout**
DTC	**C056C00**	**Pressure sensor internal failure (OBD)**
DTC	**C004510**	**Pressure sensor circuit failure**
DTC	**C0044FC**	**Pressure sensor internal failure**

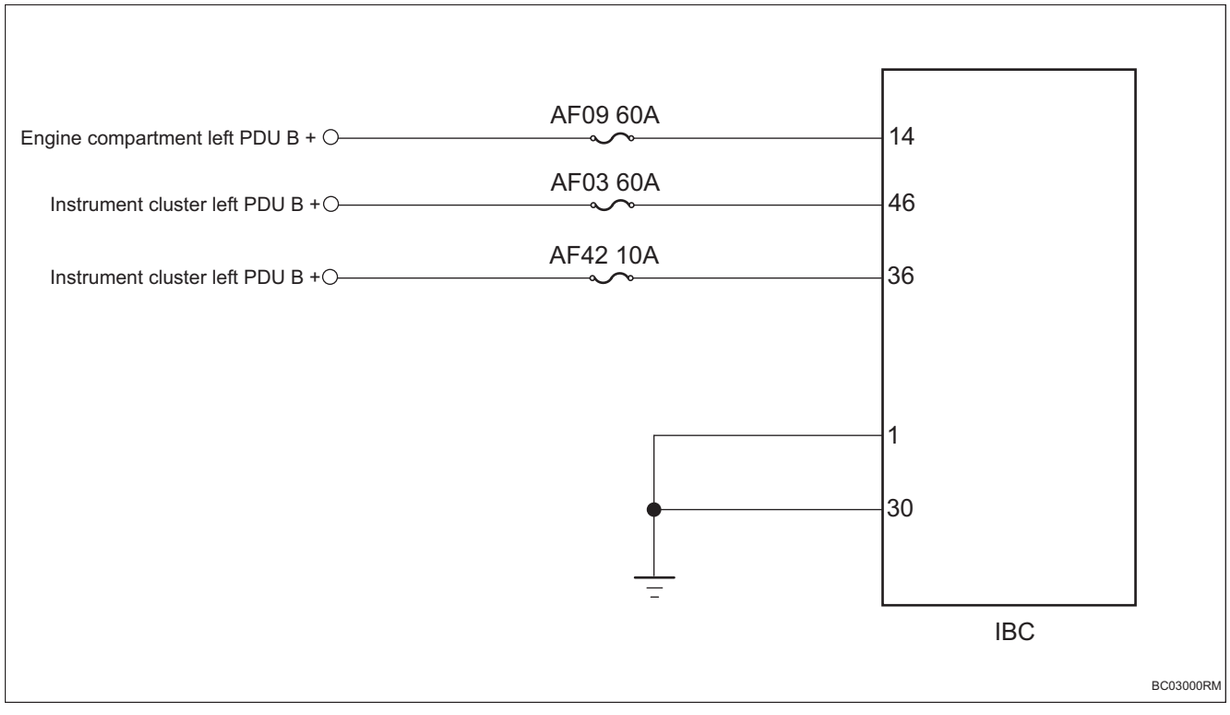
Description

When the internal pressure sensor of IBC fails, the IBC records the DTC.

DTC	DTC detection conditions	Faulty location
C054300	(a) Pressure sensor overvoltage.	• IBC • Harness and connector • Fuse • Charging system
C054200	a) Pressure sensor undervoltage.	• IBC • Harness and connector • Fuse • Charging system
C053F00	a) Internal pressure low.	• IBC • Harness and connector • Fuse • Charging system
C053E00	(a) Pressure sensor undervoltage.	• IBC • Harness and connector • Fuse • Charging system
C053D00	(a) Pressure sensor failure.	• IBC • Fuse • Harness and connector • Charging system
C007500	(a) Lips ID transmission timeout.	• IBC • Harness and connector • Fuse • Charging system

DTC	DTC detection conditions	Faulty location
C056C00	(a) Pressure sensor internal failure.	• IBC • Fuse • Harness and connector • Charging system
C004510	(a) Pressure sensor circuit failure.	• IBC • Harness and connector • Fuse • Charging system
C0044FC	(a) Pressure sensor internal failure.	• IBC • Harness and connector • Fuse • Charging system

Circuit diagram



Inspection procedure

1	**Perform preliminary inspection**

(a) Confirm whether the fault warning lamp is on when the fault occurs.

(b) Confirm the frequency of failure and whether it is random failure, etc.

(c) Confirm the working condition, vehicle speed, accelerator/brake pedal status, etc. when the fault occurs.

(d) Check whether the vehicle has been in an accident or repaired.

(e) Check whether the vehicle power supply system is normal (such as whether the battery terminal is normal and whether the IBC fuse is damaged).

(f) Check the IBC for bump or impact marks.

(g) Check whether the IBC is installed correctly, check the brake fluid reservoir hose for leakage and check its grounding status.

(h) Check the IBC connector connection status and check the connector for rust, false connection, water ingress, etc.

(i) Check and repair according to the problems checked out.

(j) Connect the HQ-VDS.

(k) Set the ignition switch to "ON".

(l) Read and store DTC.

(m) Clear the DTC and power on and off again.

(n) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

OK → **End**

NG

2	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

3	Check harness and connector

(a) Check whether the harness and connector are connected tightly.

(b) Check whether the harness and connector are damaged or aged.

NG → **Repair or replace the harness and connector**

OK

4	**Check the IBC fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the IBC fuse.

(d) Measure the resistance according to the values in the table below.

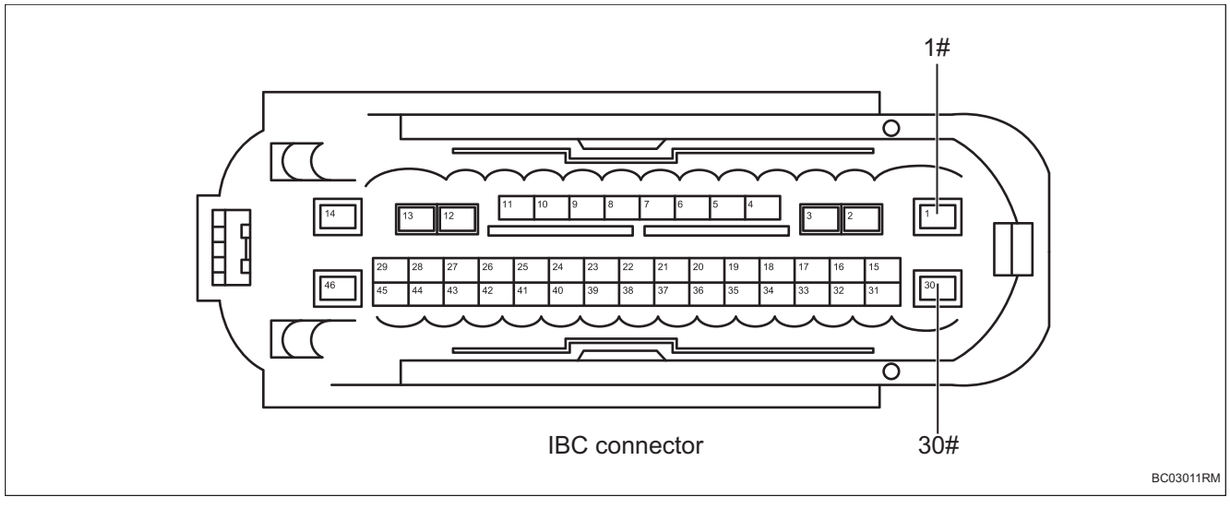
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

5	**Check the IBC ground**



(a) Disconnect the IBC connector.

(b) Measure the resistance according to the values in the table below.

BC

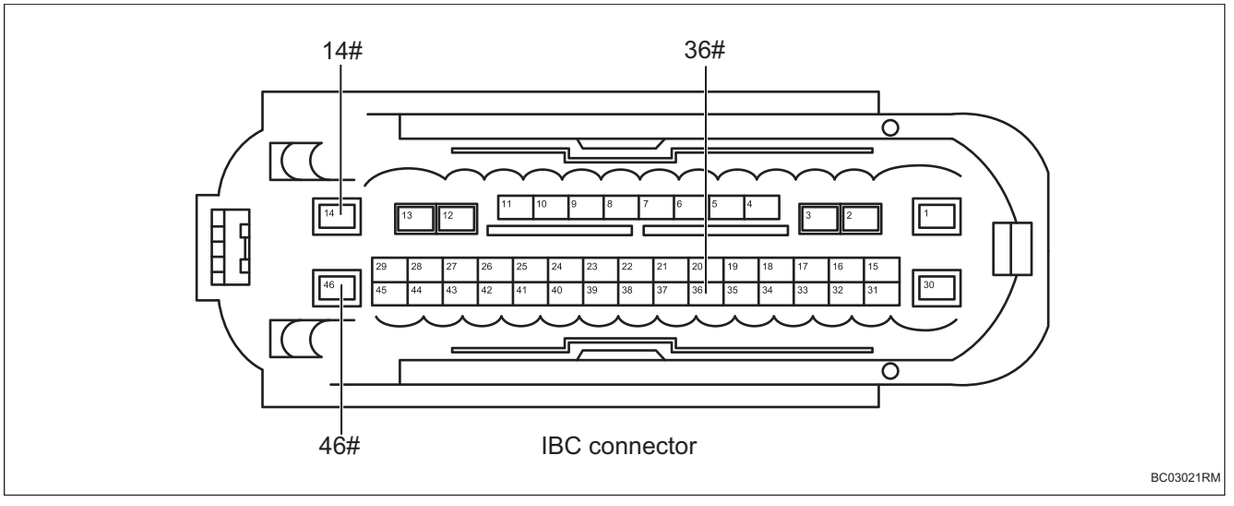
Standard value

Detector connection	Detection conditions	Specified state
IBC connector 1# - body GND	Always connected	Less than 1Ω
IBC connector 30# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

6	Check the IBC power supply



(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

BC

Standard value

Detector connection	Detection conditions	Specified state
IBC connector 14# - body GND	The ignition switch is set to "ON"	Battery voltage
IBC connector 46# - body GND	The ignition switch is set to "ON"	Battery voltage
IBC connector 36# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

7	**Read DTC**

(a) Re-ignite after power-off.

(b) The brake hold is not necessary for more than 30 s.

(c) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

NG → **Replace the IBC (See page BC-118)**

OK

8	**End**

DTC	C055E00	Brake line leakage

Description

When an abnormal system pressure is detected, the IBC records the DTC.

DTC	DTC detection conditions	Faulty location
C055E00	(a) System leakage.	• Brake system line • IBC (internal pressure sensor)

Inspection procedure

1	Perform preliminary inspection

(a) Confirm with the customer what operations were performed before and after the failure.

(b) Check whether there is a text prompt or the fault warning lamp lights up when the fault occurs.

(c) Connect the HQ-VDS.

(d) Set the ignition switch to "ON".

(e) Read and store DTC.

(f) Clear the DTC and power on and off again.

(g) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

OK → **End**

NG

2	Check for CAN-related faults

(a) Check whether there are CAN communication related DTCs.

(b) Check whether the CAN bus hardware and software have faults.

NG → **Repair according to the fault**

OK

3	Check brake line for air

(a) Check the brake line system for air.

BC

NG → **Perform off-line bleeding in the brake system (ensure that there is no residual air in the brake line and IBC)**

OK

4	**Read DTC**

(a) Confirm whether the fault warning lamp is on when the fault occurs.

(b) Confirm the frequency of failure and whether it is random failure, etc.

(c) Confirm the working condition, vehicle speed, accelerator/brake pedal status, etc. when the fault occurs.

(d) Check whether the vehicle has been in an accident or repaired.

(e) Check whether the vehicle power supply system is normal (such as whether the battery terminal is normal and whether the IBC fuse is damaged).

(f) Check the IBC for bump or impact marks.

(g) Check whether the IBC is installed correctly, check the brake fluid reservoir hose for leakage and check its grounding status.

(h) Check the IBC connector connection status and check the connector for rust, false connection, water ingress, etc.

(i) Check and repair according to the problems checked out.

(j) Connect the HQ-VDS.

(k) Set the ignition switch to "ON"

(l) Read and store DTC.

(m) Clear the DTC and power on and off again

(n) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

NG → **Replace the IBC (See page BC-118)**

OK

5	**End**

DTC	**C055F00**	**BSCM/EBBC hydraulic function failure (OBD)**
DTC	**C055FFB**	**IPB system related hydraulic valve mechanical failure**
DTC	**C059700**	**IPB not installed**

Description

When the actual pressure value of the vehicle deviates from the set pressure beyond the set range, the IBC records the DTC.

DTC	DTC detection conditions	Faulty location
C055F00	(a) Abnormal IBC hydraulic function.	• Brake system line • IBC (internal pressure sensor)
C055FFB	(a) IBC hydraulic valve mechanical failure.	• Brake system line • IBC (internal pressure sensor)
C059700	(a) IBC installation failure.	• Brake system line • IBC (internal pressure sensor)

Inspection procedure

1	**Perform preliminary inspection**

(a) Confirm whether the fault warning lamp is on when the fault occurs.

(b) Confirm the frequency of failure and whether it is random failure, etc.

(c) Confirm the working condition, vehicle speed, accelerator/brake pedal status, etc. when the fault occurs.

(d) Check whether the vehicle has been in an accident or repaired.

(e) Check whether the vehicle power supply system is normal (such as whether the battery terminal is normal and whether the IBC fuse is damaged).

(f) Check the IBC for bump or impact marks.

(g) Check whether the IBC is installed correctly, check the brake fluid reservoir hose for leakage and check its grounding status.

(h) Check the IBC connector connection status and check the connector for rust, false connection, water ingress, etc.

(i) Check and repair according to the problems checked out.

(j) Connect the HQ-VDS.

(k) Set the ignition switch to "ON".

(l) Read and store DTC.

(m) Clear the DTC and power on and off again.

(n) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

OK → **End**

NG

2	Check for CAN-related faults

(a) Check whether there are CAN communication related DTCs.

(b) Check whether the CAN bus hardware and software have faults.

NG → **Repair according to the fault**

OK

3	Check brake line for air

(a) Check the brake line system for air.

NG → **Perform off-line bleeding in the brake system (ensure that there is no residual air in the brake line and IBC)**

OK

BC

4	Read DTC

(a) Depress the brake pedal after re-ignition.

(b) Power off the vehicle and wait for 5 minutes.

(c) Wait for 30s after power on again. Do not perform any brake related actions during this period. (Depress the brake pedal, turn on the APB, apply the service brake, etc.)

(d) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

NG → **Replace the IBC (See page BC-118)**

OK

5	**End**

DTC	C055F92	BSCM/EBBC hydraulic function failure
DTC	C05B000	Brake line hydraulic circuit leakage

Description

When hydraulic brake circuit leakage or hydraulic function failure is detected, the IBC records the DTC.

DTC	DTC detection conditions	Faulty location
C055F92	(a) Hydraulic function failure	• Brake system line • IBC (internal pressure sensor)
C05B000	(a) Brake line leakage.	• Brake system line • IBC (internal pressure sensor)

Inspection procedure

1	Perform preliminary inspection

(a) Confirm whether the fault warning lamp is on when the fault occurs.

(b) Confirm the frequency of failure and whether it is random failure, etc.

(c) Confirm the working condition, vehicle speed, accelerator/brake pedal status, etc. when the fault occurs.

(d) Check whether the vehicle has been in an accident or repaired.

(e) Check whether the vehicle power supply system is normal (such as whether the battery terminal is normal and whether the IBC fuse is damaged).

(f) Check the IBC for bump or impact marks.

(g) Check whether the IBC is installed correctly, check the brake fluid reservoir hose for leakage and check its grounding status.

(h) Check the IBC connector connection status and check the connector for rust, false connection, water ingress, etc.

(i) Check and repair according to the problems checked out.

(j) Connect the HQ-VDS.

(k) Set the ignition switch to "ON".

(l) Read and store DTC.

(m) Clear the DTC and power on and off again.

(n) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal

Results	Go to
Fault does not reappear	Normal

OK → End

NG

2	Check for CAN-related faults

(a) Check whether there are CAN communication related DTCs.

(b) Check whether the CAN bus hardware and software have faults.

NG → Repair according to the fault

OK

3	Check brake line for air

(a) Check the brake line system for air.

NG → Perform off-line bleeding in the brake system (ensure that there is no residual air in the brake line and IBC)

OK

4	Read DTC

(a) Depress the brake pedal after re-ignition.

(b) Power off the vehicle and wait for 5 minutes.

(c) Wait for 30s after power on again. Do not perform any brake related actions during this period. (Depress the brake pedal, turn on the APB, apply the service brake, etc.)

(d) Depress the accelerator pedal to accelerate the vehicle above 15 kph.

(e) Wait for 20s. Do not perform any brake related actions during this period. (Depress the brake pedal, turn on the APB, apply the service brake, etc.)

(f) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

OK → **End**

NG

5	Read DTC again

(a) Power off the vehicle and wait for 5 minutes.

(b) Re-ignite and drive at a speed above 30 kph for at least 30 seconds.

(c) Stop the vehicle and shut down the engine. (Set to P gear position and do not apply the parking brake)

(d) Wait for at least 100 s, during which no action is allowed (do not open or close the door, do not turn on any equipment function to avoid disturbing ECU sleep).

(e) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

NG → **Replace the IBC (See page BC-118)**

OK

6	End

DTC	**C0595FC**	**Brushless motor initialization timeout**
DTC	**C059500**	**Brushless motor drive chip not in working mode (OBD)**
DTC	**C058900**	**Position sensor failure**
DTC	**C058800**	**Position sensor failure**
DTC	**C058AFC**	**Brake booster motor "A" position sensor**
DTC	**C059000**	**Brake booster motor phase overcurrent (OBD)**
DTC	**C0590FC**	**Brake booster motor phase overcurrent (OBD)**
DTC	**C059100**	**Brake booster motor phase undercurrent (OBD)**
DTC	**C0591FC**	**Brake booster motor phase undercurrent (OBD)**
DTC	**C059100**	**Brake booster motor phase undercurrent (OBD)**
DTC	**C0591FC**	**Brake booster motor phase undercurrent (OBD)**
DTC	**C059200**	**Brake booster motor "B" phase overcurrent (OBD)**
DTC	**C0592FC**	**Brake booster motor "B" phase overcurrent (OBD)**
DTC	**C059300**	**Brake booster motor "B" phase undercurrent (OBD)**
DTC	**C0593FC**	**Brake booster motor "B" phase undercurrent (OBD)**
DTC	**C059400**	**Brake booster motor "A" fault**
DTC	**C059592**	**Brushless motor drive chip not in working mode**
DTC	**C058A00**	**Angular acceleration value measured by motor position sensor implausible**

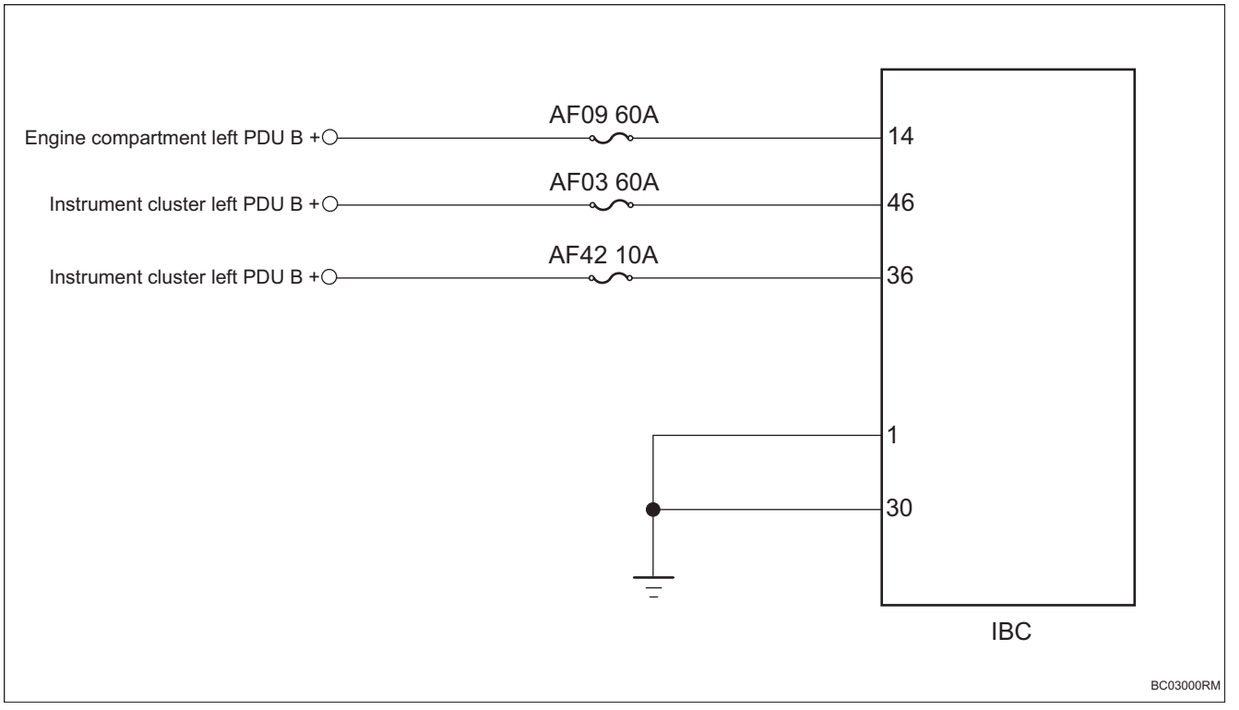
Description

When the IBC pump motor works abnormally, the IBC records the DTC.

DTC	DTC detection conditions	Faulty location
C0595FC	(a) Motor initialization failure.	• IBC • Harness and connector • Fuse • Charging system
C059500	(a) Motor drive chip failure.	• IBC • Harness and connector • Fuse • Charging system
C058900	(a) Position sensor failure.	• IBC • Harness and connector • Fuse • Charging system
C058800	(a) Position sensor failure.	• IBC • Harness and connector • Fuse • Charging system
C058AFC	(a) Booster motor "A" position sensor failure.	• IBC • Fuse • Harness and connector • Charging system
C059000	(a) Booster motor phase overcurrent.	• IBC • Harness and connector • Fuse • Charging system
C0590FC	(a) Booster motor phase overcurrent.	• IBC • Fuse • Harness and connector • Charging system
C059100	(a) Booster motor phase undercurrent.	• IBC • Harness and connector • Fuse • Charging system
C0591FC	(a) Booster motor phase undercurrent.	• IBC • Harness and connector • Fuse • Charging system
C059100	(a) Booster motor phase undercurrent.	• IBC • Harness and connector • Fuse • Charging system
C0591FC	(a) Booster motor phase undercurrent.	• IBC • Harness and connector • Fuse • Charging system

DTC	DTC detection conditions	Faulty location
C059200	(a) Booster motor "B" phase overcurrent.	• IBC • Harness and connector • Fuse • Charging system
C0592FC	(a) Booster motor "B" phase overcurrent.	• IBC • Harness and connector • Fuse • Charging system
C059300	(a) Booster motor "B" phase undercurrent.	• IBC • Harness and connector • Fuse • Charging system
C0593FC	(a) Booster motor "B" phase undercurrent.	• IBC • Harness and connector • Fuse • Charging system
C059400	(a) Booster motor "A" failure.	• IBC • Harness and connector • Fuse • Charging system
C059592	(a) Motor drive chip failure.	• IBC • Harness and connector • Fuse • Charging system
C058A00	(a) Motor angular acceleration value implausible.	• IBC • Harness and connector • Fuse • Charging system

Circuit diagram



Inspection procedure

1	**Perform preliminary inspection**

(a) Confirm whether the fault warning lamp is on when the fault occurs.

(b) Confirm the frequency of failure and whether it is random failure, etc.

(c) Confirm the working condition, vehicle speed, accelerator/brake pedal status, etc. when the fault occurs.

(d) Check whether the vehicle has been in an accident or repaired.

(e) Check whether the vehicle power supply system is normal (such as whether the battery terminal is normal and whether the IBC fuse is damaged).

(f) Check the IBC for bump or impact marks.

(g) Check whether the IBC is installed correctly, check the brake fluid reservoir hose for leakage and check its grounding status.

(h) Check the IBC connector connection status and check the connector for rust, false connection, water ingress, etc.

(i) Check and repair according to the problems checked out.

(j) Connect the HQ-VDS.

(k) Set the ignition switch to "ON".

(l) Read and store DTC.

(m) Clear the DTC and power on and off again.

(n) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

OK → **End**

NG

2	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

3	Check harness and connector

(a) Check whether the harness and connector are connected tightly.

(b) Check whether the harness and connector are damaged or aged.

NG → **Repair or replace the harness and connector**

OK

4	Check the IBC fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the IBC fuse.

(d) Measure the resistance according to the values in the table below.

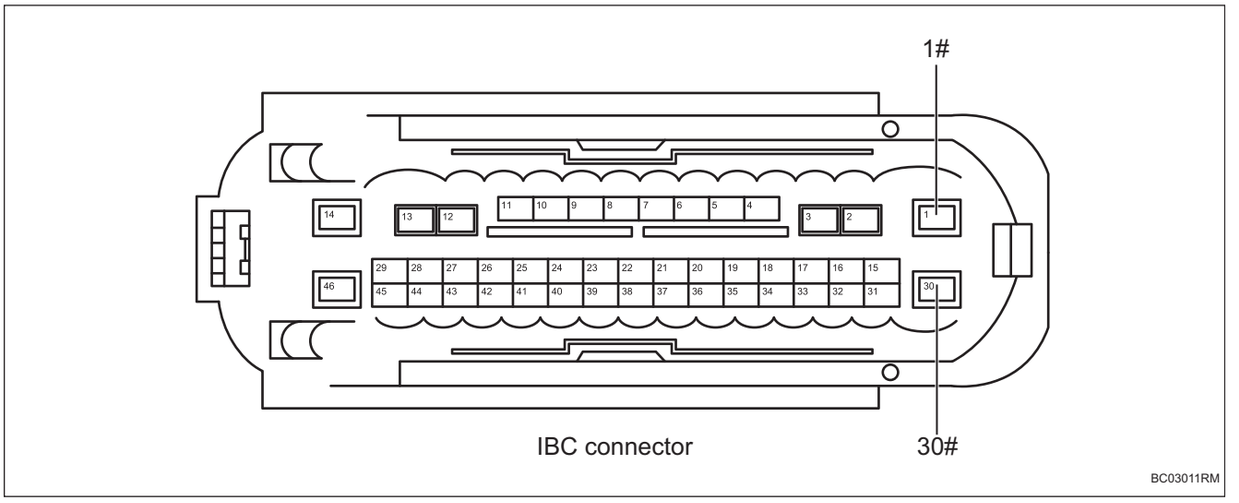
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

5	Check the IBC ground



(a) Disconnect the IBC connector.

(b) Measure the resistance according to the values in the table below.

Standard value

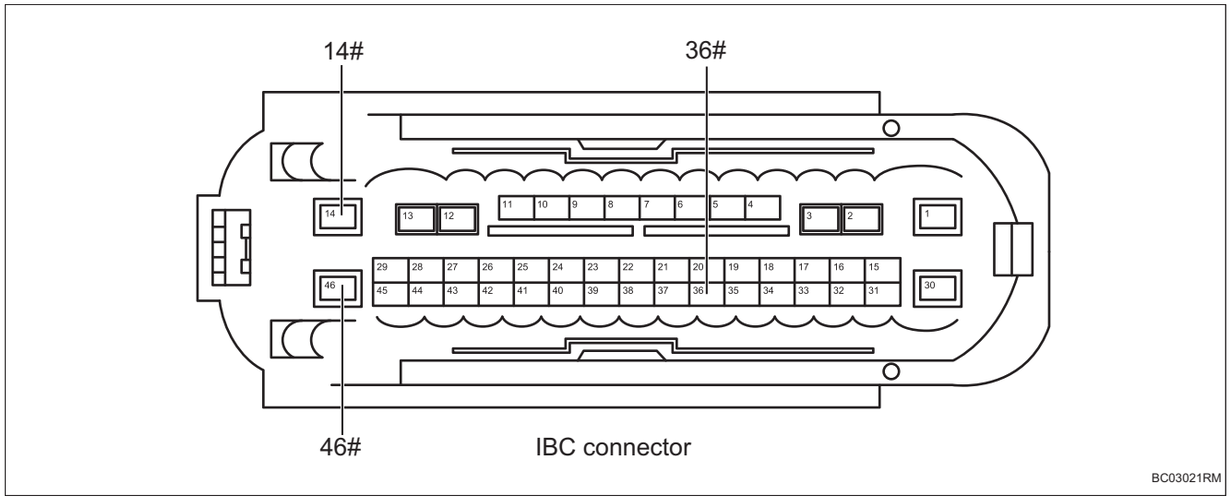
Detector connection	Detection conditions	Specified state
IBC connector 1# - body GND	Always connected	Less than 1Ω
IBC connector 30# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

6	Check the IBC power supply

BC



(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
IBC connector 14# - body GND	The ignition switch is set to "ON"	Battery voltage
IBC connector 46# - body GND	The ignition switch is set to "ON"	Battery voltage
IBC connector 36# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

7	**Replace the IBC (See page BC-118)**

DTC	C108C08	Reverse gear signal change failure

Description

When the bake fluid level sensor fails, the IBC records the DTC.

DTC	DTC detection conditions	Faulty location
C108C08	(a) Reverse gear signal failure.	• Brake lamp switch • Harness and connector • EGSM

Inspection procedure

1	Check brake lamp switch

(a) Check whether the brake lamp switch is installed correctly.

(b) Check whether the brake lamp switch is damaged.

(c) Check the brake lamp switch harness and connector for short circuit or open circuit.

NG → **Repair according to the fault**

OK

2	Check EGSM

(a) Check the EGSM for faults.

NG → **Repair according to the fault**

OK

3	End

DTC	C121208	Variant error

Description

When the configuration information is not written or there is an error, the IBC records the DTC.

DTC	DTC detection conditions	Faulty location
C121208	(a) Abnormal configuration information.	• Abnormal configuration information

Inspection procedure

1	**Write correct configuration information via HQ-VDS**

DTC	C156D62	EPB position unknown or EPB motor abnormal
DTC	C1567FC	Right caliper harness failure
DTC	C156701	Right caliper harness failure
DTC	C156700	Right caliper polarity error
DTC	C1566FC	Left caliper harness failure
DTC	C156601	Left caliper harness failure
DTC	C156600	Left caliper polarity error
DTC	C15611E	Coupling between left and right caliper harnesses
DTC	C155D45	Failure to perform operation requested by PBC to read and write NVM
DTC	C155C00	Time for pulling up or pressing down APB button out of limit
DTC	C154A00	Left caliper motor or piston stalling during release
DTC	C154900	Right caliper motor or piston stalling during release
DTC	C154800	Abnormal right caliper current
DTC	C154700	Excessive current difference between both ends of left caliper
DTC	C154604	Excessive current difference between both ends of the right caliper
DTC	C155512	APB BUTTON circuit power supply undervoltage
DTC	C156800	During initialization test, the left caliper enable line detects undesired voltage level
DTC	C156801	During initialization test, the left caliper enable line detects undesired voltage level
DTC	C156801	Left caliper mofet deactivation test failure
DTC	C15681D	Left caliper short circuit
DTC	C1568FC	Left caliper internal LS side control failure

DTC	C156900	During initialization test, the right caliper enable line detects undesired voltage level
DTC	C156901	Right caliper mofet deactivation test failure
DTC	C15691D	Right caliper short circuit
DTC	C1569FC	Right caliper internal LS side control failure
DTC	C156B00	Initialization phase APB MIC CRC error
DTC	C156BFC	Periodic monitoring of APB MIC CRC error
DTC	C156C00	MICAPBGPIO overtemperature
DTC	C156C92	Caliper control affected by implausible memory data
DTC	C013976	PBC fault39
DTC	C013776	PBC fault37
DTC	C013696	PBC fault36
DTC	C013596	PBC fault35
DTC	C013496	PBC fault34
DTC	C013396	PBC fault33
DTC	C013296	PBC fault32
DTC	C013196	PBC fault31
DTC	C013096	PBC fault30
DTC	C012996	PBC fault29
DTC	C012896	PBC fault28
DTC	C012796	PBC fault27
DTC	C012696	PBC fault26
DTC	C012596	PBC fault25
DTC	C012496	PBC fault24
DTC	C012396	PBC fault23
DTC	C012296	PBC fault22
DTC	C012196	PBC fault21
DTC	C012096	PBC fault20

DTC	**C011996**	**PBC fault19**
DTC	**C011896**	**PBC fault18**
DTC	**C011796**	**PBC fault17**
DTC	**C011696**	**PBC fault16**
DTC	**C011596**	**PBC fault15**
DTC	**C011496**	**PBC fault14**
DTC	**C011396**	**PBC fault13**
DTC	**C011296**	**PBC fault12**
DTC	**C011196**	**PBC fault11**
DTC	**C011096**	**PBC fault10**
DTC	**C010996**	**PBC fault9**
DTC	**C010896**	**PBC fault8**
DTC	**C010796**	**PBC fault7**
DTC	**C010696**	**PBC fault6**
DTC	**C010596**	**PBC fault5**
DTC	**C010496**	**PBC fault4**
DTC	**C010396**	**PBC fault3**
DTC	**C010296**	**PBC fault2**
DTC	**C010196**	**PBC fault1**
DTC	**C010096**	**PBC fault0**
DTC	**C156000**	**Left EPB actuator electronic fault**
DTC	**C156100**	**Left EPB actuator electronic fault**

Description

When the IBC detects a brake caliper related fault, the IBC records the DTC.

DTC	DTC detection conditions	Faulty location
C156D62	(a) EPB position unknown or EPB motor abnormal	• IBC • Harness and connector • Brake caliper
C1567FC	(a) Right caliper harness failure	• IBC • Harness and connector • Brake caliper

DTC	DTC detection conditions	Faulty location
C156701	(a) Right caliper harness failure	• IBC • Harness and connector • Brake caliper
C156700	(a) Right caliper polarity error	• IBC • Harness and connector • Brake caliper
C1566FC	(a) Left caliper harness failure	• IBC • Harness and connector • Brake caliper
C156601	(a) Left caliper harness failure	• IBC • Harness and connector • Brake caliper
C156600	(a) Left caliper polarity error	• IBC • Harness and connector • Brake caliper
C15611E	(a) Coupling between left and right caliper harnesses	• IBC • Harness and connector • Brake caliper
C155D45	(a) Failure to perform operation requested by PBC to read and write NVM	• IBC • Harness and connector • Brake caliper
C155C00	(a) Time for pulling up or pressing down APB button out of limit	• IBC • Harness and connector • Brake caliper
C154A00	(a) Left caliper motor or piston stalling during release	• IBC • Harness and connector • Brake caliper
C154900	(a) Right caliper motor or piston stalling during release	• IBC • Harness and connector • Brake caliper
C154800	(a) Abnormal right caliper current	• IBC • Harness and connector • Brake caliper
C154700	(a) Excessive current difference between both ends of left caliper	• IBC • Harness and connector • Brake caliper
C154604	(a) Excessive current difference between both ends of right caliper	• IBC • Harness and connector • Brake caliper
C155512	(a) APB BUTTON circuit power supply undervoltage	• IBC • Harness and connector • Brake caliper

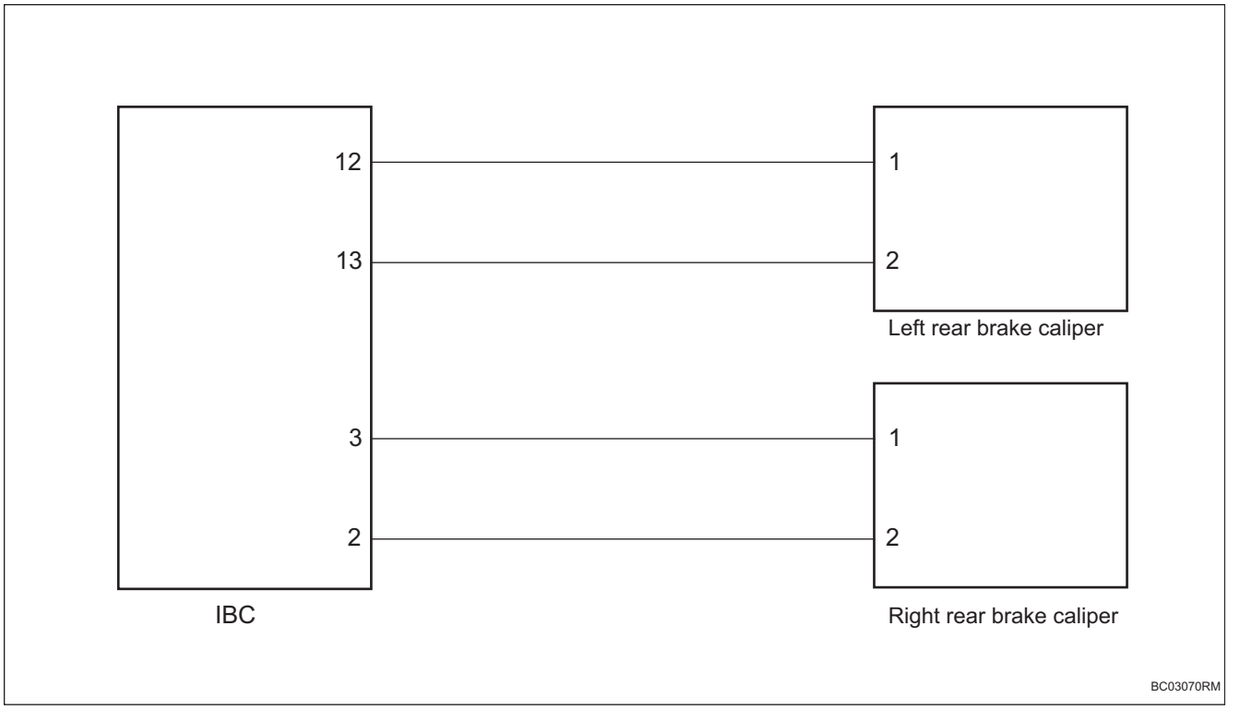
DTC	DTC detection conditions	Faulty location
C156800	(a) During initialization test, the left caliper enable line detects undesired voltage level	• IBC • Harness and connector • Brake caliper
C156801	(a) During initialization test, the left caliper enable line detects undesired voltage level	• IBC • Harness and connector • Brake caliper
C156801	(a) Left caliper mofet deactivation test failure	• IBC • Harness and connector • Brake caliper
C15681D	(a) left caliper short circuit	• IBC • Harness and connector • Brake caliper
C1568FC	(a) Left caliper internal LS side control failure	• IBC • Harness and connector • Brake caliper
C156900	(a) During initialization test, the right caliper enable line detects undesired voltage level	• IBC • Harness and connector • Brake caliper
C156901	(a) Right caliper mofet deactivation test failure	• IBC • Harness and connector • Brake caliper
C15691D	(a) right caliper short circuit	• IBC • Harness and connector • Brake caliper
C1569FC	(a) Right caliper internal LS side control failure	• IBC • Harness and connector • Brake caliper
C156B00	(a) Initialization phase APB MIC CRC error	• IBC • Harness and connector • Brake caliper
C156BFC	(a) Periodic monitoring of APB MIC CRC error	• IBC • Harness and connector • Brake caliper
C156C00	(a) MICAPBGPIO overtemperature	• IBC • Harness and connector • Brake caliper
C156C92	(a) Caliper control affected by implausible memory data	• IBC • Harness and connector • Brake caliper
C013976	(a) PBC fault39	• IBC • Harness and connector • Brake caliper

DTC	DTC detection conditions	Faulty location
C013776	PBC fault37	• IBC • Harness and connector • Brake caliper
C013696	(a) PBC fault36	• IBC • Harness and connector • Brake caliper
C013596	(a) PBC fault35	• IBC • Harness and connector • Brake caliper
C013496	(a) PBC fault34	• IBC • Harness and connector • Brake caliper
C013396	(a) PBC fault33	• IBC • Harness and connector • Brake caliper
C013296	(a) PBC fault32	• IBC • Harness and connector • Brake caliper
C013196	(a) PBC fault31	• IBC • Harness and connector • Brake caliper
C013096	(a) PBC fault30	• IBC • Harness and connector • Brake caliper
C012996	(a) PBC fault29	• IBC • Harness and connector • Brake caliper
C012896	(a) PBC fault28	• IBC • Harness and connector • Brake caliper
C012796	(a) PBC fault27	• IBC • Harness and connector • Brake caliper
C012696	(a) PBC fault26	• IBC • Harness and connector • Brake caliper
C012596	(a) PBC fault25	• IBC • Harness and connector • Brake caliper
C012496	(a) PBC fault24	• IBC • Harness and connector • Brake caliper

DTC	DTC detection conditions	Faulty location
C012396	(a) PBC fault23	• IBC • Harness and connector • Brake caliper
C012296	(a) PBC fault22	• IBC • Harness and connector • Brake caliper
C012196	(a) PBC fault21	• IBC • Harness and connector • Brake caliper
C012096	(a) PBC fault20	• IBC • Harness and connector • Brake caliper
C011996	(a) PBC fault19	• IBC • Harness and connector • Brake caliper
C011896	(a) PBC fault18	• IBC • Harness and connector • Brake caliper
C011796	(a) PBC fault17	• IBC • Harness and connector • Brake caliper
C011696	(a) PBC fault16	• IBC • Harness and connector • Brake caliper
C011596	(a) PBC fault15	• IBC • Harness and connector • Brake caliper
C011496	(a) PBC fault14	• IBC • Harness and connector • Brake caliper
C011396	(a) PBC fault13	• IBC • Harness and connector • Brake caliper
C011296	(a) PBC fault12	• IBC • Harness and connector • Brake caliper
C011196	(a) PBC fault11	• IBC • Harness and connector • Brake caliper
C011096	(a) PBC fault10	• IBC • Harness and connector • Brake caliper

DTC	DTC detection conditions	Faulty location
C010996	(a) PBC fault9	• IBC • Harness and connector • Brake caliper
C010896	(a) PBC fault8	• IBC • Harness and connector • Brake caliper
C010796	(a) PBC fault7	• IBC • Harness and connector • Brake caliper
C010696	(a) PBC fault6	• IBC • Harness and connector • Brake caliper
C010596	(a) PBC fault5	• IBC • Harness and connector • Brake caliper
C010496	(a) PBC fault4	• IBC • Harness and connector • Brake caliper
C010396	(a) PBC fault3	• IBC • Harness and connector • Brake caliper
C010296	(a) PBC fault2	• IBC • Harness and connector • Brake caliper
C010196	(a) PBC fault1	• IBC • Harness and connector • Brake caliper
C010096	(a) PBC fault0	• IBC • Harness and connector • Brake caliper
C156000	(a) Left EPB actuator electronic fault	• IBC • Harness and connector • Brake caliper
C156100	(a) Left EPB actuator electronic fault	• IBC • Harness and connector • Brake caliper

Circuit diagram



Inspection procedure

1	**Perform preliminary inspection**

(a) Confirm whether the fault warning lamp is on when the fault occurs.

(b) Confirm the frequency of failure and whether it is random failure, etc.

(c) Confirm the working condition, vehicle speed, accelerator/brake pedal status, etc. when the fault occurs.

(d) Check whether the vehicle has been in an accident or repaired.

(e) Check whether the vehicle power supply system is normal (such as whether the battery terminal is normal and whether the IBC fuse is damaged).

(f) Check the IBC for bump or impact marks.

(g) Check whether the IBC is installed correctly, check the brake fluid reservoir hose for leakage and check its grounding status.

(h) Check the IBC connector connection status and check the connector for rust, false connection, water ingress, etc.

(i) Check and repair according to the problems checked out.

(j) Connect the HQ-VDS.

(k) Set the ignition switch to "ON".

(l) Read and store DTC.

(m) Clear the DTC and power on and off again.

(n) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

OK → **End**

NG

2	Check the brake caliper

(a) Check whether the appearance of the brake caliper is normal.

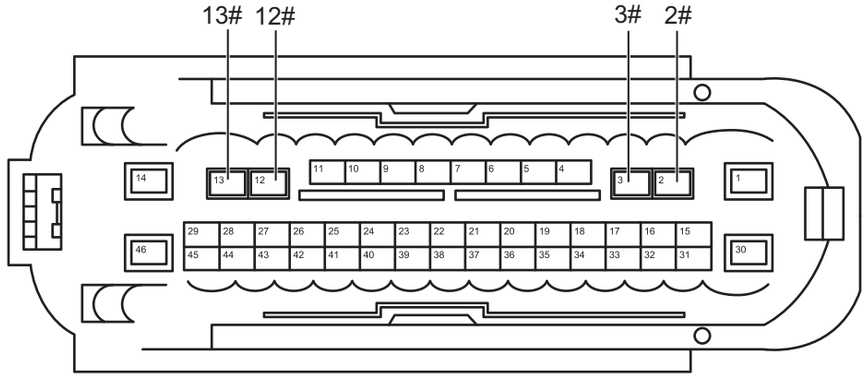
(b) Check whether the brake caliper is installed correctly.

(c) Check the brake caliper pipeline for leakage.

NG → **Repair according to the fault phenomenon**

OK

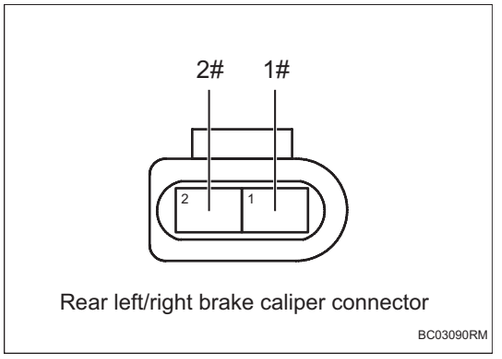
3	Check brake caliper harness and connector for open circuit



IBC connector

BC03081RM

BC



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the IBC connector.

(d) Disconnect the brake caliper connector.

(e) Measure the resistance according to the values in the table below.

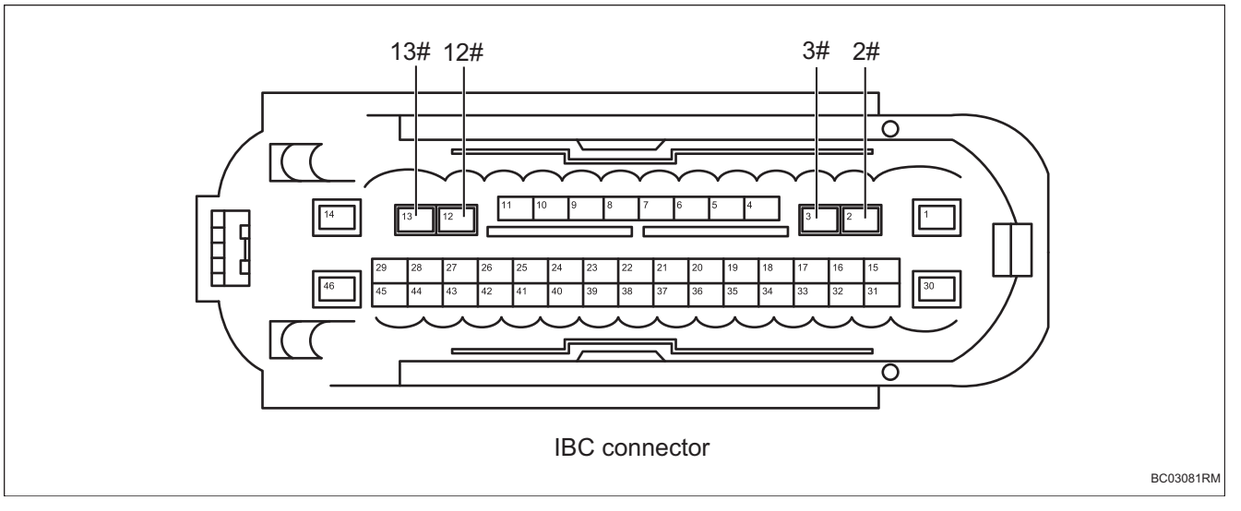
Standard value

Detector connection	Detection conditions	Specified state
Left rear brake caliper connector 1# -IBC connector 12#	Always connected	Less than 1Ω
Left rear brake caliper connector 2# -IBC connector 13#	Always connected	Less than 1Ω
Right rear brake caliper connector 1# -IBC connector 3#	Always connected	Less than 1Ω
Right rear brake caliper connector 2# -IBC connector 2#	Always connected	Less than 1Ω

NG → **Repair and replace harness or connector**

OK

4	**Check brake caliper harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
IBC connector 13# -body GND	Always connected	10 KΩ or greater

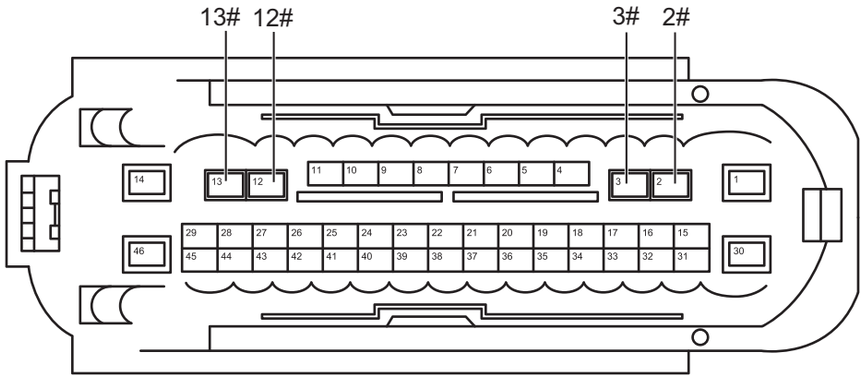
BC

Detector connection	Detection conditions	Specified state
IBC connector 12# -body GND	Always connected	10 KΩ or greater
IBC connector 3# -body GND	Always connected	10 KΩ or greater
IBC connector 2# -body GND	Always connected	10 KΩ or greater

NG → **Repair and replace harness or connector**

OK

5	**Check brake caliper harness and connector for circuit shorted to power supply**



IBC connector

BC03081RM

(a) Connect the battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
IBC connector 13# -body GND	Set the ignition switch to "ON"	Less than 1 V
IBC connector 12# -body GND	Set the ignition switch to "ON"	Less than 1 V
IBC connector 3# -body GND	Set the ignition switch to "ON"	Less than 1 V
IBC connector 2# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair and replace harness or connector**

OK

6	**Replace left/right rear brake caliper (See page BR-18)**

(a) Replace the left/right rear brake caliper.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the IBC (See page BC-118)**

OK

7	**End**

DTC	C200004	Misuse hub mode

Description

When the hub mode is misused, the IBC records the DTC.

DTC	DTC detection conditions	Faulty location
C200004	(a) Misuse hub mode.	• Hub mode setting

Inspection procedure

1	Set hub mode by diagnostic command

DTC	C2A1700	Air in hydraulic brake circuit
DTC	C055FFC	IPB system related hydraulic valve mechanical failure (OBD)

Description

When there is air in the hydraulic brake circuit or the hydraulic valve has mechanical failure, the IBC records the DTC.

DTC	DTC detection conditions	Faulty location
C2A1700	(a) Air in brake circuit.	• Brake system line • IBC (internal pressure sensor)
C055FFC	(a) Hydraulic valve mechanical failure.	• Brake system line • IBC (internal pressure sensor)

Inspection procedure

1	Perform preliminary inspection

(a) Confirm whether the fault warning lamp is on when the fault occurs.

(b) Confirm the frequency of failure and whether it is random failure, etc.

(c) Confirm the working condition, vehicle speed, accelerator/brake pedal status, etc. when the fault occurs.

(d) Check whether the vehicle has been in an accident or repaired.

(e) Check whether the vehicle power supply system is normal (such as whether the battery terminal is normal and whether the IBC fuse is damaged).

(f) Check the IBC for bump or impact marks.

(g) Check whether the IBC is installed correctly, check the brake fluid reservoir hose for leakage and check its grounding status.

(h) Check the IBC connector connection status and check the connector for rust, false connection, water ingress, etc.

(i) Check and repair according to the problems checked out.

(j) Connect the HQ-VDS.

(k) Set the ignition switch to "ON".

(l) Read and store DTC.

(m) Clear the DTC and power on and off again.

(n) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

OK → **End**

NG

2	**Check for CAN-related faults**

(a) Check whether there are CAN communication related DTCs.

(b) Check whether the CAN bus hardware and software have faults.

NG → **Repair according to the fault**

OK

3	**Check brake line for air**

(a) Check the brake line system for air.

NG → **Perform off-line bleeding in the brake system (ensure that there is no residual air in the brake line and IBC)**

OK

4	**Read DTC**

(a) Re-ignite.

(b) Power off the vehicle and wait for 5 minutes.

(c) Re-ignite and drive at a speed above 15 kph for at least 30 seconds. (d) Stop the vehicle normally and turn off the engine.

(d) Wait 2 minutes, during which period of time there shall be no action. (Do not open or close the door, and do not turn on any equipment to avoid disturbing ECU sleep)

(e) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal

Results	Go to
Fault does not reappear	Normal

OK → **End**

NG

5	**Read DTC again**

(a) Power off the vehicle and wait for 5 minutes.

(b) Re-ignite, start at 0 bar, and slowly depress the brake pedal (build up to about 10 bar per second) until the pressure reaches 40 bar. Hold the pressure for 10 seconds. Release the pedal slowly (release a pressure of approx. 10 bar per second). Wait 2 minutes, during which period of time there shall be no action. (Do not open or close the door, and do not turn on any equipment to avoid disturbing ECU sleep)

(c) Do this for 5 times.

(d) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

NG → **Replace the IBC (See page BC-118)**

OK

6	**End**

DTC	P000000	System failure to sleep normally

Description

When the system sleeps abnormally due to failure to power down normally, the IBC records the DTC.

DTC	DTC detection conditions	Faulty location
P000000	(a) System failure to sleep normally.	• Power on and off again

Inspection procedure

1	**Power on and off again, and clear DTC**

DTC	P25C700	Internal hardware error (OBD)
DTC	P25C600	Internal hardware error (OBD)
DTC	C057A00	Brake booster temperature sensor "B" circuit undervoltage (OBD)
DTC	C057900	Brake booster temperature sensor "B" circuit undervoltage (OBD)
DTC	C054100	Pressure sensor failure
DTC	C059900	Incompatible RPS calibration software version
DTC	P060B00	ECU internal error (OBD)
DTC	P06B800	Lips ID value read failure
DTC	P06B8FC	RPS NVM value read fairure
DTC	P060400	RAM fault (OBD)
DTC	P060500	ROM fault
DTC	P060600	ECU internal error (OBD)
DTC	P057B00	Brake pedal position sensor circuit internal fault
DTC	P057C00	Brake pedal position sensor circuit undervoltage
DTC	P057D00	Brake pedal position sensor circuit overvoltage
DTC	P057E00	Brake pedal position sensor circuit intermittent failure
DTC	P05DD00	Brake pedal position sensor circuit undervoltage
DTC	P05DE00	Brake pedal position sensor circuit overvoltage
DTC	P05DF00	Brake pedal position sensor circuit intermittent failure
DTC	P05E000	Brake pedal displacement sensor measurement error (OBD)

DTC	**P05E009**	**Brake pedal displacement sensor measurement error**
DTC	**P060200**	**ECU internal error (OBD)**
DTC	**P062C00**	**Wheel speed sensor IC test failure**
DTC	**C057E00**	**Brake pedal position sensor circuit intermittent failure (OBD)**
DTC	**C05C200**	**Booster motor overtemperature (OBD)**
DTC	**C05C24B**	**Booster motor overtemperature**
DTC	**C05C300**	**Brake booster motor "A" power supply circuit**
DTC	**C061900**	**Travel sensor 1 correction value incorrect**
DTC	**C061A00**	**Travel sensor 2 correction value incorrect**
DTC	**C1000FC**	**APBMI software and hardware error**
DTC	**C102001**	**ECU internal hardware, control unit error (OBD)**
DTC	**P05FF00**	**BSM related error, brake pedal hard (OBD)**
DTC	**P05FF09**	**BSM related error, brake pedal hard/soft**
DTC	**P05FF03**	**Brake master cylinder pressure applied by the driver greater than expected**
DTC	**P0606FC**	**ECU internal error (OBD)**
DTC	**C100004**	**ECU internal fault**
DTC	**C101008**	**ECU internal error (OBD)**
DTC	**P05CB00**	**Vehicle hardware mismatch**
DTC	**C100104**	**Network timeout caused by hardware fault**
DTC	**C100047**	**ECU internal error (OBD)**

Description

When there is a fault inside the IBC, the IBC records the DTC.

DTC	DTC detection conditions	Faulty location
P25C700	(a) Internal hardware error (OBD)	• IBC • Harness and connector • Fuse • Charging system

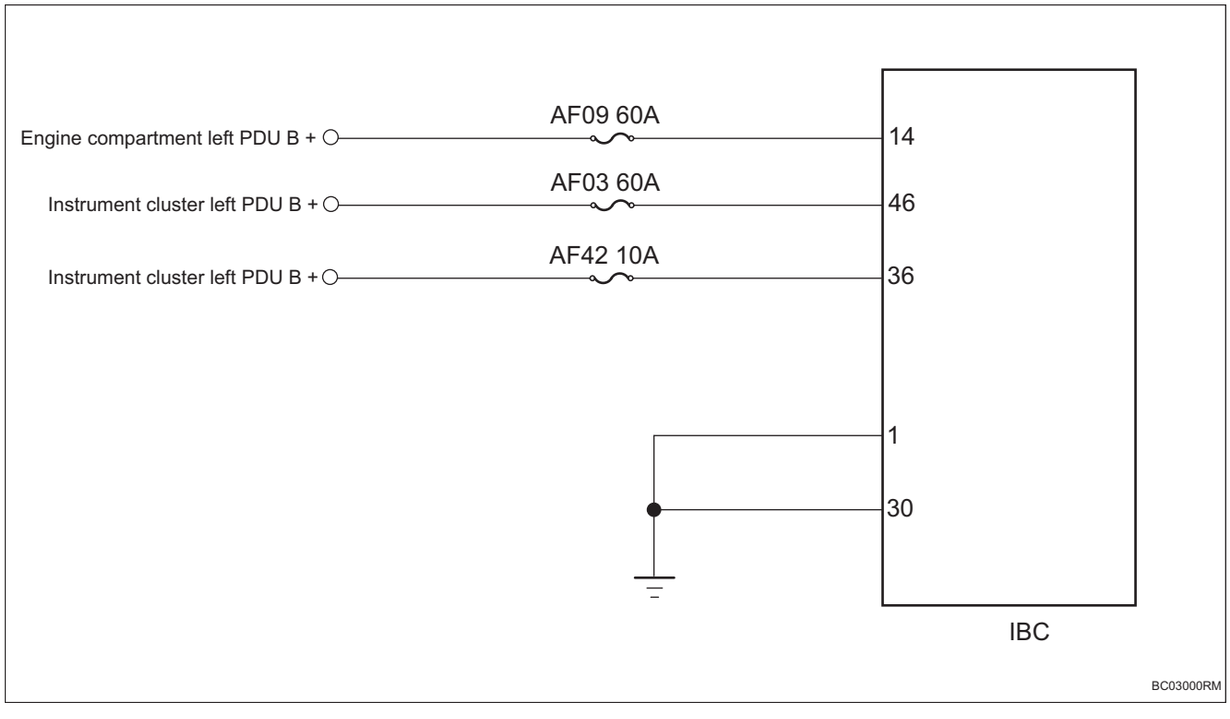
DTC	DTC detection conditions	Faulty location
P25C600	(a) Internal hardware error (OBD)	• IBC • Harness and connector • Fuse • Charging system
C057A00	(a) Brake booster temperature sensor "B" circuit undervoltage (OBD)	• IBC • Harness and connector • Fuse • Charging system
C057900	(a) Brake booster temperature sensor "B" circuit undervoltage (OBD)	• IBC • Harness and connector • Fuse • Charging system
C054100	(a) Pressure sensor failure	• IBC • Fuse • Harness and connector • Charging system
C059900	(a) Incompatible RPS calibration software version	• IBC • Harness and connector • Fuse • Charging system
P060B00	(a) ECU internal error (OBD)	• IBC • Fuse • Harness and connector • Charging system
P06B800	(a) Lips ID value read failure	• IBC • Harness and connector • Fuse • Charging system
P06B8FC	(a) RPS NVM value read failure	• IBC • Harness and connector • Fuse • Charging system
P060400	(a) RAM fault (OBD)	• IBC • Harness and connector • Fuse • Charging system
P060500	(a) ROM fault	• IBC • Harness and connector • Fuse • Charging system
P060600	(a) ECU internal error (OBD)	• IBC • Harness and connector • Fuse • Charging system

DTC	DTC detection conditions	Faulty location
P057B00	(a) Brake pedal position sensor circuit internal fault	• IBC • Harness and connector • Fuse • Charging system
P057C00	(a) Brake pedal position sensor circuit undervoltage	• IBC • Harness and connector • Fuse • Charging system
P057D00	(a) Brake pedal position sensor circuit overvoltage	• IBC • Harness and connector • Fuse • Charging system
P057E00	(a) Brake pedal position sensor circuit intermittent failure	• IBC • Harness and connector • Fuse • Charging system
P05DD00	(a) Brake pedal position sensor circuit undervoltage	• IBC • Harness and connector • Fuse • Charging system
P05DE00	(a) Brake pedal position sensor circuit overvoltage	• IBC • Harness and connector • Fuse • Charging system
P05DF00	(a) Brake pedal position sensor circuit intermittent failure	• IBC • Harness and connector • Fuse • Charging system
P05E000	(a) Brake pedal displacement sensor measurement error (OBD)	• IBC • Harness and connector • Fuse • Charging system
P05E009	(a) Brake pedal displacement sensor measurement error	• IBC • Harness and connector • Fuse • Charging system
P060200	(a) ECU internal error (OBD)	• IBC • Harness and connector • Fuse • Charging system
P062C00	(a) Wheel speed sensor IC test failure	• IBC • Fuse • Harness and connector • Charging system

DTC	DTC detection conditions	Faulty location
C057E00	(a) Brake pedal position sensor circuit intermittent failure (OBD)	• IBC • Harness and connector • Fuse • Charging system
C05C200	(a) Booster motor overtemperature (OBD)	• IBC • Fuse • Harness and connector • Charging system
C05C24B	(a) Booster motor overtemperature	• IBC • Harness and connector • Fuse • Charging system
C05C300	(a) Brake booster motor "A" power supply circuit	• IBC • Harness and connector • Fuse • Charging system
C061900	(a) Travel sensor 1 correction value incorrect	• IBC • Harness and connector • Fuse • Charging system
C061A00	(a) Travel sensor 2 correction value incorrect	• IBC • Harness and connector • Fuse • Charging system
C1000FC	(a) APBMI software and hardware error	• IBC • Harness and connector • Fuse • Charging system
C102001	(a) ECU internal hardware and control unit error (OBD)	• IBC • Harness and connector • Fuse • Charging system
P05FF00	(a) BSM related error, brake pedal hard (OBD)	• IBC • Harness and connector • Fuse • Charging system
P05FF09	(a) BSM related error, brake pedal hard/soft	• IBC • Harness and connector • Fuse • Charging system
P05FF03	(a) Brake master cylinder pressure applied by the driver greater than expected	• IBC • Harness and connector • Fuse • Charging system

DTC	DTC detection conditions	Faulty location
P0606FC	(a) ECU internal error (OBD)	• IBC • Harness and connector • Fuse • Charging system
C100004	(a) ECU internal fault	• IBC • Harness and connector • Fuse • Charging system
C101008	(a) ECU internal error (OBD)	• IBC • Harness and connector • Fuse • Charging system
P05CB00	(a) Vehicle hardware mismatch	• IBC • Harness and connector • Fuse • Charging system
C100104	(a) Network timeout caused by hardware fault	• IBC • Harness and connector • Fuse • Charging system
C100047	(a) ECU internal error (OBD)	• IBC • Harness and connector • Fuse • Charging system

Circuit diagram



Inspection procedure

1	**Perform preliminary inspection**

(a) Confirm whether the fault warning lamp is on when the fault occurs.

(b) Confirm the frequency of failure and whether it is random failure, etc.

(c) Confirm the working condition, vehicle speed, accelerator/brake pedal status, etc. when the fault occurs.

(d) Check whether the vehicle has been in an accident or repaired.

(e) Check whether the vehicle power supply system is normal (such as whether the battery terminal is normal and whether the IBC fuse is damaged).

(f) Check the IBC for bump or impact marks.

(g) Check whether the IBC is installed correctly, check the brake fluid reservoir hose for leakage and check its grounding status.

(h) Check the IBC connector connection status and check the connector for rust, false connection, water ingress, etc.

(i) Check and repair according to the problems checked out.

(j) Connect the HQ-VDS.

(k) Set the ignition switch to "ON".

(l) Read and store DTC.

(m) Clear the DTC and power on and off again.

(n) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

BC

OK → **End**

NG

2	**Check the battery voltage**

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

3	**Check harness and connector**

(a) Check whether the harness and connector are connected tightly.

(b) Check whether the harness and connector are damaged or aged.

NG → **Repair or replace the harness and connector**

OK

4	**Check the IBC fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the IBC fuse.

(d) Measure the resistance according to the values in the table below.

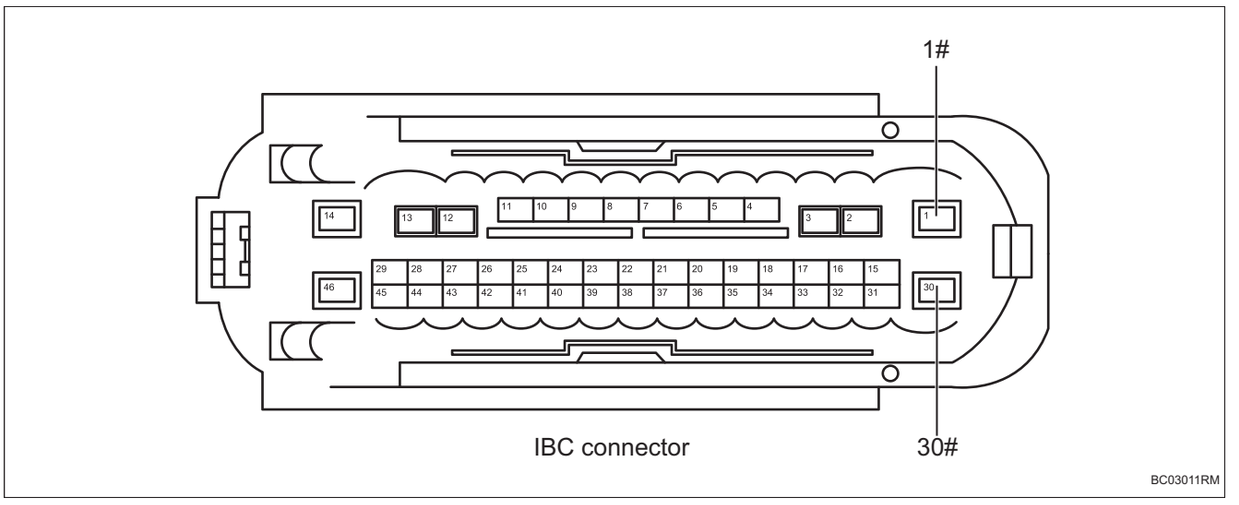
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

5	**Check the IBC ground**



(a) Disconnect the IBC connector.

(b) Measure the resistance according to the values in the table below.

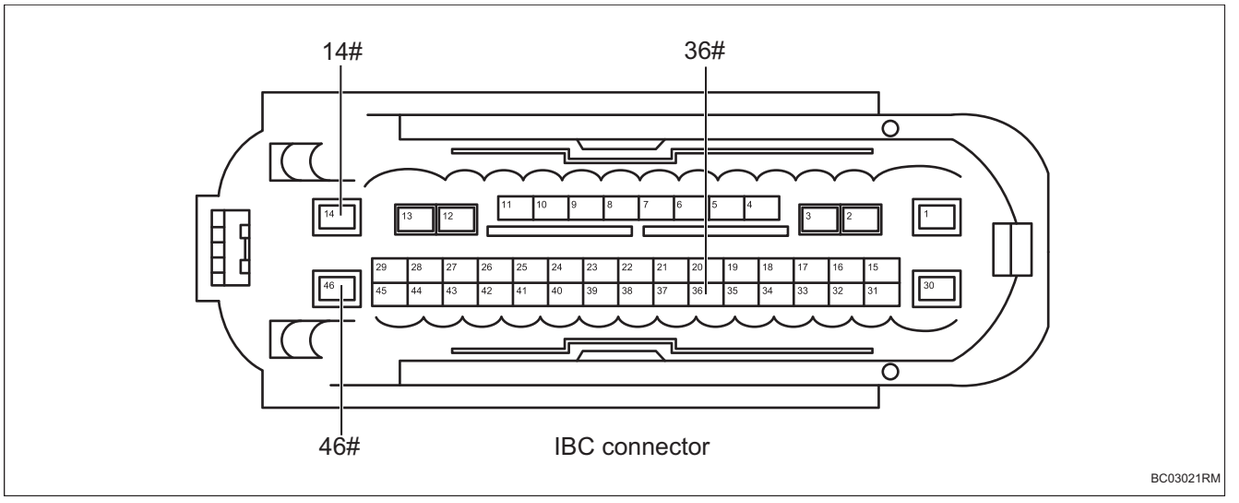
Standard value

Detector connection	Detection conditions	Specified state
IBC connector 1# - body GND	Always connected	Less than 1Ω
IBC connector 30# - body GND	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

6	**Check the IBC power supply**



(a) Install the fuse.

BC

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
IBC connector 14# - body GND	The ignition switch is set to "ON"	Battery voltage
IBC connector 46# - body GND	The ignition switch is set to "ON"	Battery voltage
IBC connector 36# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

7	**Read DTC**

(a) Re-ignite after power-off.

(b) The brake hold is not necessary for more than 30 s.

(c) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

NG → **Replace the IBC (See page BC-118)**

OK

8	**End**

DTC	U006488	CAN bus off
DTC	U007300	CAN bus off (OBD)
DTC	U129387	HCU message lost
DTC	U1293F7	HCU message lost (OBD)
DTC	U1100F7	EMS message lost (OBD)
DTC	U113887	DMS message lost
DTC	U124587	HU message lost
DTC	U123587	IFC message lost
DTC	U119987	DDCU message lost
DTC	U116487	ATC message lost
DTC	U115587	IC message lost
DTC	U115187	YAW message lost
DTC	U114687	GW message lost
DTC	U059486	HCU signal error
DTC	U059484	HCU message length error
DTC	U059483	HCU message checksum error
DTC	U059482	HCU count error
DTC	U0594F6	HCU signal error (OBD)
DTC	U0594F4	HCU message length error (OBD)
DTC	U0594F3	HCU check error (OBD)
DTC	U0594F2	HCU count error (OBD)
DTC	U0401F4	EMS message length error (OBD)
DTC	U043986	DMS signal error
DTC	U043984	DMS message length error
DTC	U043983	DMS check error
DTC	U043982	DMS count error
DTC	U054686	HU signal error
DTC	U054684	HU message length error
DTC	U054683	HU check error

DTC	U054682	HU message count error
DTC	U049A84	DDCU message length error
DTC	U045286	YAW signal error
DTC	U045284	YAW message length
DTC	U045283	YAW message checksum error
DTC	U045282	YAW message count error
DTC	U044786	GW signal error
DTC	U044784	GW message length error
DTC	U043386	IFC signal error
DTC	U043384	IFC message length error
DTC	U043383	IFC message checksum error
DTC	U043382	IFC message count error
DTC	C046008	SAS signal invalid
DTC	U042086	SAS signal error
DTC	U042084	SAS message length error
DTC	U042083	SAS message checksum error
DTC	U042082	SAS message count error
DTC	U042484	ATC message length error
DTC	U042486	ATC signal error
DTC	U042386	IC signal error
DTC	U042384	IC message length error
DTC	U013187	SAS message lost
DTC	U000700	CAN undervoltage
DTC	U000400	CAN undervoltage (OBD)
DTC	U000500	CAN overvoltage

Description

When the communication between the IBC and other systems is abnormal or interrupted, the IBC records the DTC.

DTC	DTC detection conditions	Faulty location
U006488	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U007300	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U129387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U1293F7	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U1100F7	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U113887	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U124587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U123587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U119987	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U116487	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059486	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059484	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059483	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059482	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U0594F6	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U0594F4	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U0594F3	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U0594F2	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

DTC	DTC detection conditions	Faulty location
U0401F4	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U043986	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U043984	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U043983	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U043982	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U054686	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U054684	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U054683	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U054682	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U049A84	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U045286	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U045284	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U045283	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U045282	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U044786	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U044784	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U043386	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U043384	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U043383	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U043382	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
C046008	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

DTC	DTC detection conditions	Faulty location
U042086	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042084	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042083	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042082	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042484	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042486	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042386	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042384	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U013187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U000700	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U000400	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U000500	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

DTC	**P056024**	**UBB power supply lost**
DTC	**P056300**	**ECU power supply overvoltage**
DTC	**P056200**	**Low voltage causes ECU number of consecutive restarts out of limit (OBD)**
DTC	**P0562FC**	**Power supply undervoltage**
DTC	**P056023**	**UBVR power supply lost**
DTC	**C190004**	**Power supply voltage greater than voltage threshold**
DTC	**C190104**	**Low voltage causes ECU number of consecutive restarts out of limit**
DTC	**C1901FC**	**Power supply undervoltage**

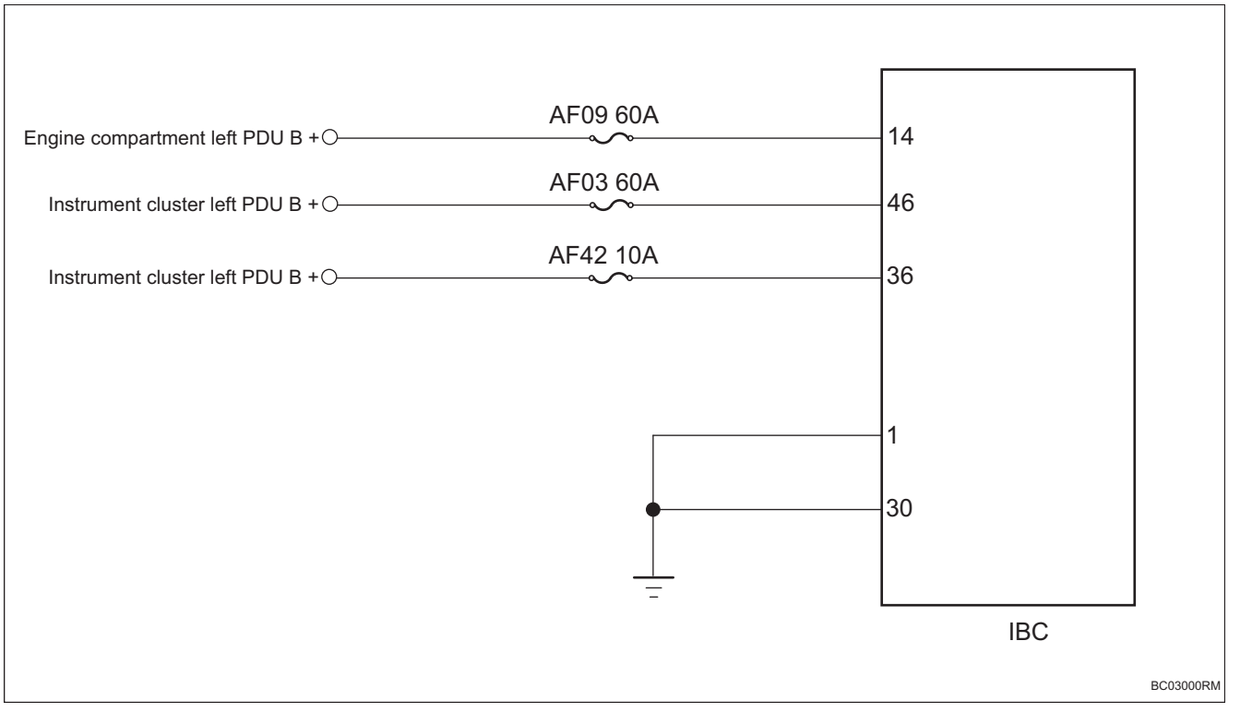
Description

When the IBC power supply voltage is abnormal, the IBC records the DTC.

DTC	DTC detection conditions	Faulty location
P056024	(a) UBB power supply lost	• IBC • Harness and connector • Fuse • Charging system
P056300	(a) ECU power supply overvoltage	• IBC • Harness and connector • Fuse • Charging system
P056200	(a) Low voltage causes ECU number of consecutive restarts out of limit (OBD)	• IBC • Harness and connector • Fuse • Charging system
P0562FC	(a) Power supply undervoltage	• IBC • Harness and connector • Fuse • Charging system
P056023	(a) UBVR power supply lost	• IBC • Fuse • Harness and connector • Charging system
C190004	(a) Power supply voltage greater than voltage threshold	• IBC • Harness and connector • Fuse • Charging system

DTC	DTC detection conditions	Faulty location
C190104	(a) Low voltage causes ECU number of consecutive restarts out of limit	• IBC • Fuse • Harness and connector • Charging system
C1901FC	(a) Power supply undervoltage	• IBC • Harness and connector • Fuse • Charging system

Circuit diagram



Inspection procedure

1	**Perform preliminary inspection**

BC

(a) Confirm whether the fault warning lamp is on when the fault occurs.

(b) Confirm the frequency of failure and whether it is random failure, etc.

(c) Confirm the working condition, vehicle speed, accelerator/brake pedal status, etc. when the fault occurs.

(d) Check whether the vehicle has been in an accident or repaired.

(e) Check whether the vehicle power supply system is normal (such as whether the battery terminal is normal and whether the IBC fuse is damaged).

(f) Check the IBC for bump or impact marks.

(g) Check whether the IBC is installed correctly, check the brake fluid reservoir hose for leakage and check its grounding status.

(h) Check the IBC connector connection status and check the connector for rust, false connection, water ingress, etc.

(i) Check and repair according to the problems checked out.

(j) Connect the HQ-VDS.

(k) Set the ignition switch to "ON".

(l) Read and store DTC.

(m) Clear the DTC and power on and off again.

(n) Re-read the DTC.

Results:

Results	Go to
Fault reappears	Abnormal
Fault does not reappear	Normal

OK → **End**

NG

2	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

3	Check the IBC fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the IBC fuse.

(d) Measure the resistance according to the values in the table below.

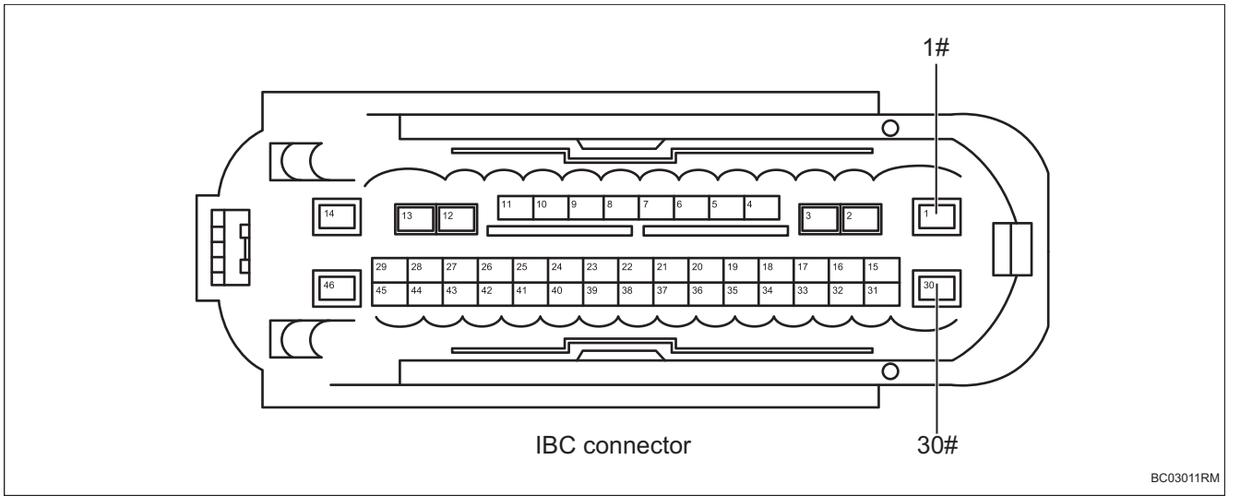
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

4	Check the IBC ground



(a) Disconnect the IBC connector.

(b) Measure the resistance according to the values in the table below.

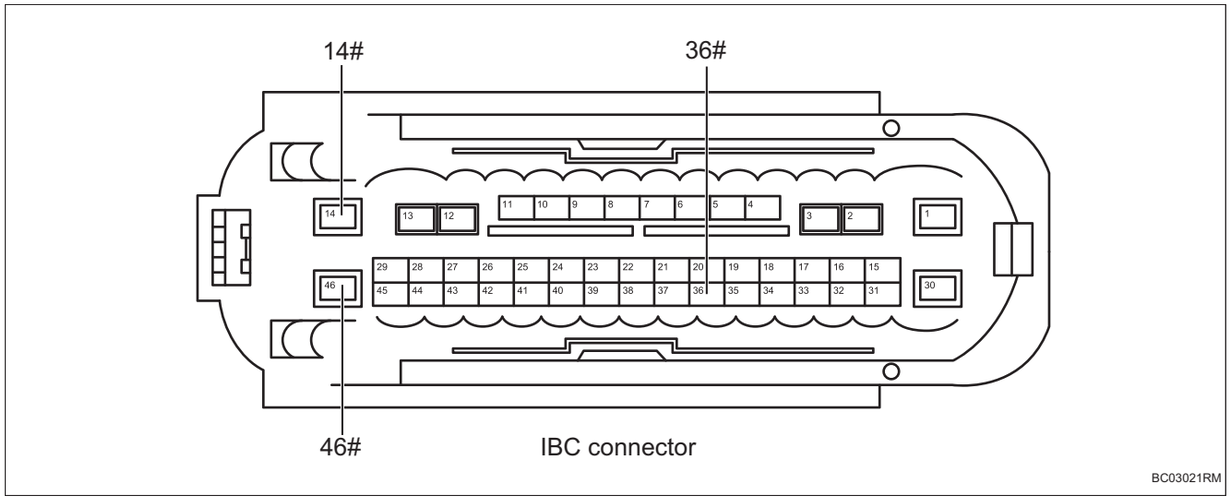
Standard value

Detector connection	Detection conditions	Specified state
IBC connector 1# - body GND	Always connected	Less than 1Ω
IBC connector 30# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

5	Check the IBC power supply



(a) Install the fuse.

(b) Connection the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
IBC connector 14# - body GND	The ignition switch is set to "ON"	Battery voltage
IBC connector 46# - body GND	The ignition switch is set to "ON"	Battery voltage
IBC connector 36# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

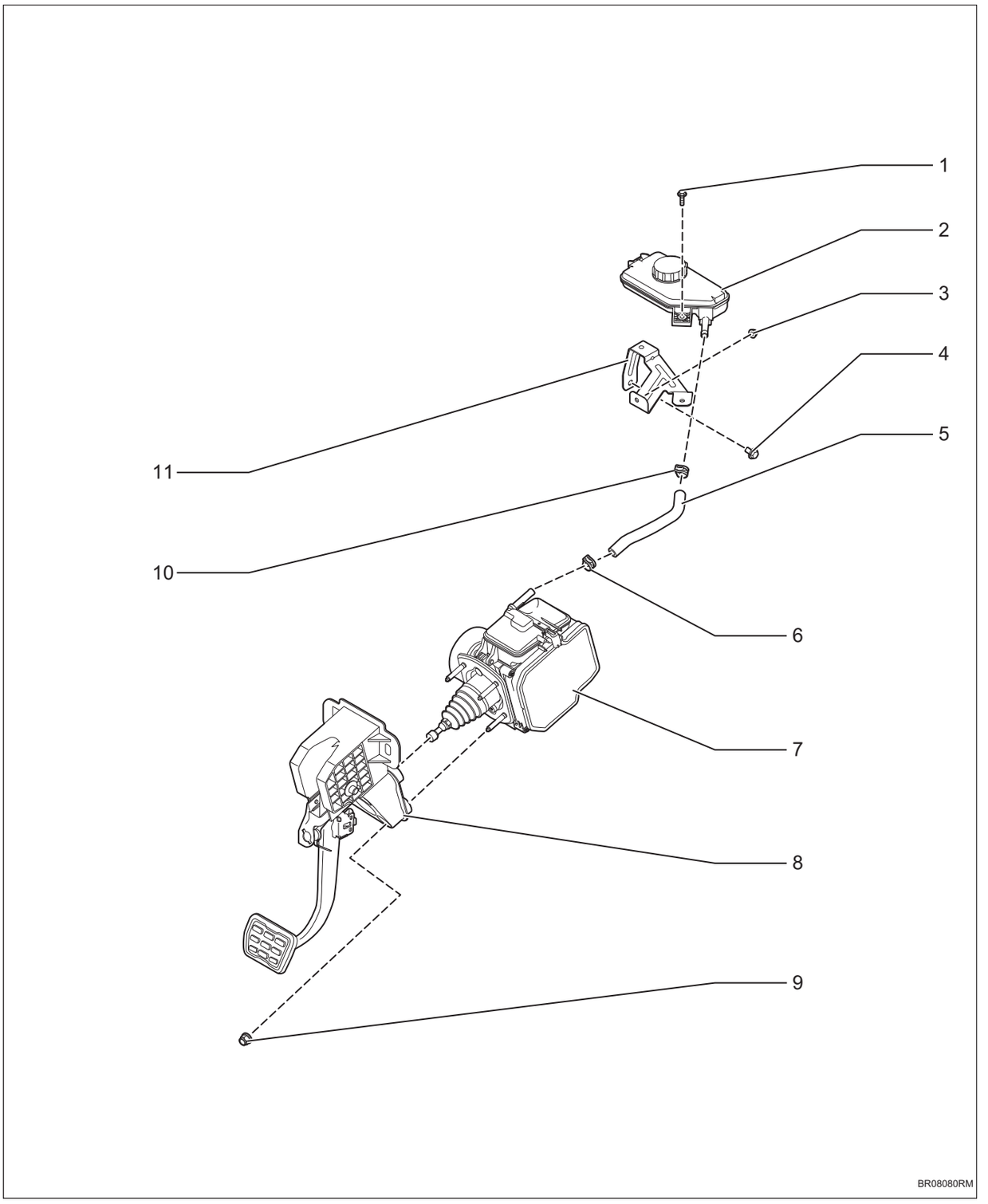
OK

6	**Replace the IBC (See page BC-118)**

BC

IBC assembly

Parts



1. Hexagon flange bolt

- X2

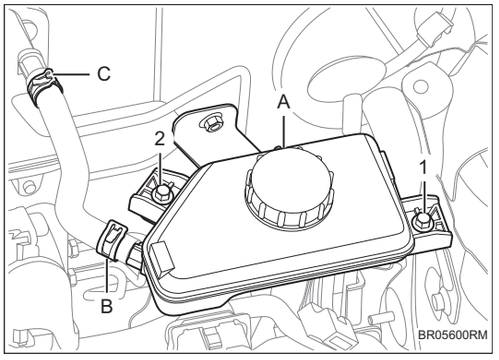
- Torque: 7.8~10.8 N · m

2. **Split fluid reservoir assembly**
3. **Hexagon flange nut**
   - Torque: 7.8~10.8 N · m
4. **Hexagon flange bolt**
   - Torque: 18.6~25.5 N · m
5. **Reservoir connecting hose**
6. **Steel band spring hose clamp**
7. **IBC assembly**
8. **Brake pedal**
9. **Hexagon flange nut**
   - X4
   - Torque: 18.6~25.5 N · m
   - Tightening sequence: crosswise and diagonal tightening
10. **Steel band spring hose clamp**
11. **Reservoir bracket assembly**

Removal

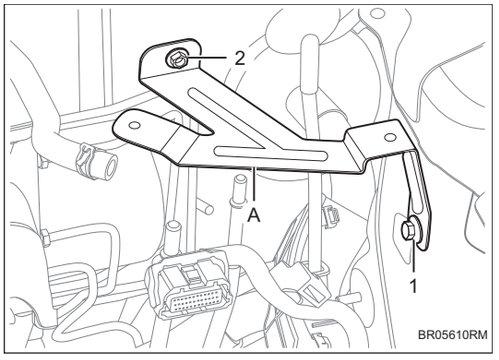
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Drain brake fluid (See page BR-1)**
3. **Remove left lower guard plate of instrument cluster (See page IP-5)**
4. **Remove brake lamp switch (See page BR-4)**
5. **Remove the split fluid reservoir assembly (only for HEV models)**

   (a) Detach the clamp-B-C-, and remove the reservoir connecting hose.



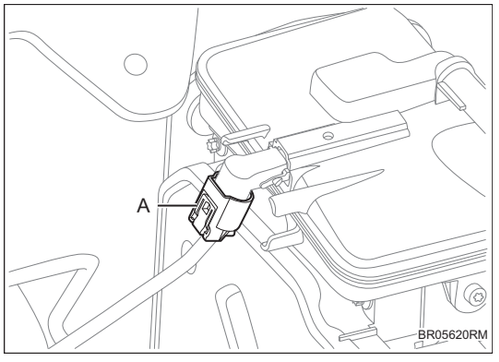
   (b) Remove the bolt -1-2-, and remove the split fluid reservoir assembly-A-.

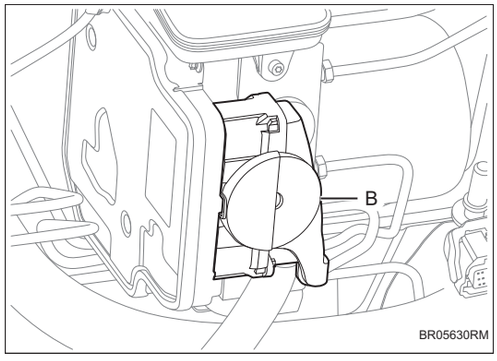
   (c) Remove the bolt -1-nut -2-, and remove the reservoir bracket assembly-A-.



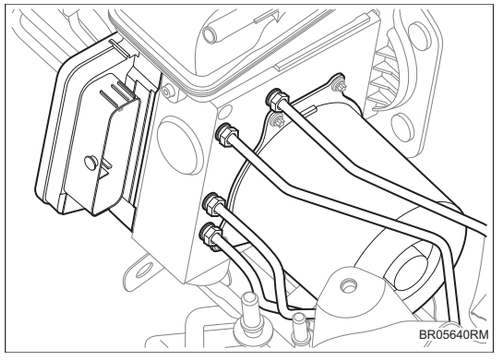
6. **Remove IBC assembly (only for HEV models)**

   (a) Disconnect the bake fluid level sensor harness connector-A-.

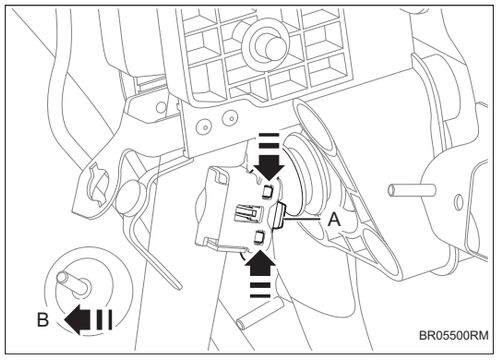




(b) Disconnect the IBC assembly harness connector-B-.



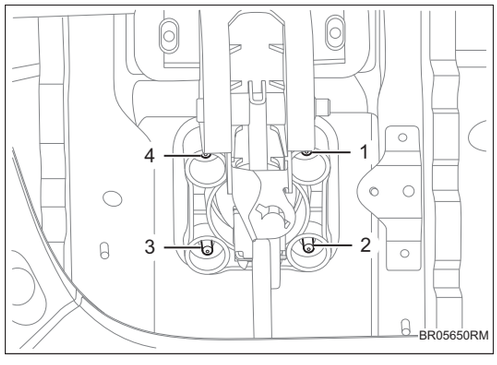
(c) Detach nut -1-4-, and disconnect the brake pipe from the integrated brake control assembly-A.



(d) Detach a total of 4 fixing claws -arrow- on the left and right.

(e) Pry the brake pedal assembly in the direction of -arrow B-, and detach the locking clip -A-.

(f) Remove the nut -1-4- and remove the IBC assembly.



BC

Installation

1. The installation procedure is the reverse of removal procedure, and the following points apply:

Caution:

Replace the shim with a new one during installation and clean the part with a plastic scraper before installing the new shim. Please do not leave scratches on the part.

Brake system

Brake fluid BR-1
- On-board inspection BR-1
- Change the braking fluid BR-1

Brake switch assembly BR-3
- Parts BR-3
- Removal BR-4
- Installation BR-4

Brake pedal BR-5
- Parts BR-5
- Removal BR-6
- Installation BR-7

Front brake disc BR-8
- Parts BR-8
- Check BR-9
- Removal BR-10
- Installation BR-10

Front brake caliper assembly BR-11
- Parts BR-11
- Removal BR-13
- Installation BR-14

Rear brake disc BR-15
- Parts BR-15
- Check BR-16
- Removal BR-17
- Installation BR-17

Rear brake caliper assembly BR-18
- Parts BR-18
- Removal BR-19
- Installation BR-20

Electric vacuum pump BR-21
- Parts BR-21
- Removal BR-23
- Installation BR-25

Vacuum booster & master cylinder and reservoir assembly BR-26
- Parts BR-26
- Removal BR-27
- Installation BR-28

Brake pipe assembly BR-29

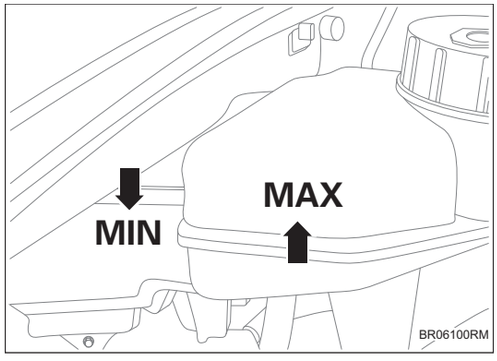
Part (only for HEV) BR-29
Parts BR-31
Removal BR-33
Installation BR-38

Brake fluid

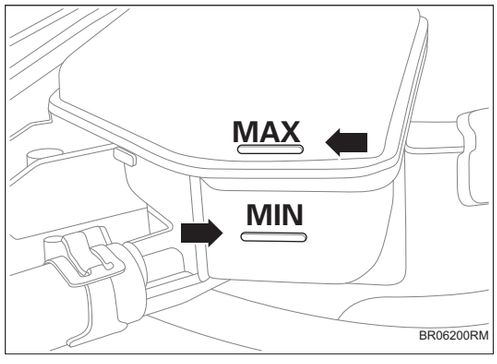
On-board inspection

1. Check brake fluid

(a) Check whether the brake fluid level in the vacuum booster reservoir is between the MAX and MIN marks.



(b) Check if the brake fluid level in the split fluid reservoir assembly is between the MAX and MIN marks. (Only for HEV models)



Hint:

If the fluid level is below the MIN mark, add brake fluid.

Check the brake system for leaks, and if there are abnormalities, repair or replace abnormal parts.

Change the braking fluid

Hint:

If any operation is performed on the brake system or air is suspected in the brake line, the brake system should be bled.

Note:

Before bleeding the brake system, move the gearshift lever to the P gear position and apply the parking brake.

While bleeding the brake system, add brake fluid to keep the fluid level in the reservoir between the MIN and MAX lines.

If brake fluid is splashed on any painted or rubber surface, it shall be cleaned immediately.

1. Add the brake fluid to the reservoir and ensure that there is enough brake fluid in the reservoir.

Type of brake fluid	Brake fluid capacity
DOT4	Only for HEV models 0.82±0.05 L (L)
DOT4	0.74±0.05 L

2. Bleed the brake master cylinder

(a) Individually loose the brake line nuts on the brake master cylinder by using a suitable tool.

(b) Slowly depress the brake pedal and hold it.

(c) Repeat several times until no bubbles are generated.

3. Bleed the brake line

(a) Connect plastic pipe to bleed screw.

(b) Press brake pedal several times and then press the pedal and loosen the bleed screw.

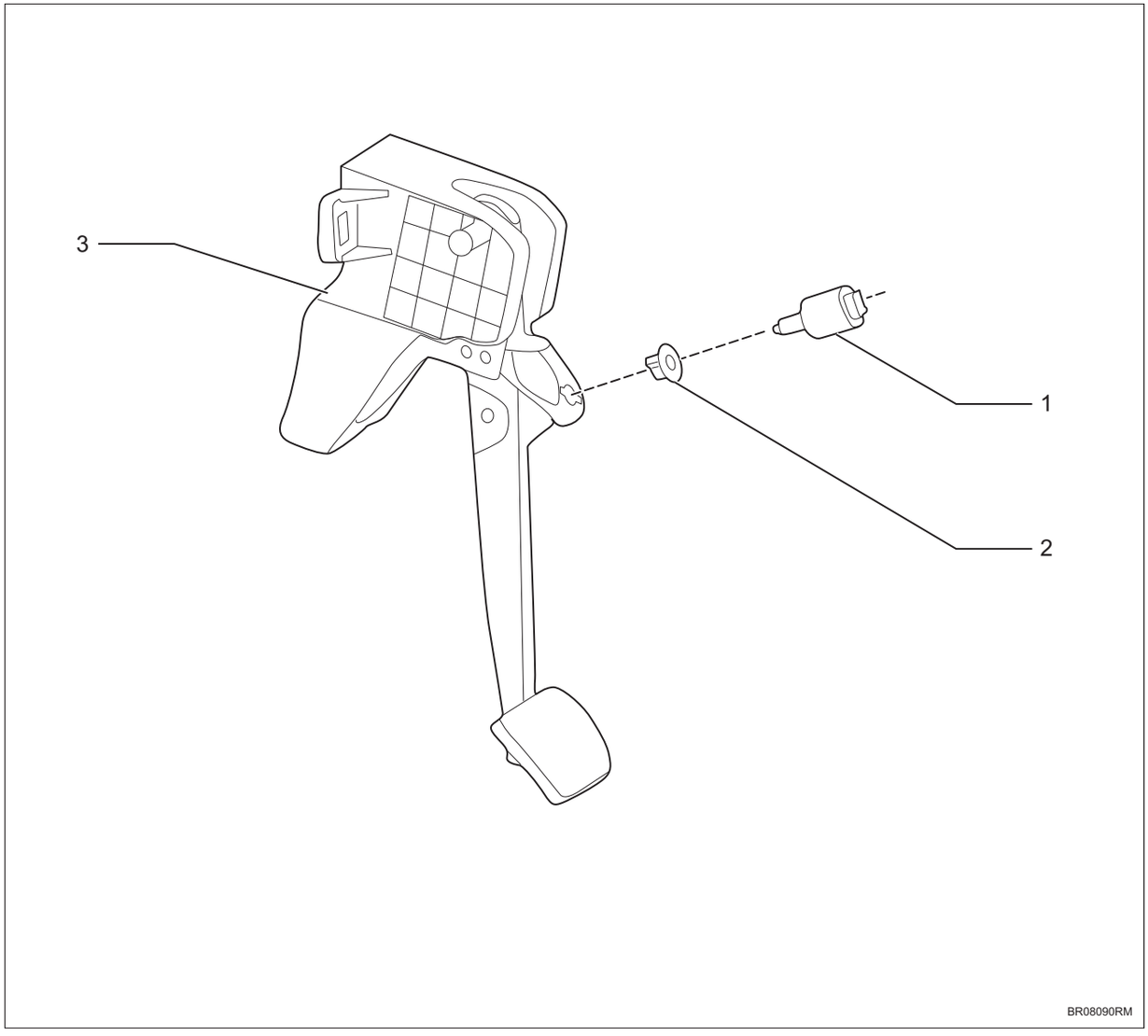
(c) Tighten bleed screw when brake fluid no longer spills.

(d) Repeat several times until no bubbles are generated in the discharged brake fluid.

(e) Fasten the bleed screw.

Brake switch assembly

Parts



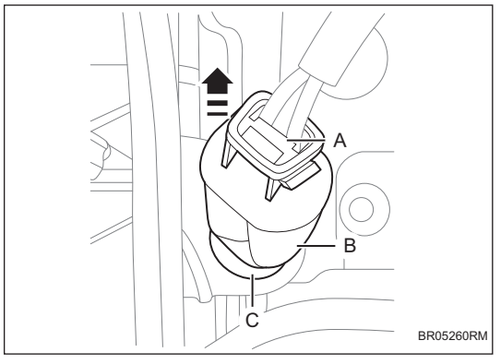
1. **Brake switch assembly**
2. **Resin nut assembly**
3. **Brake pedal bracket assembly**

Removal

Hint:

Depress the brake pedal before removing the brake switch assembly.

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove instrument cluster left lower guard plate (See page IP-5)**
3. **Remove brake switch assembly**



(a) Disconnect the harness connector-A- of brake switch assembly-B-.

(b) Rotate and remove the brake switch assembly-B- as arrowed.

(c) Remove the resin nut assembly-C-.

Installation

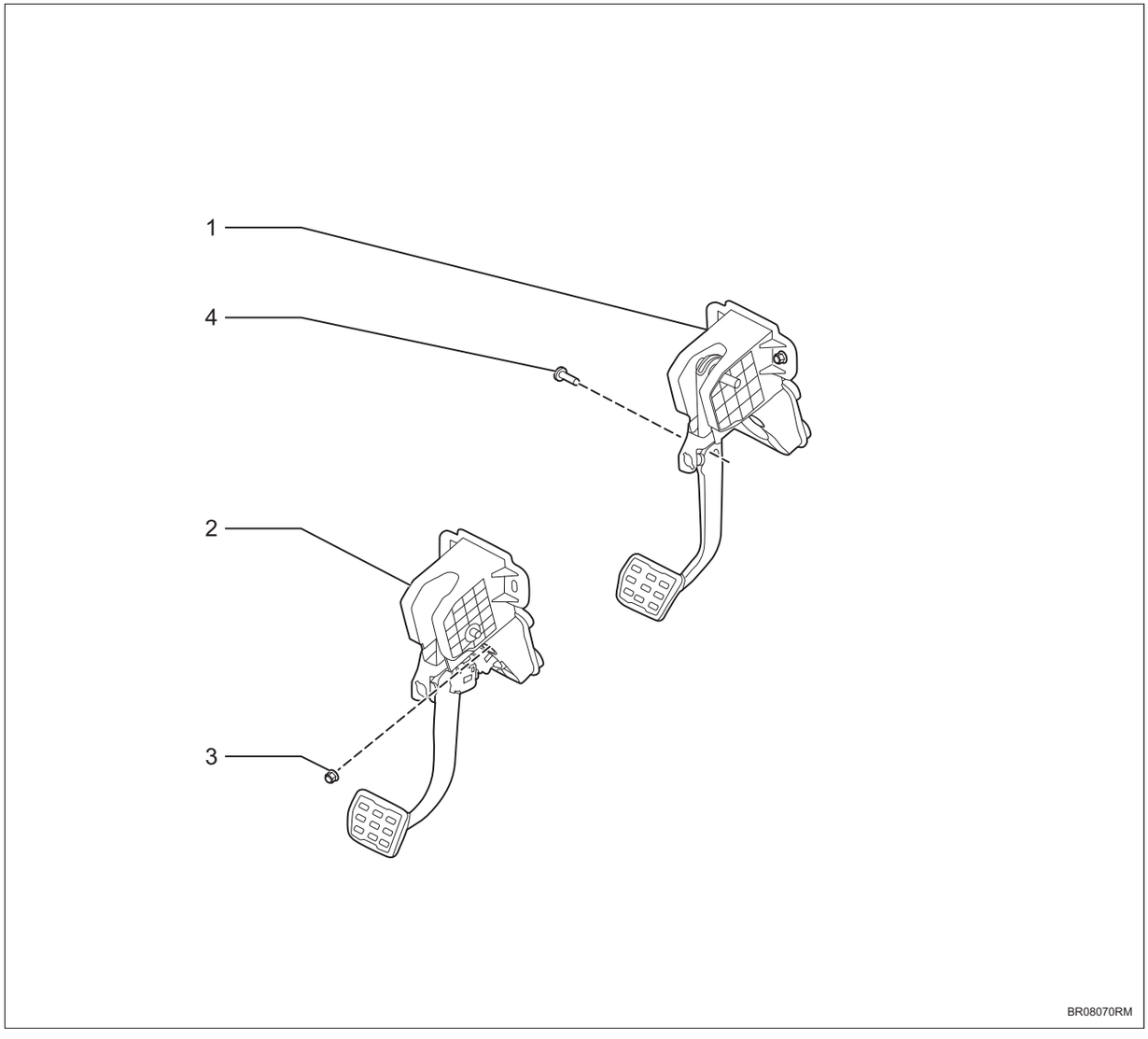
1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

   Caution:

   Depress the brake pedal before installing the brake switch assembly.

Brake pedal

Parts



1. **Brake pedal and bracket assembly**
2. **Brake pedal and bracket assembly (only for HEV models)**
3. **Hexagon flange nut**
   - X6
   - Torque: 20.6~27.5 N · m
   - Tightening sequence: crosswise and diagonal tightening
4. **Pin assembly**

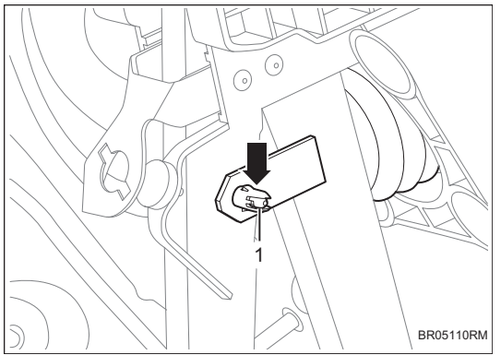
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove instrument cluster left lower guard plate (See page IP-5)**
3. **Remove brake pedal switch sensor assembly (See page BR-4)**
4. **Remove brake pedal**

   Hint:

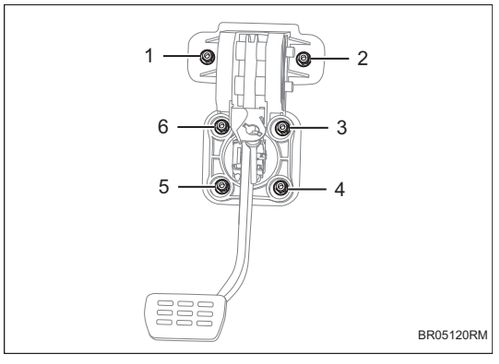
   Free stroke of brake pedal : ⩽ 7.8 mm

   Brake pedal stroke: 119.6 mm



   (a) Remove the pin retainer -arrow- from the brake pedal assembly.

   (b) Remove brake master cylinder push rod connecting pin -1- from the brake pedal assembly.



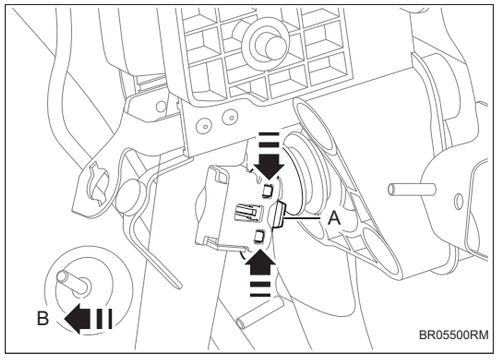
   (c) Remove the nut -1-6- and remove the brake pedal.

5. **Remove brake pedal (only for HEV models)**

   Hint:

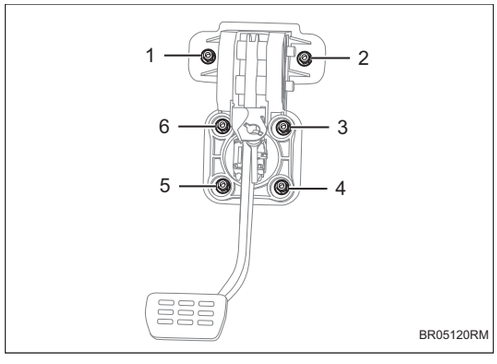
   Free stroke of brake pedal : ⩽ 12 mm

   Brake pedal stroke: 153.2 mm



(a) Detach a total of 4 fixing claws -arrow- on the left and right.

(b) Pry the brake pedal assembly in the direction of -arrow B- and detach the locking clip-A-.



(c) Remove the nut -1-6- and remove the brake pedal.

Installation

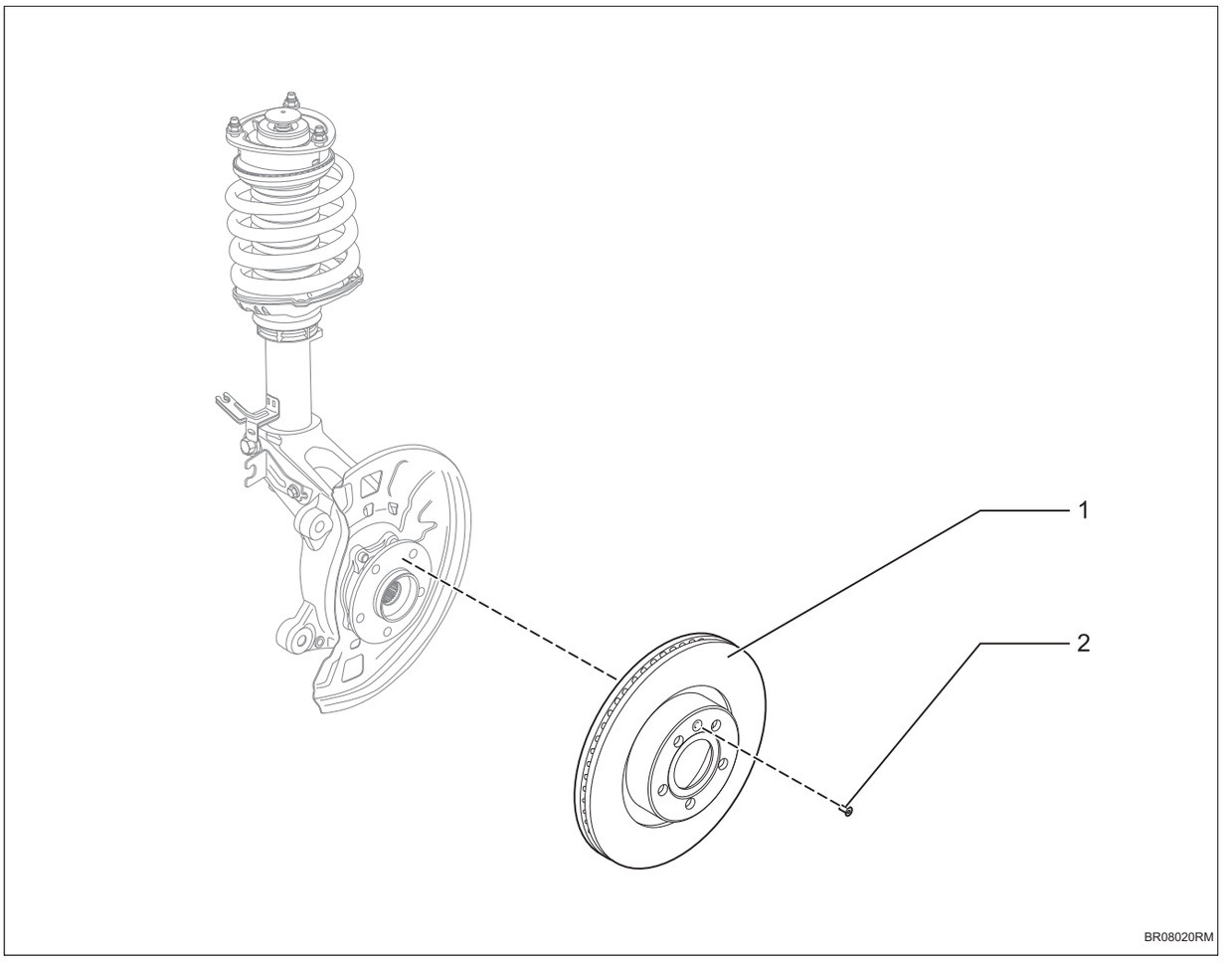
1. The installation procedure is the reverse of removal procedure, and the following points apply:

Hint:

- Torque: 20.6~27.5 N · m
- Tightening sequence: crosswise and diagonal tightening

Front brake disc

Parts

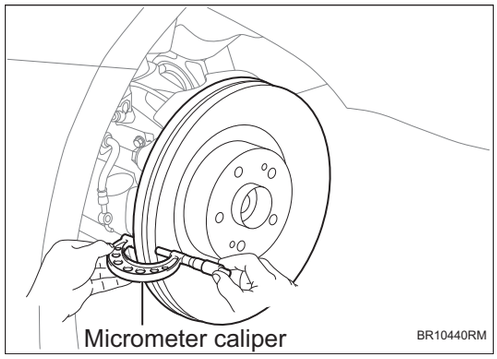


1. **Front brake disc**
2. **Screw**

Check

1. Check brake disc thickness

(a) Measure the thickness of the brake disc with a micrometer caliper.



Standard thickness	28 mm
Minimum thickness	26 mm

Hint:

If the thickness of the brake disc is less than the minimum value, replace the front brake disc.

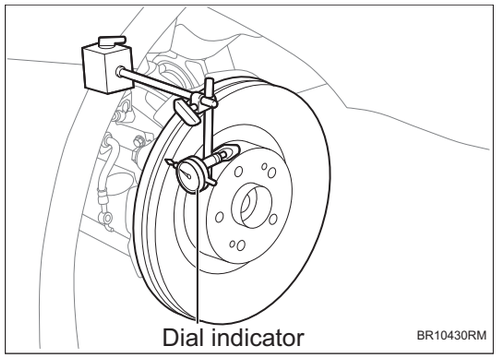
2. Check brake disc radial runout.

(a) Secure the front brake disc with brake disc locating screw and wheel bolt.

(b) Wipe the brake disc friction ring surface with a clean cloth.

(c) Radial runout of the hub bearing unit assembly.

(d) Measure the radial runout of the brake disc with a dial indicator at a distance of 10 mm from the outer edge of the front brake disc.



Note:

Maximum brake disc radial runout: 0.06 mm

Hint:

The magnet of the dial indicator shall be kept away from the hub bearing unit assembly and the speed sensor.

Install the dial indicator on the shock absorber and if the radial runout exceeds the maximum, change the installation position of the brake disc on the hub bearing unit assembly to reduce the radial runout. If the radial runout still exceeds the maximum value after the installation position is changed, then grind brake disc. If the front brake disc axial runout exceeds the maximum value, replace the front brake disc.

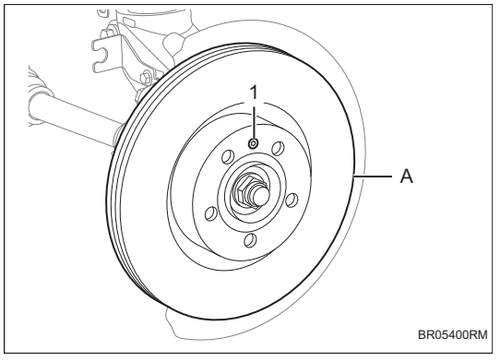
Removal

Hint:

The removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

1. **Remove front wheel (See page TW-3)**
2. **Remove front brake caliper assembly (See page BR-13)**
3. **Remove the front brake disc**
   (a) Remove screw -1- and remove front brake disc -A-.

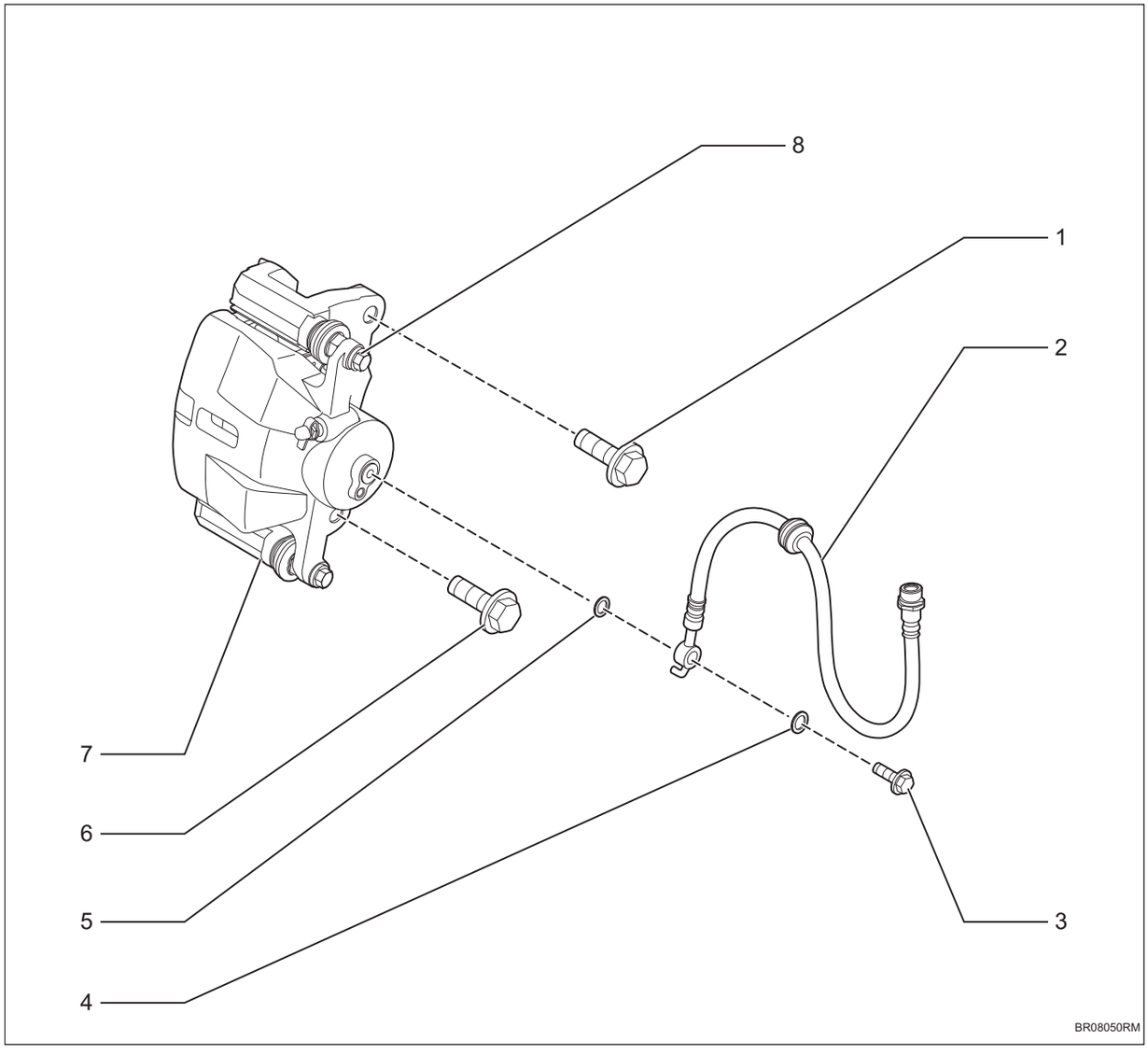


Installation

1. **The installation procedure is the reverse of removal procedure.**

Front brake caliper assembly

Parts



1. **Assembling bolt**
   - Torque: 170~190 N · m
2. **Front brake hose assembly**
3. **Connecting bolt**
   - Torque: 22~29 N · m
4. **Gasket-hollow bolt**
5. **Gasket-hollow bolt**
6. **Assembling bolt**
   - Torque: 170~190 N · m
7. **Front brake caliper assembly**
8. **Assembling bolt**

- X2
- Torque: 30~35 N · m

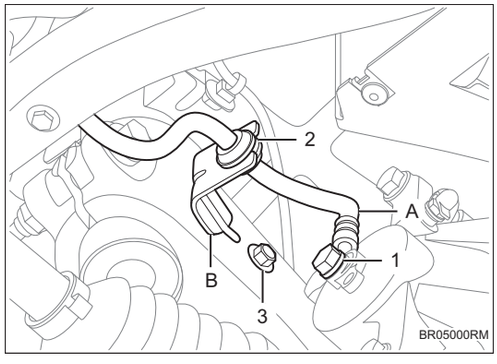
Removal

Hint:

The removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

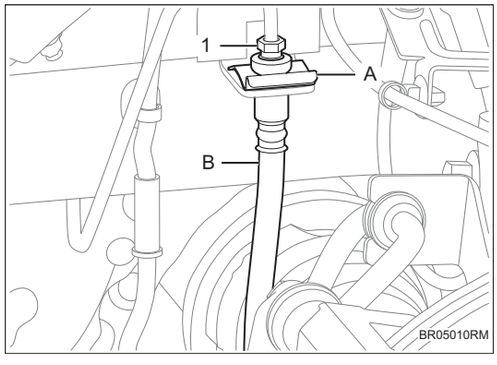
1. **Remove front wheel (See page TW-3)**
2. **Drain brake fluid (See page BR-1)**
3. **Remove front brake hose**



(a) Remove bolt -1- and disconnect front brake hose-A-.

(b) Detach the front brake hose fixing device -2-.

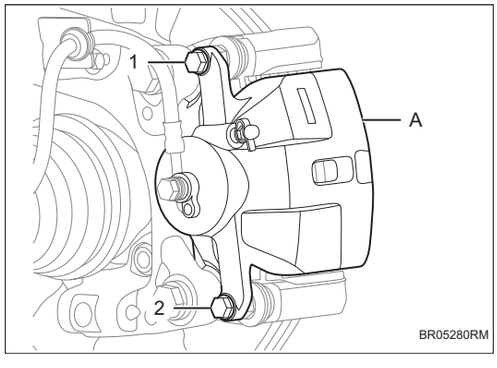
(c) Remove bolt -3- and remove brake pipe bracket-B-.



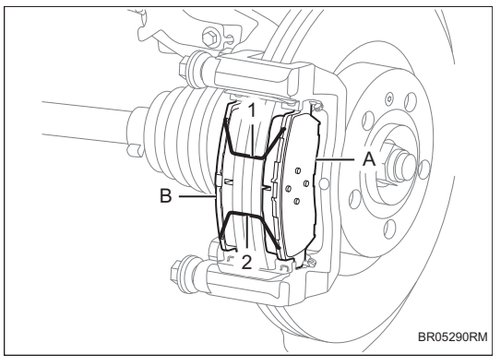
(d) Detach the front brake pipe assembly nut -1-, and remove the front brake hose clip-A-.

(e) Remove the front brake hose -B-.

4. **Remove front brake caliper assembly**

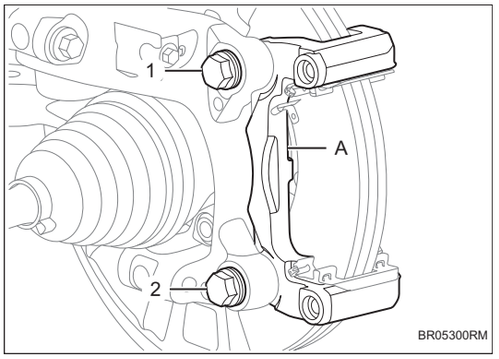


(a) Remove the bolt -1-2- and the clamp-A-.



(b) Detach the snap springs -1-2- and remove the brake linings-A-B-.

Standard thickness	**Total thickness**		**Thickness of friction material**
	Inner sheet/ Outer sheet	18.3 mm (mm) /17.9 mm (mm)	11.2 mm
Minimum thickness	Inner sheet/ Outer sheet	9.1 mm (mm) / 8.7 mm (mm)	2 mm



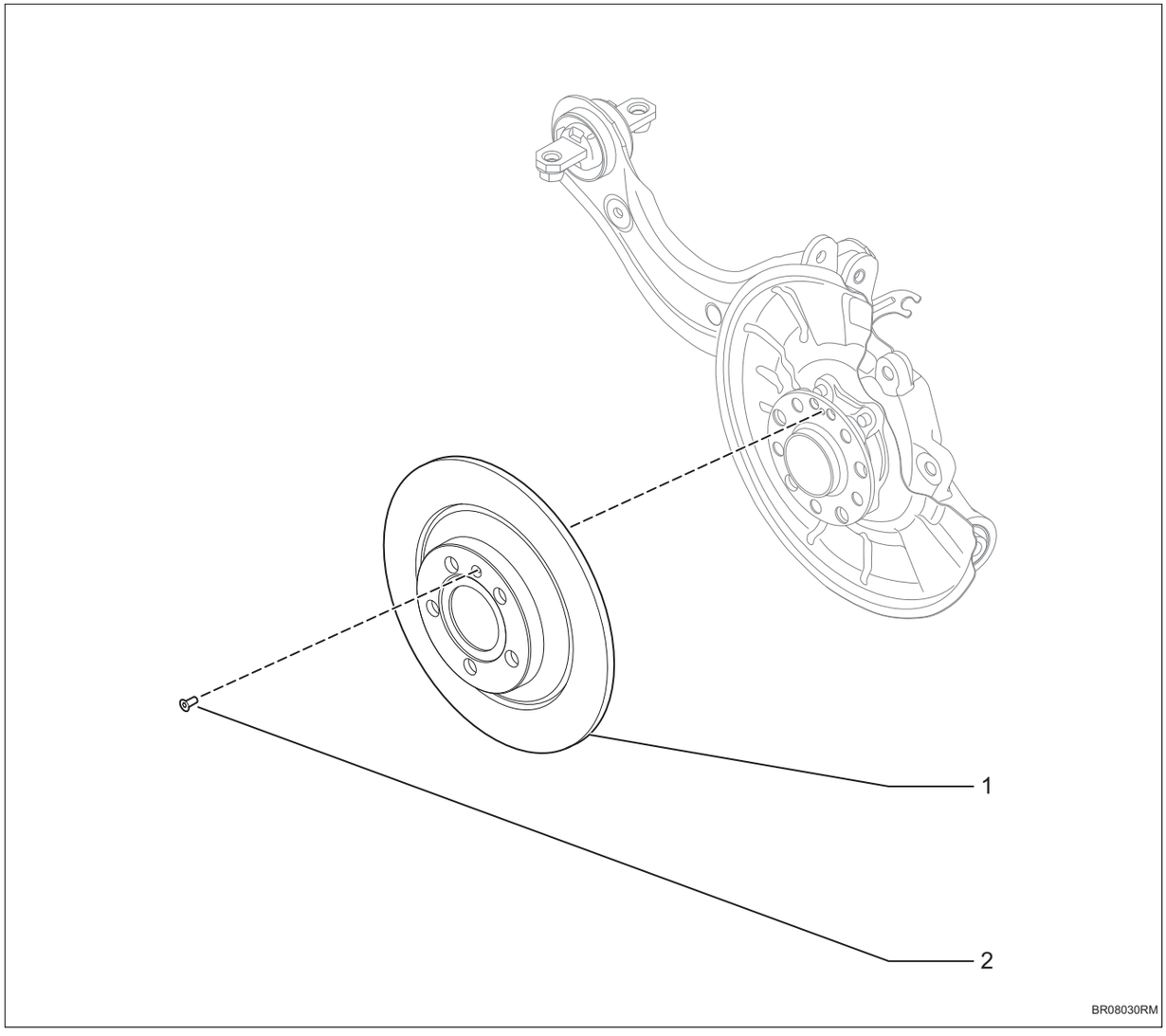
(c) Remove the bolt -1-2- and the front brake caliper bracket-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Rear brake disc

Parts

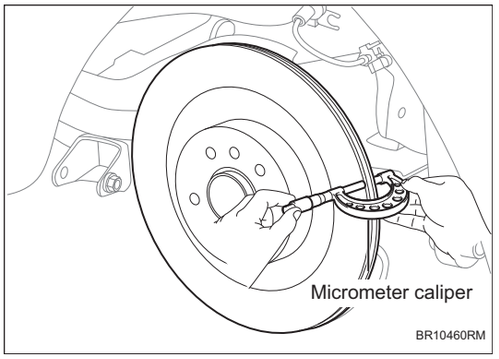


1. **Rear brake disc**
2. **Screw**

Check

1. Check brake disc thickness

(a) Measure the thickness of the brake disc with a micrometer caliper.



Standard thickness	10 mm
Minimum thickness	8 mm

Hint:

If the thickness of the brake disc is less than the minimum value, replace the rear brake disc.

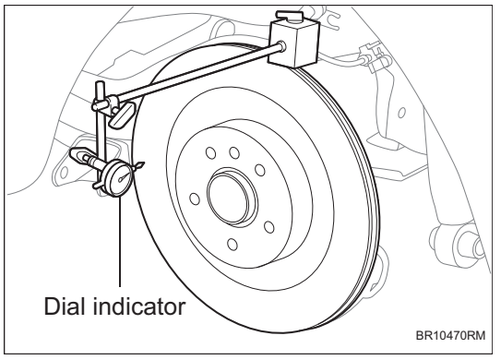
2. Check brake disc radial runout.

(a) Secure the rear brake disc with brake disc locating screw and wheel bolt.

(b) Wipe the brake disc friction ring surface with a clean cloth.

(c) Check the radial runout of the hub bearing unit assembly.

(d) Measure the radial runout of the brake disc with a dial indicator at a distance of 10 mm from the outer edge of the rear brake disc.



Note:

Maximum brake disc radial runout: 0.06 mm

Hint:

The magnet of the dial indicator shall be kept away from the hub bearing unit assembly and the speed sensor.

Install the dial indicator on the shock absorber and if the radial runout exceeds the maximum, change the installation position of the brake disc on the hub bearing unit assembly to reduce the radial runout. If the radial runout still exceeds the maximum value after the installation position is changed, grind the brake disc or replace the rear brake disc.

Removal

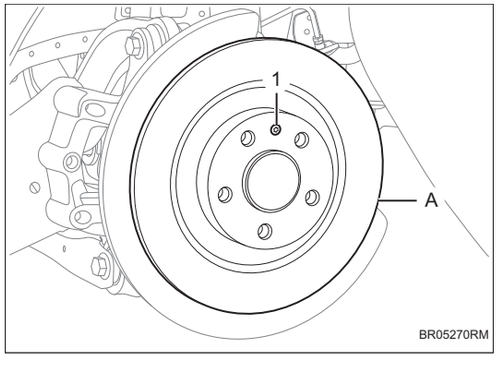
Hint:

The removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

1. **Remove rear wheel (See page TW-3)**
2. **Remove rear brake caliper assembly (See page BR-19)**
3. **Remove the rear brake disc**

   (a) Remove the screw -1- and rear brake disc -A-.

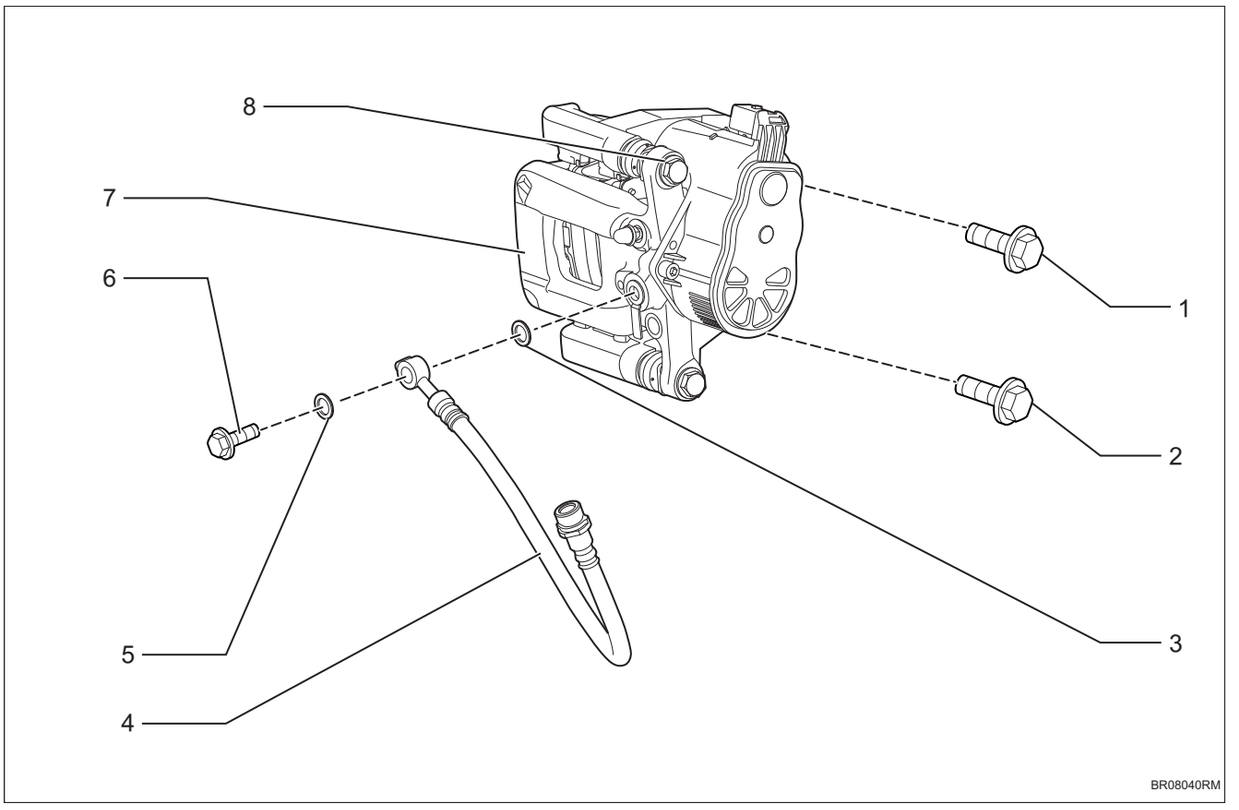


Installation

1. **The installation procedure is the reverse of removal procedure.**

Rear brake caliper assembly

Parts



1. **Assembling bolt**
   - Torque: 100~120 N · m
2. **Assembling bolt**
   - Torque: 100~120 N · m
3. **Gasket-hollow bolt**
4. **Left rear brake hose assembly**
5. **Gasket-hollow bolt**
6. **Connecting bolt**
   - Torque: 22 ~ 29 N · m
7. **Left rear brake caliper assembly**
8. **Assembling bolt**
   - X2
   - Torque: 30~33 N · m

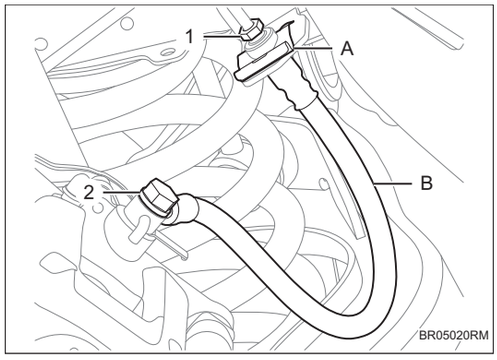
Removal

Hint:

The removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

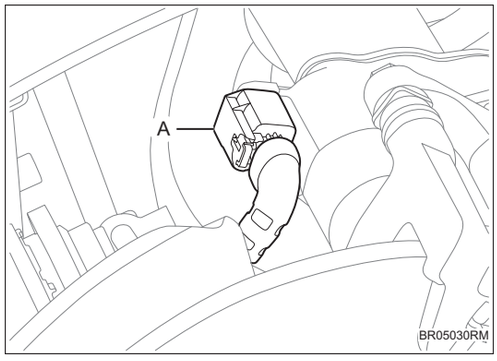
1. **Place the ignition switch in the ON position**
2. **Connect the HQ-VDS to enter the service mode, and release the caliper.**
3. **Remove the rear wheel (See page TW-3)**
4. **Disconnect the battery negative terminal (See page CH-20)**
5. **Drain brake fluid (See page BR-1)**
6. **Remove the rear brake hose**



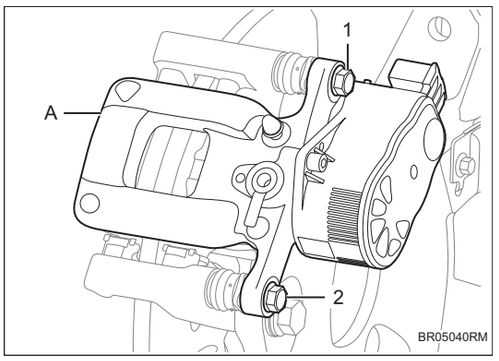
(a) Remove the bolt -2-, and disconnect the rear brake hose-B-.

(b) Detach the rear brake pipe assembly nut -1-, and remove the rear brake hose clip-A-.

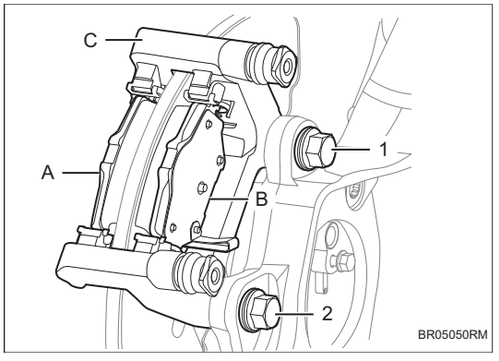
7. **Remove rear brake caliper assembly**



(a) Disconnect the EPB motor harness connector -A-.



(b) Remove the bolt -1-2- and the clamp-A-.



(c) Remove the brake lining -A-B-.

Standard thickness	**Total thickness**	**Thickness of friction material**
	18.52 mm	11 mm
Minimum thickness	9.52 mm	2 mm

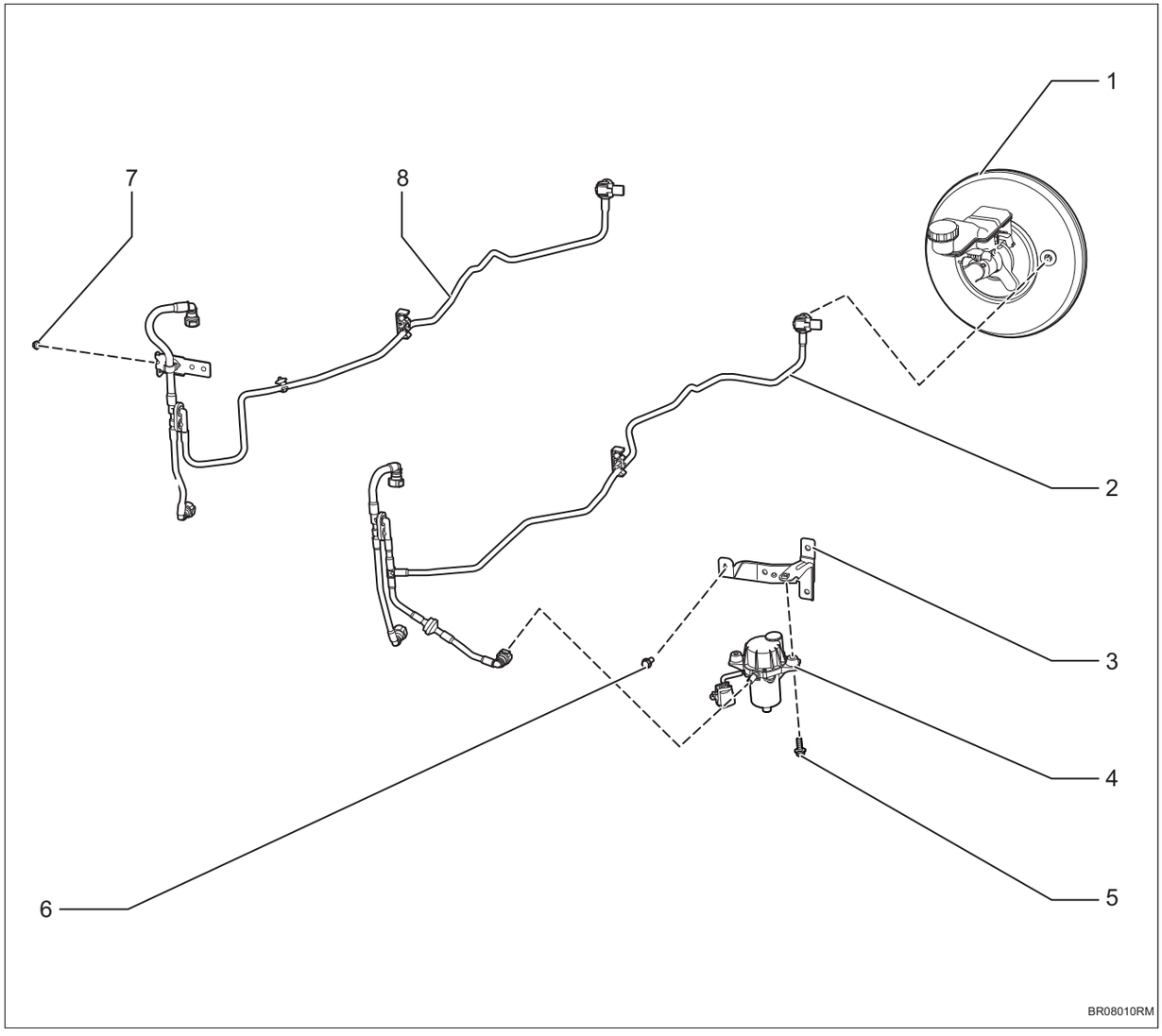
(d) Remove the bolt -1-2- and the rear brake caliper bracket-C-.

Installation

1. The installation procedure is the reverse of removal procedure.

Electric vacuum pump

Parts



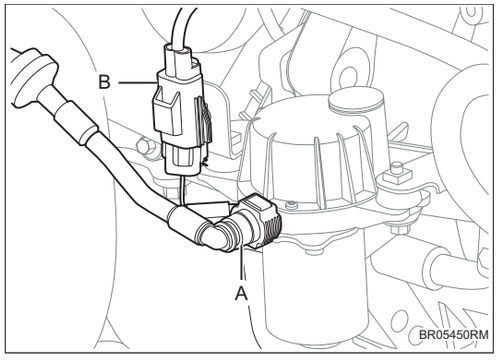
1. **Brake master cylinder and reservoir assembly**
2. **Vacuum pipe assembly (only for 1.5T model)**
3. **Vacuum pump bracket assembly (only for 1.5T model)**
4. **Vacuum pump assembly (only for 1.5T model)**
5. **Hexagon flange bolt**
   - X2
   - Torque: 7.8~10.8 N · m
6. **Hexagon flange bolt**
   - X3
   - Torque: 18.5~25.5 N · m
7. **Hexagon flange nut**

- Torque: 6~80 N · m

8. Vacuum pipe assembly (for 2.0T models)

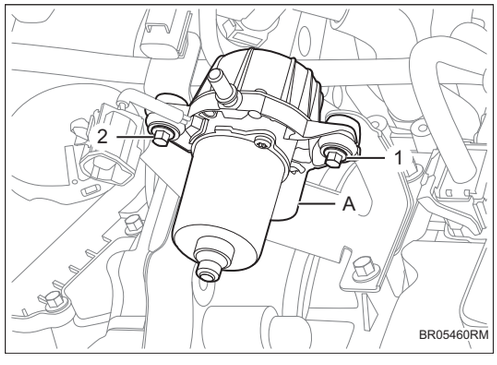
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove engine bottom guard plate assembly (See page ET-34)**
3. **Remove the electric vacuum pump (only for 1.5 T model)**

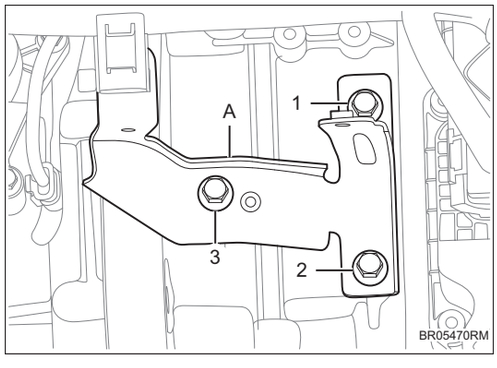


(a) Disconnect the harness connector-B-.

(b) Detach electric vacuum pump connection vacuum pipe -A-.

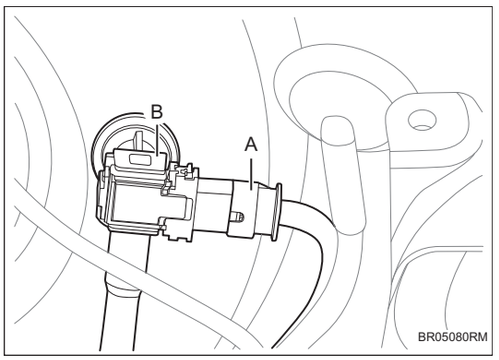


(c) Remove the bolt -1-2- and the electric vacuum pump assembly-A-.

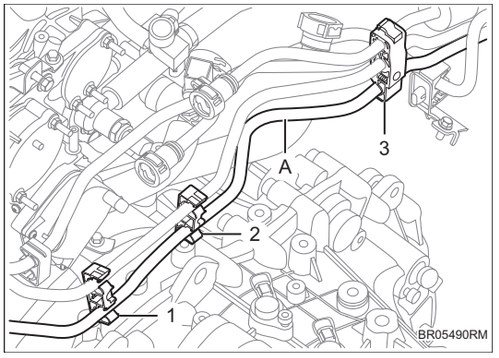


(d) Remove the bolt -1-3-, and the electric vacuum pump assembly bracket-A-.

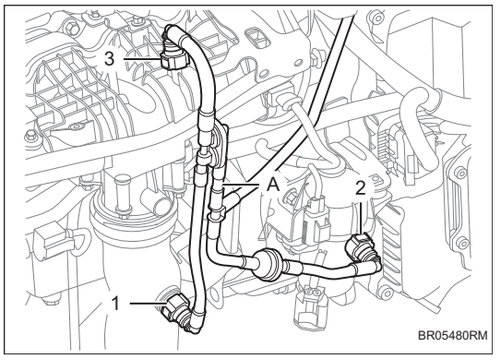
4. **Remove intake elbow assembly (See page IT-10)**
5. **Remove the battery assembly (See page CH-20)**
6. **Remove the vacuum pipe assembly (only for 1.5T model)**



(a) Disconnect the harness connector-A- and detach vacuum pipe-B-.

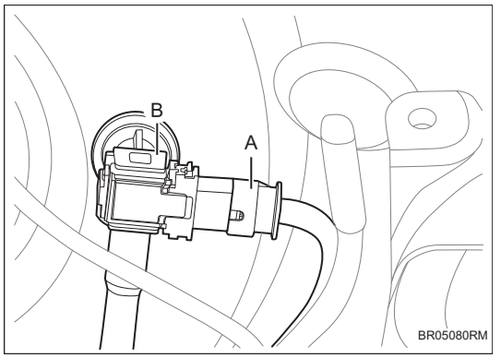


(b) Detach the fixing clip -1-3- of the vacuum pipe -A-.

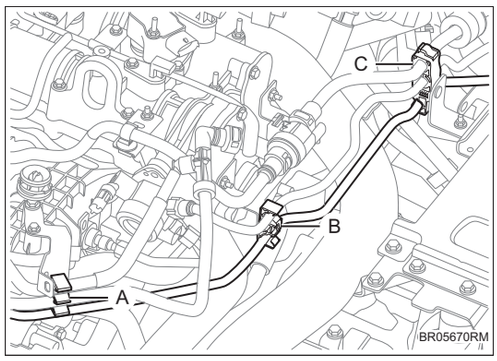


(c) Detach the vacuum pipe -1-3- and remove the vacuum pipe -A-.

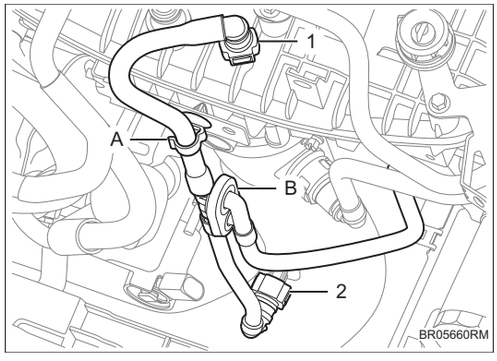
7. Remove vacuum pipe assembly (only for 2.0T model)



(a) Disconnect the harness connector-A- and detach vacuum pipe-B-.



(b) Detach vacuum pipe fixing clips -A-C-.



(c) Detach vacuum pipes -1-2- and the vacuum pipe retaining clip -A-.

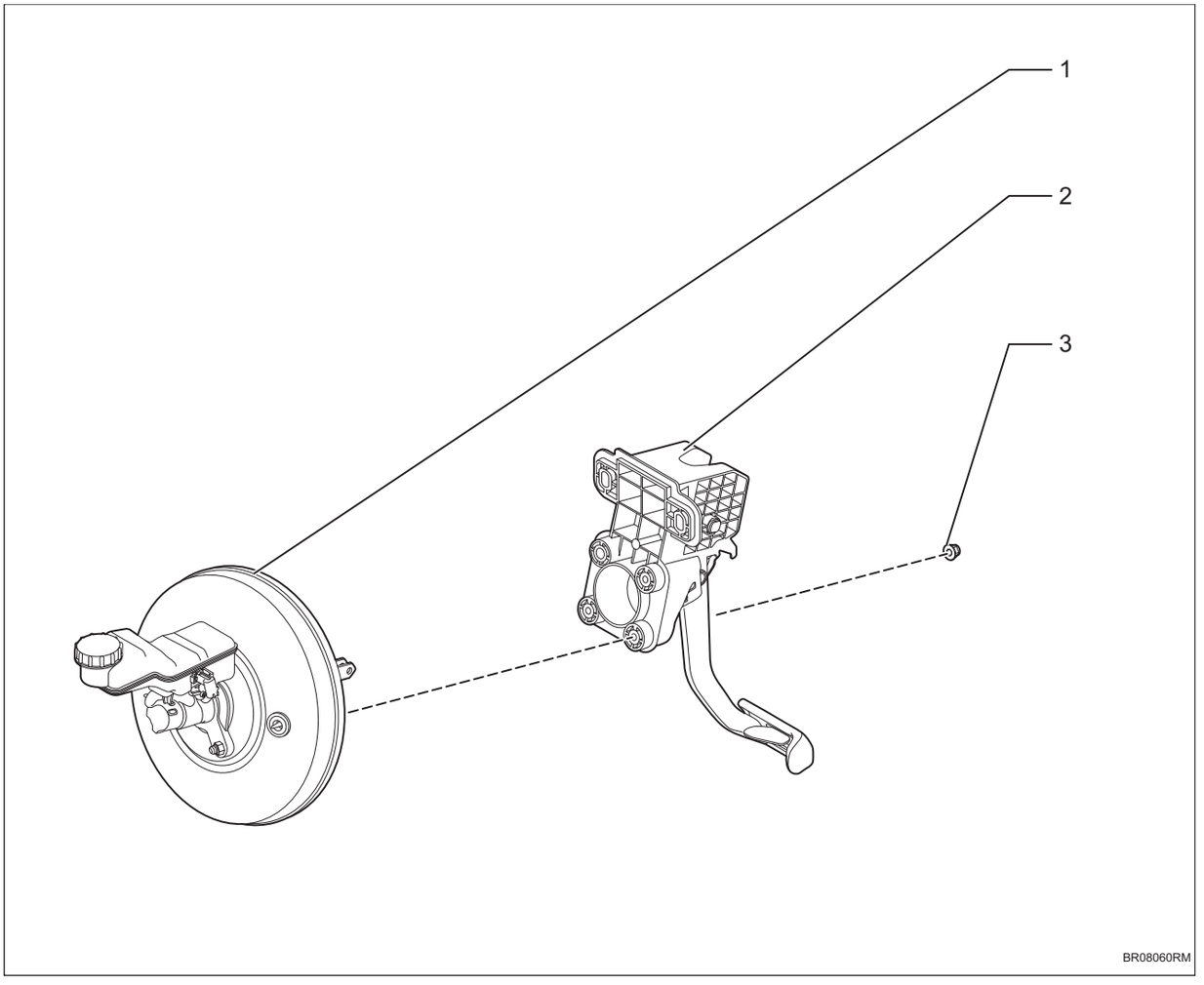
(d) Remove the vacuum pipe -B-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Vacuum booster & master cylinder and reservoir assembly

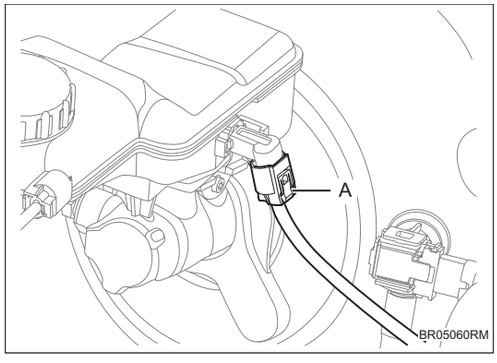
Parts



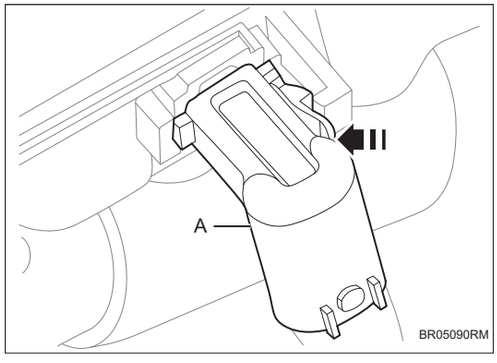
1. **Vacuum booster & master cylinder and reservoir assembly**
2. **Brake pedal**
3. **Hexagon flange nut**
   - X4
   - Torque: 20.6~27.5 N · m
   - Tightening sequence: crosswise and diagonal tightening

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Drain brake fluid (See page BR-1)**
3. **Remove left lower guard plate of instrument cluster (See page IP-5)**
4. **Remove brake lamp switch (See page BR-4)**
5. **Remove bake fluid level sensor**

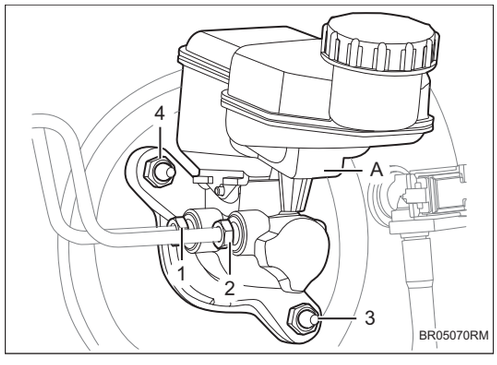


(a) Disconnect the bake fluid level sensor harness connector-A-.



(b) Press the claw-arrow- and remove the bake fluid level sensor-A-.

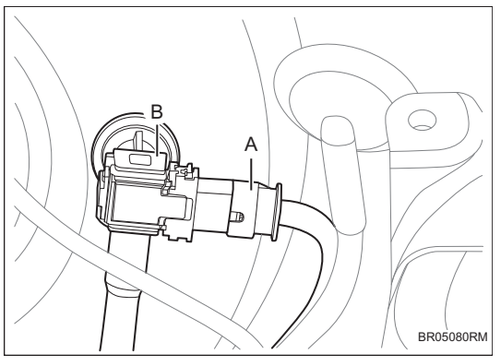
6. **Remove brake master cylinder**



(a) Detach nut -1-2- and disconnect the brake pipe from brake master cylinder-A.

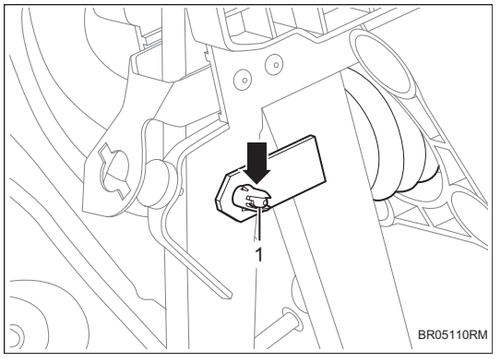
(b) Remove the nut -3-4-, brake master cylinder and reservoir assembly-A-.

7. **Remove vacuum booster**



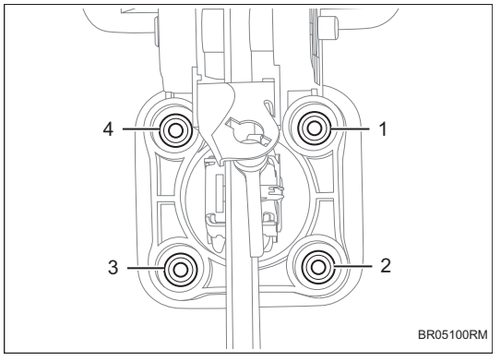
(a) Disconnect the vacuum sensor harness connector-A-.

(b) Pull out the vacuum pipe and vacuum sensor -B-.



(c) Remove the pin retainer -arrow- from the brake pedal assembly.

(d) Remove brake master cylinder push rod connecting pin -1- from the brake pedal assembly.



(e) Remove the nut -1-4- and remove the vacuum booster.

Installation

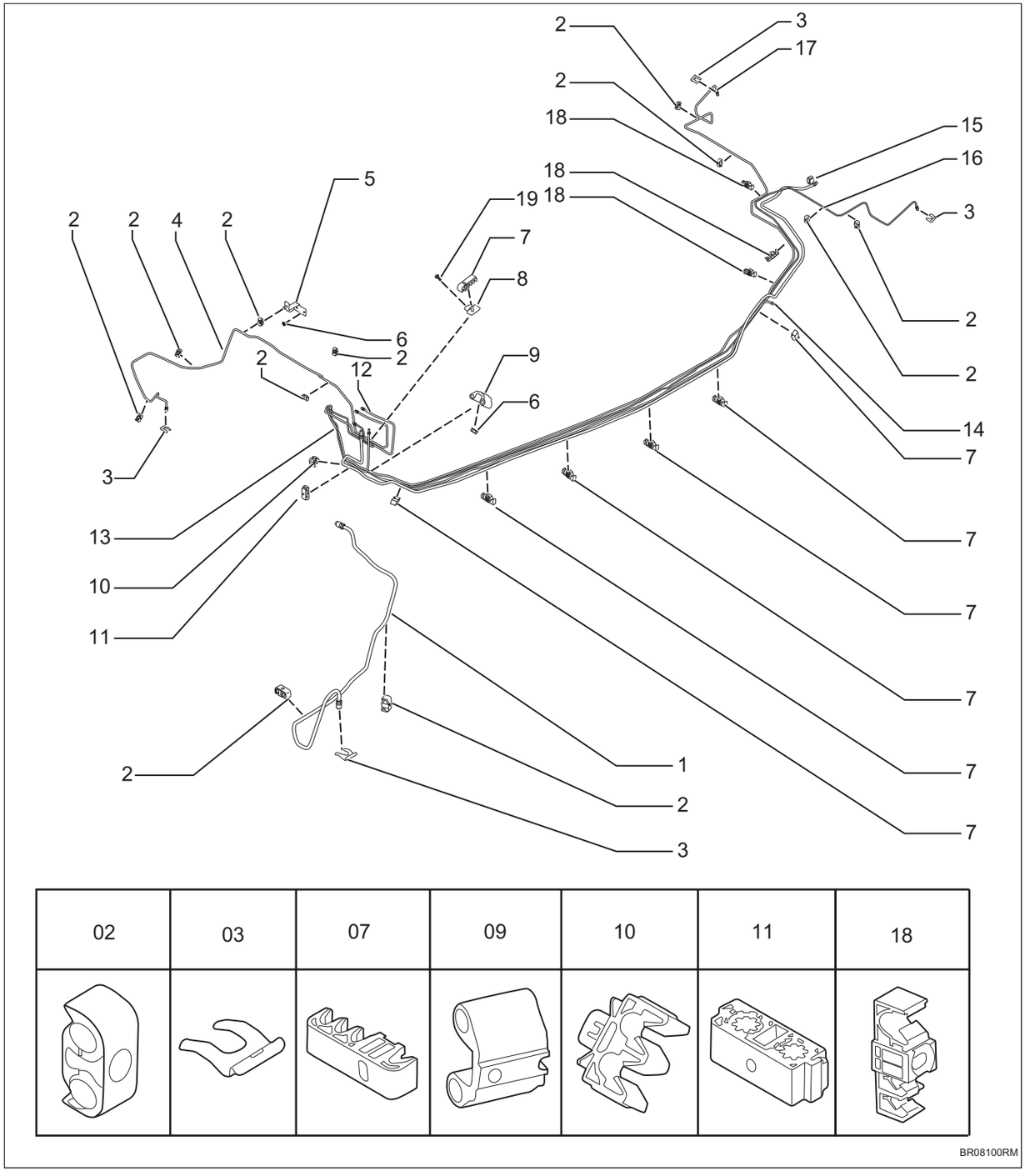
1. The installation procedure is the reverse of removal procedure, and the following points apply:

Caution:

Replace the shim with a new one during installation and clean the part with a plastic scraper before installing the new shim. Please do not leave scratches on the part.

Brake pipe assembly

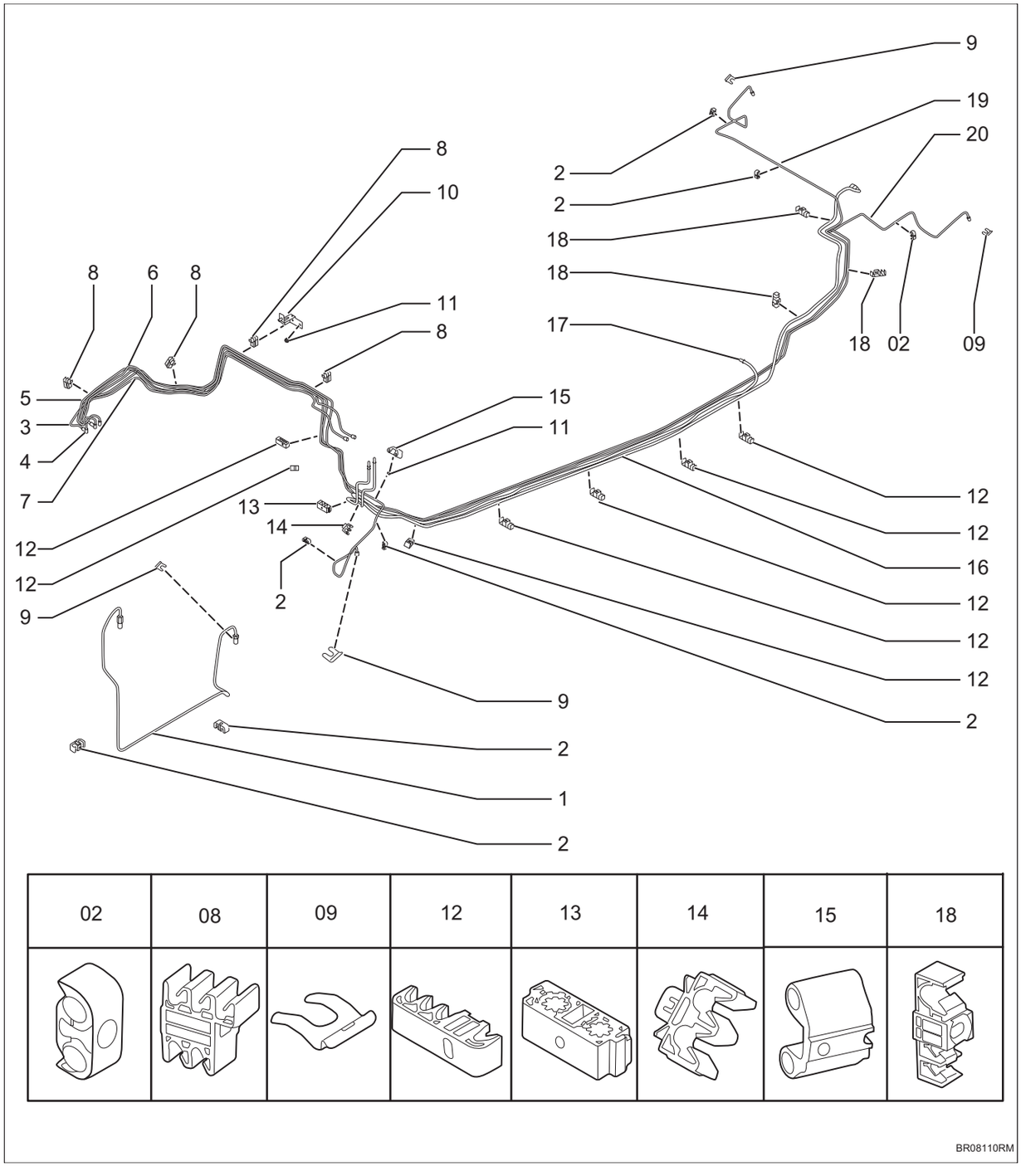
Part (only for HEV)



1. **Left front brake pipe assembly**
2. **Dual pipe clamp**
   - X11
3. **Clip - rear brake hose**
4. **Right front brake pipe assembly I**

5. **Brake pipe bracket assembly**
6. **Hexagon flange nut**
   - X3
   - Torque: 8~12 N · m
7. **Four-pipe clamp**
   - X7
8. **Brake pipe bracket assembly**
9. **Union**
10. **Dual pipe clamp I**
11. **Damping dual pipe clamp**
12. **Left rear brake pipe assembly I**
13. **Right rear brake pipe assembly I**
14. **Fuel pipe assembly I**
15. **Desorption pipe assembly I**
16. **Left rear brake pipe assembly II**
17. **Right rear brake pipe assembly II**
18. **Three-pipe clamp**
    - X3
19. **Hexagon flange bolt**
    - Torque: 8~12 N · m

Parts

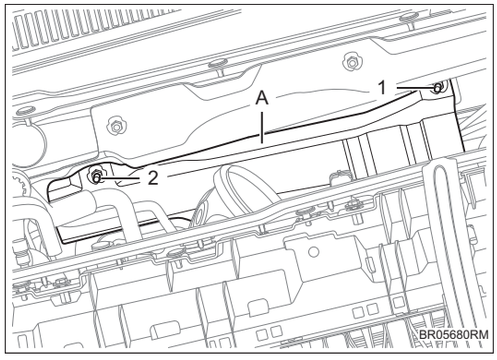


1. **Right front brake pipe assembly**
   - X4
2. **Dual pipe clamp**
   - X7
3. **Master cylinder - chamber brake pipe assembly**
4. **Left rear brake pipe assembly I**

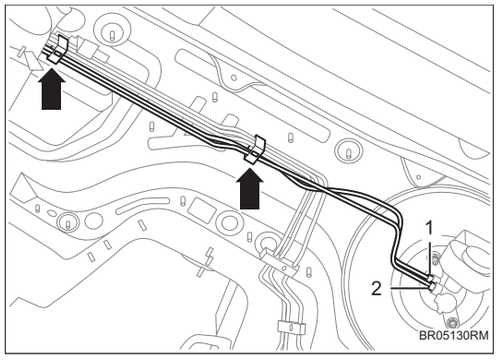
5. **Left front brake pipe assembly I**
6. **Right rear brake pipe assembly I**
7. **Master cylinder chamber II brake pipe assembly**
8. **Five-pipe clamp**
   - X4
9. **Clip - rear brake hose**
10. **Brake pipe bracket assembly**
11. **Hexagon flange nut**
    - X3
    - Torque: 8~12 N · m
12. **Four-pipe clamp**
    - X7
13. **Damping type dual pipe clamp**
    - X2
14. **Dual pipe clamp**
15. **Union**
16. **Desorption pipe assembly I**
17. **Fuel pipe assembly I**
18. **Three-pipe clamp**
    - X3
19. **Right rear brake pipe assembly II**
20. **Left rear brake pipe assembly II**

Removal

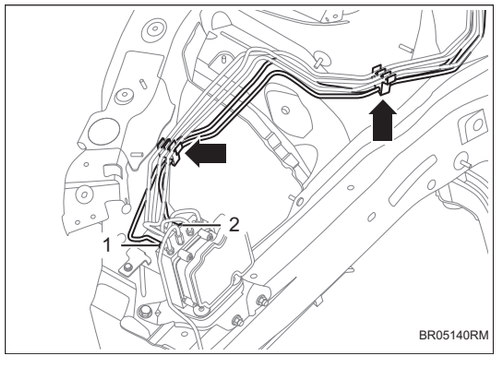
1. **Remove expansion tank assembly (See page CO-29)**
2. **Remove the brake pipe assembly of the master cylinder chamber (for 1.5 T, 2.0 T and 1.8 T models)**



(a) Remove nuts -1-2- and detach heat shield Ⅳ -A-.

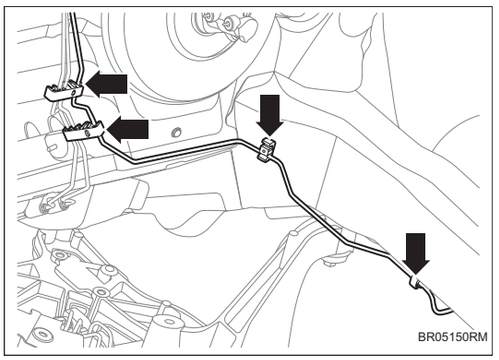


(b) Detach the master cylinder side oil pipe nuts -1-2-, and detach the oil pipe clamp -arrow-.

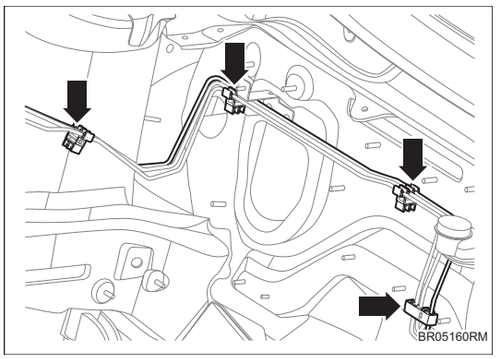


(c) Detach the ESC unit assembly side nuts -1-2-, and detach the oil pipe fixing clip -arrow-.

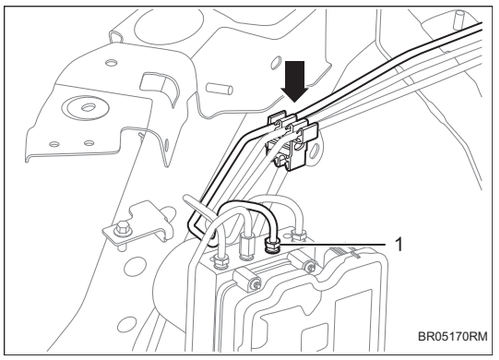
3. **Remove vehicle front wheel (See page TW-3)**
4. **Remove the left front wheel housing assembly (See page ET-39)**
5. **Remove the left front brake hose (See page BR-13)**
6. **Remove the battery assembly (See page CH-20)**
7. **Remove split fluid reservoir assembly (only for HEV models) (See page BC-120)**
8. **Remove the left front brake pipe (applicable to 1.5 T, 2.0 T and 1.8 T models)**



(a) Detach the oil pipe clamp on the left side of the body -arrow-.

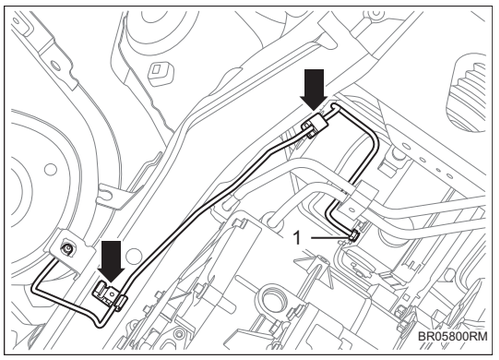


(b) Detach the middle side oil pipe clamp of the body -arrow-.



(c) Detach the ESC unit assembly side nut -1-, and detach the oil pipe fixing clip -arrow-.

9. Remove the left front brake pipe (only for HEV models)

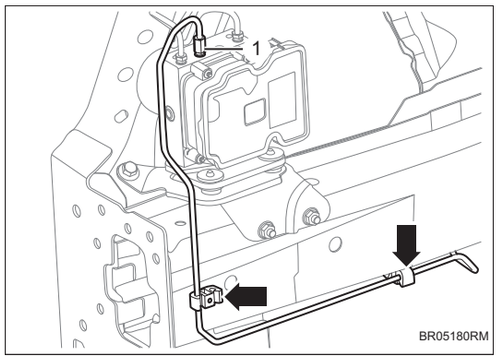


(a) Detach the IBC assembly side nut -1-, and the pipe fixing clip -arrow-.

10. Remove the right front brake hose (See page BR-13)

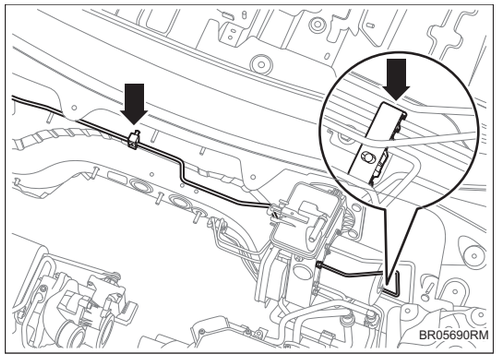
11. Remove the right front wheel housing assembly (See page ET-39)

12. Remove the right front brake pipe (applicable to 1.5 T, 2.0 T and 1.8 T models)

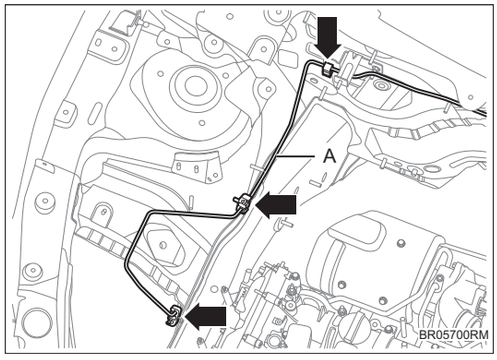


(a) Detach the ESC unit assembly side nut -1-, and detach the oil pipe fixing clip -arrow-.

13. Remove the right front brake pipe (only for HEV models)

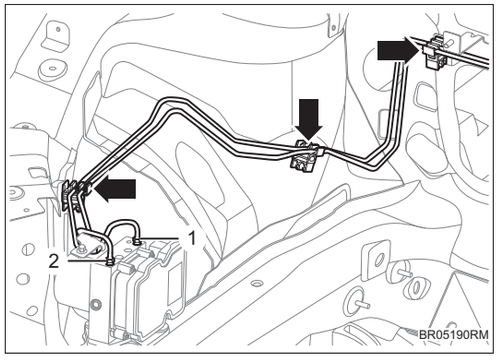


(a) Detach the IBC assembly side nut -1-, and the pipe fixing clip -arrow-.

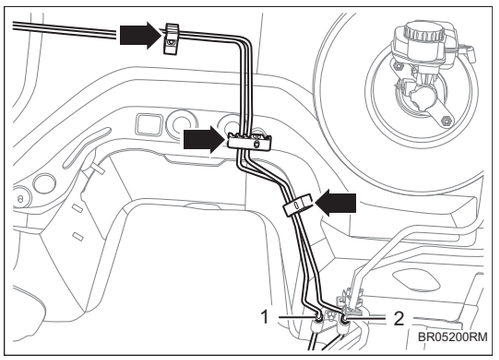


(b) Detach the pipe clamp -arrow- and remove the right front brake pipe -A-.

14. Remove the rear brake pipe assembly I (applicable to 1.5T, 2.0T and 1.8T models)

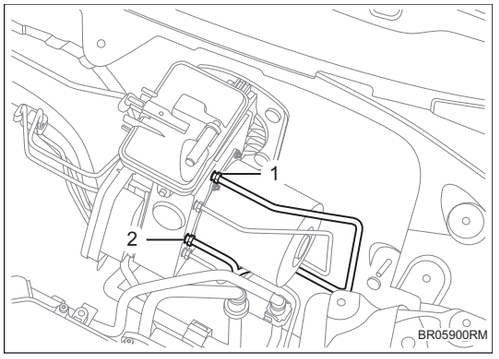


(a) Detach the ESC unit assembly side nuts -1-2-, and detach the oil pipe fixing clip -arrow-.

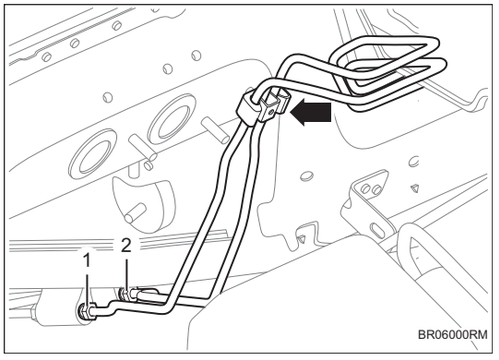


(b) Detach union nuts -1-2-, and detach oil pipe clamp -arrow-.

15. Remove the rear brake pipe assembly I (only for HEV models)



(a) Detach the IBC assembly side nut -1-2-, and the pipe fixing clip -arrow-.



(b) Detach union nuts -1-2-, and detach oil pipe clamp -arrow-.

16. Remove the rear wheels (See page TW-3)

17. Remove rear wheel housing assembly (See page ET-39)

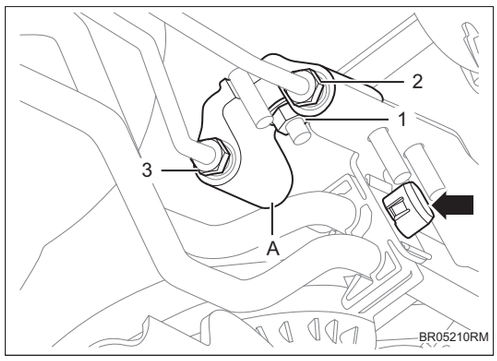
18. Remove the rear brake hose (See page BR-19)

19. Remove floor left bottom guard plate I (See page ET-34)

20. Remove floor left bottom guard plate II (See page ET-34)

21. Remove fuel tank (See page FU-14)

22. Remove the rear brake pipe assembly II

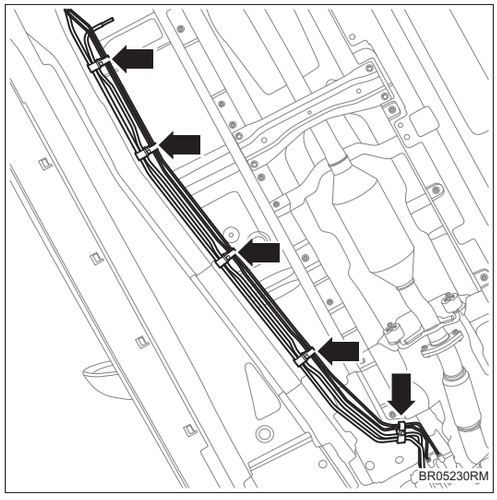


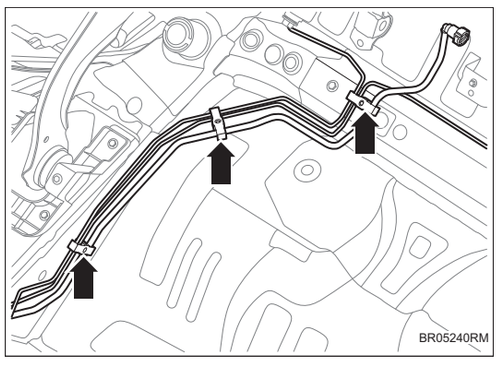
(a) Detach union nuts -2-3-and detach the tubing.

(b) Remove the nut -1- and the two-way joint -A-.

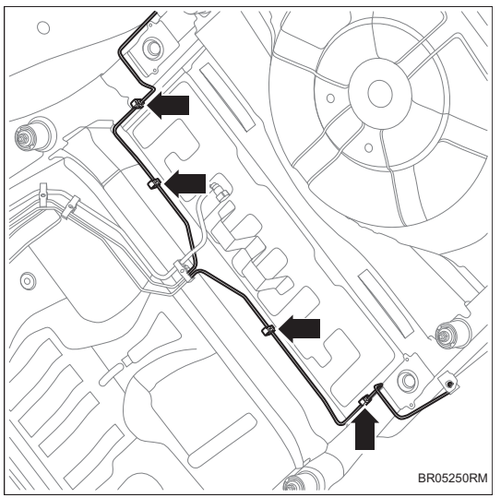
(c) Detach the pipe retaining clip -arrow-.

(d) Detach the underbody oil pipe clamp -arrow-.





(e) detach the underbody oil pipe clamp -arrow-.



(f) Detach the oil pipe clamp above the rear suspension -arrow-.

(g) Remove the left and right rear brake pipe assembly II.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Seat system

Driver seat control system SE-1
Precautions SE-1
Location of parts SE-3
System diagram SE-6
Function description SE-6
Symptom chart SE-7
ECU terminal SE-7
DTC chart SE-8
U300317 ..... SE-9
U300316 ..... SE-9
B108111 ..... SE-12
B108211 ..... SE-12
B108311 ..... SE-12
B108411 ..... SE-12
B108511 ..... SE-12
B108611 ..... SE-12
B108711 ..... SE-12
B108811 ..... SE-12
B108C31 ..... SE-17
B108D31 ..... SE-21
B108E31 ..... SE-25
B108F31 ..... SE-29
U002888 ..... SE-33
U014687 ..... SE-33
U112187 ..... SE-33
U115587 ..... SE-33
U014087 ..... SE-33
U110087 ..... SE-33
U129387 ..... SE-33
SCCU system SE-34
Precautions SE-34
Location of parts SE-36
System diagram SE-38
Function description SE-40
Symptom chart SE-41
ECU terminal SE-42
DTC chart SE-43
B10E016 ..... SE-45
B10E017 ..... SE-45

B10E115 ..... SE-49
B10E111 ..... SE-49
B10E215 ..... SE-52
B10E211 ..... SE-52
B10E311 ..... SE-55
B10E313 ..... SE-55
B10E312 ..... SE-55
B10E411 ..... SE-59
B10E413 ..... SE-59
B10E412 ..... SE-59
B10E513 ..... SE-63
B10E511 ..... SE-63
B10E512 ..... SE-63
B10E613 ..... SE-67
B10E611 ..... SE-67
B10E612 ..... SE-67
B10E711 ..... SE-71
B10E713 ..... SE-71
B10E712 ..... SE-71
B10E815 ..... SE-75
B10E811 ..... SE-75
B10E915 ..... SE-78
B10E911 ..... SE-78
B10EB11 ..... SE-81
B10EC15 ..... SE-81
U102388 ..... SE-84
U133086 ..... SE-84
U133186 ..... SE-84
U133286 ..... SE-84
U133386 ..... SE-84
U134086 ..... SE-84
U024987 ..... SE-84
U024A87 ..... SE-84
U024B87 ..... SE-84
U024C87 ..... SE-84
U025187 ..... SE-84
U034086 ..... SE-84
U035986 ..... SE-84
U035A86 ..... SE-84
U020287 ..... SE-90
U020187 ..... SE-90
U115587 ..... SE-90
U014087 ..... SE-90

U002888 ..... SE-90
U014687 ..... SE-90
U112187 ..... SE-90
U124587 ..... SE-90
Front seat assembly SE-91
Parts SE-91
Removal SE-93
Installation SE-95
Rear seat SE-96
Parts SE-96
Removal SE-98
Installation SE-101

Driver seat control system

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Warning:

Before repairing the high voltage system or adjacent high voltage system components, be sure to carefully read the "Instructions and precautions for maintenance work" in the introduction carefully!

2. ENGINE START/STOP button (ignition switch) representation: engine start (ignition)

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button in OFF position	OFF (OFF)
ENGINE START/STOP button in ON (ACC) position	On (ACC)
ENGINE START/STOP button in ON (IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button in ON (IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

3. when the battery cable is disconnected and reconnected, some systems require initialization.

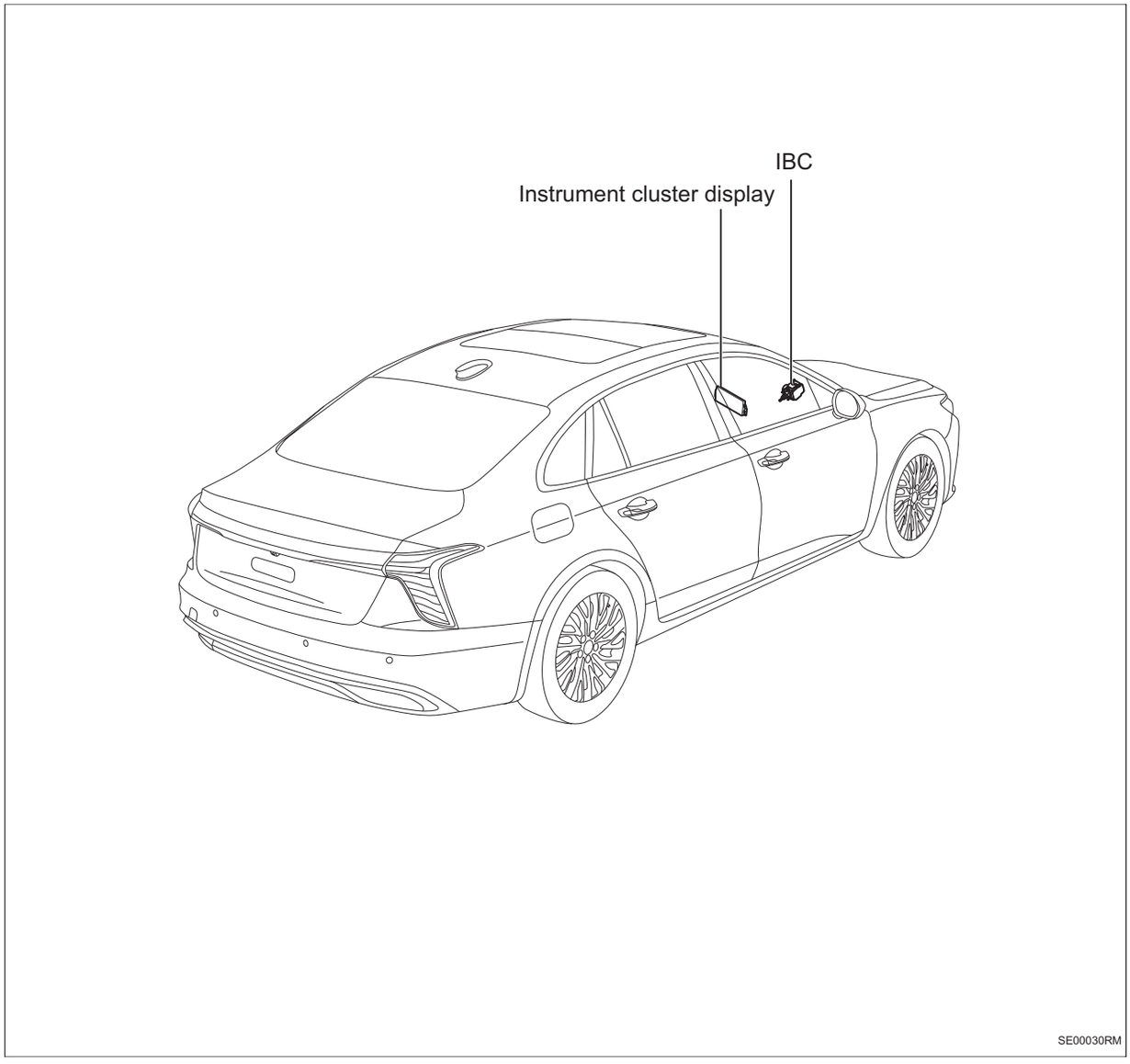
4. General repair instructions

(a) When checking the seat control system, it may affect the airbag work. Therefore, before carrying out maintenance work, be sure to carefully read and confirm the precautions for airbag.

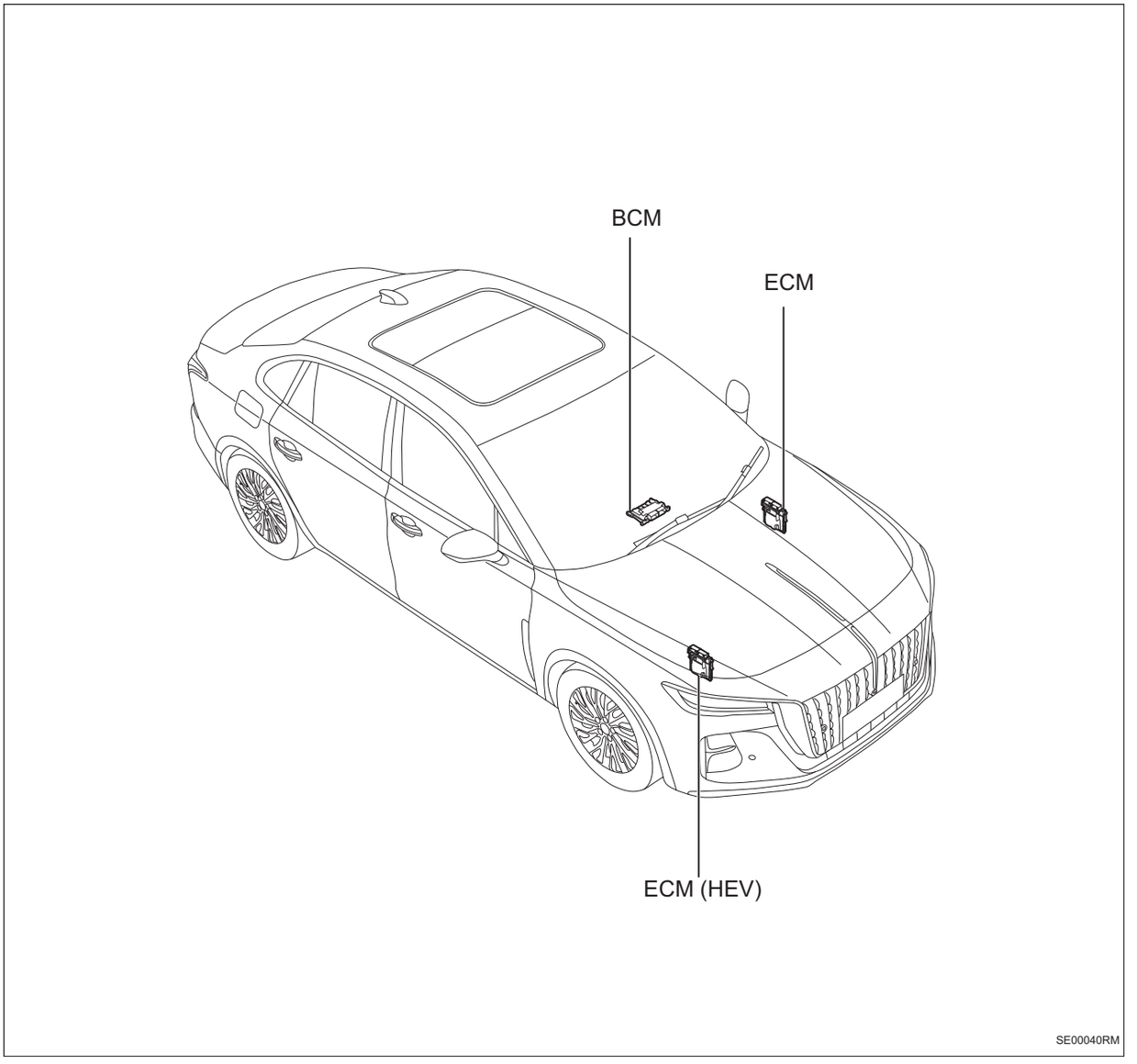
(b) When the part needs to be replaced or the connector needs to be disconnected during maintenance of seat control system, disconnect the battery negative cable.

(c) The door control system needs to be initialized after reconnecting the battery. And use the HQ-VDS to "clear DTC" for all electronic control systems.

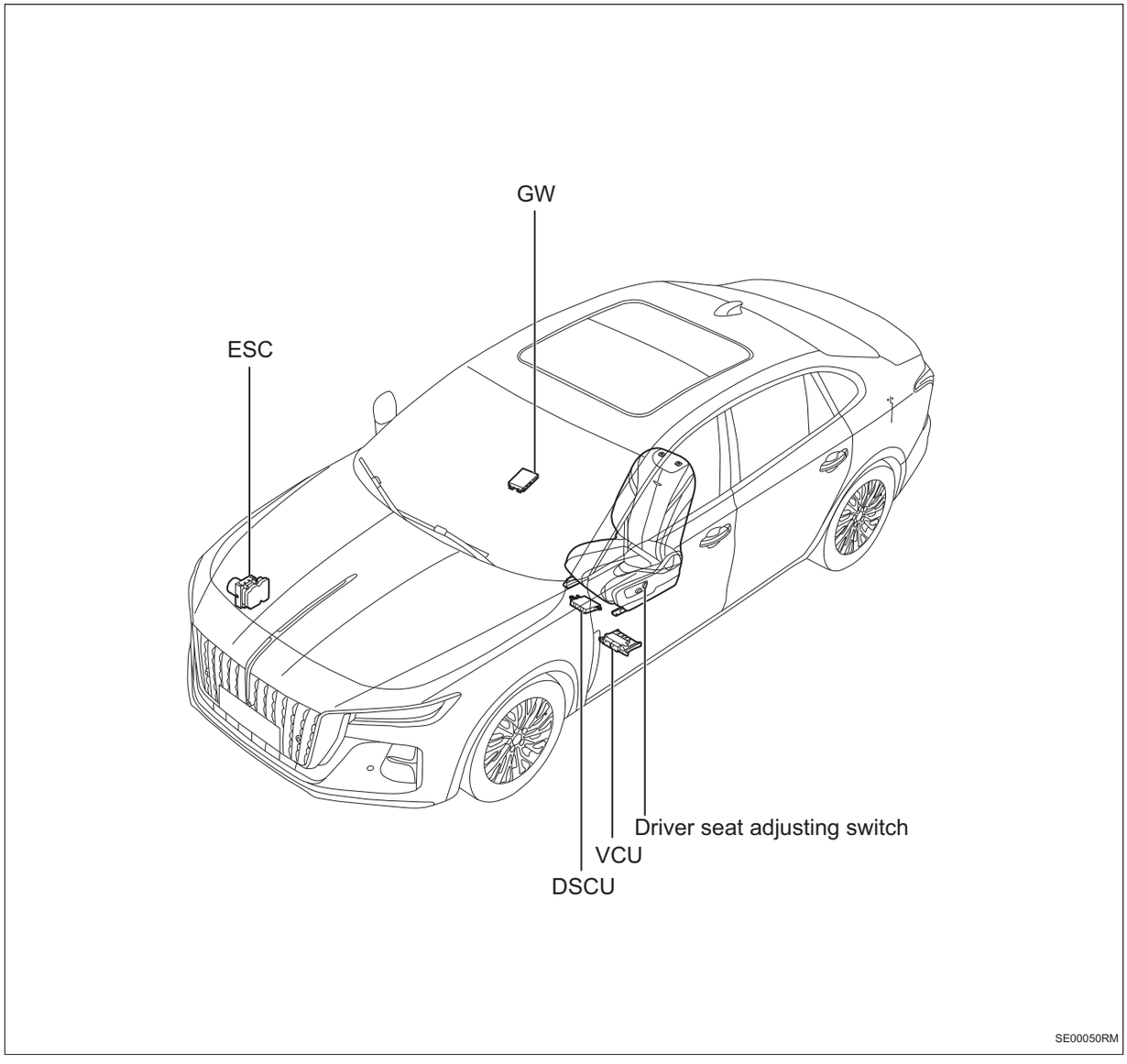
Location of parts



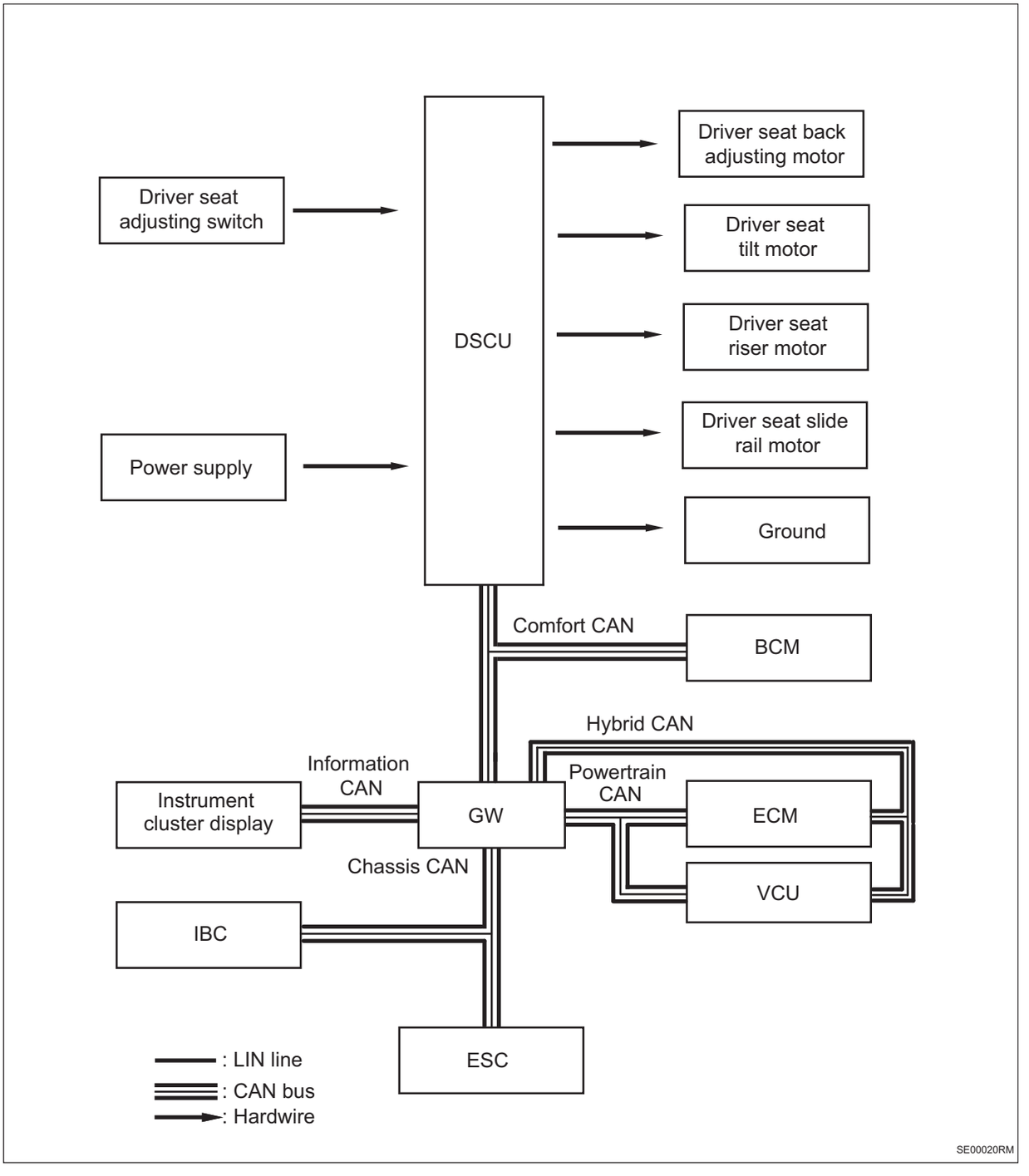
Location of parts



Location of parts



System diagram



SE

Function description

1. System description

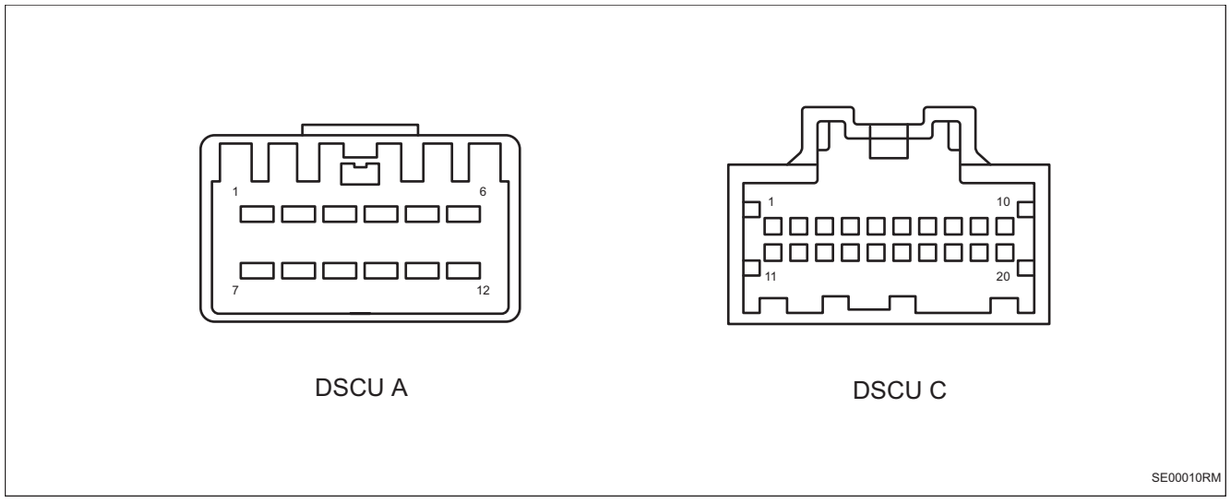
(a) The driver seat functions can be adjusted by driver seat adjusting switch.

Symptom chart

Driver seat

Fault	Possible location
Electric seat inoperative	• Fuse • DSCU • Driver seat adjusting switch • Related harness and connector • Adjusting motor • Battery

ECU terminal



DSCU

DSCU A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Driver seat forward	7	Driver seat motor downward
2	Driver seat backward	8	Driver seat motor upward
3	Driver backrest forward	9	Driver seat recliner motor downward
4	Driver backrest rearward	10	Driver seat recliner motor upward
5	Driver seat power supply	11	Driver seat ground
6	Driver seat power supply	12	Driver seat ground

DSCU C			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Driver seat Hall power supply	11	Driver seat backward input
2	Driver seat recliner motor upper/lower Hall signal	12	Driver seat backrest backward input
3	Driver seat front and rear Hall signal	13	Driver seat forward input
4	Driver seat motor upper and lower Hall signal	14	Driver seat motor downward input

DSCU C			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
5	Driver seat back front and rear Hall signal	15	Driver seat recliner motor downward input
6	Seat adjusting switch GND	16	Driver seat motor upward input
7	—	17	Driver seat back forward input
8	—	18	Driver seat recliner motor upward input
9	—	19	CAN_H
10	—	20	CAN_L

DTC chart

DSCU

DTC	Description	Reference page
B108111	Seat forward switch shorted to ground	(See page SE-12)
B108211	Seat backward switch shorted to ground	(See page SE-12)
B108311	Seat upward switch shorted to ground	(See page SE-12)
B108411	Seat downward switch shorted to ground	(See page SE-12)
B108511	Seat back forward switch shorted to ground	(See page SE-12)
B108611	Seat back backward switch shorted to ground	(See page SE-12)
B108711	Cushion up switch shorted to ground	(See page SE-12)
B108811	Cushion down switch shorted to ground	(See page SE-12)
B108C31	Seat front-and-rear adjustment motor Hall sensor fault	(See page SE-17)
B108D31	Seat up-and-down adjustment motor Hall sensor fault	(See page SE-21)
B108E31	Seat back motor Hall sensor fault	(See page SE-25)
B108F31	Cushion motor Hall sensor fault	(See page SE-29)
U300317	System power supply overvoltage	(See page SE-9)
U300316	System power supply undervoltage	(See page SE-9)
U002888	Comfort CAN bus off	(See page SE-33)
U014687	GW node lost	(See page SE-33)
U112187	ESP/IBC message lost	(See page SE-33)
U110087	ECM message lost	(See page SE-33)
U115587	Instrument cluster control unit message lost	(See page SE-33)
U014087	BCM 1 node lost	(See page SE-33)
U129387	HCU message lost	(See page SE-33)

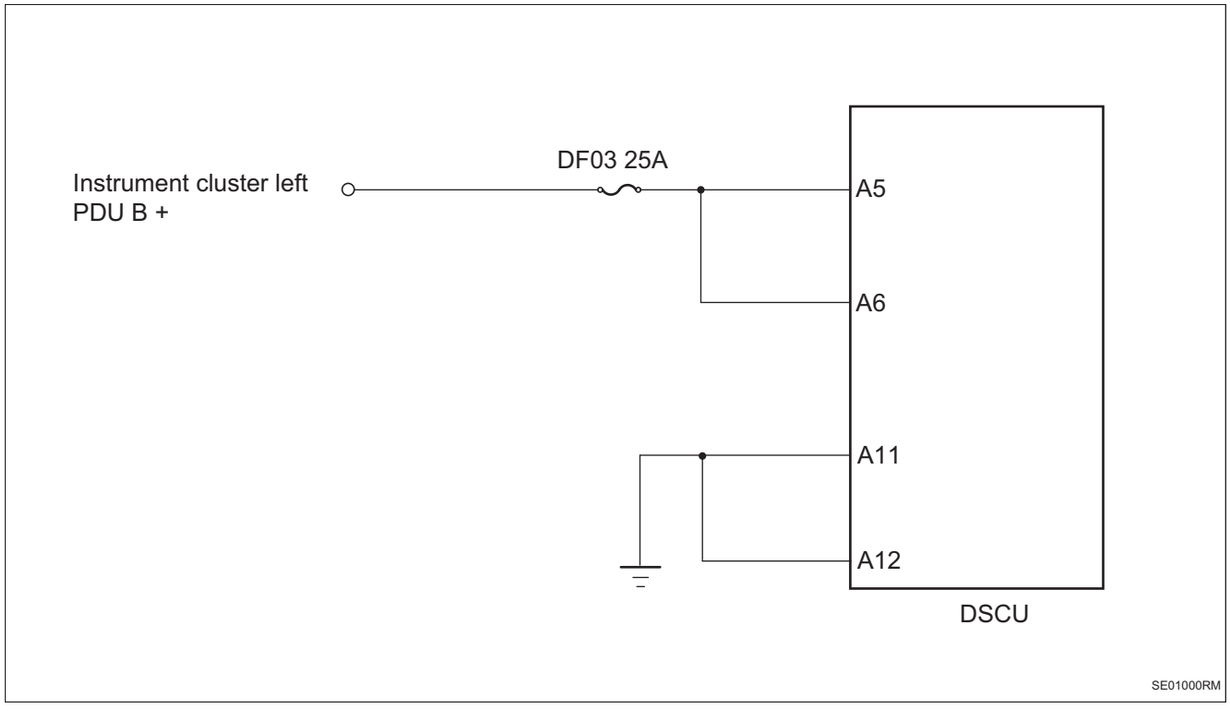
DTC	U300317	System power supply overvoltage
DTC	U300316	System power supply undervoltage

Description

When the DSCU input voltage is too high or too low, DSCU records the DTC.

DTC	DTC detection conditions	Faulty location
U300317	(a) System power supply overvoltage.	• DSCU • Harness and connector • Battery/charging system
U300316	(a) System power supply undervoltage.	• DSCU • Fuse • Harness and connector • Battery/charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery + - battery -	Always connected	About 11~14 V

SE

NG → **Overhaul the charging system**

OK

2	**Check driver seat fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the driver seat fuse.

(d) Measure the resistance according to the values in the table below.

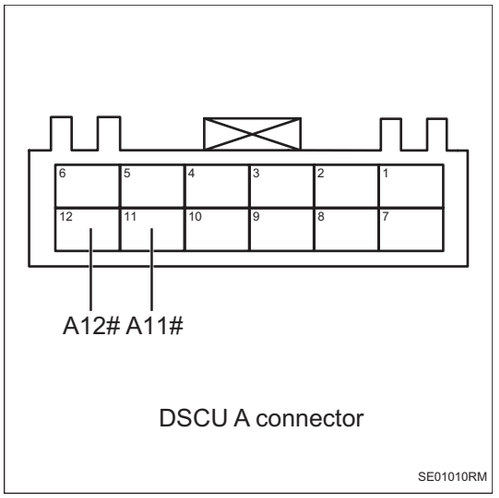
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3	**Check the DSCU ground**



(a) Disconnect the DSCU connector.

(b) Measure the resistance according to the values in the table below.

Standard value

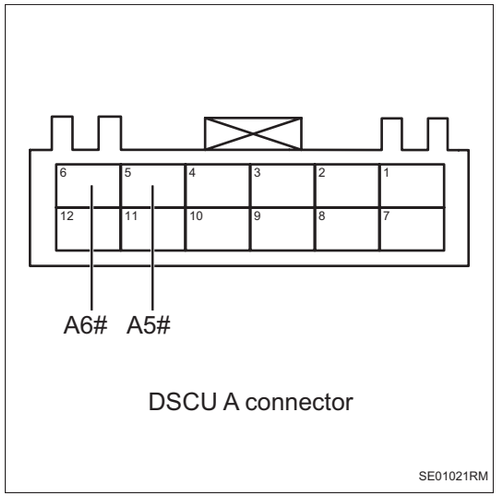
Detector connection	Detection conditions	Specified state
DSCU connector A11# -body GND	Always connected	Less than 1Ω
DSCU connector A12# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check DSCU power supply**

SE



(a) Install the fuse.

(b) Connect the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DSCU connector A5# -body GND	The ignition switch is set to "ON"	Battery voltage
DSCU connector A6# -body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace DSCU (See page SE-91)**

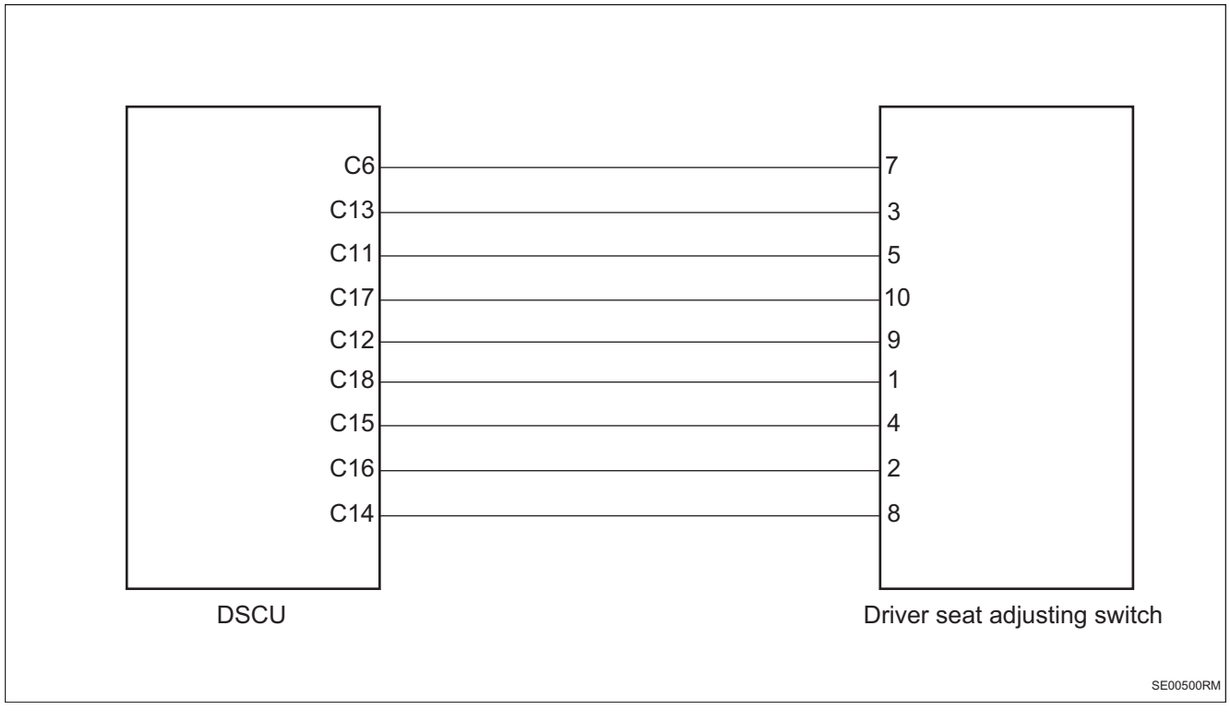
DTC	**B108111**	**Seat forward switch shorted to ground**
DTC	**B108211**	**Seat backward switch shorted to ground**
DTC	**B108311**	**Seat upward switch shorted to ground**
DTC	**B108411**	**Seat downward switch shorted to ground**
DTC	**B108511**	**Seat back forward switch shorted to ground**
DTC	**B108611**	**Seat back backward switch shorted to ground**
DTC	**B108711**	**Cushion up switch shorted to ground**
DTC	**B108811**	**Cushion down switch shorted to ground**

Description

When the driver seat adjusting switch is short circuited, the DSCU records the DTC.

DTC	DTC detection conditions	Faulty location
B108111	(a) Seat forward switch shorted to ground.	• Driver seat adjusting switch • Harness and connector • DSCU
B108211	(a) Seat backward switch shorted to ground.	• Driver seat adjusting switch • Harness and connector • DSCU
B108311	(a) Seat upward switch shorted to ground.	• Driver seat adjusting switch • Harness and connector • DSCU
B108411	(a) Seat downward switch shorted to ground.	• Driver seat adjusting switch • Harness and connector • DSCU
B108511	(a) Seat back forward switch shorted to ground.	• Driver seat adjusting switch • Harness and connector • DSCU
B108611	(a) Seat back backward switch shorted to ground	• Driver seat adjusting switch • Harness and connector • DSCU
B108711	(a) Cushion up switch shorted to ground.	• Driver seat adjusting switch • Harness and connector • DSCU
B108811	(a) Cushion down switch shorted to ground.	• Driver seat adjusting switch • Harness and connector • DSCU

Circuit diagram



Inspection procedure

1	**Check driver seat adjusting switch**

(a) Check the driver seat adjusting switch for foreign matter.

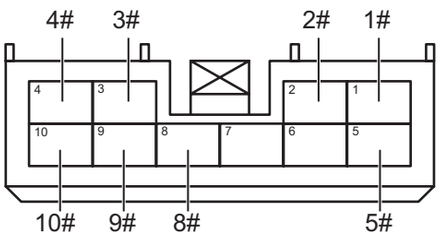
(b) Adjust the driver seat adjusting switch to check whether it is stuck.

NG → **Repair according to the fault**

OK

2	**Check driver seat adjusting switch harness and connector for circuit shorted to ground**

SE



Driver seat adjusting switch connector

SE00510RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DSCU connector.

(d) Disconnect the driver seat adjusting switch connector.

(e) Measure the resistance according to the values in the table below.

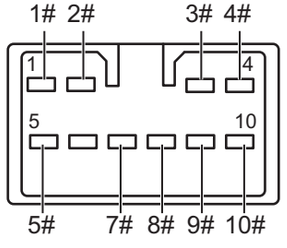
Standard value

Detector connection	Detection conditions	Specified state
Driver seat adjusting switch connector 1# - body GND	Always connected	10 KΩ or greater
Driver seat adjusting switch connector 2# - body GND	Always connected	10 KΩ or greater
Driver seat adjusting switch connector 3# - body GND	Always connected	10 KΩ or greater
Driver seat adjusting switch connector 4# - body GND	Always connected	10 KΩ or greater
Driver seat adjusting switch connector 5# - body GND	Always connected	10 KΩ or greater
Driver seat adjusting switch connector 8# - body GND	Always connected	10 KΩ or greater
Driver seat adjusting switch connector 9# - body GND	Always connected	10 KΩ or greater
Driver seat adjusting switch connector 10# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

3	**Check driver seat adjusting switch**



Driver seat adjusting switch

SE00520RM

(a) Adjust the driver seat adjusting switch to the corresponding position.

(b) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Driver seat adjusting switch 3# -driver seat adjusting switch 7#	Switch in forward adjustment position	Less than 1Ω
Driver seat adjusting switch 3# -driver seat adjusting switch 7#	Switch in original position	10 KΩ or greater

SE

Detector connection	Detection conditions	Specified state
Driver seat adjusting switch 5# -driver seat adjusting switch 7#	Switch in backward adjustment position	Less than 1Ω
Driver seat adjusting switch 5# -driver seat adjusting switch 7#	Switch in original position	10 KΩ or greater
Driver seat adjusting switch 10# -driver seat adjusting switch 7#	Switch in seat back forward adjustment position	Less than 1Ω
Driver seat adjusting switch 10# -driver seat adjusting switch 7#	Switch in original position	10 KΩ or greater
Driver seat adjusting switch 9# -driver seat adjusting switch 7#	Switch in seat back backward adjustment position	Less than 1Ω
Driver seat adjusting switch 9# -driver seat adjusting switch 7#	Switch in original position	10 KΩ or greater
Driver seat adjusting switch 1# -driver seat adjusting switch 7#	Switch in upward position	Less than 1Ω
Driver seat adjusting switch 1# -driver seat adjusting switch 7#	Switch in original position	10 KΩ or greater
Driver seat adjusting switch 4# -driver seat adjusting switch 7#	Switch in downward position	Less than 1Ω
Driver seat adjusting switch 4# -driver seat adjusting switch 7#	Switch in original position	10 KΩ or greater
Driver seat adjusting switch 2# -driver seat adjusting switch 7#	Switch in upward adjustment position	Less than 1Ω
Driver seat adjusting switch 2# -driver seat adjusting switch 7#	Switch in original position	10 KΩ or greater
Driver seat adjusting switch 8# -driver seat adjusting switch 7#	Switch in downward adjustment position	Less than 1Ω
Driver seat adjusting switch 8# -driver seat adjusting switch 7#	Switch in original position	10 KΩ or greater

NG → **Replace the driver seat adjusting switch (See page SE-91)**

SE

OK

4	**Replace DSCU (See page SE-91)**

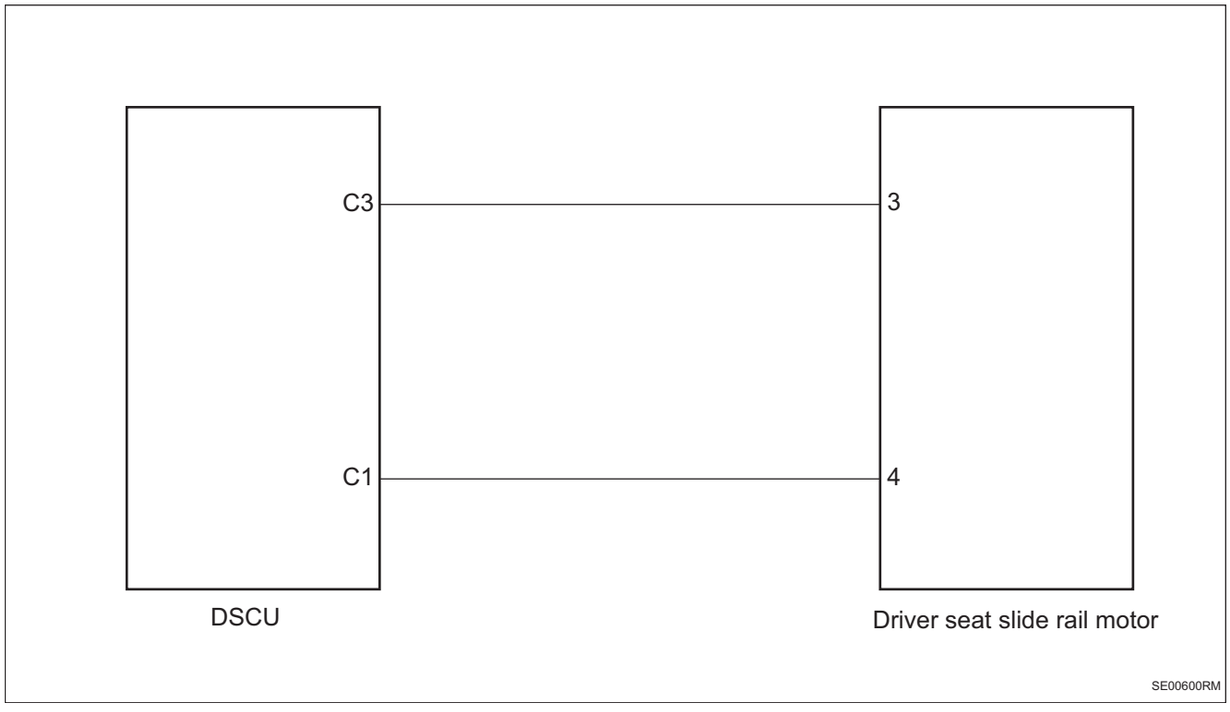
DTC	B108C31	Seat front-and-rear adjustment motor Hall sensor fault

Description

When the Hall sensor of driver seat slide rail motor fails, the DSCU records the DTC.

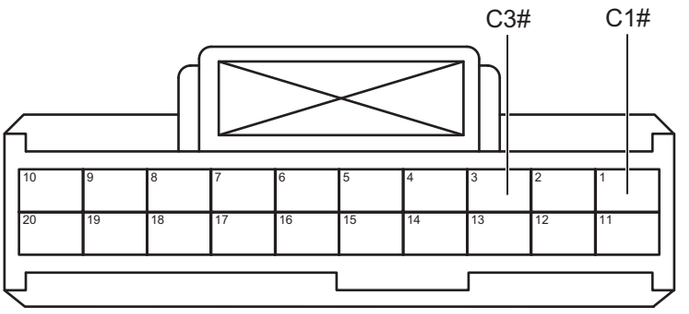
DTC	DTC detection conditions	Faulty location
B108C31	(a) Seat front-and-rear adjustment motor Hall sensor fault.	• Driver seat slide rail motor • Harness and connector • DSCU

Circuit diagram



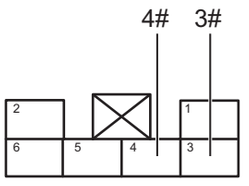
Inspection procedure

1	Check driver seat slide rail motor Hall sensor harness and connector for open circuit



DSCU C connector

SE00610RM



Driver seat slide rail motor connector

SE00620RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DSCU connector.

(d) Disconnect the driver seat slide rail motor connector.

(e) Measure the resistance according to the values in the table below.

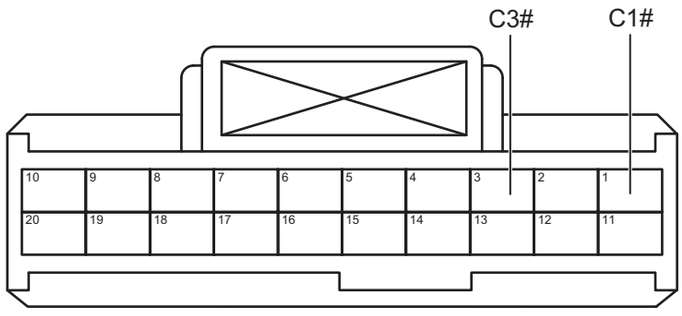
Standard value

Detector connection	Detection conditions	Specified state
DSCU connector C1# -driver seat slide rail motor 4#	Always connected	Less than 1Ω
DSCU connector C3# -driver seat slide rail motor 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check driver seat slide rail motor hall sensor harness and connector for circuit shorted to ground**



DSCU C connector

SE00610RM

(a) Measure the resistance according to the values in the table below.

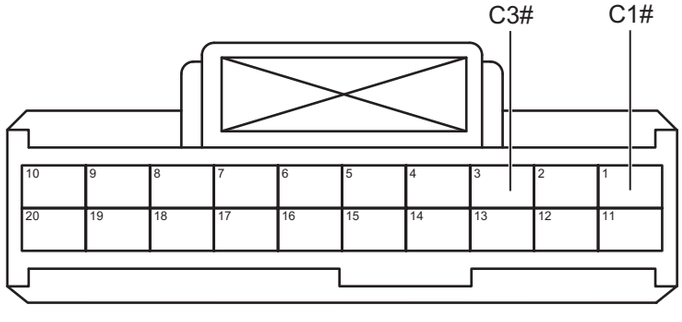
Standard value

Detector connection	Detection conditions	Specified state
DSCU connector C1# -body GND	Always connected	10 KΩ or greater
DSCU connector C3# -body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

3	**Check driver seat slide rail motor Hall sensor harness and connector for circuit shorted to power supply**



DSCU C connector

SE00610RM

(a) Connect battery negative terminal.

SE

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DSCU connector C1# -body GND	The ignition switch is set to "ON"	Less than 1 V
DSCU connector C3# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace driver seat slide rail motor (See page SE-91)**

(a) Replace the driver seat slide rail motor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace DSCU (See page SE-91)**

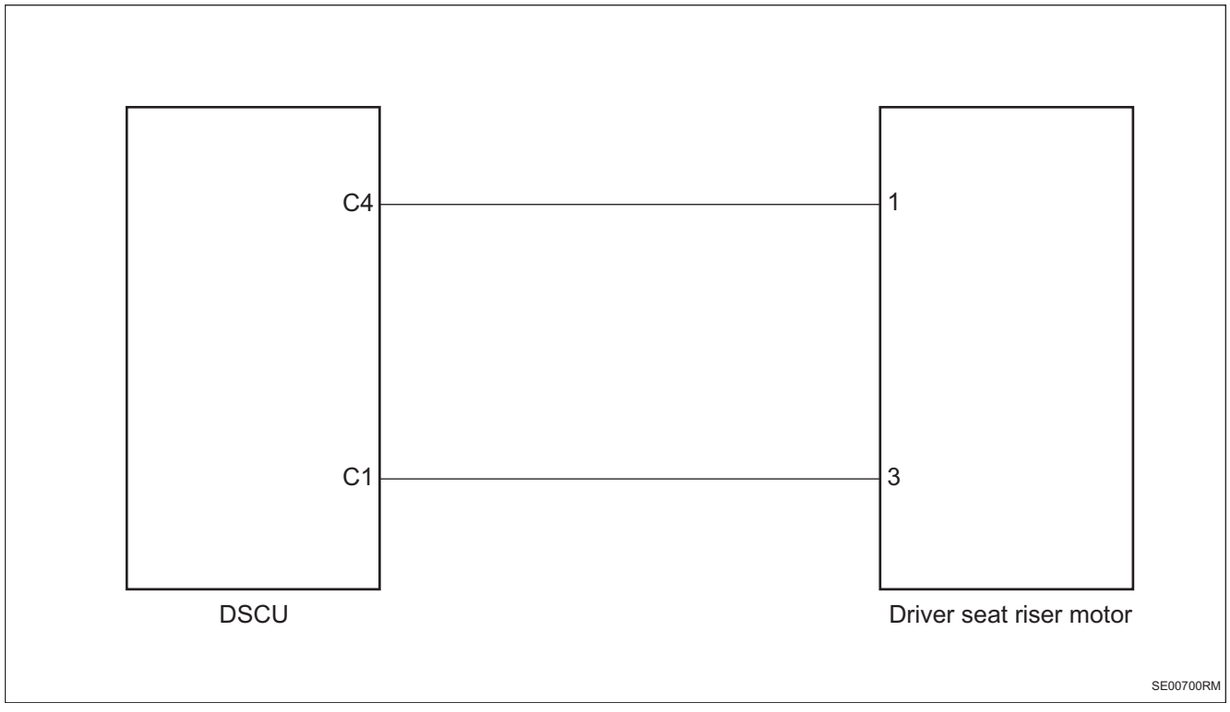
DTC	B108D31	Seat up-and-down adjustment motor Hall sensor fault

Description

When the Hall sensor of driver seat riser motor fails, the DSCU records the DTC.

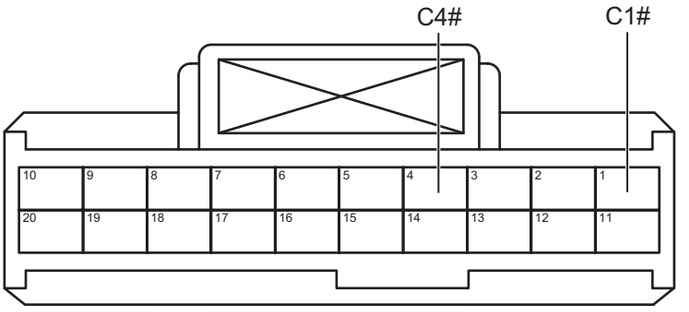
DTC	DTC detection conditions	Faulty location
B108D31	(a) Seat up-and-down adjustment motor Hall sensor fault.	• Driver seat riser motor • Harness and connector • DSCU

Circuit diagram



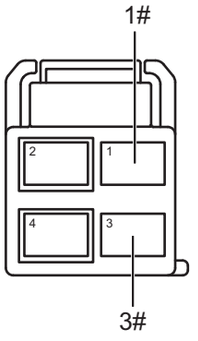
Inspection procedure

1	Check driver seat riser motor Hall sensor harness and connector for open circuit



DSCU C connector

SE00711RM



Driver seat riser motor connector

SE00720RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DSCU connector.

(d) Disconnect the driver seat riser motor connector.

(e) Measure the resistance according to the values in the table below.

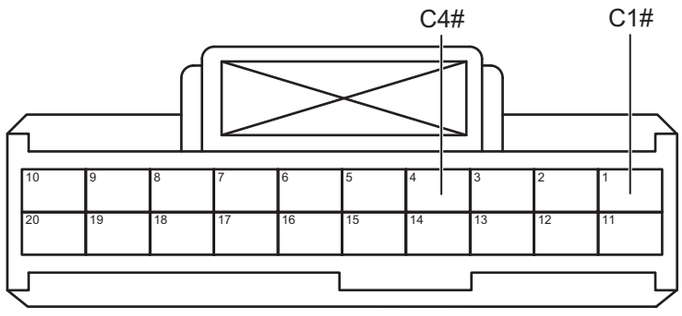
Standard value

Detector connection	Detection conditions	Specified state
DSCU connector C1# -driver seat riser motor connector 3#	Always connected	Less than 1Ω
DSCU connector C4# -driver seat riser motor connector 1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check driver seat riser motor Hall sensor harness and connector for circuit shorted to ground**



DSCU C connector

SE00711RM

(a) Measure the resistance according to the values in the table below.

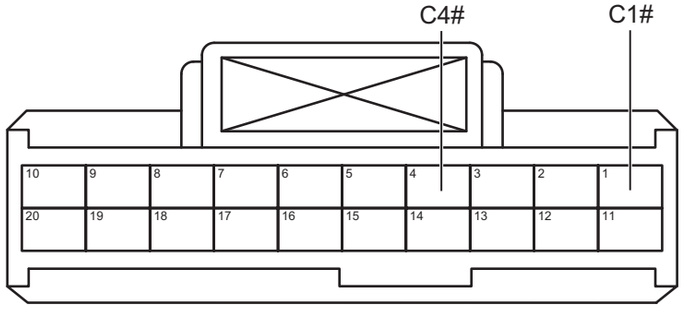
Standard value

Detector connection	Detection conditions	Specified state
DSCU connector C1# -body GND	Always connected	10 KΩ or greater
DSCU connector C4# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check driver seat riser motor Hall sensor harness and connector for circuit shorted to power supply**



DSCU C connector

SE00711RM

(a) Connect battery negative terminal.

SE

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DSCU connector C1# -body GND	The ignition switch is set to "ON"	Less than 1 V
DSCU connector C4# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace driver seat riser motor (See page SE-91)**

(a) Replace the driver seat riser motor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace DSCU (See page SE-91)**

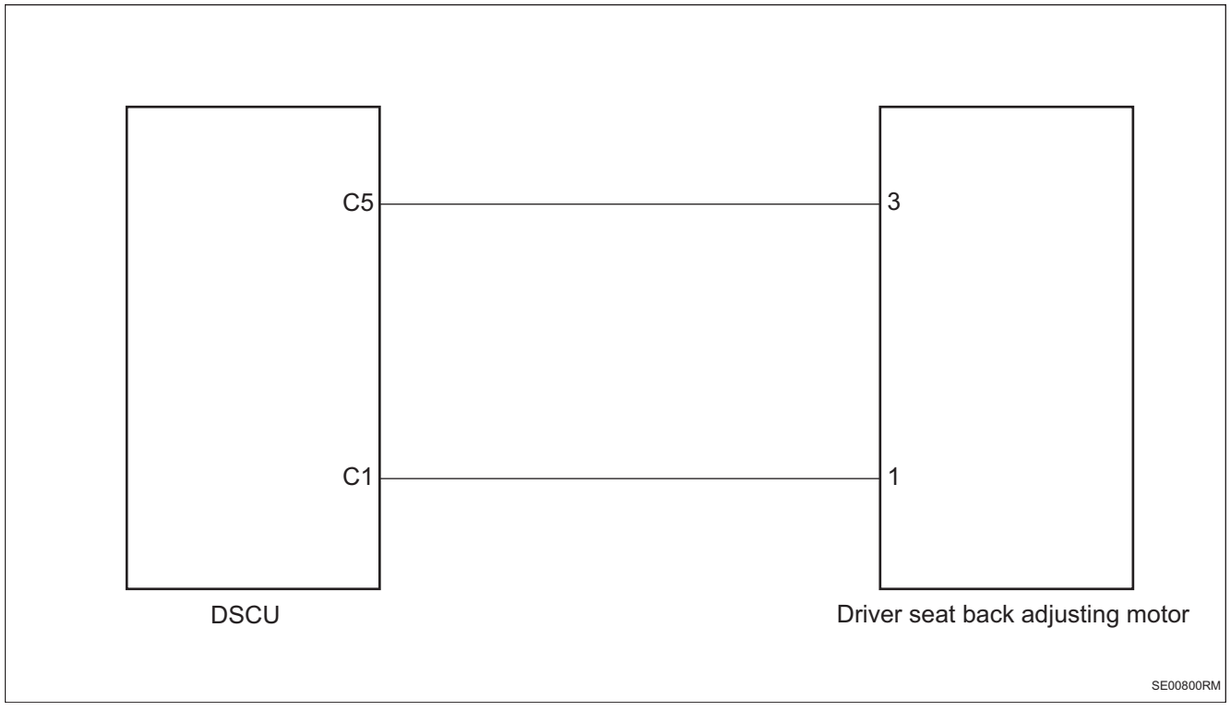
DTC	B108E31	Seat back motor Hall sensor fault

Description

The DSCU records DTC when the driver seat back adjusting motor hall sensor is faulty.

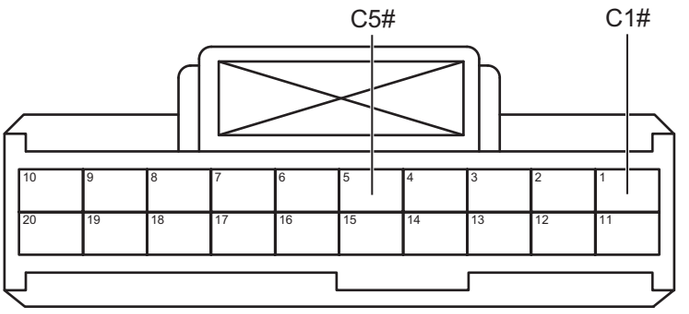
DTC	DTC detection conditions	Faulty location
B108E31	(a) Seat back motor Hall sensor fault.	• Driver seat back adjusting motor • Harness and connector • DSCU

Circuit diagram



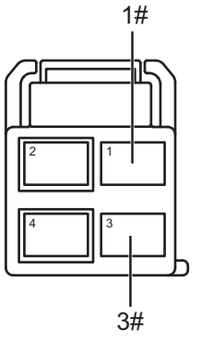
Inspection procedure

1	**Check driver seat back adjusting motor Hall sensor harness and connector for open circuit**



DSCU C connector

SE00811RM



Driver seat back adjusting motor connector

SE00820RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DSCU connector.

(d) Disconnect the driver seat back adjusting motor connector.

(e) Measure the resistance according to the values in the table below.

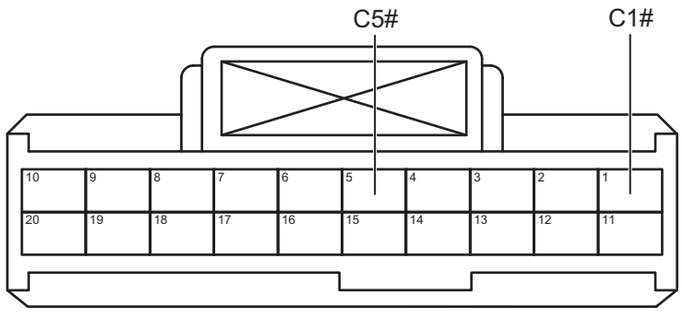
Standard value

Detector connection	Detection conditions	Specified state
DSCU connector C5# -driver seat back adjusting motor connector 3#	Always connected	Less than 1Ω
DSCU connector C1# -driver seat back adjusting motor connector 1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check driver seat back adjusting motor Hall sensor harness and connector for circuit shorted to ground**



DSCU C connector

SE00811RM

(a) Measure the resistance according to the values in the table below.

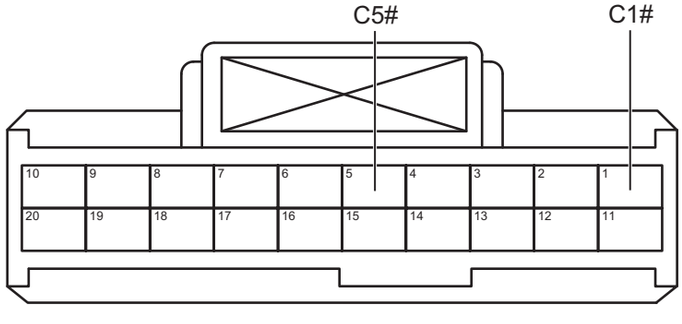
Standard value

Detector connection	Detection conditions	Specified state
DSCU connector C5# -body GND	Always connected	10 KΩ or greater
DSCU connector C1# -body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

3	**Check driver seat back adjusting motor Hall sensor harness and connector for circuit shorted to power supply**



DSCU C connector

SE00811RM

(a) Connect battery negative terminal.

SE

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DSCU connector C5# -body GND	The ignition switch is set to "ON"	Less than 1 V
DSCU connector C1# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the driver seat back adjusting motor (See page SE-91)**

(a) Replace the driver seat back adjusting motor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace DSCU (See page SE-91)**

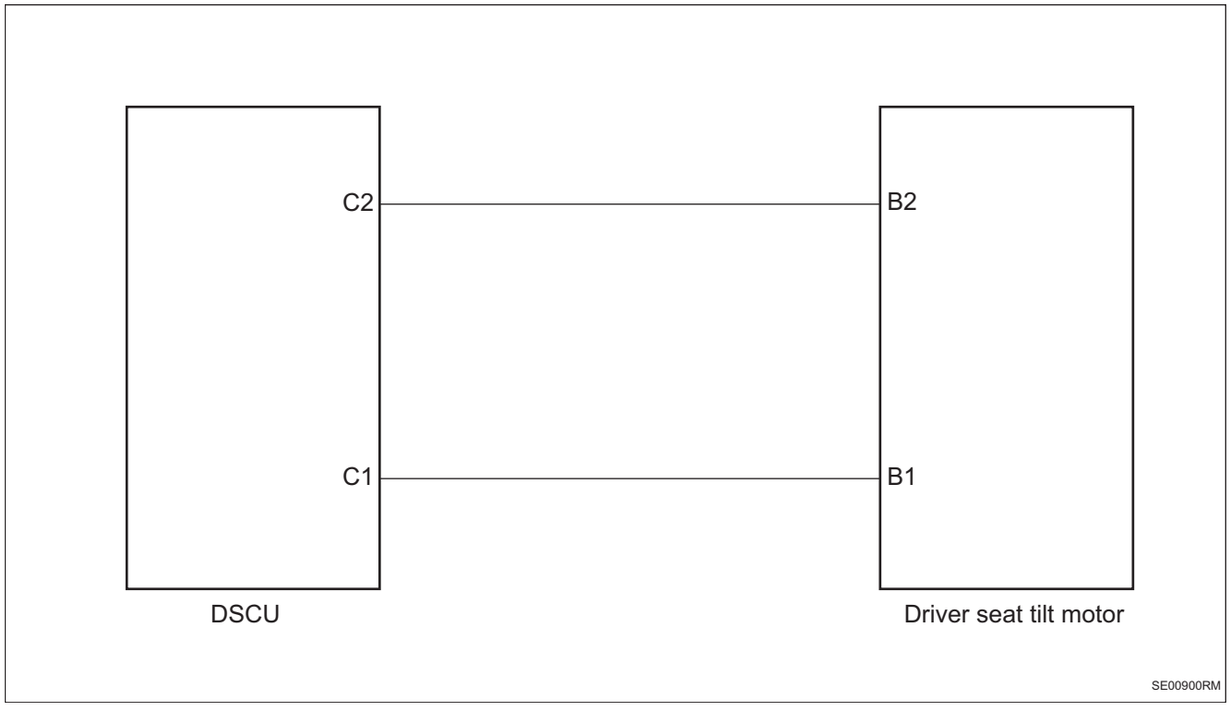
DTC	B108F31	Cushion motor Hall sensor fault

Description

When the Hall sensor of driver seat tilt motor fails, the DSCU records the DTC.

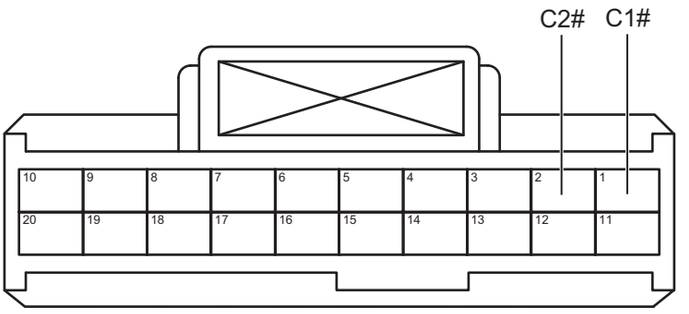
DTC	DTC detection conditions	Faulty location
B108F31	(a) Cushion motor Hall sensor fault.	• Driver seat tilt motor • Harness and connector • DSCU

Circuit diagram



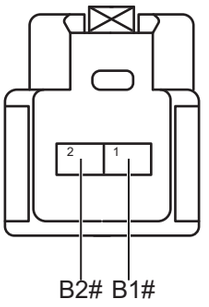
Inspection procedure

1	**Check driver seat forward tilt motor Hall sensor harness and connector for open circuit**



DSCU C connector

SE00911RM



Driver seat tilt motor B connector

SE00920RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the DSCU connector.

(d) Disconnect the driver seat tilt motor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

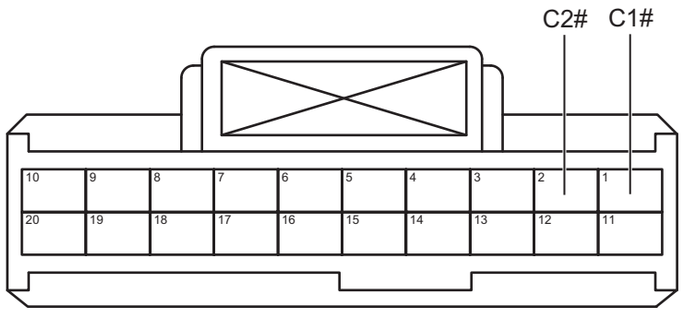
Detector connection	Detection conditions	Specified state
DSCU connector C2# -driver seat tilt motor connector B2#	Always connected	Less than 1Ω
DSCU connector C1# -driver seat tilt motor connector B1#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

2	**Check driver seat forward tilt motor Hall sensor harness and connector for circuit shorted to ground**

SE



DSCU C connector

SE00911RM

(a) Measure the resistance according to the values in the table below.

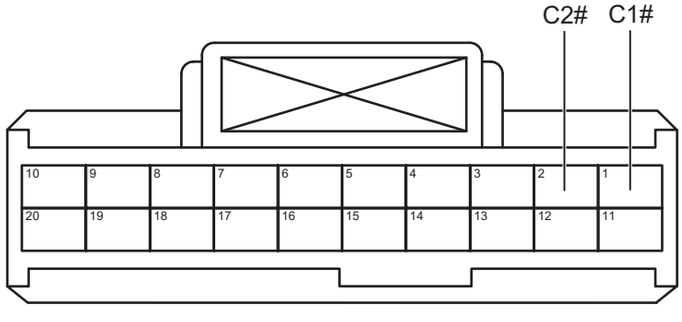
Standard value

Detector connection	Detection conditions	Specified state
DSCU connector C2# -body GND	Always connected	10 KΩ or greater
DSCU connector C1# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check driver seat forward tilt motor Hall sensor harness and connector for circuit shorted to power supply**



DSCU C connector

SE00911RM

(a) Connect battery negative terminal.

SE

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DSCU connector C2# -body GND	The ignition switch is set to "ON"	Less than 1 V
DSCU connector C1# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace driver seat tilt motor (See page SE-91)**

(a) Replace the driver seat tilt motor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace DSCU (See page SE-91)**

DTC	**U002888**	**Comfort CAN bus off**
DTC	**U014687**	**GW node lost**
DTC	**U112187**	**ESP/IBC message lost**
DTC	**U115587**	**Instrument cluster control unit message lost**
DTC	**U014087**	**BCM 1 node lost**
DTC	**U110087**	**ECM message lost**
DTC	**U129387**	**HCU message lost**

Description

When the communication between the DSCU and other systems is abnormal or interrupted, the DSCU will record the DTC.

DTC	DTC detection conditions	Faulty location
U002888	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014687	(a) Abnormal or interrupted network communication.	
U112187	(a) Abnormal or interrupted communication.	
U115587	(a) Abnormal or interrupted communication.	
U014087	(a) Abnormal or interrupted communication.	
U110087	(a) Abnormal or interrupted communication.	
U129387	(a) Abnormal or interrupted communication.	

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

SCCU system

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Warning:

Before repairing the high voltage system or adjacent high voltage system components, be sure to carefully read the "Instructions and precautions for maintenance work" in the introduction carefully!

2. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button in OFF position	OFF (OFF)
ENGINE START/STOP button in ON (ACC) position	On (ACC)
ENGINE START/STOP button in ON (IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button in ON (IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

3. when the battery cable is disconnected and reconnected, some systems require initialization.

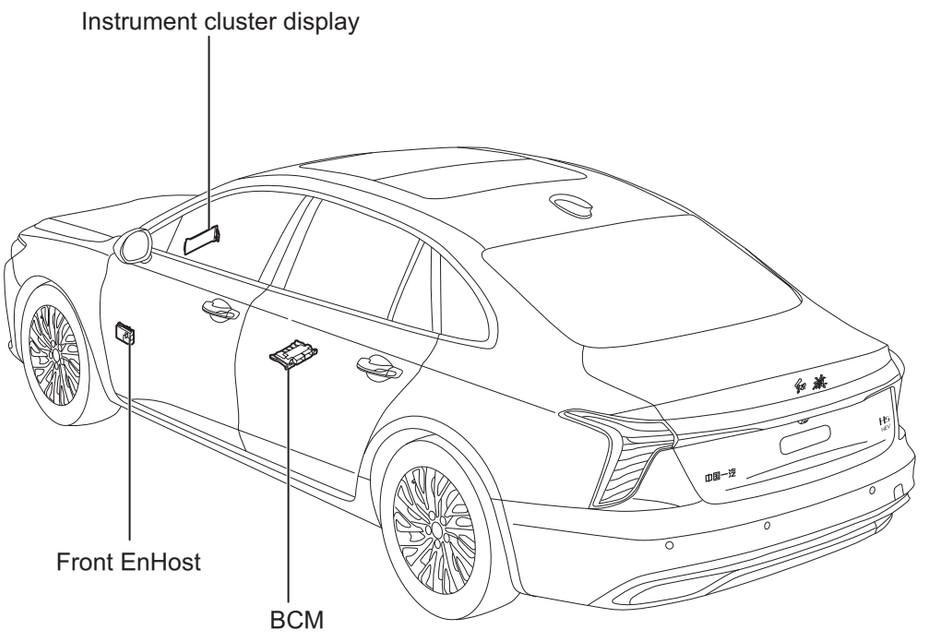
4. General repair instructions

(a) When checking the seat control system, it may affect the airbag work. Therefore, before carrying out maintenance work, be sure to carefully read and confirm the precautions for airbag.

(b) When the part needs to be replaced or the connector needs to be disconnected during maintenance of seat control system, disconnect the battery negative cable.

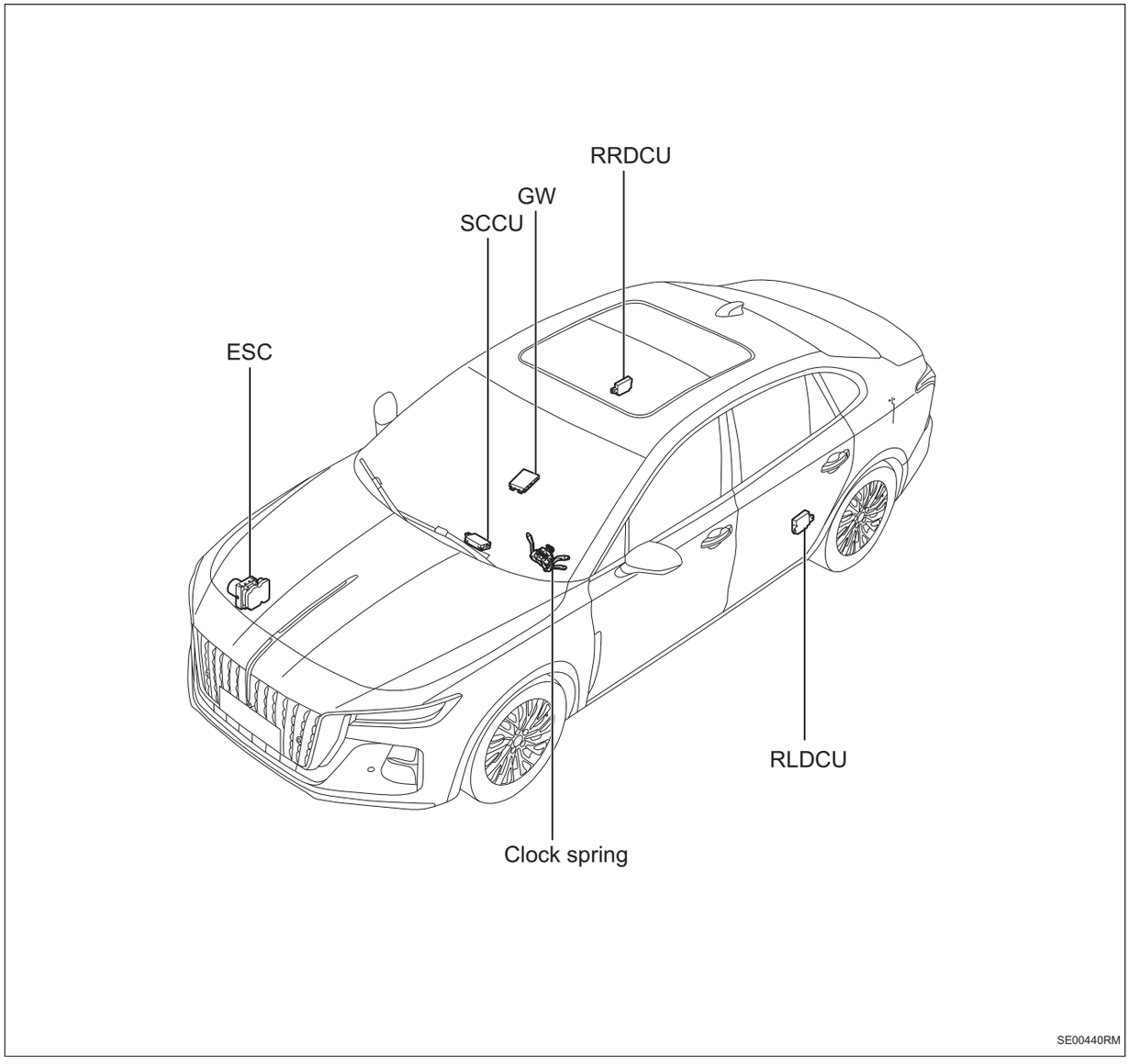
(c) The door control system needs to be initialized after reconnecting the battery. And use the HQ-VDS to "clear the DTC" for all electronic control systems.

Location of parts

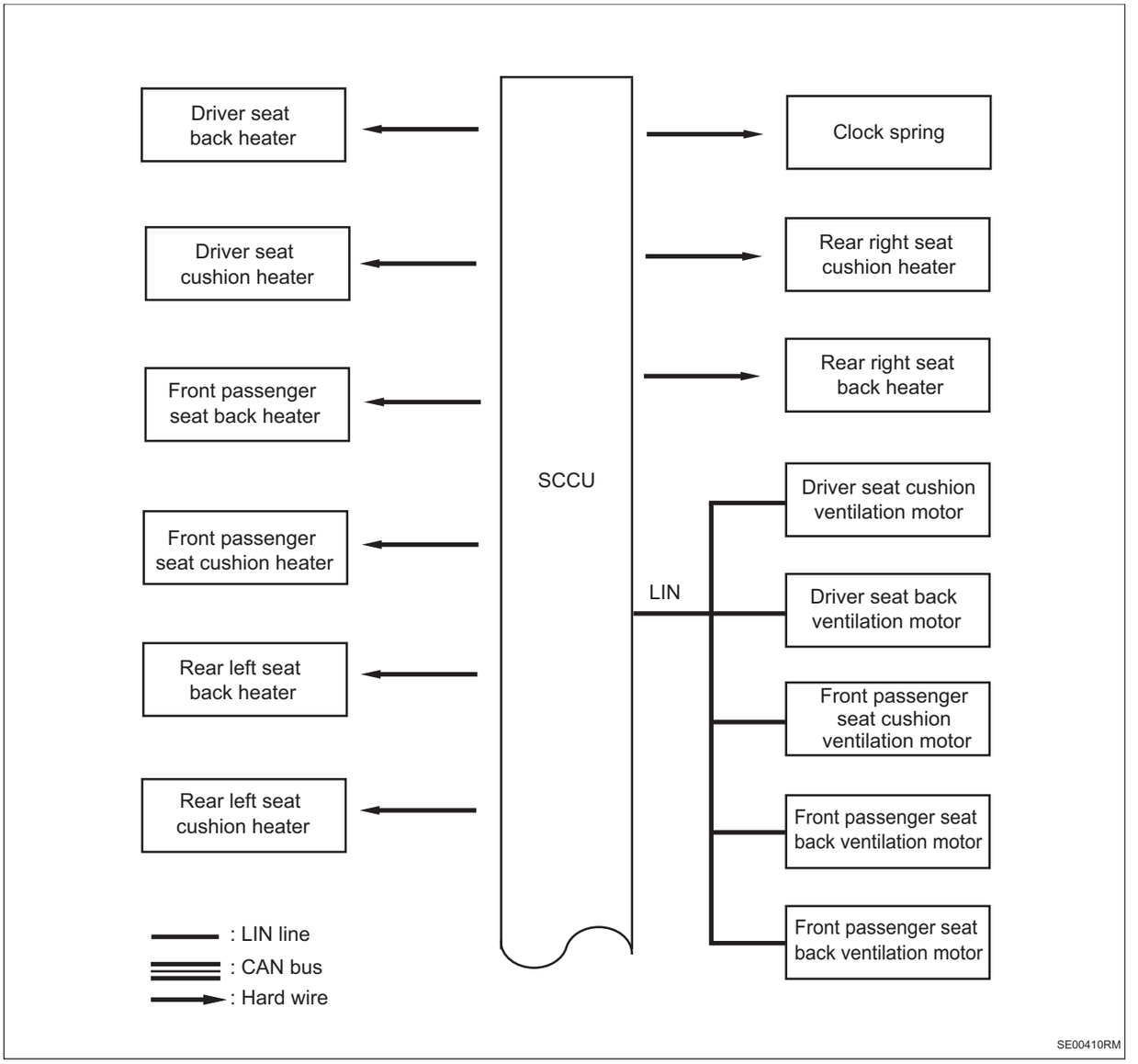


SE00430RM

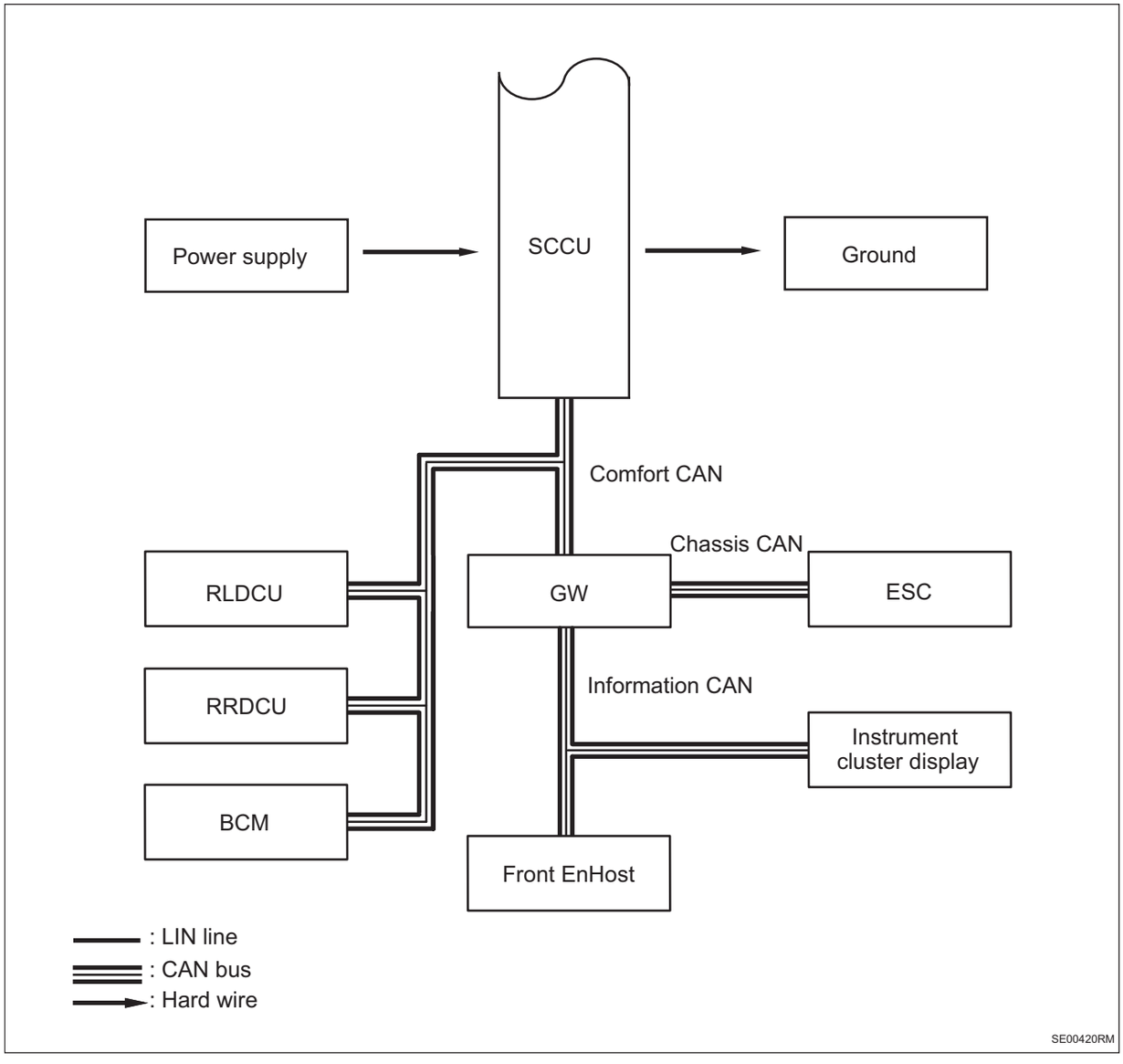
Location of parts



System diagram



System diagram



Function description

1. System description

(a) Seat ventilation and heater control unit: it realizes the heating and ventilation functions of the seat. Operate ventilation and heating switch to realize corresponding function.

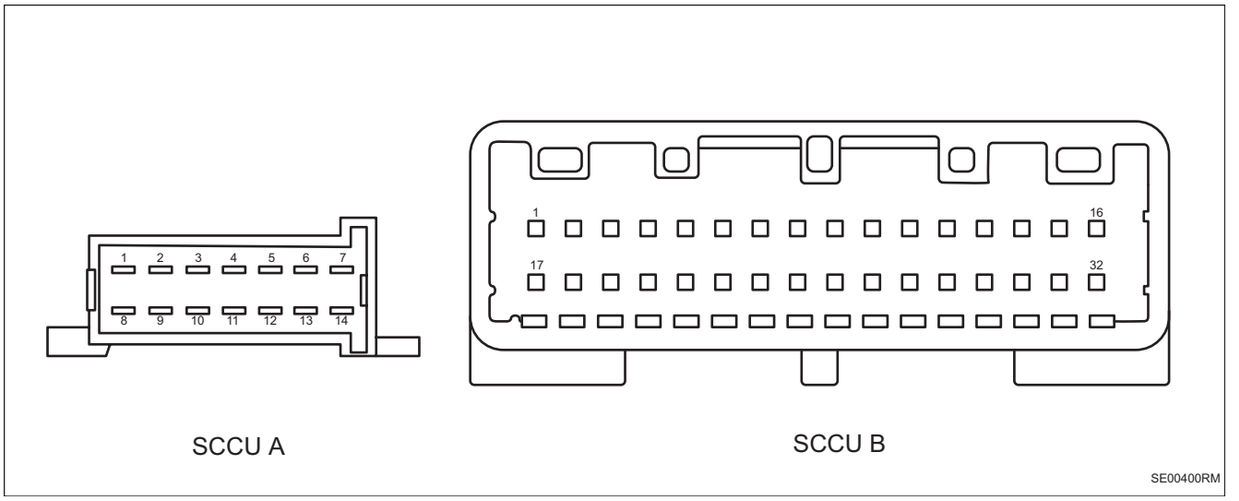
Symptom chart

Seat ventilation and heater control unit

Fault	Possible location
Heating/ventilation of seat is unavailable	• Fuse • MCP • Seat ventilation and heater control unit • Related harness and connector • Seat heater • Seat ventilation motor • CAN bus • Gateway • Battery

ECU terminal

SCCU



SCCU A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Rear right seat heater output	8	Rear right seat heater power supply
2	Steering wheel heating power supply	9	-
3	Steering wheel heater output	10	-
4	Front passenger seat heater power supply	11	-
5	Front passenger seat heater output	12	ECU ground 2
6	Rear left seat heater power supply	13	Driver seat heater output
7	Rear left seat heater output	14	Driver seat heater power supply

SCCU B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	-	17	-
2	-	18	-
3	-	19	-
4	-	20	-
5	Rear left seat heater NTC signal	21	-
6	Steering wheel heater NTC signal	22	-
7	Front passenger heater NTC signal	23	-
8	Driver heater NTC signal	24	-
9	Rear right seat heater NTC signal	25	-
10	NTC ground	26	-
11	CAN-H	27	-
12	CAN-L	28	-
13	LIN	29	-

SCCU B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
14	-	30	-
15	-	31	ECU ground 1
16	ECU power supply	32	-

DTC chart

DTC	Description	Reference page
B10E016	Battery undervoltage	(See page SE-45)
B10E017	Battery overvoltage	(See page SE-45)
B10E115	Driver seat heater sensor open circuit	(See page SE-49)
B10E111	Driver seat heater sensor circuit shorted to ground	(See page SE-49)
B10E215	Front passenger seat heater sensor circuit open	(See page SE-52)
B10E211	Front passenger seat heater sensor circuit shorted to ground	(See page SE-52)
B10E311	Driver seat heating element circuit shorted to ground	(See page SE-55)
B10E313	Driver seat heating element circuit open	(See page SE-55)
B10E312	Driver seat heating element circuit shorted to power supply	(See page SE-55)
B10E411	Front passenger seat heating element circuit shorted to ground	(See page SE-59)
B10E413	Front passenger seat heating element circuit open	(See page SE-59)
B10E412	Front passenger seat heating element circuit shorted to power supply	(See page SE-59)
B10E513	Rear seat left heating element circuit open	(See page SE-63)
B10E511	Rear seat left heating element circuit shorted to ground	(See page SE-63)
B10E512	Rear seat left heating element circuit shorted to power supply	(See page SE-63)
B10E613	Rear seat right heating element circuit open	(See page SE-67)
B10E611	Rear seat right heating element circuit shorted to ground	(See page SE-67)
B10E612	Rear seat right heating element circuit shorted to power supply	(See page SE-67)
B10E711	Steering wheel heating element circuit shorted to ground	(See page SE-71)
B10E713	Steering wheel heating element open-circuited to ground	(See page SE-71)
B10E712	Steering wheel heating element circuit shorted to power supply	(See page SE-71)
B10EB11	Steering wheel heater sensor circuit shorted to ground	(See page SE-81)
B10EC15	Steering wheel heater sensor open-circuited	(See page SE-81)

DTC	Description	Reference page
B10E815	Rear left seat heater sensor circuit open	(See page SE-75)
B10E811	Rear left seat heater sensor circuit shorted to ground	(See page SE-75)
B10E915	Rear right seat heater sensor open circuit	(See page SE-78)
B10E911	Rear right seat heater sensor circuit shorted to ground	(See page SE-78)
U020287	Rear right door module node lost	(See page SE-90)
U020187	Rear left door module node lost	(See page SE-90)
U115587	Instrument cluster control unit message lost	(See page SE-90)
U014087	BCM 1 node lost	(See page SE-90)
U002888	Comfort CAN bus off	(See page SE-90)
U014687	GW node lost	(See page SE-90)
U112187	ESP/IBC message lost	(See page SE-90)
U124587	IVI message lost	(See page SE-90)
U102388	LIN1 physical bus error	(See page SE-84)
U133086	Driver seat back ventilation fan LIN communication error	(See page SE-84)
U133186	Driver seat cushion ventilation fan LIN communication error	(See page SE-84)
U133286	Passenger seat back ventilation fan LIN communication error	(See page SE-84)
U133386	Passenger seat cushion ventilation fan LIN communication error	(See page SE-84)
U134086	Driver seat massage air pump LIN communication error	(See page SE-84)
U024987	Driver seat back ventilation fan node lost	(See page SE-84)
U024A87	Driver seat cushion ventilation fan node lost	(See page SE-84)
U024B87	Passenger seat back ventilation fan node lost	(See page SE-84)
U024C87	Passenger seat cushion ventilation fan node lost	(See page SE-84)
U025187	Driver seat massage air pump node lost	(See page SE-84)
U034086	Driver seat massage air pump fault	(See page SE-84)
U035986	Driver seat fan fault	(See page SE-84)
U035A86	Passenger seat fan fault	(See page SE-84)

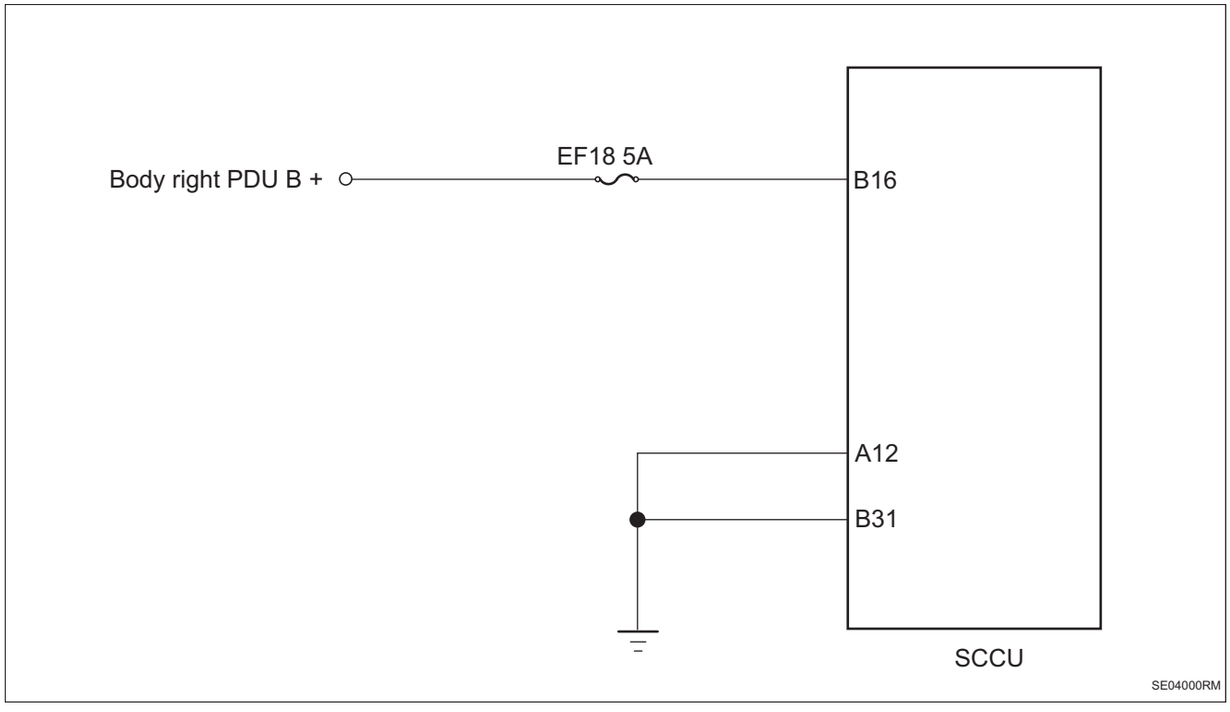
DTC	B10E016	Battery voltage low
DTC	B10E017	Battery voltage high

Description

When the SCCU input voltage is too high or too low, SCCU records the DTC.

DTC	DTC detection conditions	Faulty location
B10E016	(a) Battery undervoltage.	• SCCU • Fuse • Harness and connection unit • Battery/charging system
B10E017	(a) High battery overvoltage.	• SCCU • Harness and connection unit • Battery/charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

SE

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery + - battery -	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2	**Check SCCU fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove SCCU fuse.

(d) Measure the resistance according to the values in the table below.

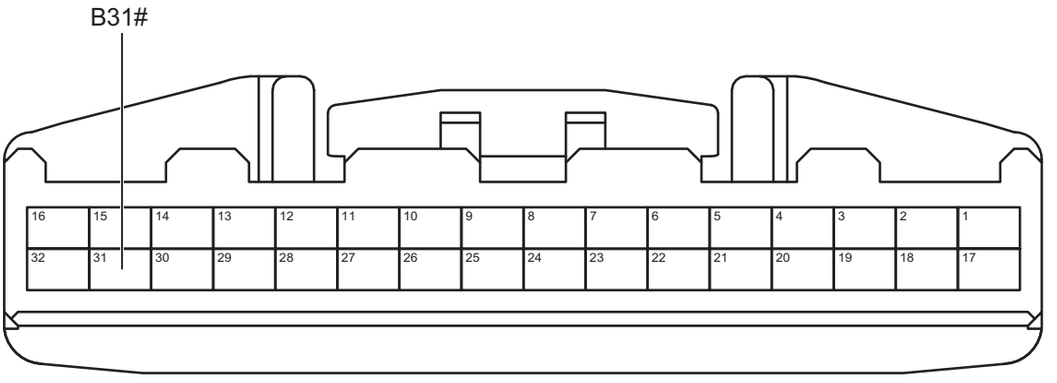
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

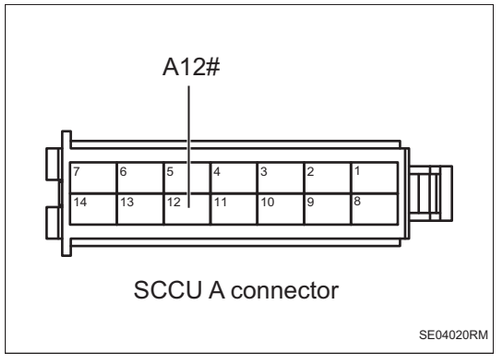
OK

3	**Check SCCU ground**



SCCU B connector

SE04010RM



(a) Measure the resistance according to the values in the table below.

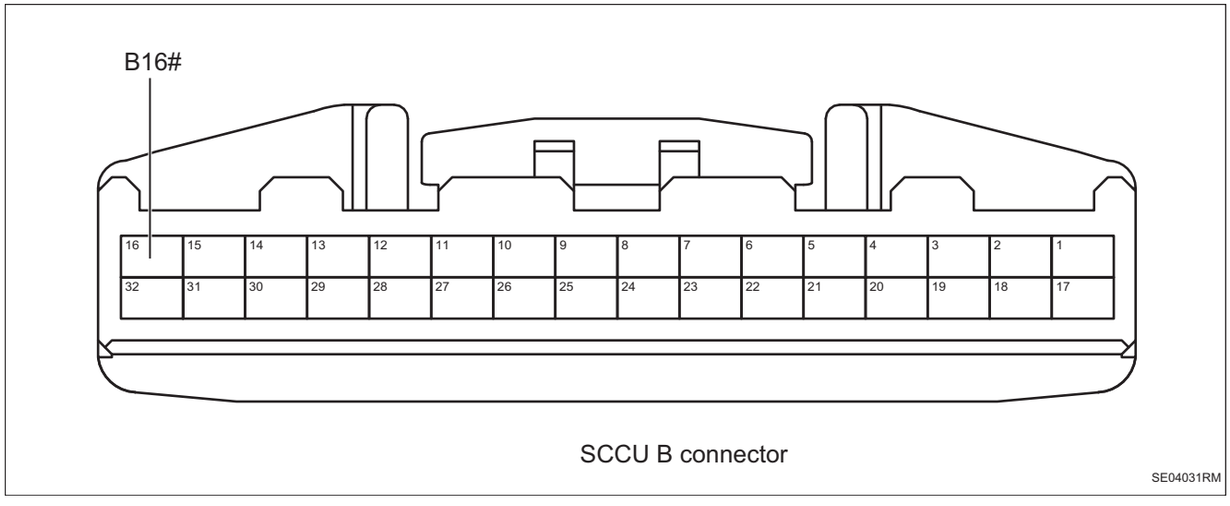
Standard value

Detector connection	Detection conditions	Specified state
SCCU connector A12# - body GND	Always connected	Less than 1Ω
SCCU connector B31# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	Check SCCU power supply



(a) Install the fuse.

(b) Connect the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
SCCU connector B16# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

SE

OK

5	**Replace SCCU (See page SE-91)**

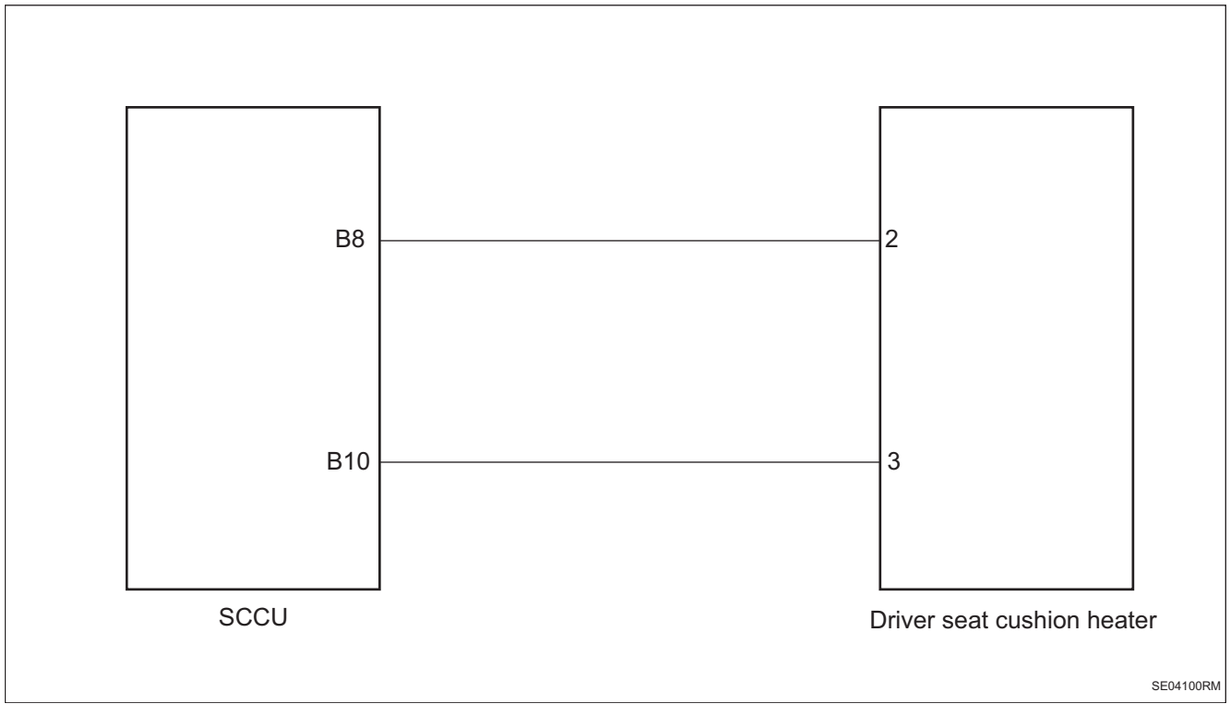
DTC	B10E115	Driver seat heater sensor open circuit
DTC	B10E111	Driver seat heater sensor circuit shorted to ground

Description

When the driver seat cushion heater sensor circuit is shorted to ground or open, the SCCU records the DTC.

DTC	DTC detection conditions	Faulty location
B10E115	(a) Driver seat heater sensor circuit open.	• Driver seat cushion heater • Harness and connector • SCCU
B10E111	(a) Driver seat heater sensor circuit shorted to ground.	• Driver seat cushion heater • Harness and connector • SCCU

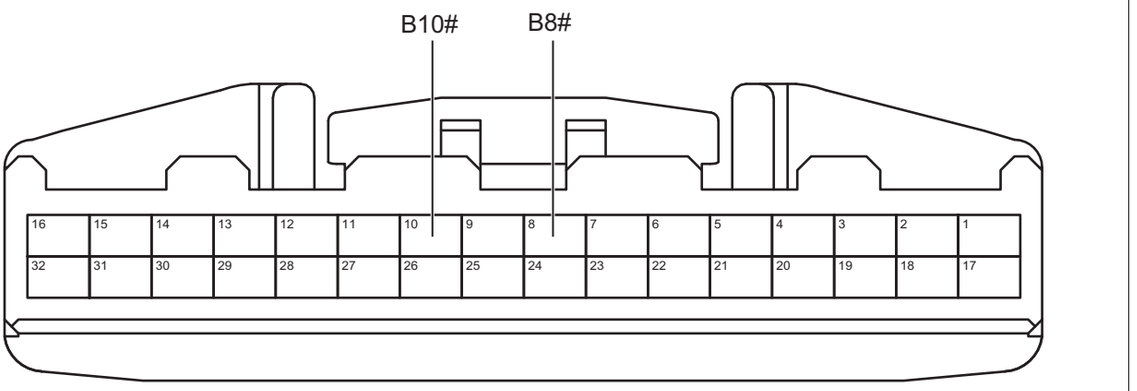
Circuit diagram



Inspection procedure

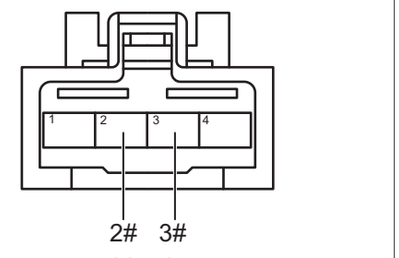
1	Check driver seat cushion heater harness and connector for open circuit

SE



SCCU B connector

SE04111RM



Driver seat cushion heater connector

SE04120RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the driver seat cushion heater connector.

(d) Disconnect the SCCU connector.

(e) Measure the resistance according to the values in the table below.

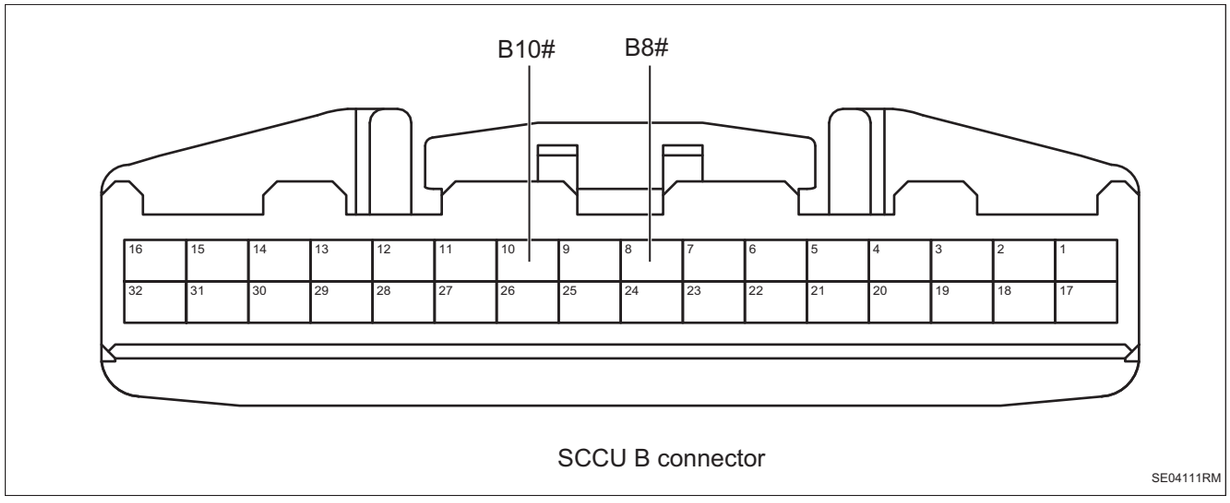
Standard value

Detector connection	Detection conditions	Specified state
SCCU connector B8# - driver seat cushion heater connector 2#	Always connected	Less than 1Ω
SCCU connector B10# - driver seat cushion heater connector 3#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

2	**Check driver seat cushion heater harness and connector for circuit shorted to ground**



SCCU B connector

SE04111RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
SCCU connector B8# - body GND	Always connected	10 KΩ or greater
SCCU connector B10# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Replace driver seat cushion heater (See page SE-91)**

(a) Replace the driver seat cushion heater.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace SCCU (See page SE-91)**

OK

4	**End**

SE

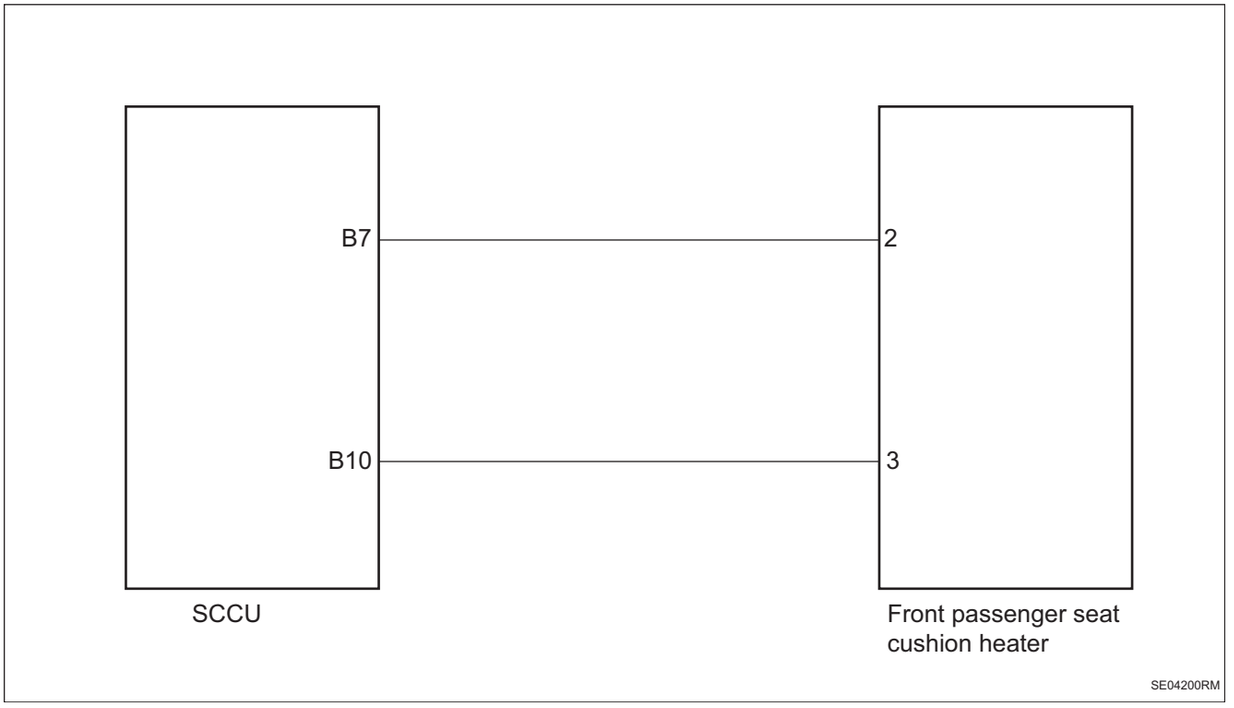
DTC	**B10E215**	**Front passenger seat heater sensor circuit open**
DTC	**B10E211**	**Front passenger seat heater sensor circuit shorted to ground**

Description

When the front passenger seat cushion heater sensor circuit is shorted to ground or open, the SCCU records the DTC.

DTC	DTC detection conditions	Faulty location
B10E215	(a) Front passenger seat heater sensor circuit open.	• Front passenger seat cushion heater • Harness and connector • SCCU
B10E211	(a) Front passenger seat heater sensor circuit shorted to ground.	• Front passenger seat cushion heater • Harness and connector • SCCU

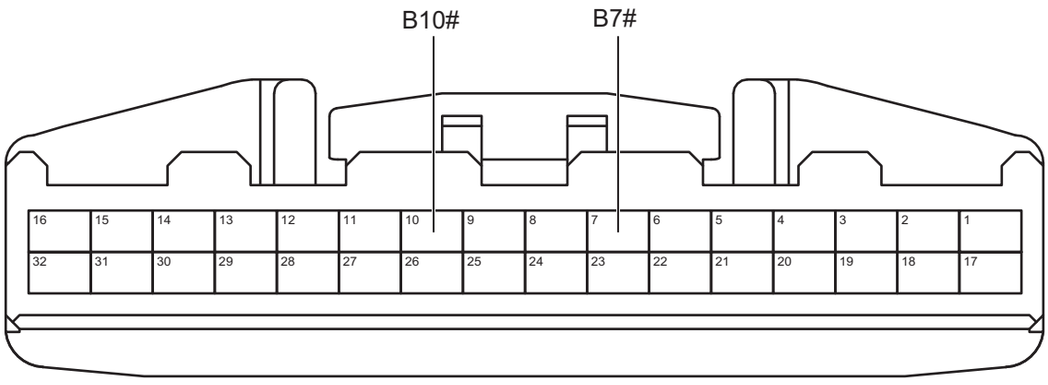
Circuit diagram



SE

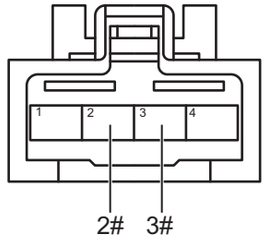
Inspection procedure

1	**Check front passenger seat cushion heater harness and connector for open circuit**



SCCU B connector

SE04211RM



Front passenger seat cushion heater connector

SE04221RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the front passenger seat cushion heater connector.

(d) Disconnect the SCCU connector.

(e) Measure the resistance according to the values in the table below.

Standard value

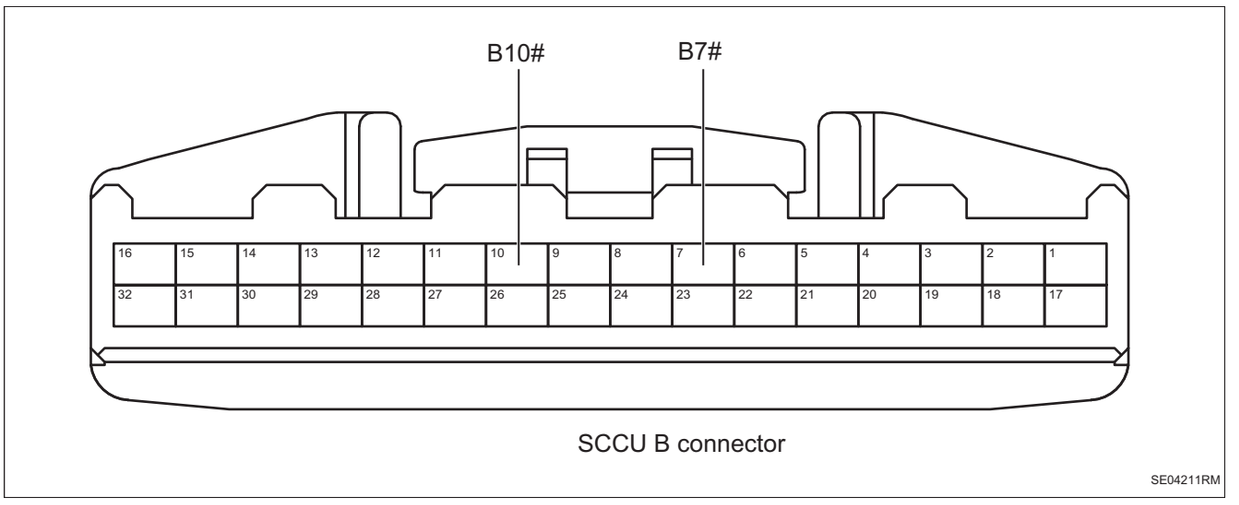
Detector connection	Detection conditions	Specified state
SCCU connector B7# - front passenger seat cushion heater connector 2#	Always connected	Less than 1Ω
SCCU connector B10# - front passenger seat cushion heater connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check front passenger seat cushion heater harness and connector for circuit shorted to ground**

SE



SCCU B connector

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
SCCU connector B7# - body GND	Always connected	10 KΩ or greater
SCCU connector B10# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Replace the front passenger seat cushion heater (See page SE-91)**

(a) Replace the front passenger seat cushion heater.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace SCCU (See page SE-91)**

OK

4	**End**

SE

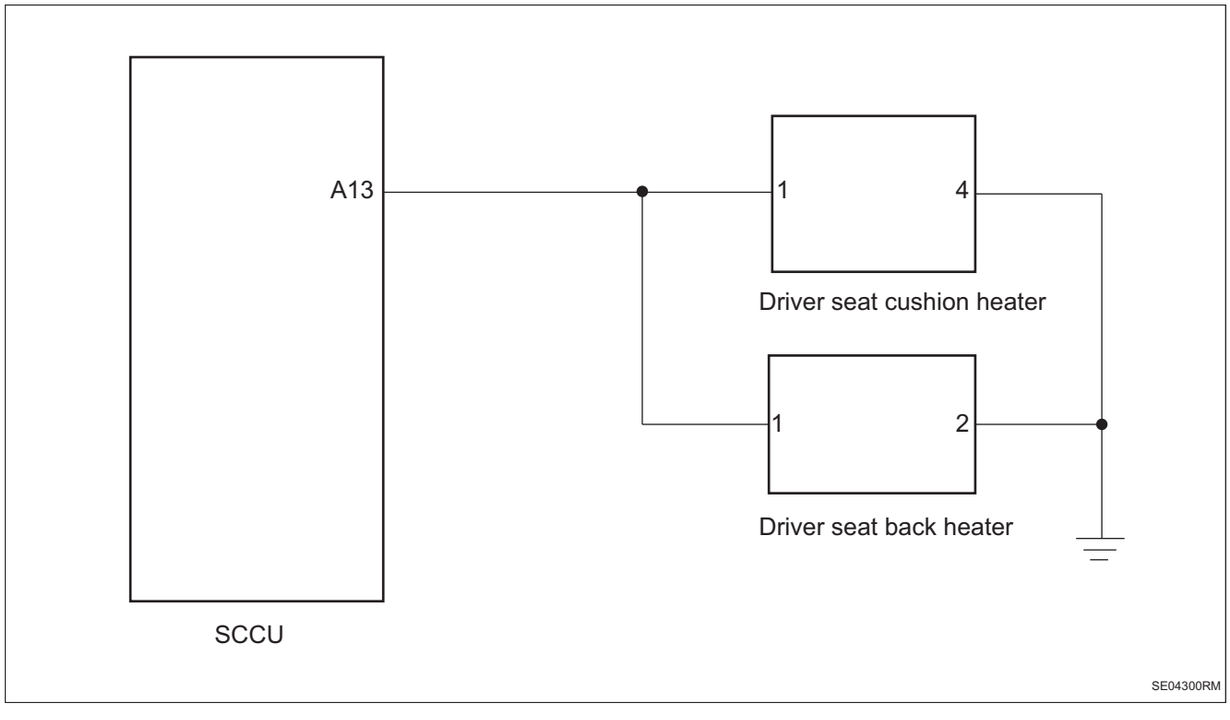
DTC	**B10E311**	**Driver seat heating element circuit shorted to ground**
DTC	**B10E313**	**Driver seat heating element circuit open**
DTC	**B10E312**	**Driver seat heating element circuit shorted to power supply**

Description

When the driver seat cushion heater and driver seat back heater lines are shorted or open, the SCCU records the DTC.

DTC	DTC detection conditions	Faulty location
B10E311	(a) Driver seat heating element circuit shorted to ground.	• Driver seat cushion heater • Driver seat back heater • Harness and connector • SCCU
B10E313	(a) Driver seat heating element circuit open.	• Driver seat cushion heater • Driver seat back heater • Harness and connector • SCCU
B10E312	(a) Driver seat heating element circuit shorted to power supply.	• Driver seat cushion heater • Driver seat back heater • Harness and connector • SCCU

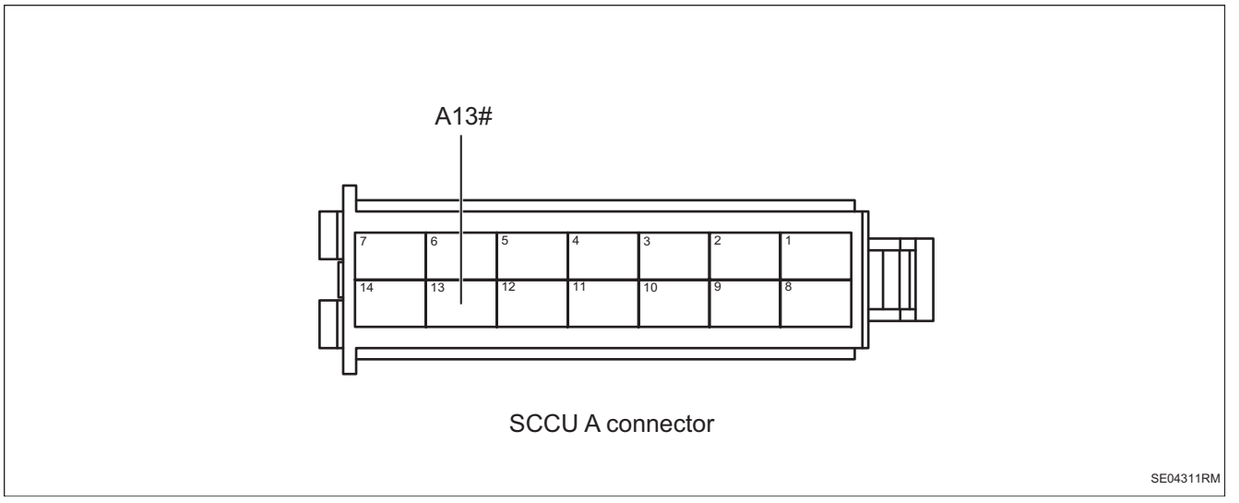
Circuit diagram



SE

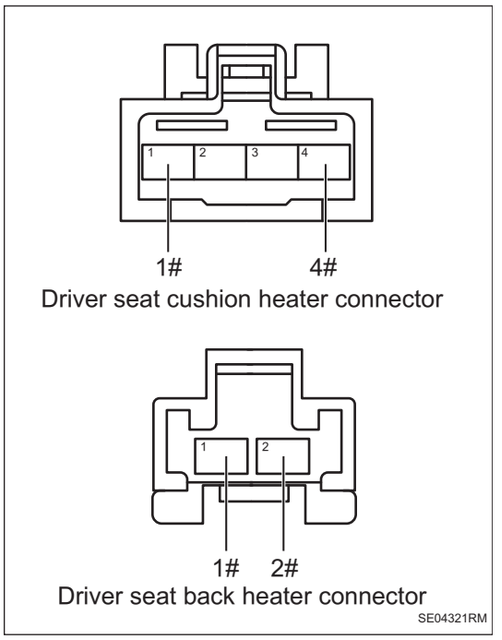
Inspection procedure

1	**Check driver seat heater harness and connector for open circuit**



SCCU A connector

SE04311RM



Driver seat cushion heater connector

Driver seat back heater connector

SE04321RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the driver seat cushion heater connector.

(d) Disconnect the driver seat back heater connector.

(e) Disconnect the SCCU connector.

(f) Measure the resistance according to the values in the table below.

Standard value

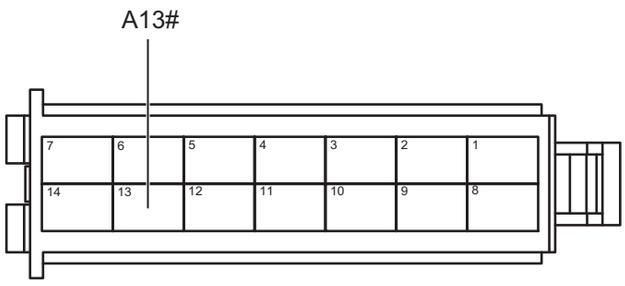
Detector connection	Detection conditions	Specified state
SCCU connector A13# - driver seat cushion heater connector 1#	Always connected	Less than 1Ω
SCCU connector A13# - driver seat back heater connector 1#	Always connected	Less than 1Ω
Driver seat cushion heater connector 4# - body GND	Always connected	Less than 1Ω
Driver seat back heater connector 2# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

SE

OK

2	**Check driver seat heater harness and connector for circuit shorted to ground**



SCCU A connector

SE04311RM

(a) Measure the resistance according to the values in the table below.

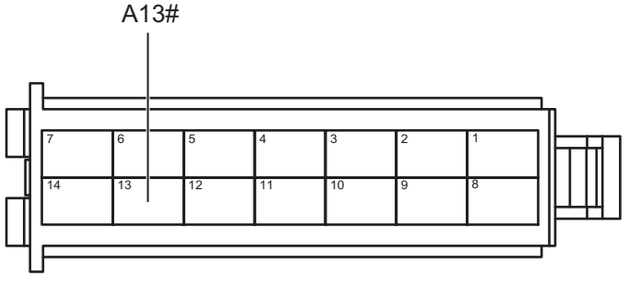
Standard value

Detector connection	Detection conditions	Specified state
SCCU connector A13# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

3	Check driver seat heater harness and connector for circuit shorted to power supply



SCCU A connector

SE04311RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

SE

Standard value

Detector connection	Detection conditions	Specified state
SCCU connector A13# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace driver seat cushion heater/driver seat back heater (See page SE-91)**

(a) Replace the driver seat cushion heater/driver seat back heater.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace SCCU (See page SE-91)**

OK

5	**End**

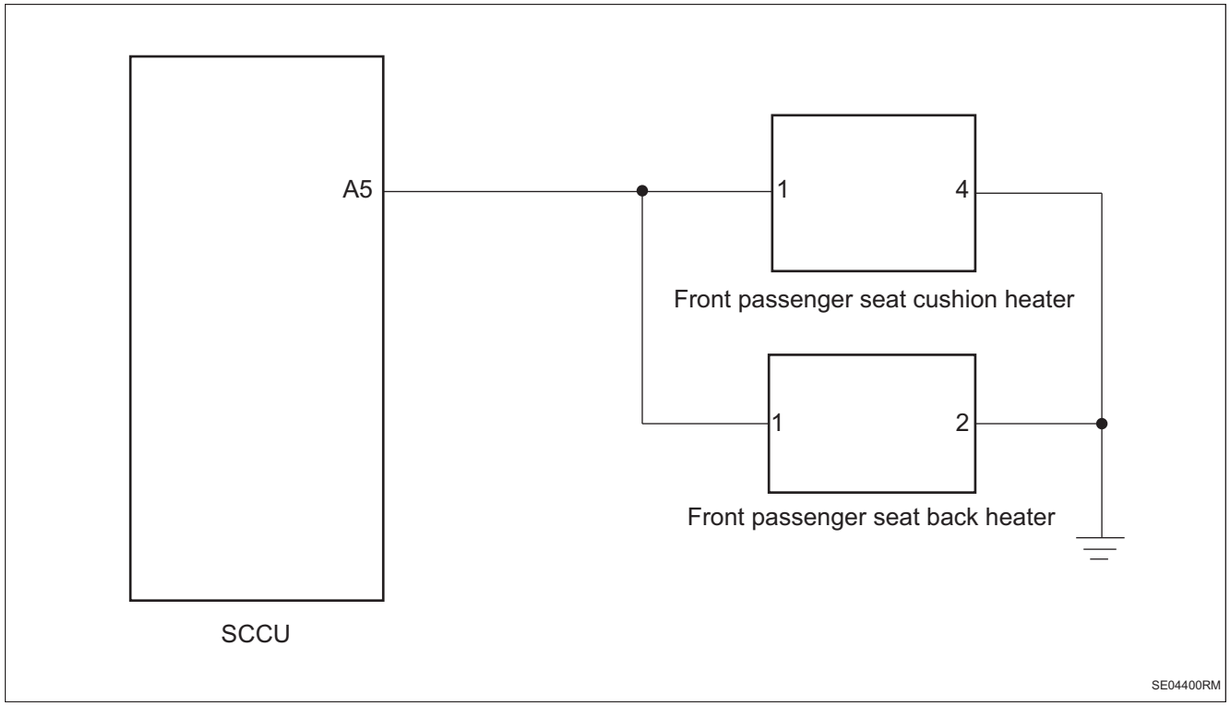
DTC	**B10E411**	**Front passenger seat heating element circuit shorted to ground**
DTC	**B10E413**	**Front passenger seat heating element circuit open**
DTC	**B10E412**	**Front passenger seat heating element circuit shorted to power supply**

Description

When the front passenger seat cushion heater and front passenger seat back heater lines are shorted or open, the SCCU records the DTC.

DTC	DTC detection conditions	Faulty location
B10E411	(a) Front passenger seat heating element circuit shorted to ground.	• Front passenger seat cushion heater • Front passenger seat back heater • Harness and connector • SCCU
B10E413	(a) Front passenger seat heating element circuit open.	• Front passenger seat cushion heater • Front passenger seat back heater • Harness and connector • SCCU
B10E412	(a) Front passenger seat heating element circuit shorted to power supply.	• Front passenger seat cushion heater • Front passenger seat back heater • Harness and connector • SCCU

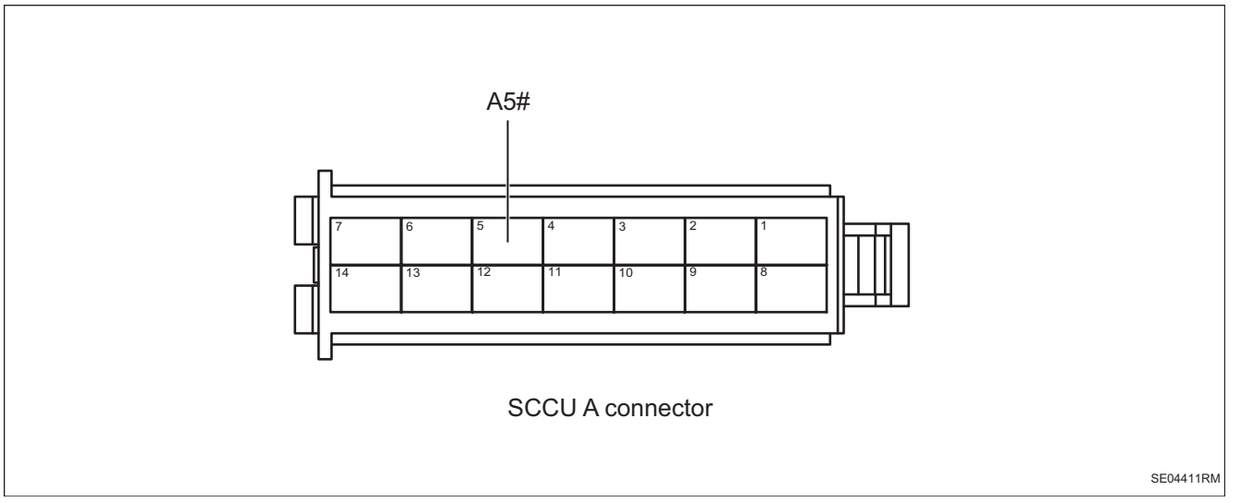
Circuit diagram



SE

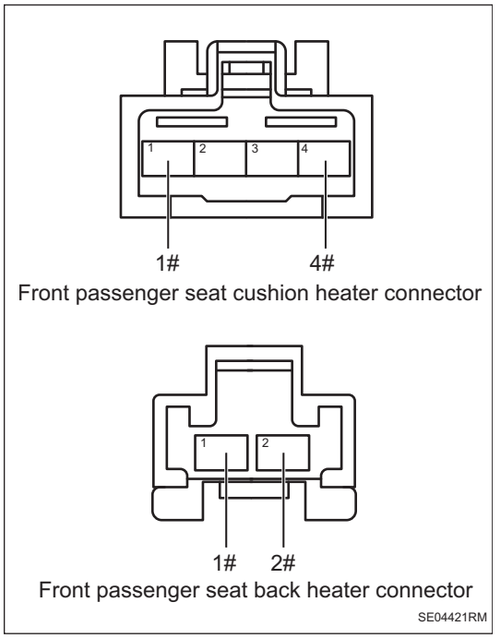
Inspection procedure

1	**Check front passenger seat heater harness and connector for open circuit**



SCCU A connector

SE04411RM



Front passenger seat cushion heater connector

Front passenger seat back heater connector

SE04421RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the front passenger seat cushion heater connector.

(d) Disconnect the front passenger seat back heater connector.

(e) Disconnect the SCCU connector.

(f) Measure the resistance according to the values in the table below.

Standard value

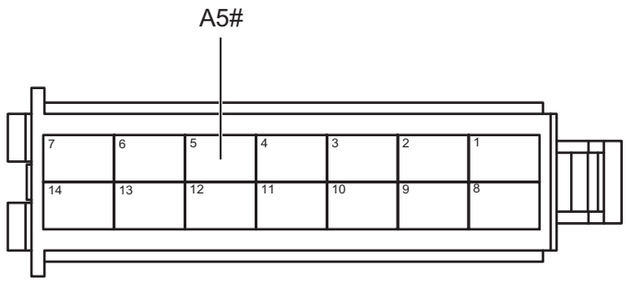
Detector connection	Detection conditions	Specified state
SCCU connector A5# - front passenger seat cushion heater connector 1#	Always connected	Less than 1Ω
SCCU connector A5# - front passenger seat back heater connector 1#	Always connected	Less than 1Ω
Front passenger seat cushion heater connector 4# - body GND	Always connected	Less than 1Ω
Front passenger seat back heater connector 2# - body GND	Always connected	Less than 1Ω

SE

NG → **Repair or replace the harness and connector**

OK

2	**Check front passenger seat heater harness and connector for circuit shorted to ground**



SCCU A connector

SE04411RM

(a) Measure the resistance according to the values in the table below.

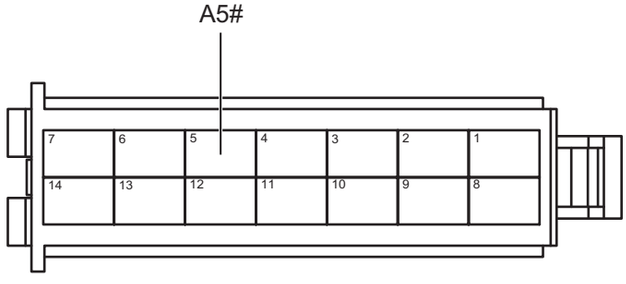
Standard value

Detector connection	Detection conditions	Specified state
SCCU connector A5# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

3	**Check front passenger seat heater harness and connector for circuit shorted to power supply**



SCCU A connector

SE04411RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

SE

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
SCCU connector A5# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace front passenger seat cushion heater/front passenger seat back heater (See page SE-91)**

(a) Replace the front passenger seat cushion heater/front passenger seat back heater.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace SCCU (See page SE-91)**

OK

5	**End**

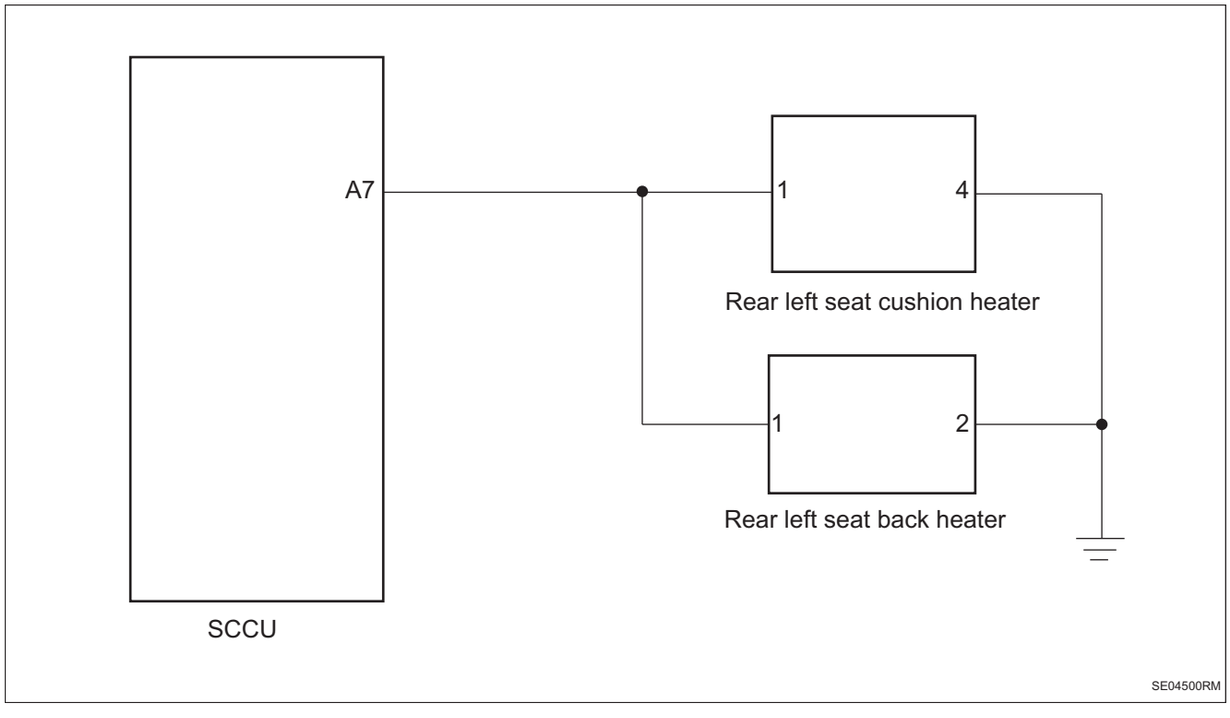
DTC	**B10E513**	**Rear seat left heating element circuit open**
DTC	**B10E511**	**Rear seat left heating element circuit shorted to ground**
DTC	**B10E512**	**Rear seat left heating element circuit shorted to power supply**

Description

When the rear left seat back heater and rear left seat cushion heater lines are shorted or open, the SCCU records the DTC.

DTC	DTC detection conditions	Faulty location
B10E513	(a) Rear seat left heating element circuit open.	• Harness and connector • Rear left seat back heater • Rear left seat cushion heater • SCCU
B10E511	(a) Rear seat left heating element circuit shorted to ground.	• Harness and connector • Rear left seat back heater • Rear left seat cushion heater • SCCU
B10E512	(a) Rear seat left heating element circuit shorted to power supply.	• Harness and connector • Rear left seat back heater • Rear left seat cushion heater • SCCU

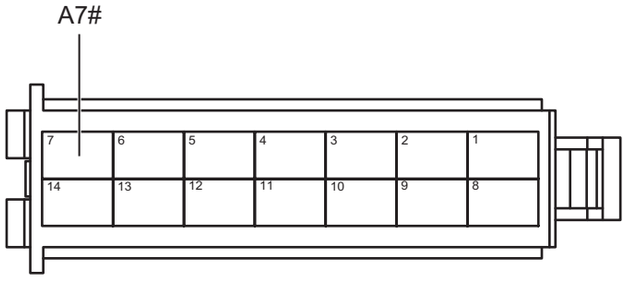
Circuit diagram



SE

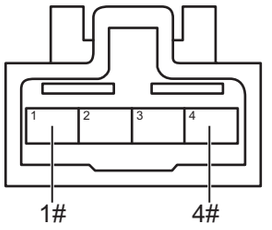
Inspection procedure

1	**Check rear left seat heater harness and connector for open circuit**

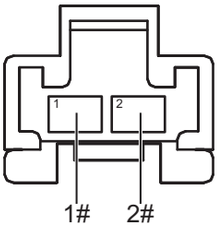


SCCU A connector

SE04511RM



Rear left seat cushion heater connector



Rear left seat back heater connector

SE04521RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the rear left seat cushion heater connector.

(d) Disconnect the rear left seat back heater connector.

(e) Disconnect the SCCU connector.

(f) Measure the resistance according to the values in the table below.

Standard value

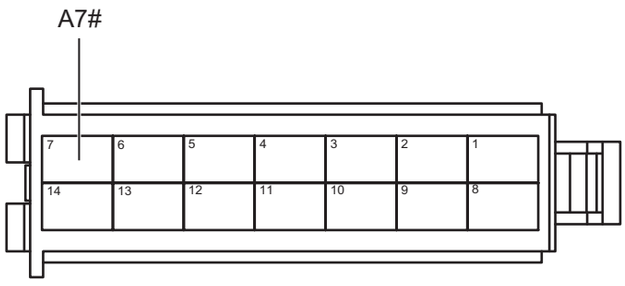
Detector connection	Detection conditions	Specified state
SCCU connector A7# - rear left seat cushion heater connector 1#	Always connected	Less than 1Ω
SCCU connector A7# - rear left seat back heater connector 1#	Always connected	Less than 1Ω
Rear left seat cushion heater connector 4# - body GND	Always connected	Less than 1Ω
Rear left seat back heater connector 2# - body GND	Always connected	Less than 1Ω

SE

NG **Repair or replace the harness and connector**

OK

2	**Check rear left seat heater harness and connector for circuit shorted to ground**



SCCU A connector

SE04511RM

(a) Measure the resistance according to the values in the table below.

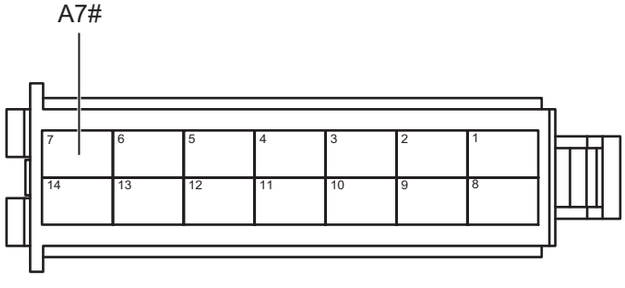
Standard value

Detector connection	Detection conditions	Specified state
SCCU connector A7# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check rear left seat heater harness and connector for circuit shorted to power supply**



SCCU A connector

SE04511RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

SE

Standard value

Detector connection	Detection conditions	Specified state
SCCU connector A7# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace rear left seat cushion heater/rear left seat back heater (See page SE-91)**

(a) Replace the rear left seat cushion heater/rear left seat back heater.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace SCCU (See page SE-91)**

OK

5	**End**

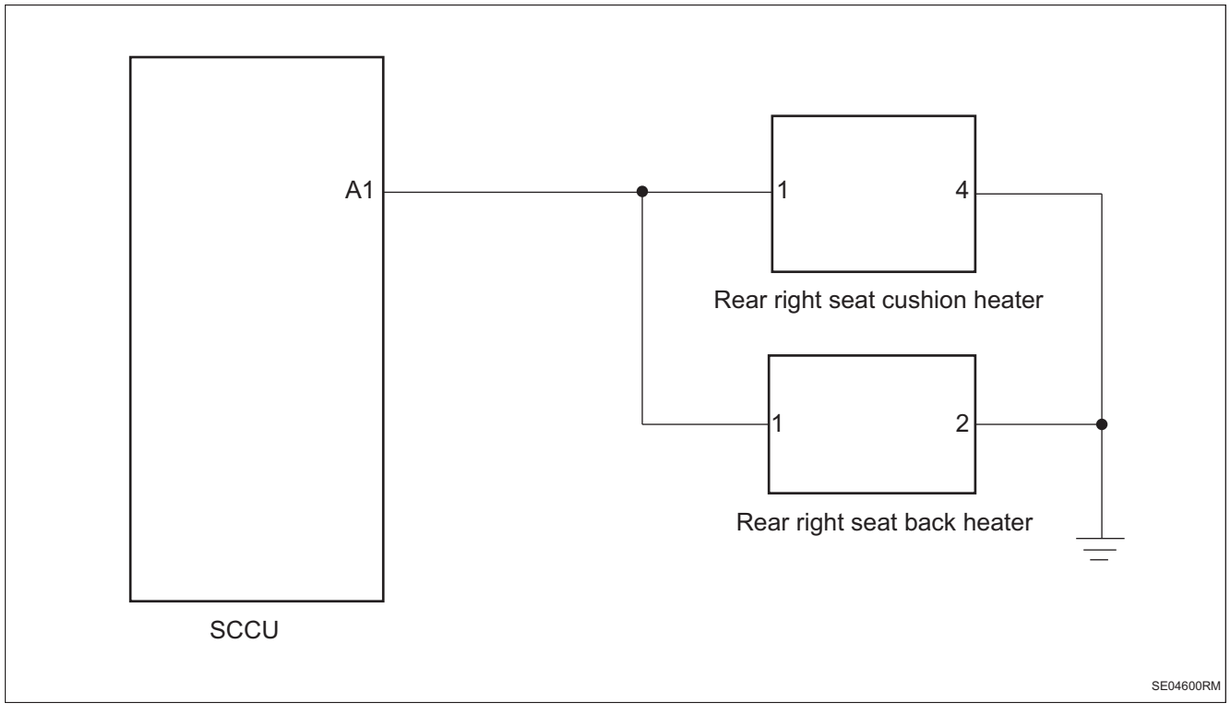
DTC	**B10E613**	**Rear seat right heating element circuit open**
DTC	**B10E611**	**Rear seat right heating element circuit shorted to ground**
DTC	**B10E612**	**Rear seat right heating element circuit shorted to power supply**

Description

When the rear right seat cushion heater and rear right seat back heater lines are shorted or open, the SCCU records the DTC.

DTC	DTC detection conditions	Faulty location
B10E613	(a) Rear seat right heating element circuit open.	• Harness and connector • Rear right seat cushion heater • Rear right seat back heater • SCCU
B10E611	(a) Rear seat right heating element circuit shorted to ground.	• Harness and connector • Rear right seat cushion heater • Rear right seat back heater • SCCU
B10E612	(a) Rear seat right heating element circuit shorted to power supply.	• Harness and connector • Rear right seat cushion heater • Rear right seat back heater • SCCU

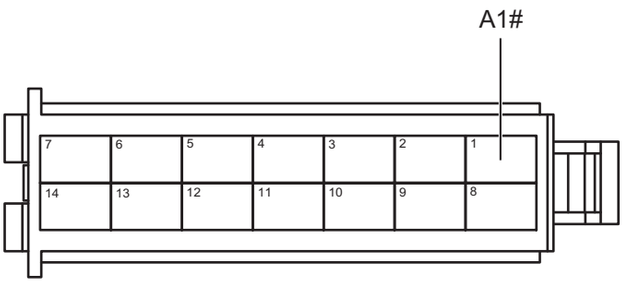
Circuit diagram



SE

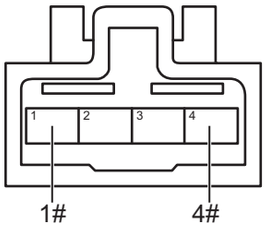
Inspection procedure

1	**Check rear right seat heater harness and connector for open circuit**

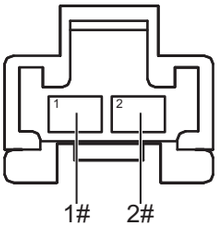


SCCU A connector

SE04611RM



Rear right seat cushion heater connector



Rear right seat back heater connector

SE04621RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the rear right seat cushion heater connector.

(d) Disconnect the rear right seat back heater connector.

(e) Disconnect the SCCU connector.

(f) Measure the resistance according to the values in the table below.

Standard value

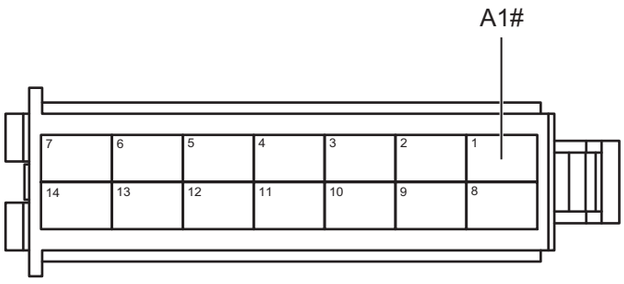
Detector connection	Detection conditions	Specified state
SCCU connector A1# - rear right seat cushion heater connector 1#	Always connected	Less than 1Ω
SCCU connector A1# - rear right seat back heater connector 1#	Always connected	Less than 1Ω
Rear right seat cushion heater connector 4# - body GND	Always connected	Less than 1Ω
Rear right seat back heater connector 2# - body GND	Always connected	Less than 1Ω

SE

NG **Repair or replace the harness and connector**

OK

2	**Check rear right seat heater harness and connector for circuit shorted to ground**



SCCU A connector

SE04611RM

(a) Measure the resistance according to the values in the table below.

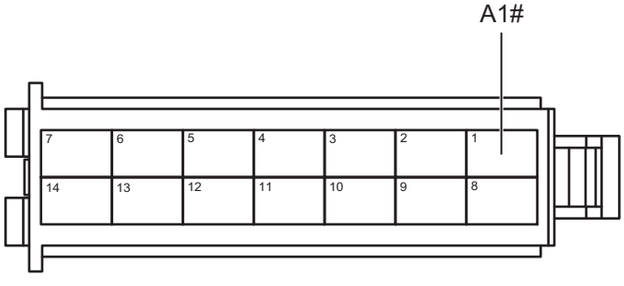
Standard value

Detector connection	Detection conditions	Specified state
SCCU connector A1# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

3	**Check rear right seat heater harness and connector for circuit shorted to power supply**



SCCU A connector

SE04611RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

SE

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
SCCU connector A1# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace rear right seat cushion heater/rear right seat back heater (See page SE-91)**

(a) Replace the rear right seat cushion heater/rear right seat back heater.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace SCCU (See page SE-91)**

OK

5	**End**

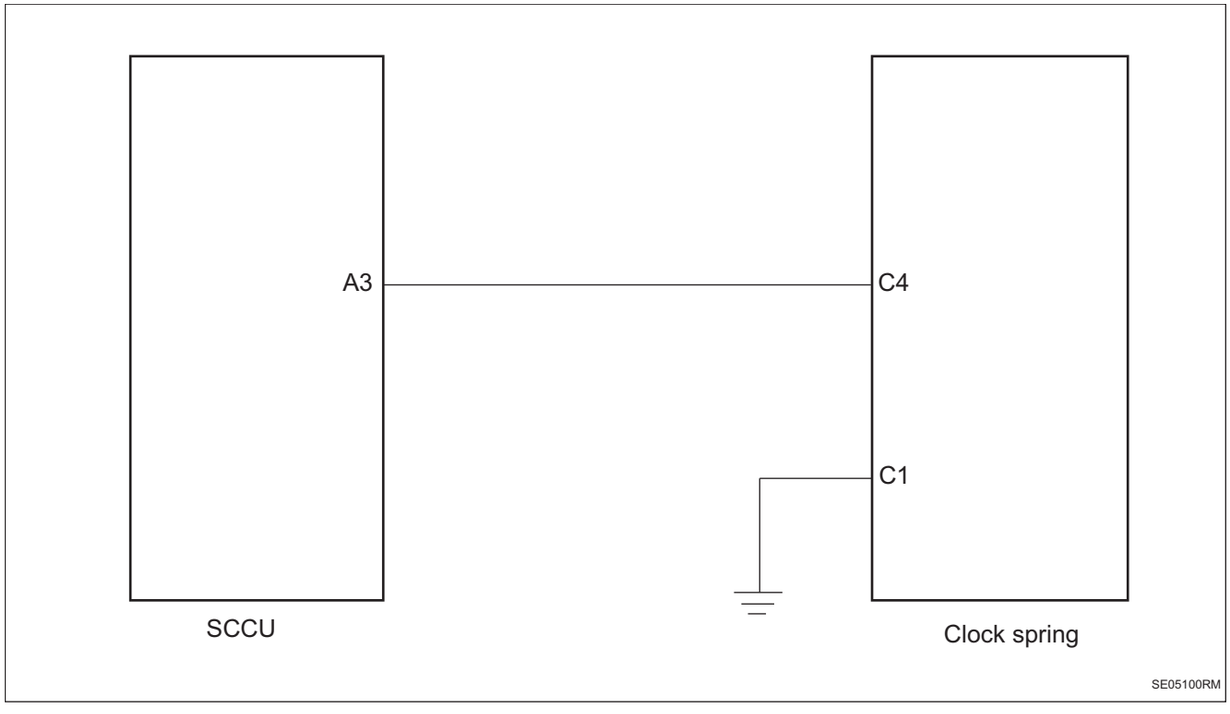
DTC	**B10E711**	**Steering wheel heating element circuit shorted to ground**
DTC	**B10E713**	**Steering wheel heating element open-circuited to ground**
DTC	**B10E712**	**Steering wheel heating element circuit shorted to power supply**

Description

When the steering wheel heater line is shorted to ground or open, the SCCU records the DTC.

DTC	DTC detection conditions	Faulty location
B10E711	(a) Steering wheel heating element circuit shorted to ground.	• Clock spring • Harness and connector • SCCU
B10E713	(a) steering wheel heating element open-circuited to ground.	• Clock spring • Harness and connector • SCCU
B10E712	(a) Steering wheel heating element circuit shorted to power supply.	• Clock spring • Harness and connector • SCCU

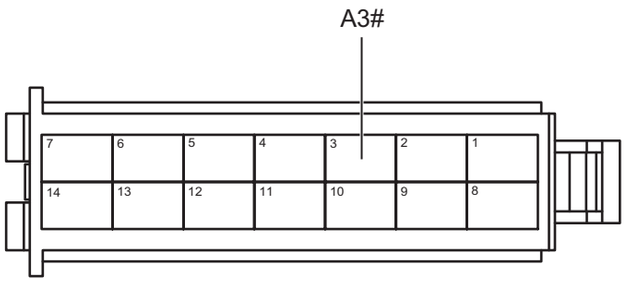
Circuit diagram



Inspection procedure

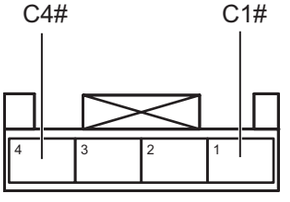
1	**Check clock spring harness and connector for open circuit**

SE



SCCU A connector

SE05111RM



Clock spring C connector

SE05121RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the clock spring connector.

(d) Disconnect the SCCU connector.

(e) Measure the resistance according to the values in the table below.

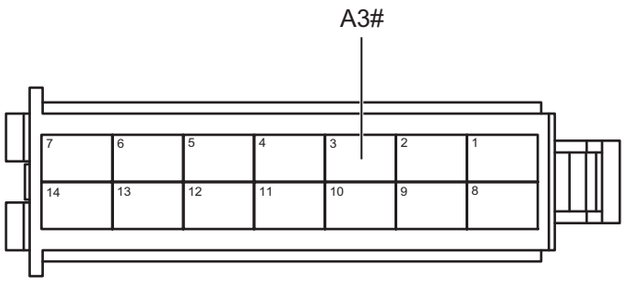
Standard value

Detector connection	Detection conditions	Specified state
SCCU connector A3# - clock spring connector C4#	Always connected	Less than 1Ω
Clock spring connector C1# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check clock spring harness and connector for circuit shorted to ground**



SCCU A connector

SE05111RM

(a) Measure the resistance according to the values in the table below.

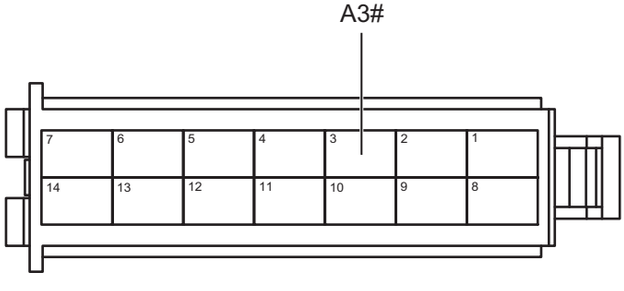
Standard value

Detector connection	Detection conditions	Specified state
SCCU connector A3# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check clock spring harness and connector for circuit shorted to power supply**



SCCU A connector

SE05111RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

SE

Standard value

Detector connection	Detection conditions	Specified state
SCCU connector A3# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the clock spring (See page SR-5)**

(a) Replace the clock spring.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace SCCU (See page SE-91)**

OK

5	**End**

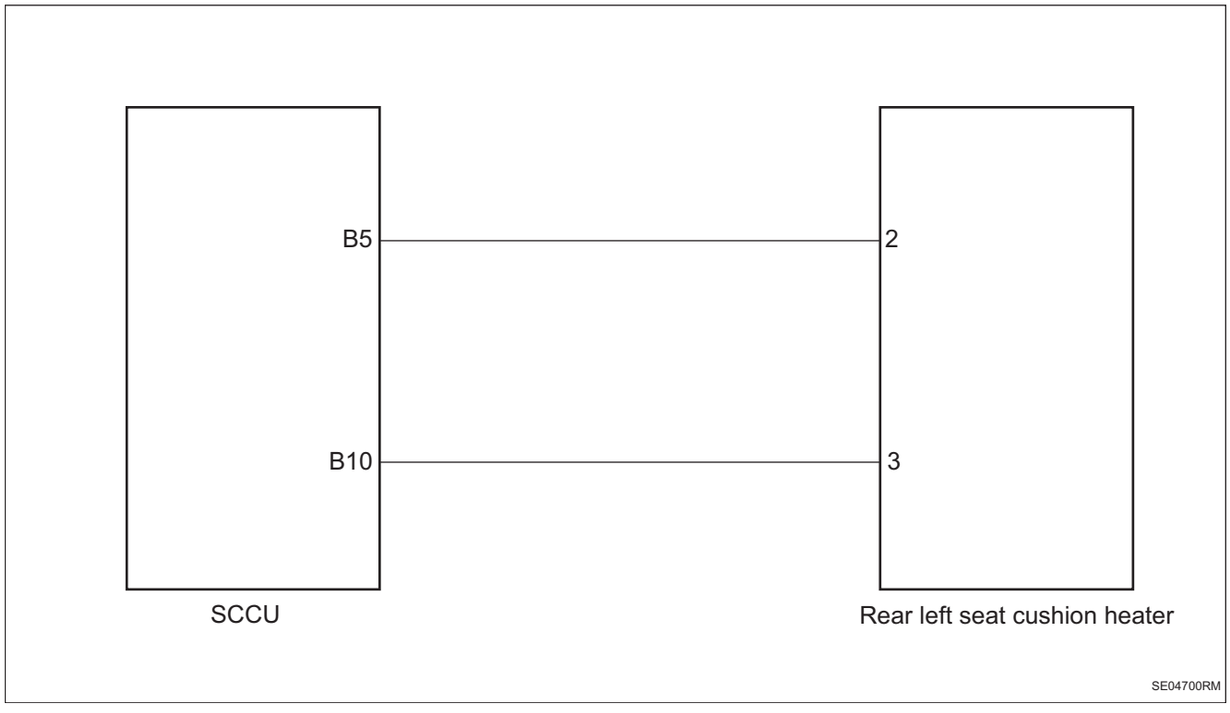
DTC	B10E815	Rear left seat heater sensor circuit open
DTC	B10E811	Rear left seat heater sensor circuit shorted to ground

Description

When the rear left seat cushion heater sensor circuit is shorted to ground or open, the SCCU records the DTC.

DTC	DTC detection conditions	Faulty location
B10E815	(a) Rear left seat heater sensor circuit open.	• Rear left seat cushion heater • Harness and connector • SCCU
B10E811	(a) Rear left seat heater sensor circuit shorted to ground.	• Rear left seat cushion heater • Harness and connector • SCCU

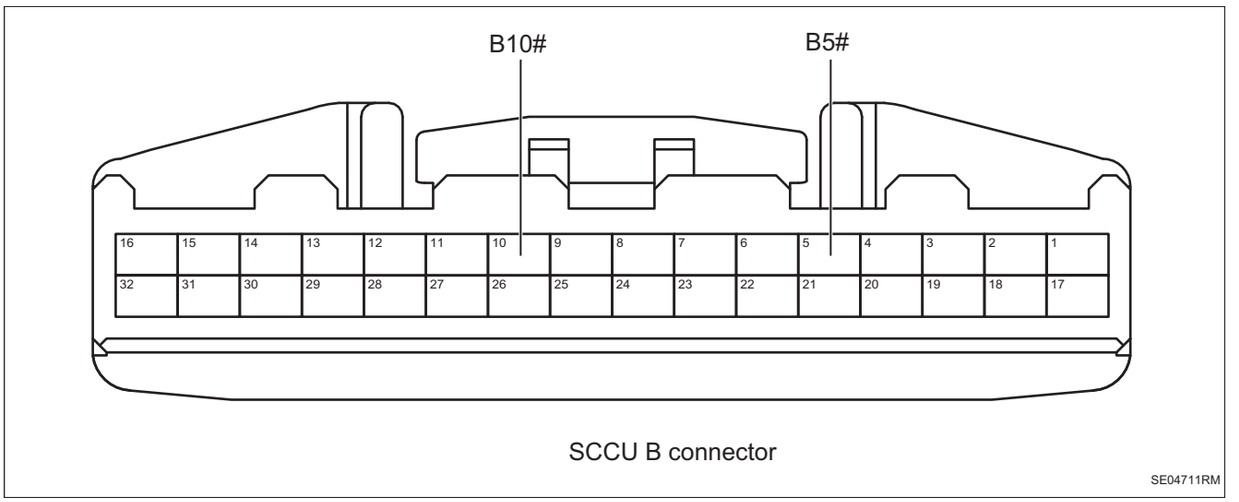
Circuit diagram



Inspection procedure

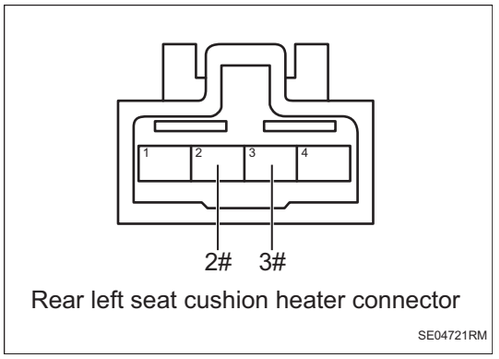
1	Check rear left seat cushion heater harness and connector for open circuit

SE



SCCU B connector

SE04711RM



Rear left seat cushion heater connector

SE04721RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the rear left seat cushion heater connector.

(d) Disconnect the SCCU connector.

(e) Measure the resistance according to the values in the table below.

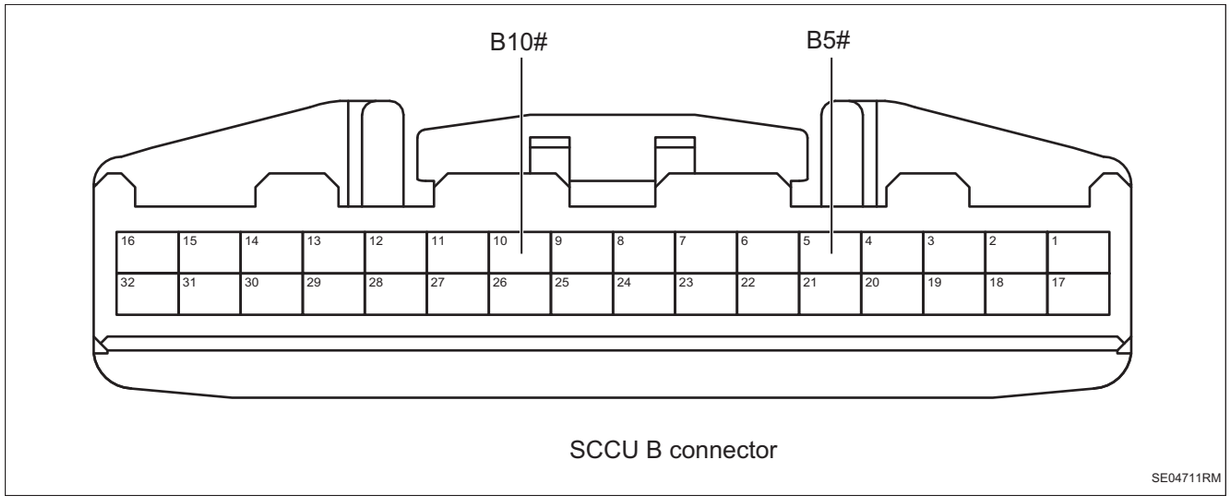
Standard value

Detector connection	Detection conditions	Specified state
SCCU connector B5# - rear left seat cushion heater connector 2#	Always connected	Less than 1Ω
SCCU connector B10# - rear left seat cushion heater connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check rear left seat cushion heater harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
SCCU connector B5# - body GND	Always connected	10KΩ or greater
SCCU connector B10# - body GND	Always connected	10KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Replace rear left seat cushion heater (See page SE-96)**

(a) Replace the rear left seat cushion heater.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace SCCU (See page SE-91)**

OK

4	**End**

SE

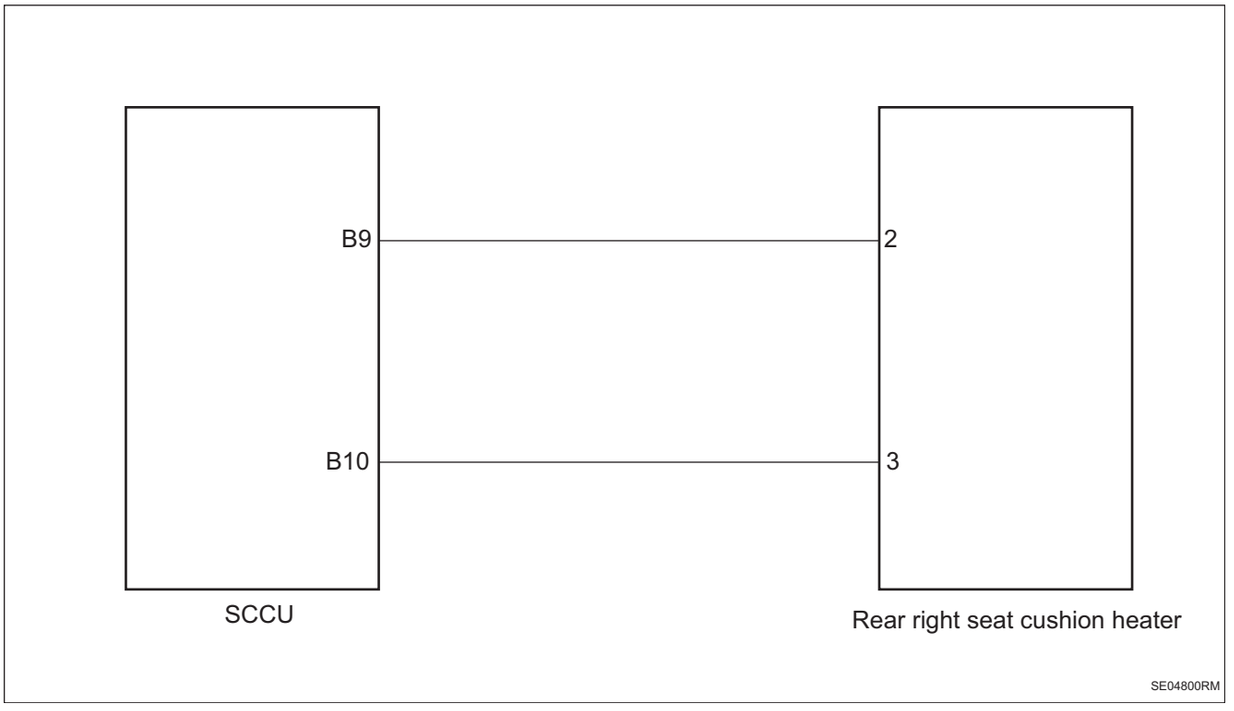
DTC	B10E915	Rear right seat heater sensor open circuit
DTC	B10E911	Rear right seat heater sensor circuit shorted to ground

Description

When the rear right seat cushion heater sensor circuit is shorted to ground or open, the SCCU records the DTC.

DTC	DTC detection conditions	Faulty location
B10E915	(a) Rear right seat heater sensor open circuit.	• Rear right seat cushion heater • Harness and connector • SCCU
B10E911	(a) Rear right seat heater sensor circuit shorted to ground.	• Rear right seat cushion heater • Harness and connector • SCCU

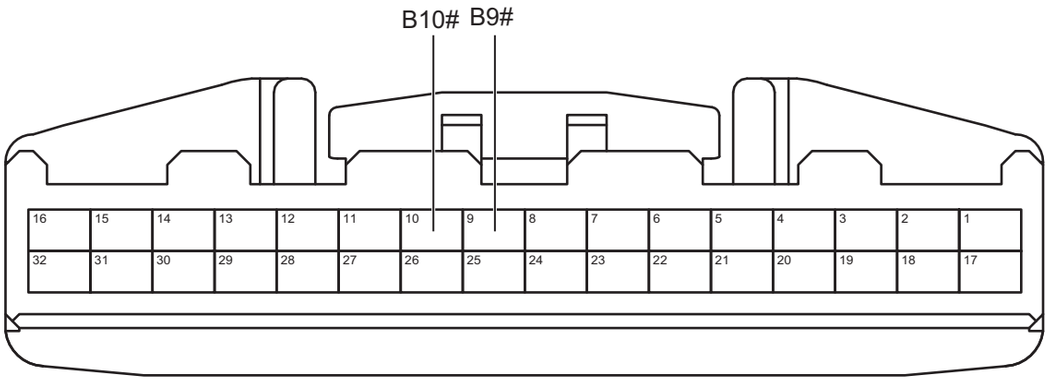
Circuit diagram



Inspection procedure

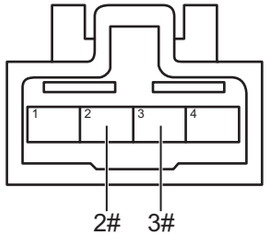
SE

1	Check rear right seat cushion heater harness and connector for open circuit



SCCU B connector

SE04811RM



Rear right seat cushion heater connector

SE04821RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the rear right seat cushion heater connector.

(d) Disconnect the SCCU connector.

(e) Measure the resistance according to the values in the table below.

Standard value

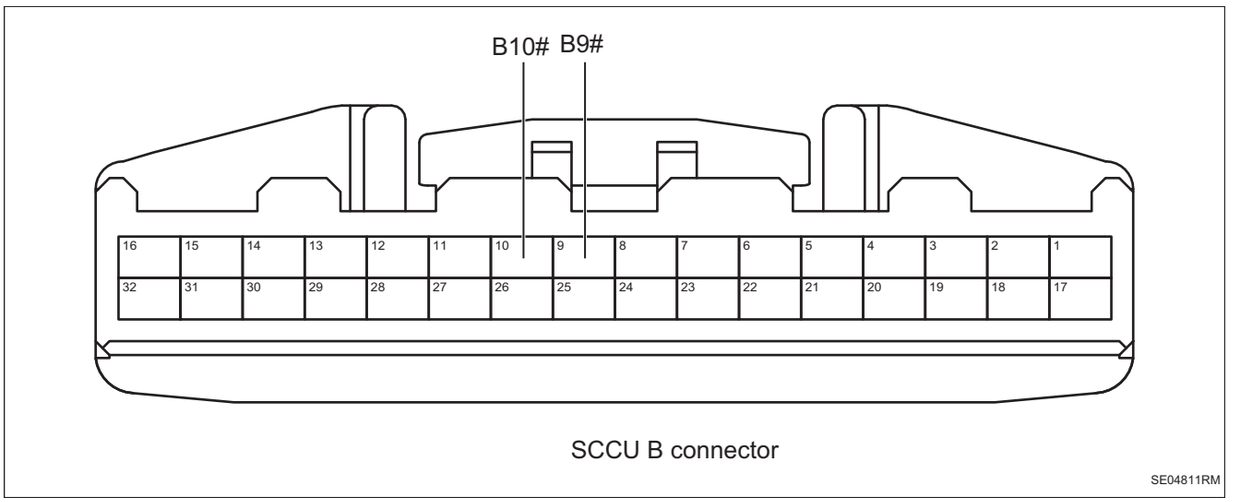
Detector connection	Detection conditions	Specified state
SCCU connector B9# - rear right seat cushion heater connector 2#	Always connected	Less than 1Ω
SCCU connector B10# - rear right seat cushion heater connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check rear right seat cushion heater harness and connector for circuit shorted to ground**

SE



SCCU B connector

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
SCCU connector B9# - body GND	Always connected	10 KΩ or greater
SCCU connector B10# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Replace rear right seat cushion heater (See page SE-96)**

(a) Replace the rear right seat cushion heater.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace SCCU (See page SE-91)**

OK

4	**End**

SE

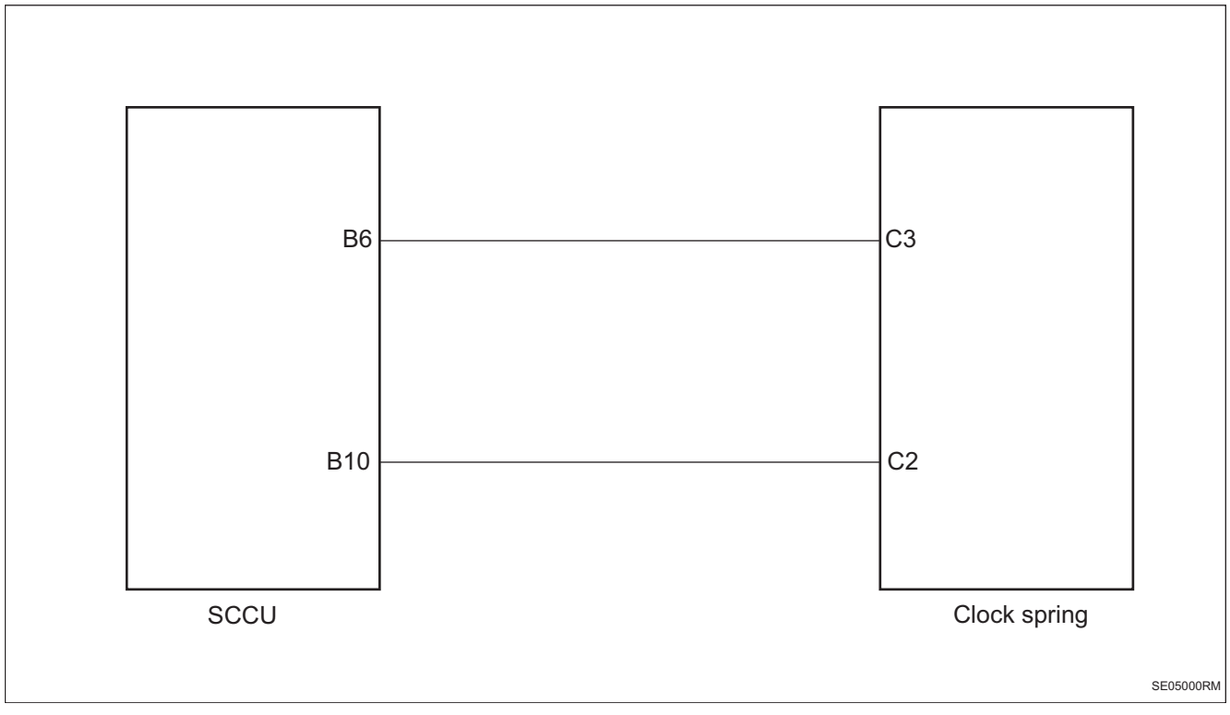
DTC	**B10EB11**	**Steering wheel heater sensor circuit shorted to ground**
DTC	**B10EC15**	**Steering wheel heater sensor open-circuited**

Description

When the steering wheel heater sensor circuit is shorted to ground or open, the SCCU records the DTC.

DTC	DTC detection conditions	Faulty location
B10EB11	(a) Steering wheel heater sensor circuit shorted to ground.	• Clock spring • Harness and connector • SCCU
B10EC15	(a) Steering wheel heater sensor open-circuited.	• Clock spring • Harness and connector • SCCU

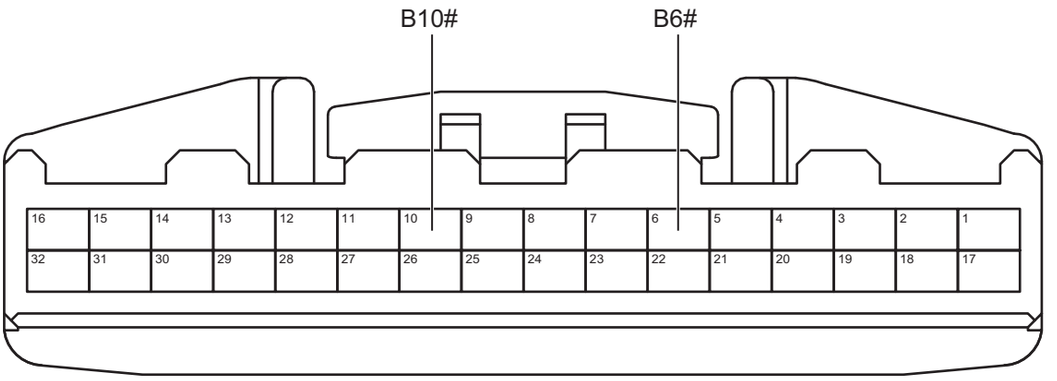
Circuit diagram



Inspection procedure

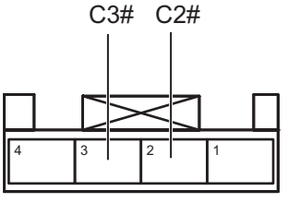
1	**Check clock spring harness and connector for open circuit**

SE



SCCU B connector

SE05011RM



Clock spring C connector

SE05021RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the clock spring connector.

(d) Disconnect the SCCU connector.

(e) Measure the resistance according to the values in the table below.

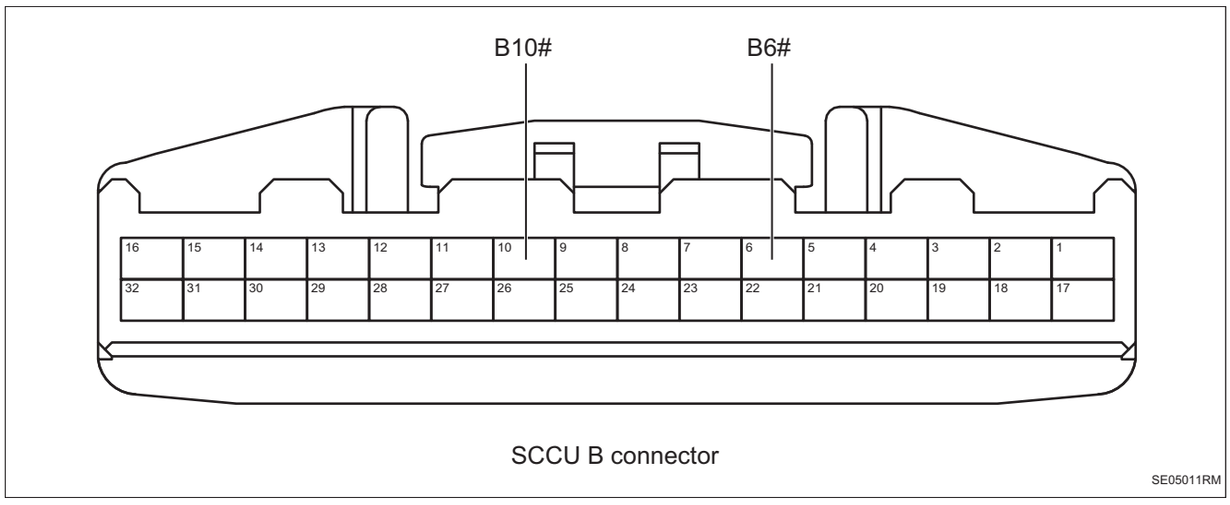
Standard value

Detector connection	Detection conditions	Specified state
SCCU connector B6# - clock spring connector C3#	Always connected	Less than 1Ω
SCCU connector B10# - clock spring connector C2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check clock spring harness and connector for circuit shorted to ground**



SCCU B connector

SE05011RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
SCCU connector B6# - body GND	Always connected	10 KΩ or greater
SCCU connector B10# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Replace the clock spring (See page SR-5)**

(a) Replace the clock spring.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace SCCU (See page SE-91)**

OK

4	**End**

SE

DTC	**U102388**	**LIN1 physical bus error**
DTC	**U133086**	**Driver seat back ventilation fan LIN communication error**
DTC	**U133186**	**Driver seat cushion ventilation fan LIN communication error**
DTC	**U133286**	**Passenger seat back ventilation fan LIN communication error**
DTC	**U133386**	**Passenger seat cushion ventilation fan LIN communication error**
DTC	**U134086**	**Driver seat massage air pump LIN communication error**
DTC	**U024987**	**Driver seat back ventilation fan node lost**
DTC	**U024A87**	**Driver seat cushion ventilation fan node lost**
DTC	**U024B87**	**Passenger seat back ventilation fan node lost**
DTC	**U024C87**	**Passenger seat cushion ventilation fan node lost**
DTC	**U025187**	**Driver seat massage air pump node lost**
DTC	**U034086**	**Driver seat massage air pump fault**
DTC	**U035986**	**Driver seat fan fault**
DTC	**U035A86**	**Passenger seat fan fault**

Description

When the seat ventilation motor or driver seat massage lumbar support control unit is faulty or the communication with the SCCU is abnormal, the SCCU records the DTC.

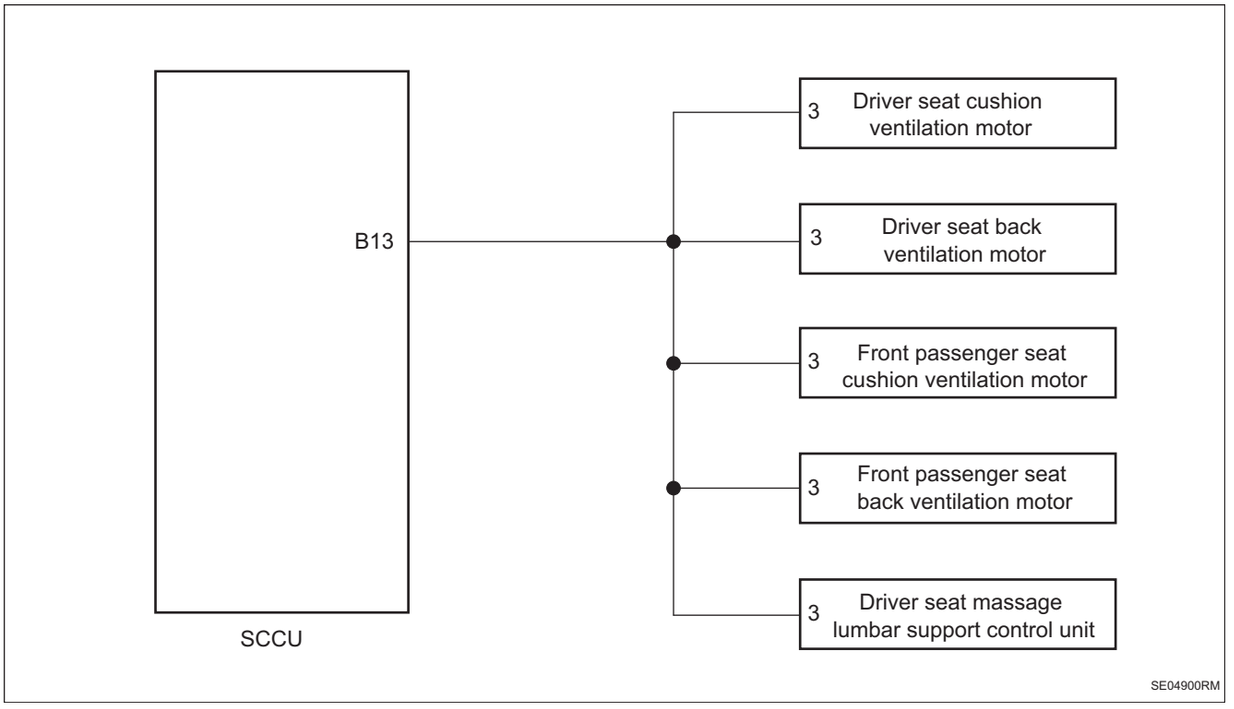
DTC	DTC detection conditions	Faulty location
U102388	(a) LIN1 physical bus error.	• Driver seat cushion ventilation motor • Driver seat back ventilation motor • Front passenger seat cushion ventilation motor • Front passenger seat back ventilation motor • Harness and connector • Driver seat massage lumbar support control unit • SCCU

SE

DTC	DTC detection conditions	Faulty location
U133086	(a) Driver seat back ventilation fan LIN communication error.	• Driver seat back ventilation motor • Harness and connector • SCCU
U133186	(a) Driver seat cushion ventilation fan LIN communication error.	• Driver seat cushion ventilation motor • Harness and connector • SCCU
U133286	(a) Passenger seat back ventilation fan LIN communication error.	• Front passenger seat back ventilation motor • Harness and connector • SCCU
U133386	(a) Passenger seat cushion ventilation fan LIN communication error.	• Front passenger seat cushion ventilation motor • Harness and connector • SCCU
U134086	(a) Driver seat massage air pump LIN communication error.	• Driver seat massage lumbar support control unit • Harness and connector • SCCU
U024987	(a) Driver seat back ventilation fan node lost.	• Driver seat back ventilation motor • Harness and connector • SCCU
U024A87	(a) Driver seat cushion ventilation fan node lost.	• Driver seat cushion ventilation motor • Harness and connector • SCCU
U024B87	(a) Passenger seat back ventilation fan node lost.	• Front passenger seat back ventilation motor • Harness and connector • SCCU
U024C87	(a) Passenger seat cushion ventilation fan node lost.	• Front passenger seat cushion ventilation motor • Harness and connector • SCCU
U025187	(a) Driver seat massage air pump node is lost.	• Driver seat massage lumbar support control unit • Harness and connector • SCCU
U034086	(a) Driver seat massage air pump failure.	• Driver seat massage lumbar support control unit • Harness and connector • SCCU
U035986	(a) Driver seat fan fault.	• Driver seat cushion ventilation motor • Driver seat back ventilation motor • Harness and connector • SCCU

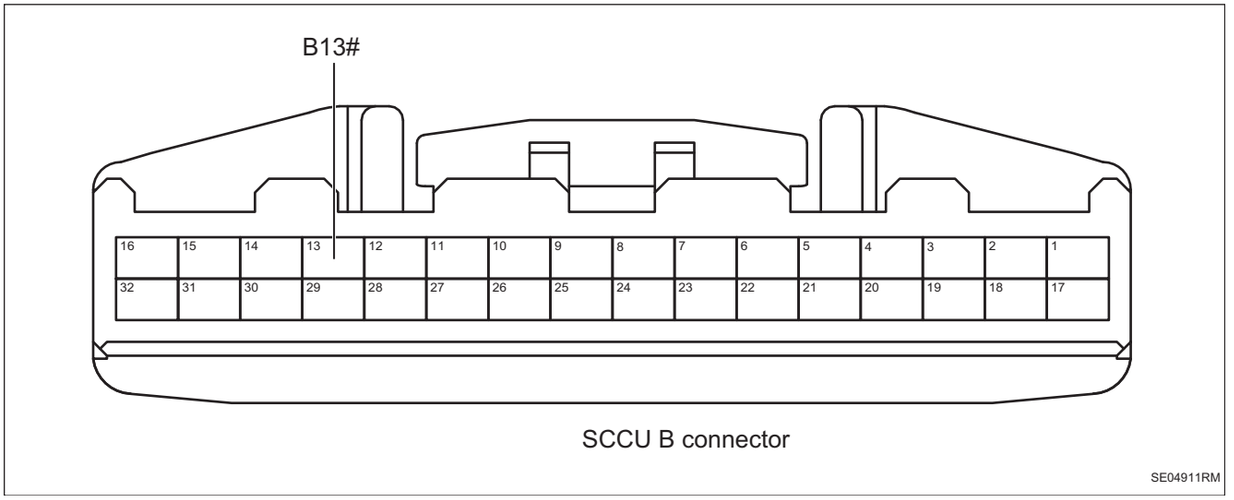
DTC	DTC detection conditions	Faulty location
U035A86	(a) Passenger seat fan fault.	• Front passenger seat cushion ventilation motor • Front passenger seat back ventilation motor • Harness and connector • SCCU

Circuit diagram

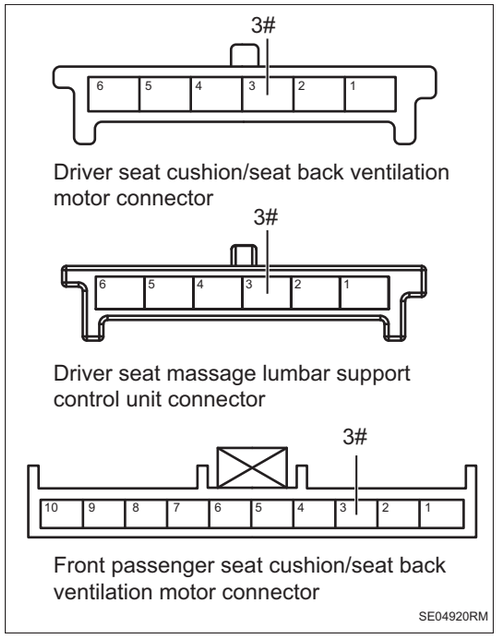


Inspection procedure

1	**Check driver seat massage lumbar support control unit, ventilation motor harness and connector for open circuit**



SE



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the driver seat cushion and seat back ventilation motor connector.

(d) Disconnect the front passenger seat cushion and seat back ventilation motor connector.

(e) Disconnect the driver seat massage lumbar support control unit connector.

(f) Disconnect the SCCU connector.

(g) Measure the resistance according to the values in the table below.

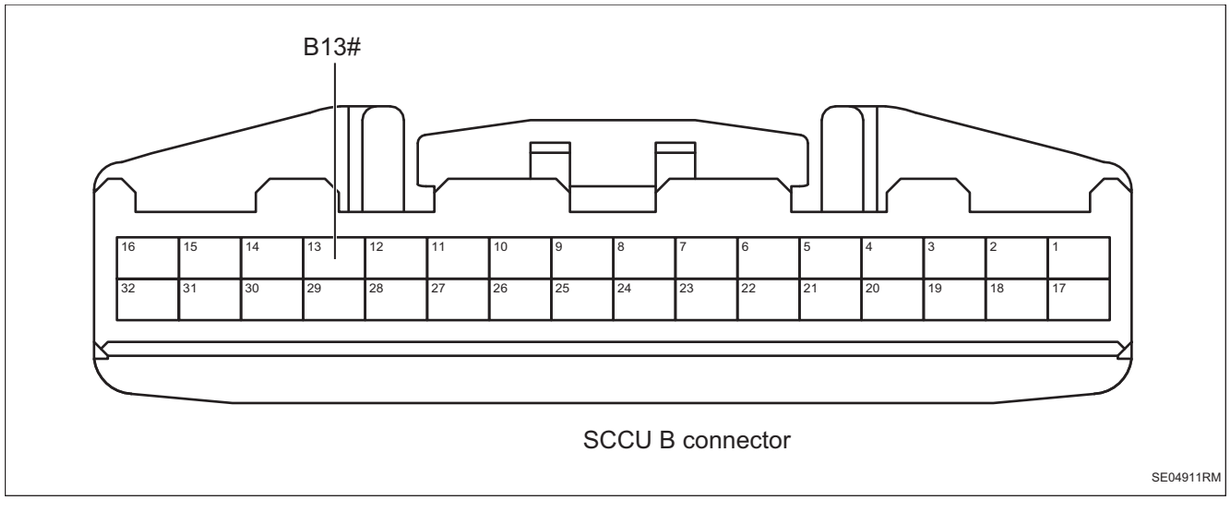
Standard value

Detector connection	Detection conditions	Specified state
SCCU connector B13# -driver seat cushion ventilation motor connector 3#	Always connected	Less than 1Ω
SCCU connector B13# -driver seat backrest ventilation motor connector 3#	Always connected	Less than 1Ω
SCCU connector B13# -front passenger seat cushion ventilation motor connector 3#	Always connected	Less than 1Ω
SCCU connector B13# -front passenger seat back ventilation motor connector 3#	Always connected	Less than 1Ω
SCCU connector B13# -driver seat massage lumbar support control unit connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check driver seat massage lumbar support control unit, ventilation motor harness and connector for circuit shorted to ground**



SE

(a) Measure the resistance according to the values in the table below.

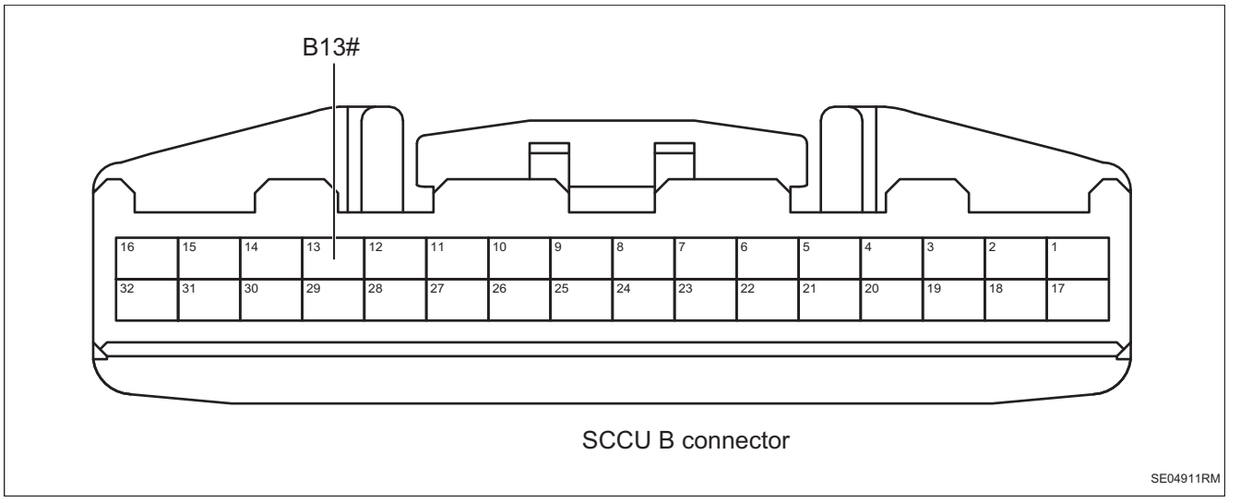
Standard value

Detector connection	Detection conditions	Specified state
SCCU connector B13# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check driver seat massage lumbar support control unit and ventilation motor harnesses and connectors for circuit shorted to power supply**



SCCU B connector

SE04911RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
SCCU connector B13# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace driver seat massage lumbar support control unit, and driver and front passenger seat ventilation motors (See page SE-91)**

(a) Replace the driver seat massage lumbar support control unit, and driver and front passenger seat ventilation motors.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace SCCU (See page SE-91)**

OK

5	**End**

DTC	**U020287**	**Rear right door module node lost**
DTC	**U020187**	**Rear left door module node lost**
DTC	**U115587**	**Instrument cluster control unit message lost**
DTC	**U014087**	**BCM 1 node lost**
DTC	**U002888**	**Comfort CAN bus off**
DTC	**U014687**	**GW node lost**
DTC	**U112187**	**ESP/IBC message lost**
DTC	**U124587**	**IVI message lost**

Description

When the communication between the SCCU and other systems is abnormal or interrupted, the SCCU will record the DTC.

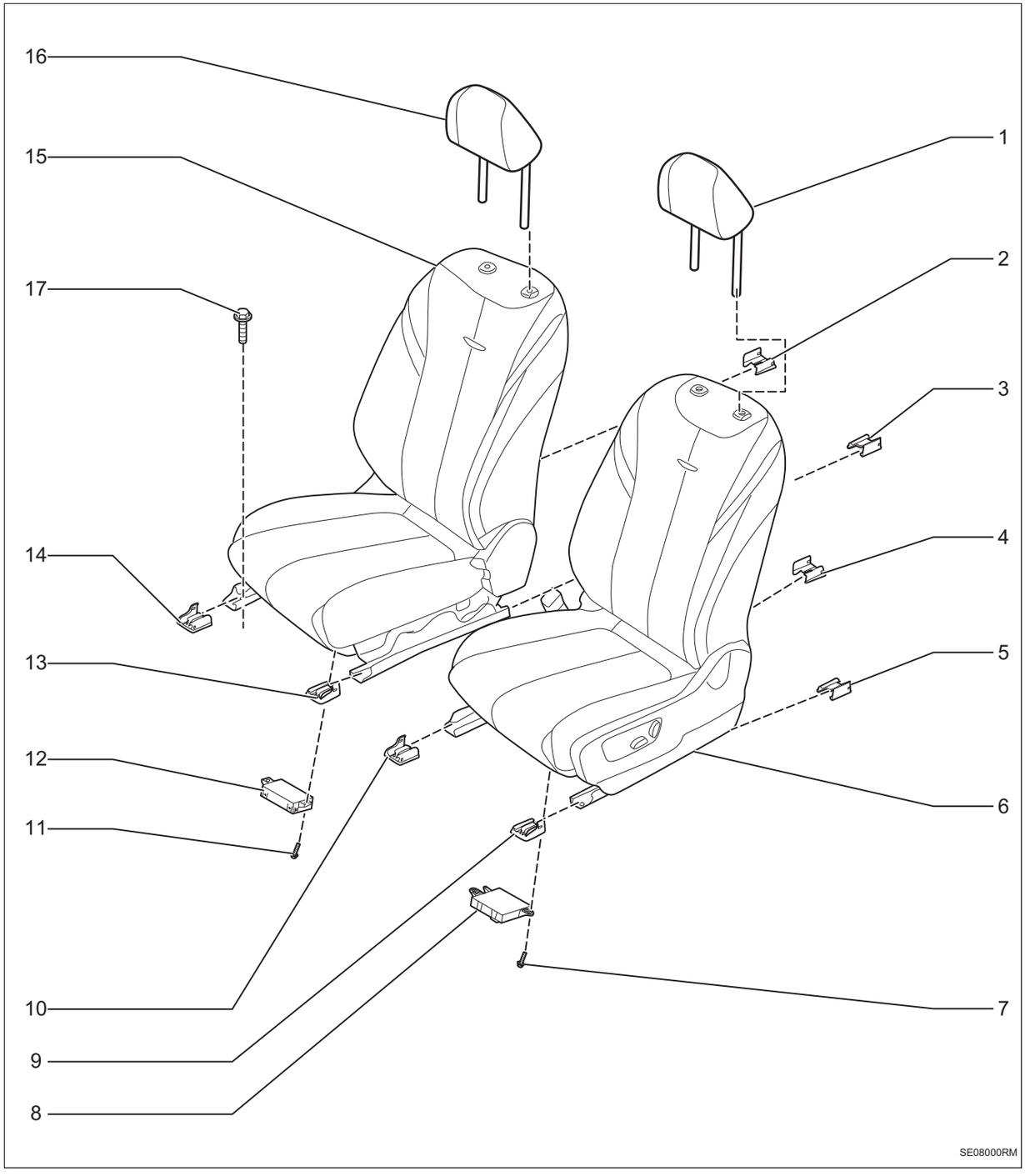
DTC	DTC detection conditions	Faulty location
U020287	(a) Abnormal or interrupted communication.	• Relevant system control unit • Harness and connector
U020187	(a) Abnormal or interrupted communication.	• Relevant system control unit • Harness and connector
U115587	(a) Abnormal or interrupted communication.	• Relevant system control unit • Harness and connector
U014087	(a) Abnormal or interrupted communication.	• Relevant system control unit • Harness and connector
U002888	(a) Abnormal or interrupted communication.	• Relevant system control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	• Relevant system control unit • Harness and connector
U112187	(a) Abnormal or interrupted communication.	• Relevant system control unit • Harness and connector
U124587	(a) Abnormal or interrupted communication.	• Relevant system control unit • Harness and connector

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

Front seat assembly

Parts



1. **Front seat head restraint assembly**
2. **Lower slide rail right rear cover**
3. **Lower slide rail left rear cover**
4. **Lower slide rail right rear cover**
5. **Lower slide rail left rear cover**

6. **Driver seat assembly**
7. **Hexagon flange bolt**
   - X2
   - Torque:4 ~ 6 N·m
8. **DSCU assembly**
9. **Lower slide rail left front cover**
10. **Lower slide rail right front cover**
11. **Hexagon flange bolt**
    - X2
    - Torque:4 ~ 6 N·m
12. **SCCU assembly**
13. **Lower slide rail left front cover**
14. **Lower slide rail right front cover**
15. **Front passenger seat assembly**
16. **Front seat head restraint assembly**
17. **Hexagon flange bolt**
    - X8
    - Torque:16.2 ~ 25 N·m

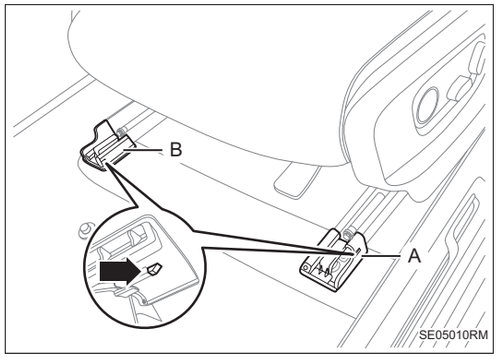
Removal

Hint:

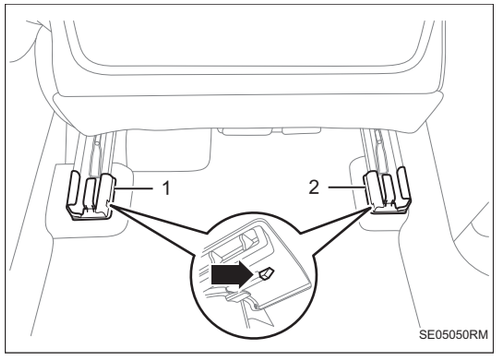
The passenger seat is removed in the same order as the driver seat.

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the driver seat belt pretensioner buckle assembly (See page SB-3)**
3. **Remove driver seat assembly**

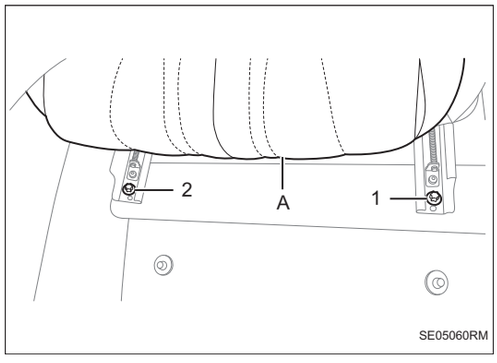
(a) Detach the claw as arrowed, and remove the driver seat assembly slide rail front cover-A-B-.

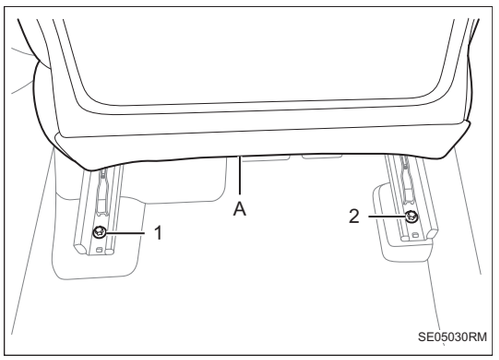


(b) Detach the claw as arrowed, and remove the driver seat assembly slide rail rear covers -1-2-.

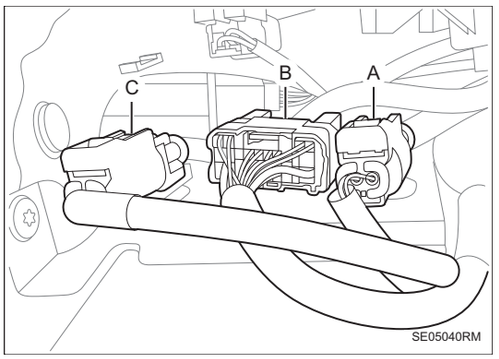


(c) Remove the front fixing bolts -1-2- of driver seat assembly -A-.



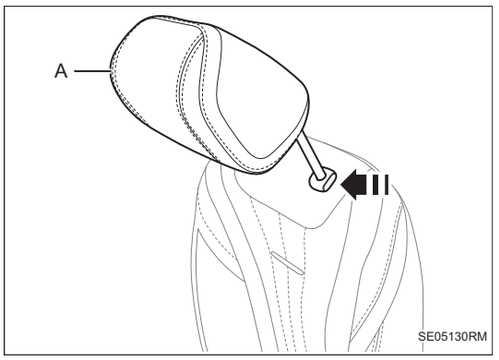


(d) Remove the rear fixing bolts -1-2- of driver seat assembly -A-.



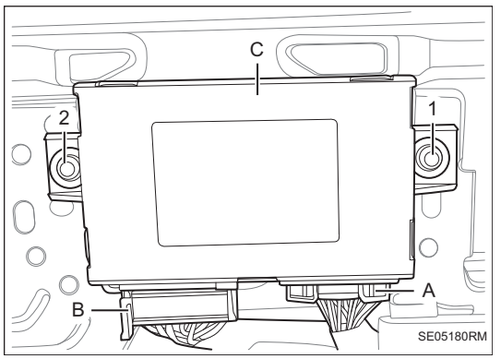
(e) Disconnect the driver seat assembly harness connector-A-C-, and remove the driver seat assembly.

4. Remove the head restraint assembly



(a) Press the lock button as arrowed, and remove the head restraint assembly-A-.

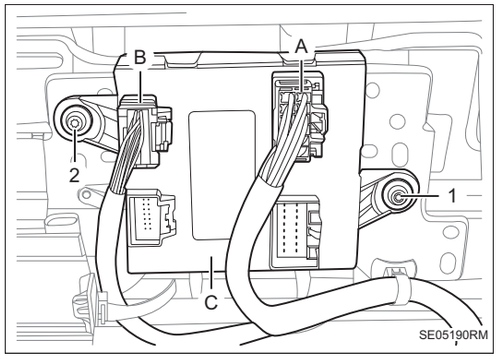
5. Remove SCCU



(a) Disconnect the harness connector-A-B- and remove screw -1-2-.

(b) Remove SCCU assembly-C-.

6. Remove DSCU



(a) Disconnect the harness connector-A-B- and remove screw -1-2-.

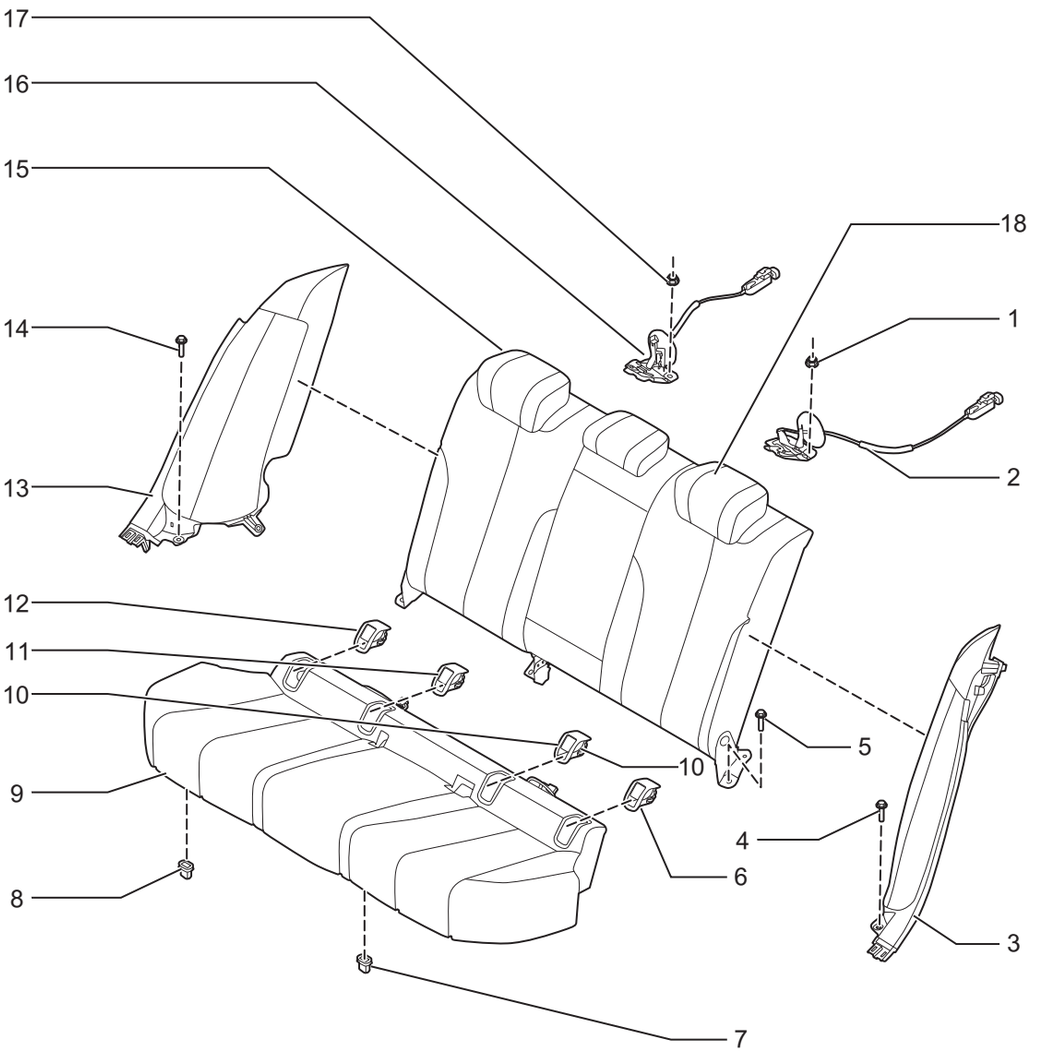
(b) Remove DSCU-C-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Rear seat

Parts

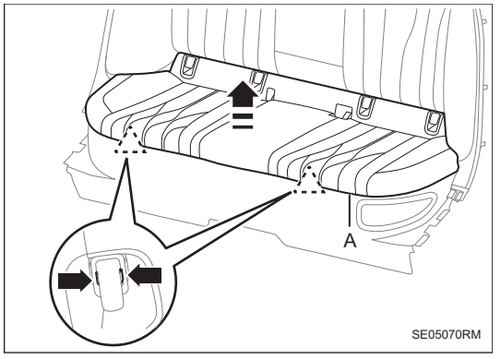


1. **Hexagon flange nut**
   - X2
   - Torque: 37.3~52 N · m
2. **Rear left seat back unlocking mechanism assembly**
3. **Rear left seat back wing assembly**

4. **Hexagon flange bolt**
   - X2
   - Torque: 16~26 N · m
5. **Hexagon flange bolt**
   - X6
   - Torque: 39~51 N · m
6. **Child safety seat lower anchorage cover assembly**
7. **Buckle assembly-rear seat cushion**
8. **Buckle assembly-rear seat cushion**
9. **Rear seat logic assembly**
10. **Child safety seat lower anchorage cover assembly**
11. **Child safety seat lower anchorage cover assembly**
12. **Child safety seat lower anchorage cover assembly**
13. **Rear right seat back wing assembly**
14. **Hexagon flange bolt**
    - X2
    - Torque: 16~26 N · m
15. **Rear right seat back assembly**
16. **Rear right seat back unlocking mechanism assembly**
17. **Hexagon flange nut**
    - X2
    - Torque: 37.3~52 N · m
18. **Rear left seat back assembly**

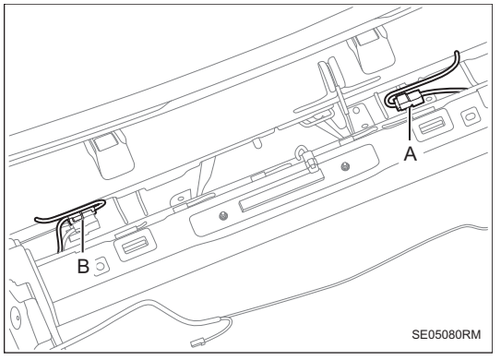
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove rear seat cushion assembly (only for HEV models)**



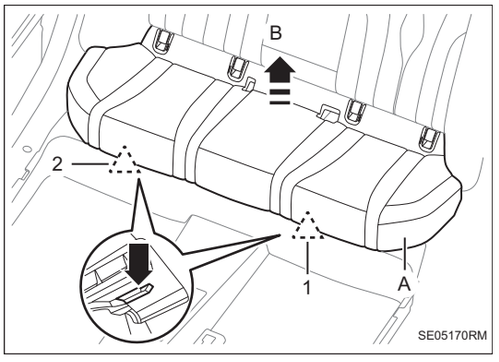
(a) Lift rear seat cushion assembly-A-firmly in the direction of arrow B.

(b) Detach the claw -arrow- of buckle assemblies -1- 2- and detach the rear seat cushion assembly -A- .



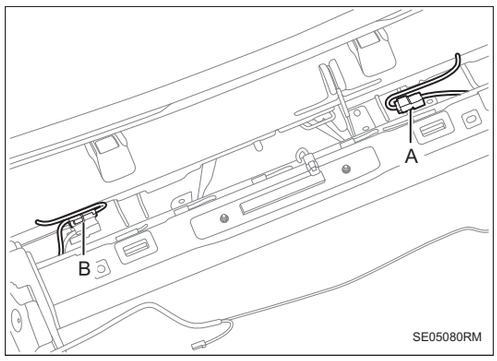
(c) Disconnect the rear seat cushion assembly harness connector-A-B-.

3. **Remove the rear seat cushion assembly**



(a) Lift rear seat cushion assembly-A-firmly in the direction of arrow B.

(b) Detach the claw -arrow- of buckle assemblies -1- 2- and detach the rear seat cushion assembly -A- .

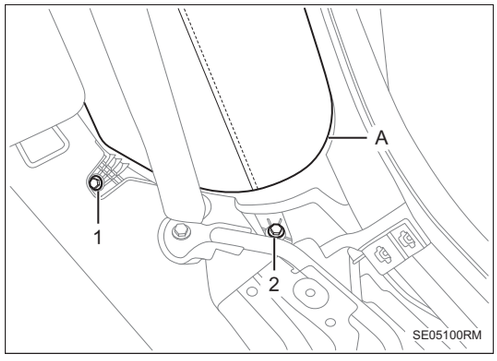


(c) Disconnect the rear seat cushion assembly harness connector-A-B-.

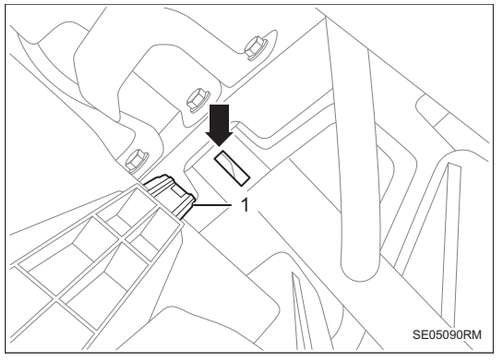
4. Remove rear left seat back wing assembly

Hint:

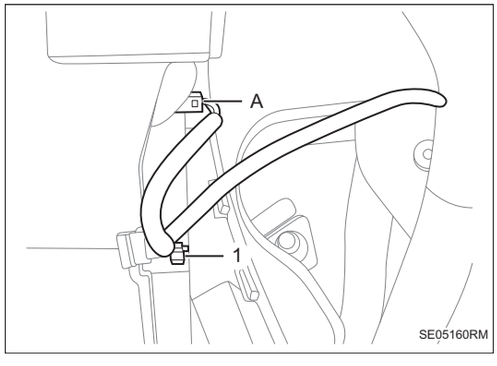
The removal sequence on the right side is the same as that on the left side.



(a) Remove the fixing bolts -1-2- of the rear left seat back wing assembly -A-.

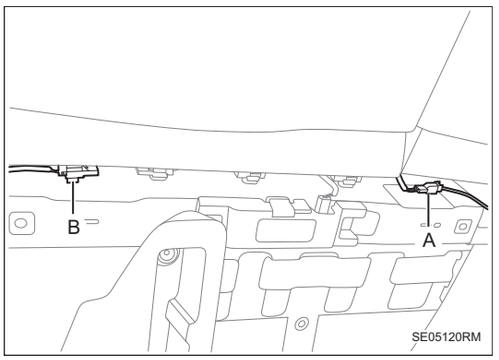


(b) Detach the retaining clip-1- of rear left seat back wing assembly.

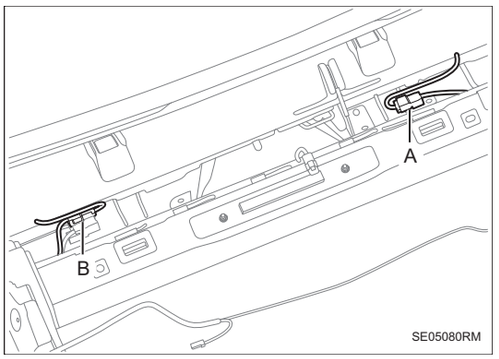


(c) Disconnect the airbag harness connector -A- and detach the harness fixing clip -1-.

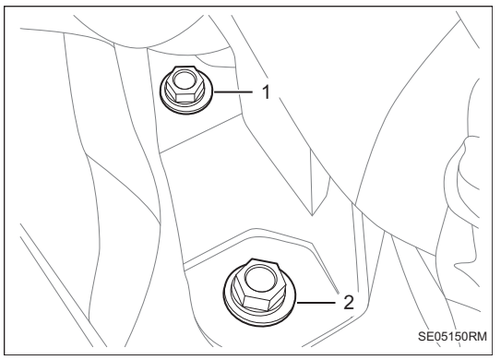
5. Remove the rear seat back assembly



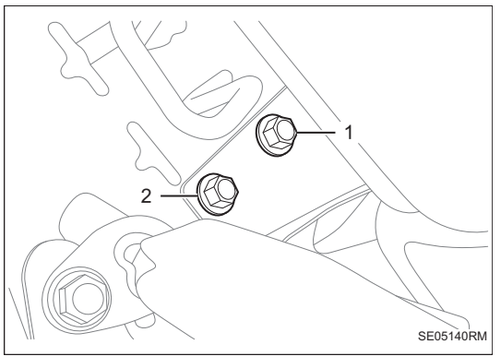
(a) Disconnect the rear seat back assembly harness connector-A-B-.



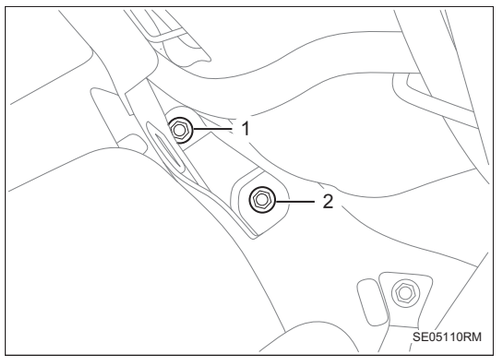
(b) Disconnect the harness connectors-A-B- of rear seat cushion assembly.



(c) Remove the right fixing bolts -1-2- of rear right seat back assembly.



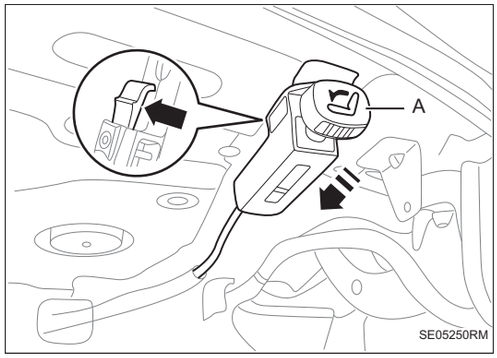
(d) Remove the middle fixing bolts -1-2- of the rear right seat back assembly.



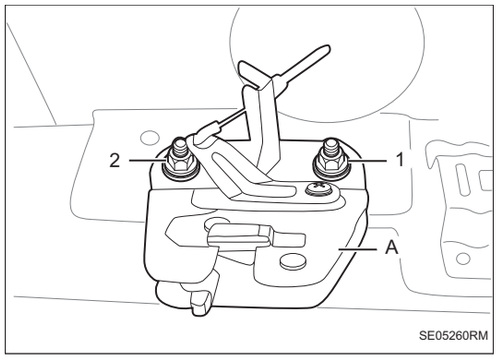
(e) Remove the left fixing bolts -1-2- of rear left seat back assembly.

(f) Remove the rear seat back assembly.

6. Remove the rear seat lock



(a) Detach the claw -arrow-, and push the handle mechanism -A- in the direction of -movement arrow-.



(b) Remove the bolt -1-2- and the rear seat lock-A-.

Installation

1. The installation procedure is the reverse of removal procedure.

Lighting system

Light domain control unit LI-1
Precautions LI-1
Location of parts LI-2
System diagram LI-6
System description LI-7
Symptom chart LI-8
ECU terminal LI-9
DTC chart LI-10
U300316 .....LI-13
U300317 .....LI-13
B151100 .....LI-16
B151000 .....LI-16
B152100 .....LI-16
B152000 .....LI-16
B151200 .....LI-20
B151300 .....LI-20
B152200 .....LI-20
B152300 .....LI-20
B151400 .....LI-22
B152400 .....LI-22
B151500 .....LI-25
B151600 .....LI-25
B152500 .....LI-25
B152600 .....LI-25
B151700 .....LI-27
B152700 .....LI-27
B151800 .....LI-29
B152800 .....LI-29
B151900 .....LI-31
B155A00 .....LI-31
B152900 .....LI-31
B155B00 .....LI-31
B151A00 .....LI-33
B152A00 .....LI-33
B151B00 .....LI-35
B151C00 .....LI-37
B152C00 .....LI-37
B152D00 .....LI-39
B151D00 .....LI-39

B152E00 .....LI-43
B152F00 .....LI-47
B153016 .....LI-50
B153017 .....LI-50
B153013 .....LI-50
B153012 .....LI-50
B153316 .....LI-53
B153317 .....LI-53
B153901 .....LI-53
B153A01 .....LI-53
B153416 .....LI-53
B153417 .....LI-53
B153D01 .....LI-53
B153E01 .....LI-53
B153655 .....LI-59
B154000 .....LI-60
B153716 .....LI-60
B153717 .....LI-60
B155087 .....LI-60
B154200 .....LI-60
B153B16 .....LI-60
B153B17 .....LI-60
B155187 .....LI-60
B154400 .....LI-60
B153916 .....LI-60
B153917 .....LI-60
B155287 .....LI-60
B154500 .....LI-60
B153A16 .....LI-60
B153A17 .....LI-60
B155387 .....LI-60
B154600 .....LI-60
B153D16 .....LI-60
B153D17 .....LI-60
B155487 .....LI-60
B154700 .....LI-60
B153116 .....LI-60
B153117 .....LI-60
B155587 .....LI-60
B155688 .....LI-60
B155766 .....LI-60
B154816 .....LI-70
B154916 .....LI-71

B154917 ..... LI-71
B154A14 ..... LI-71
B154A12 ..... LI-71
B154B14 ..... LI-71
B154B12 ..... LI-71
B154898 ..... LI-71
B154F55 ..... LI-71
B154E06 ..... LI-77
B154C16 ..... LI-77
B154C17 ..... LI-77
B154C13 ..... LI-77
B154C12 ..... LI-77
B154D16 ..... LI-77
B154D17 ..... LI-77
B154D13 ..... LI-77
B154D12 ..... LI-77
B155887 ..... LI-82
B155800 ..... LI-82
B155987 ..... LI-83
B155900 ..... LI-83
U002888 ..... LI-84
U014087 ..... LI-84
U014687 ..... LI-84
U112187 ..... LI-84
U115587 ..... LI-84
U110187 ..... LI-84
U110087 ..... LI-84
U129387 ..... LI-84
AFS LI-85
Precautions LI-85
Location of parts LI-86
System diagram LI-90
System description LI-90
Symptom chart LI-91
ECU terminal LI-92
DTC chart LI-92
B164016 ..... LI-94
B164017 ..... LI-94
B165301 ..... LI-97
B165082 ..... LI-97
B165083 ..... LI-97
B165486 ..... LI-97

B165586 .....LI-97
B165686 .....LI-97
B166301 .....LI-97
B166082 .....LI-97
B166083 .....LI-97
B166486 .....LI-97
B166586 .....LI-97
B166686 .....LI-97
B165087 .....LI-97
B165101 .....LI-97
B165201 .....LI-97
B166087 .....LI-97
B166101 .....LI-97
B166201 .....LI-97
U041582 .....LI-104
U041583 .....LI-104
U042286 .....LI-104
U043386 .....LI-104
U003788 .....LI-104
U007888 .....LI-104
U009088 .....LI-104
U014687 .....LI-104
U023587 .....LI-104
U112187 .....LI-104
U114087 .....LI-104
U124587 .....LI-104
U115587 .....LI-104
U113187 .....LI-104
U110187 .....LI-104
U129387 .....LI-104
U042082 .....LI-104
U042083 .....LI-104
B167087 .....LI-104
B167082 .....LI-104
B167083 .....LI-104
B167086 .....LI-104
Lighting control unit assembly LI-107
Parts LI-107
Removal LI-108
Installation LI-108
AFS assembly LI-109
Parts LI-109

Removal LI-110
Installation LI-110
Front interior lamp assembly LI-111
Parts LI-111
Removal LI-112
Installation LI-112
Front combination lamp I assembly LI-113
Parts LI-113
Removal LI-114
Installation LI-114
Front combination lamp II assembly LI-115
Parts LI-115
Removal LI-117
Installation LI-117
Front combination lamp III assembly LI-118
Parts LI-118
Removal LI-119
Installation LI-119
Vanity mirror lamp assembly LI-120
Parts LI-120
Removal LI-121
Installation LI-121
Rear interior lamp assembly LI-122
Parts LI-122
Removal LI-123
Installation LI-123
Rear combination lamp I assembly LI-124
Parts LI-124
Removal LI-125
Installation LI-125
Rear combination lamp II assembly LI-126
Parts LI-126
Removal LI-127
Installation LI-127
Trunk lamp assembly LI-128
Parts LI-128
Removal LI-129
Installation LI-129
Ride height sensor LI-130
Parts LI-130
Removal LI-131

Installation LI-131
Door lamp assembly LI-132
Parts LI-132
Removal LI-133
Installation LI-133
High-mounted stop lamp LI-134
Parts LI-134
Removal LI-135
Installation LI-135

Light domain control unit

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Warning:

Before repairing the high voltage system or adjacent high voltage system components, be sure to carefully read the "Instructions and precautions for maintenance work" in the introduction carefully!

2. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

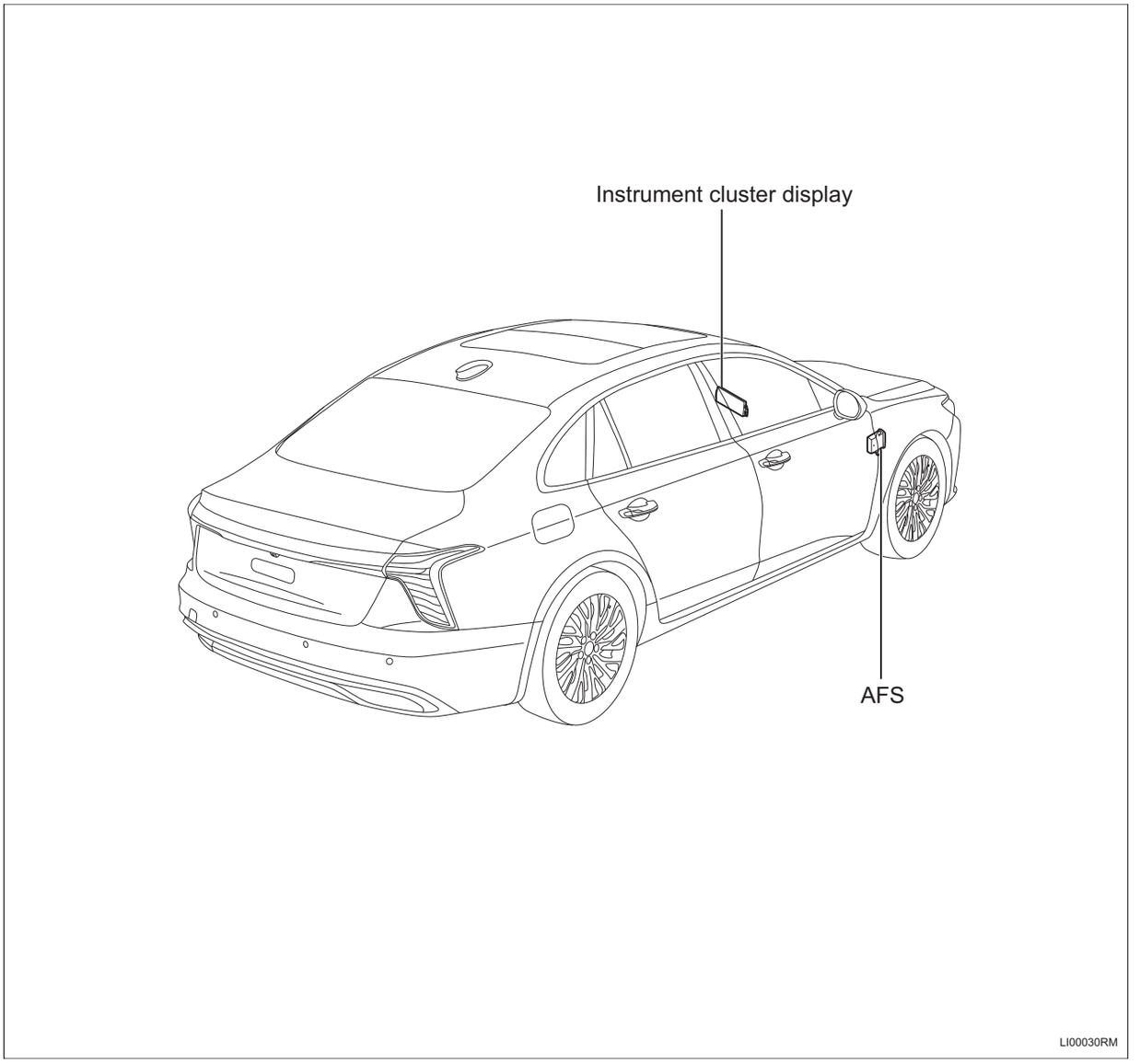
Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

3. General repair instructions

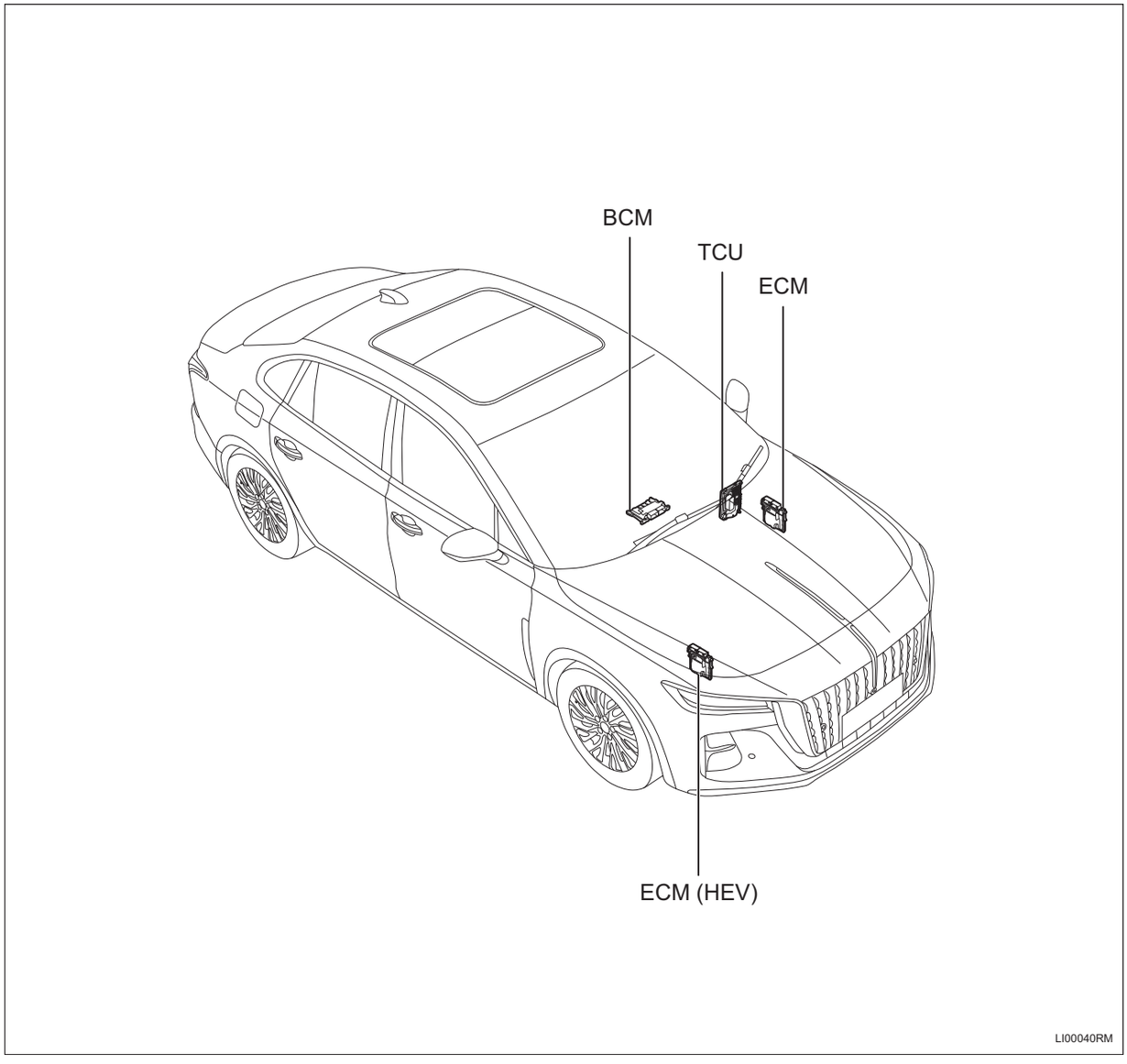
(a) When the part needs to be replaced or the connector needs to be disconnected during maintenance of light domain control system, disconnect the battery negative cable.

(b) The door control system needs to be initialized after reconnecting the battery. And use the HQ-VDS to "clear the DTC" for all electronic control systems.

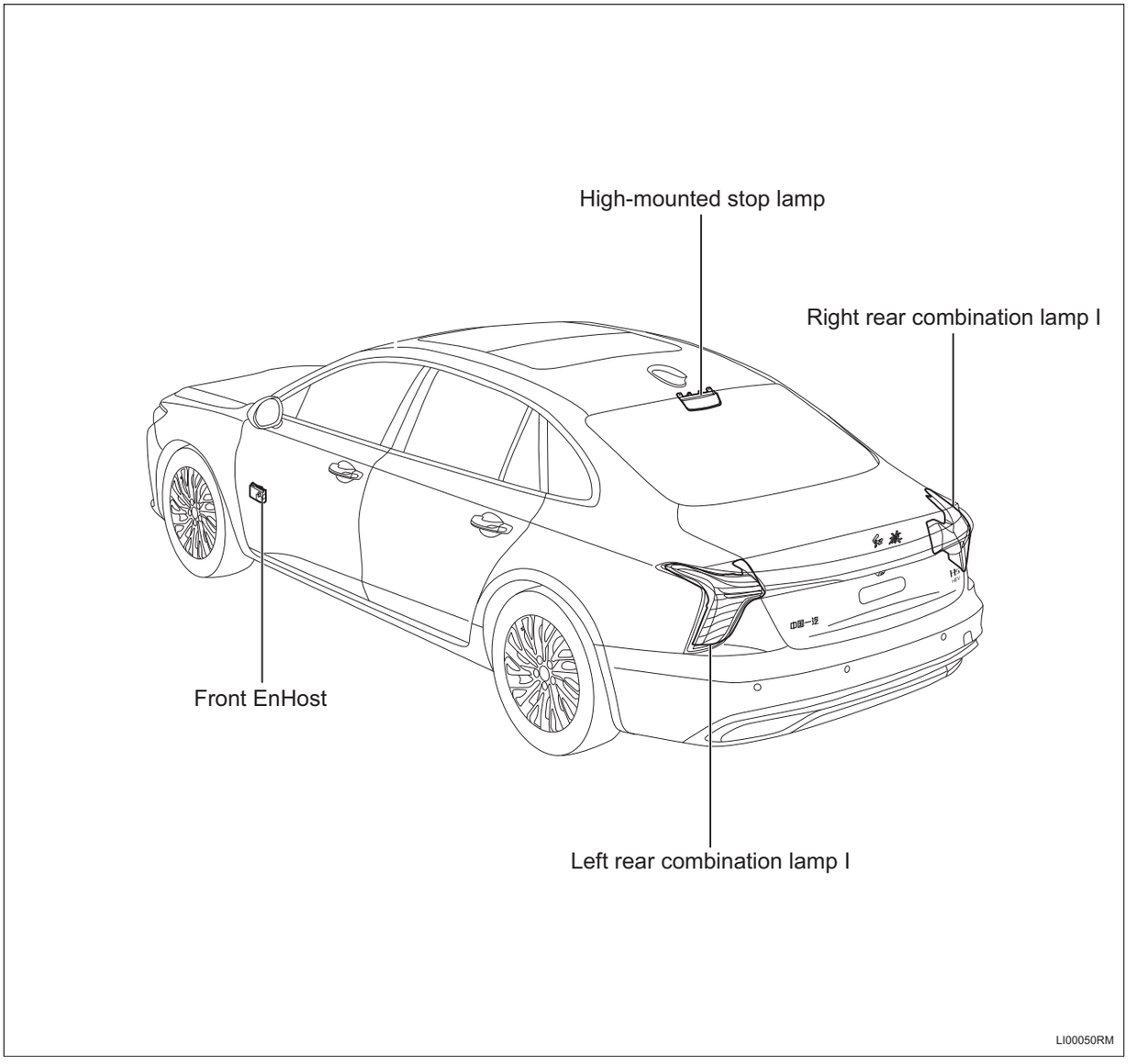
Location of parts



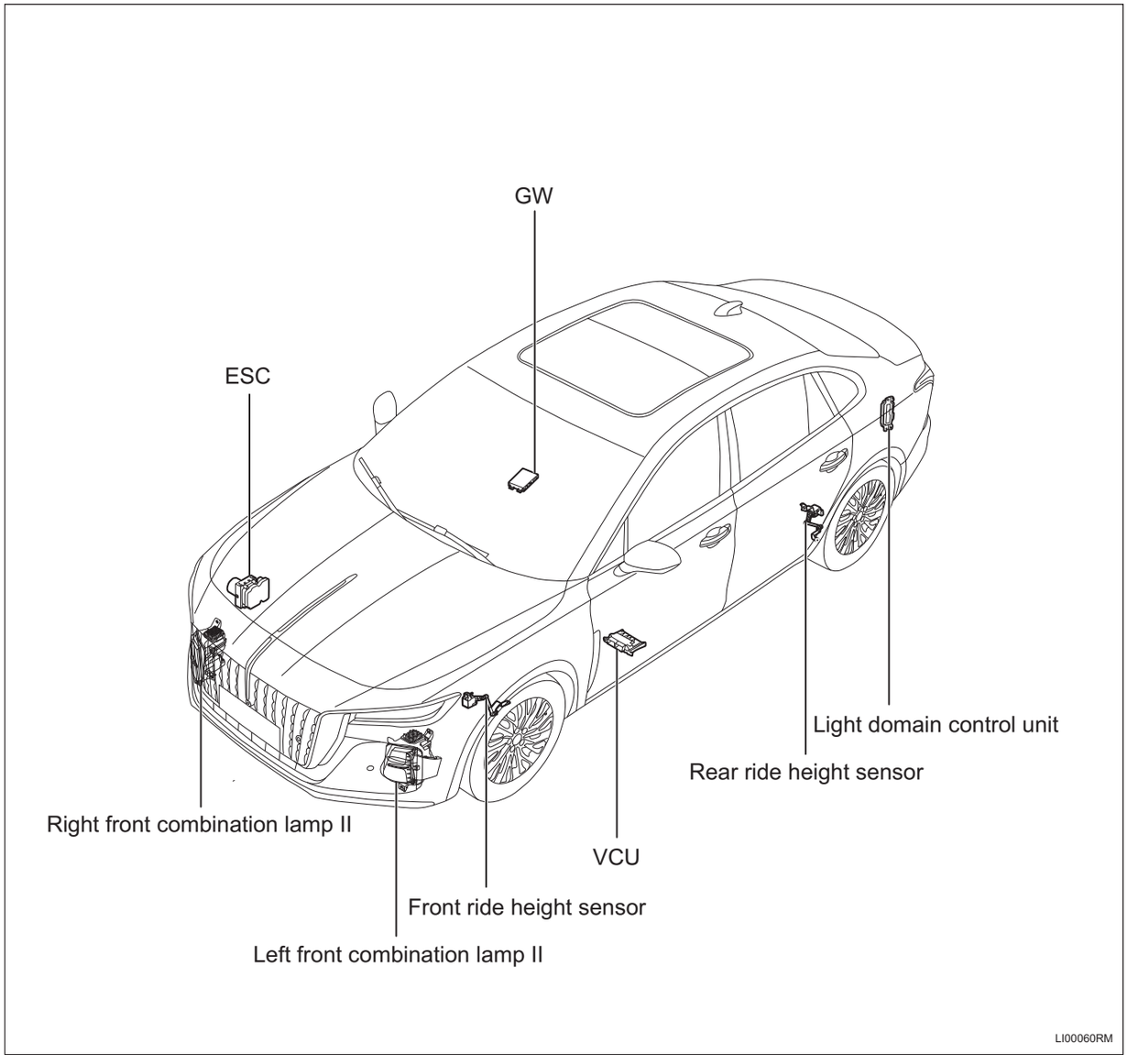
Location of parts



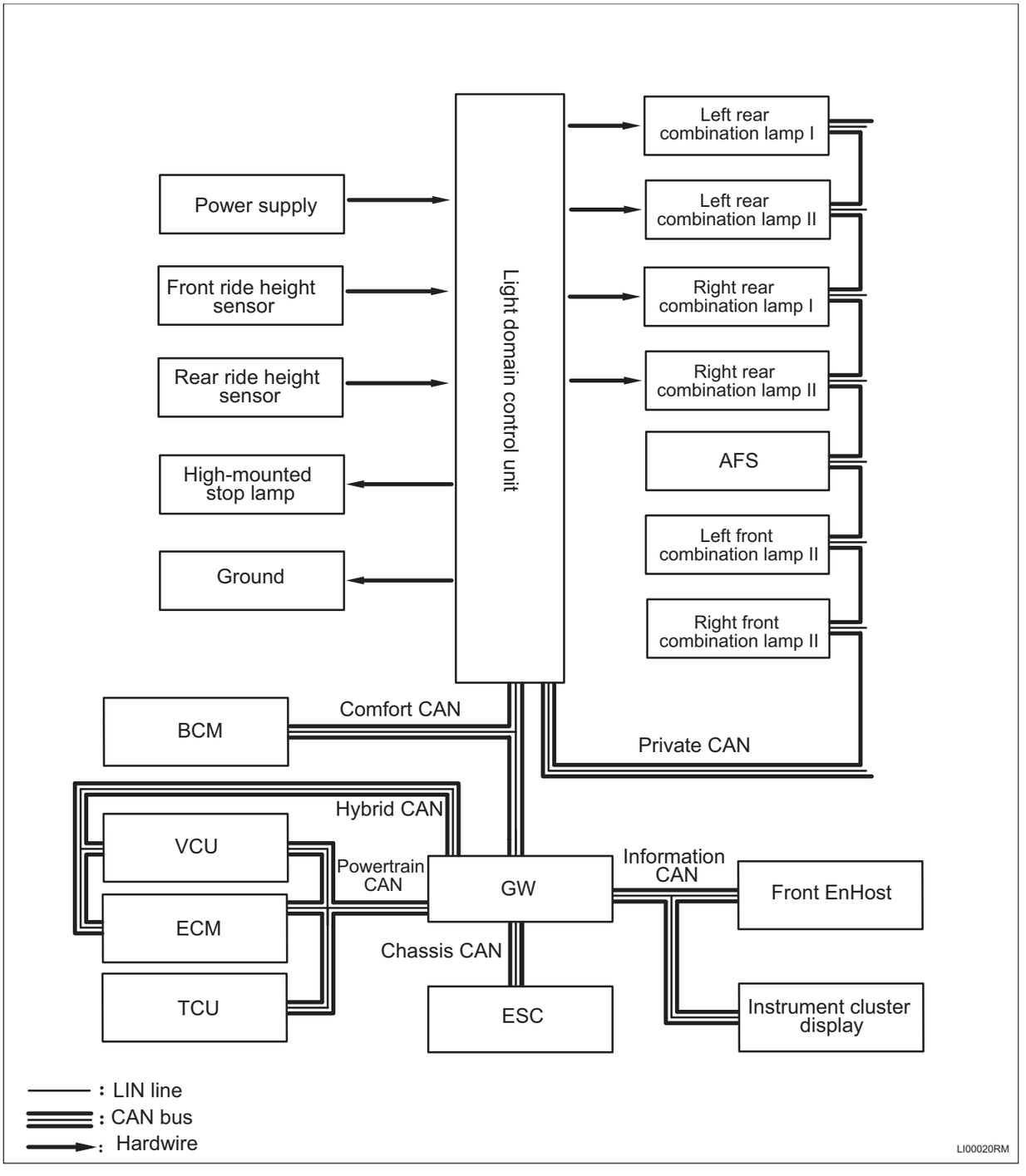
Location of parts



Location of parts



System diagram



System description

1. Overview of light domain control system

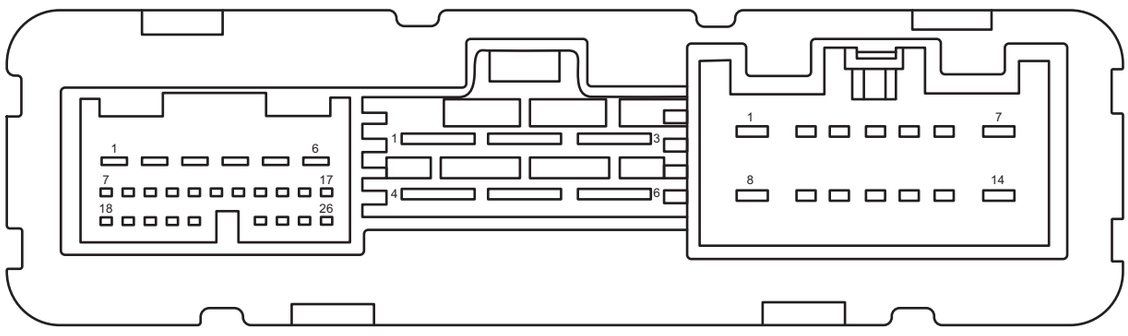
(a) The automatic headlamp leveling system can automatically adjust the headlamp beam height according to the number of occupants, the vehicle load and the road environment, so as to ensure that the headlamps do not interfere with other road users.

(b) The light domain control unit has a diagnostic function.

Symptom chart

Fault	Possible location
External light failure	• Battery • Related harness and connector • Front combination lamp • Rear combination lamp • Light domain control unit

ECU terminal



Light domain control unit A Light domain control unit B Light domain control unit C

LI00010RM

Light domain control unit A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	-	14	-
2	-	15	-
3	-	16	Brake backup signal
4	-	17	-
5	-	18	GND
6	-	19	Sensor 1 ground
7	KL30	20	Sensor 1 signal acquisition
8	Sensor 1 power supply	21	CAN0_L (vehicle)
9	CAN1_L (private)	22	CAN0_H (vehicle)
10	CAN1_H (private)	23	-
11	Brake signal 2 acquisition(BREAK_C/C)	24	-
12	Brake signal 1 acquisition(BREAK_OUT)	25	-
13	KL15	26	-

Light domain control unit B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	-	4	-
2	Left rear lamp power supply input	5	Right rear lamp power input
3	-	6	-

Light domain control unit C			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Left rear combination lamp I	8	Left rear combination lamp II
2	-	9	Sensor 2 power supply

Light domain control unit C			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
3	-	10	Sensor 2 signal acquisition
4	Left courtesy lamp/right courtesy lamp	11	Sensor 2 ground
5	-	12	Left turn signal lamp
6	High-mounted stop lamp	13	Right turn signal lamp
7	Right rear combination lamp I	14	Right rear combination lamp II

DTC chart

DTC	Description	Reference page
U300316	Power supply voltage low	(See page LI-13)
U300317	Power supply voltage high	(See page LI-13)
B151100	Left front position lamp fault	(See page LI-16)
B151000	Left front daytime running lamp fault	(See page LI-16)
B151400	Left front turn signal lamp fault	(See page LI-22)
B151500	Left front fog lamp fault	(See page LI-25)
B151600	Left front corner lamp fault	(See page LI-25)
B151200	Left low beam fault	(See page LI-20)
B151300	Left high beam fault	(See page LI-20)
B151800	Left rear reversing lamp fault	(See page LI-29)
B151700	Left rear brake lamp fault	(See page LI-27)
B151A00	Left rear turn signal lamp fault	(See page LI-33)
B151B00	Left rear fog lamp fault	(See page LI-35)
B151900	Left rear lamp assembly 1 position lamp fault	(See page LI-31)
B155A00	Left rear lamp assembly 2 position lamp fault	(See page LI-31)
B151C00	Left rear license plate lamp fault	(See page LI-37)
B152100	Right front position lamp fault	(See page LI-16)
B152000	Right front daytime running lamp fault	(See page LI-16)
B152400	Right front turn signal lamp fault	(See page LI-22)
B152500	Right front fog lamp fault	(See page LI-25)
B152600	Right front corner lamp fault	(See page LI-25)
B152200	Right low beam fault	(See page LI-20)
B152300	Right high beam fault	(See page LI-20)
B152800	Right rear reversing lamp fault	(See page LI-29)
B152700	Right rear brake lamp fault	(See page LI-27)
B152A00	Right rear turn signal lamp fault	(See page LI-33)
B152900	Right rear lamp assembly 1 position lamp fault	(See page LI-31)
B155B00	Right rear lamp assembly 2 position lamp fault	(See page LI-31)

DTC	Description	Reference page
B152C00	Right rear license plate lamp fault	(See page LI-37)
B154000	Left front lamp assembly circuit fault	(See page LI-61)
B154200	Right headlamp assembly circuit fault	(See page LI-61)
B154400	Left rear lamp assembly 1 circuit fault	(See page LI-61)
B154500	Left rear lamp assembly 2 circuit fault	(See page LI-61)
B154600	Right rear lamp assembly 1 circuit fault	(See page LI-61)
B154700	Right rear lamp assembly 2 circuit fault	(See page LI-61)
B153716	Left headlamp assembly undervoltage	(See page LI-61)
B153717	Left headlamp assembly overvoltage	(See page LI-61)
B153B16	Right front lamp assembly undervoltage	(See page LI-61)
B153B17	Right front lamp assembly overvoltage	(See page LI-61)
B153916	Left rear lamp assembly 1 undervoltage	(See page LI-61)
B153917	Left rear lamp assembly 1 overvoltage	(See page LI-61)
B153A16	Left rear lamp assembly 2 undervoltage	(See page LI-61)
B153A17	Left rear lamp assembly 2 overvoltage	(See page LI-61)
B153D16	Right rear lamp assembly 1 undervoltage	(See page LI-61)
B153D17	Right rear lamp assembly 1 overvoltage	(See page LI-61)
B153116	Right rear lamp assembly 2 undervoltage	(See page LI-61)
B153117	Right rear lamp assembly 2 overvoltage	(See page LI-61)
B154A14	Front height sensor circuit open or shorted to ground	(See page LI-71)
B154A12	Front height sensor circuit shorted to power supply	(See page LI-71)
B154B14	Rear height sensor circuit open or shorted to ground	(See page LI-71)
B154B12	Rear height sensor circuit shorted to power supply	(See page LI-71)
B154E06	Horizontal motor position process error	(See page LI-77)
B154F55	ALS zero calibration error	(See page LI-71)
B153655	ALS control parameter error	(See page LI-59)
B154C16	Left dimmer motor undervoltage	(See page LI-77)
B154C17	Left dimmer motor overvoltage	(See page LI-77)
B154C13	Left dimmer motor open circuit	(See page LI-77)
B154C12	Left dimmer motor short circuit	(See page LI-77)
B154D16	Right dimmer motor undervoltage	(See page LI-77)
B154D17	Right dimmer motor overvoltage	(See page LI-77)
B154D13	Right dimmer motor open circuit	(See page LI-77)
B154D12	Right dimmer motor short circuit	(See page LI-77)
B154916	Height sensor undervoltage	(See page LI-71)
B154917	Height sensor overvoltage	(See page LI-71)
B154898	SBC overtemperature	(See page LI-71)

DTC	Description	Reference page
B154816	SBC V1 output voltage low	(See page LI-70)
B153316	M2# undervoltage	(See page LI-53)
B153317	M2# overvoltage	(See page LI-53)
B153416	M5# undervoltage	(See page LI-53)
B153417	M5# overvoltage	(See page LI-53)
B153016	KL15 undervoltage	(See page LI-50)
B153017	KI15 overvoltage	(See page LI-50)
B153013	KL15 open circuit	(See page LI-50)
B153012	KL15 circuit shorted to power supply	(See page LI-50)
B152F00	High-mounted stop lamp fault	(See page LI-47)
B152E00	Courtesy lamp fault	(See page LI-43)
B152D00	Right side turn signal lamp fault	(See page LI-39)
B151D00	Left side turn signal lamp fault	(See page LI-39)
B153901	Left rear lamp assembly 1 voltage output circuit fault	(See page LI-53)
B153A01	Left rear lamp assembly 2 voltage output circuit fault	(See page LI-53)
B153D01	Right rear lamp assembly 1 voltage output circuit fault	(See page LI-53)
B153E01	Right rear lamp assembly 2 voltage output circuit fault	(See page LI-53)
B155087	Left headlamp assembly node lost	(See page LI-61)
B155187	Right headlamp assembly node lost	(See page LI-61)
B155287	Left rear lamp assembly 1 node lost	(See page LI-61)
B155387	Left rear lamp assembly 2 node lost	(See page LI-61)
B155487	Right rear lamp assembly 1 node lost	(See page LI-61)
B155587	Right rear lamp assembly 2 node lost	(See page LI-61)
B155688	Private CAN bus off	(See page LI-61)
B155766	CAN1 sleep timeout	(See page LI-61)
U002888	Comfort CAN bus off	(See page LI-84)
U014087	BCM1 node lost	(See page LI-84)
U014687	GW node lost	(See page LI-84)
U112187	ESP message lost	(See page LI-84)
U115587	Instrument cluster control unit message lost	(See page LI-84)
U110187	TCU message lost	(See page LI-84)
U110087	ECM message lost	(See page LI-84)
U129387	HCU message lost	(See page LI-84)
B155887	Grille emblem light node lost	(See page LI-82)
B155987	Engine hood emblem light node lost	(See page LI-83)
B155800	Grille emblem light fault	(See page LI-82)
B155900	Engine hood emblem light fault	(See page LI-83)

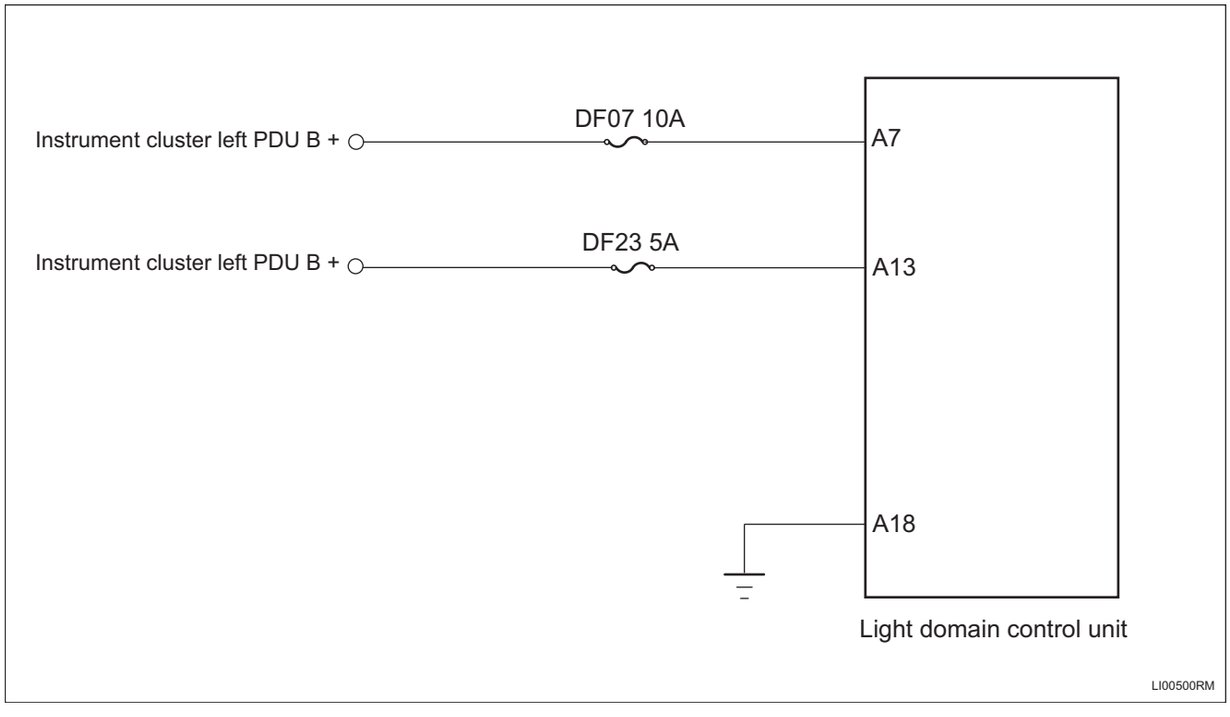
DTC	U300316	Power supply voltage low
DTC	U300317	Power supply voltage high

Description

When the light domain control unit power supply voltage is outside the normal operating range, the light domain control unit records the DTC.

DTC	DTC detection conditions	Faulty location
U300316	(a) Power supply voltage low.	• Light domain control unit • Harness and connector • Charging system
U300317	(a) Power supply voltage high.	• Light domain control unit • Harness and connector • Charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the engine and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

LI

NG → **Overhaul the charging system**

OK

2 Check the light domain control unit fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the light domain control unit fuse.

(d) Measure the resistance according to the values in the table below.

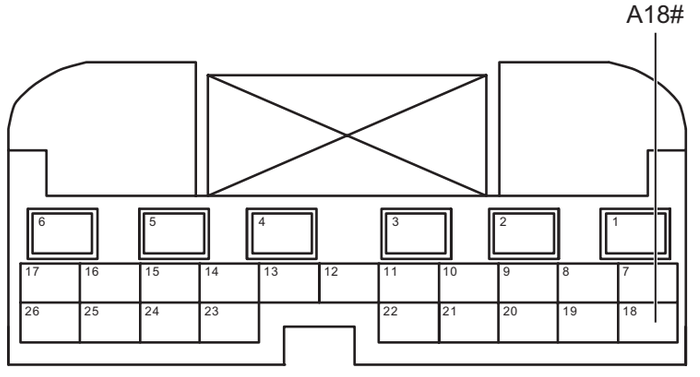
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3 Check light domain control unit ground



Light domain control unit A connector

LI00510RM

(a) Disconnect the light domain control unit connector.

(b) Measure the resistance according to the values in the table below.

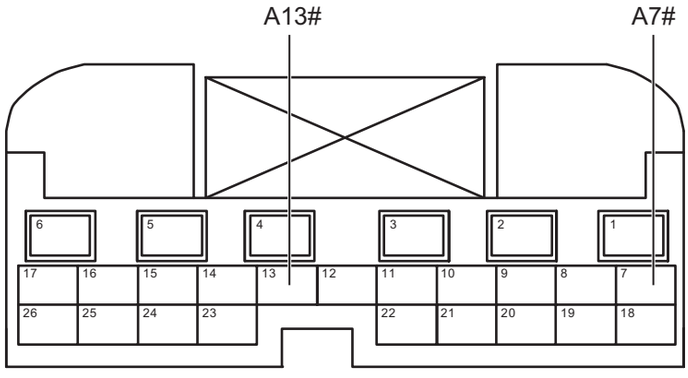
Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector A18# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check the light domain control unit power supply**



Light domain control unit A connector

LI00521RM

(a) Install the fuse.

(b) Connect the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector A7# - body GND	The ignition switch is set to "ON"	Battery voltage
Light domain control unit connector A13# - body GND	The ignition switch is set to"ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace light domain control unit (See page LI-107)**

LI

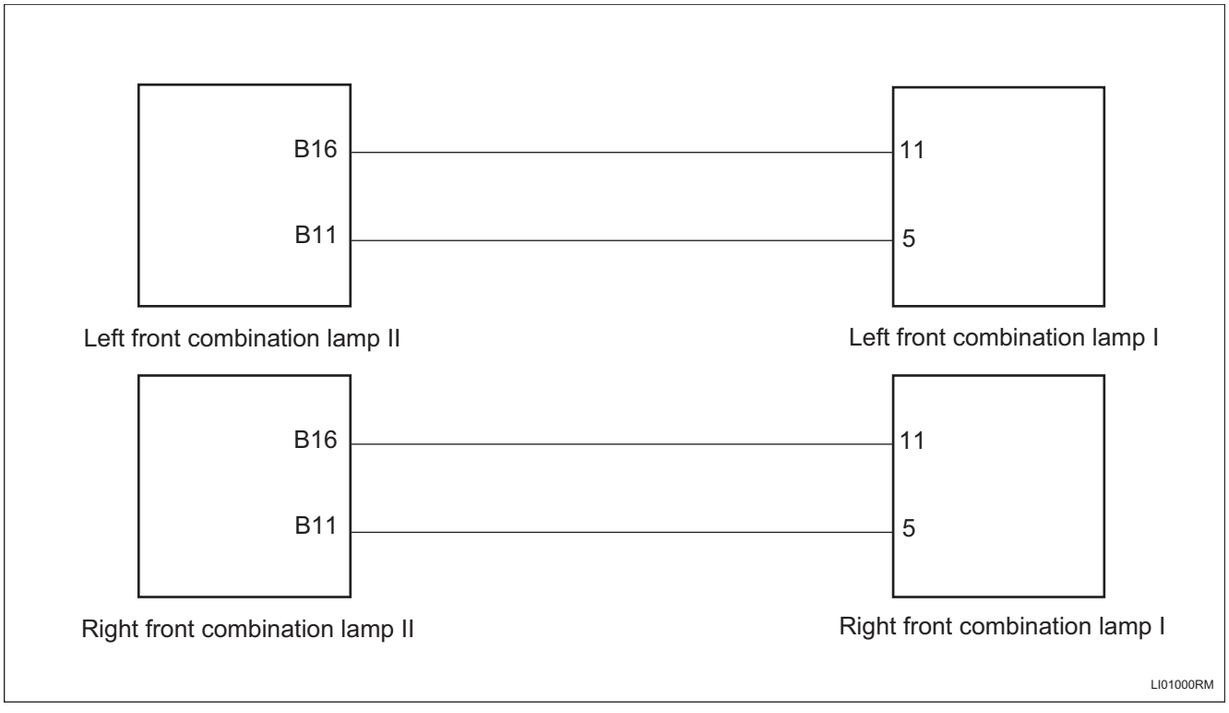
DTC	**B151100**	**Left front position lamp fault**
DTC	**B151000**	**Left front daytime running lamp fault**
DTC	**B152100**	**Right front position lamp fault**
DTC	**B152000**	**Right front daytime running lamp fault**

Description

When the left and right front position lamps and daytime running lamp fail, the light domain control unit records the DTC.

DTC	DTC detection conditions	Faulty location
B151100	(a) Left front position lamp fault.	• Left front combination lamp I • Left front combination lamp II • Harness and connector
B151000	(a) Left front daytime running lamp fault.	• Left front combination lamp I • Left front combination lamp II • Harness and connector
B152100	(a) Right front position lamp fault.	• Right front combination lamp I • Right front combination lamp II • Harness and connector
B152000	(a) Right front daytime running lamp fault.	• Right front combination lamp I • Right front combination lamp II • Harness and connector

Circuit diagram



Inspection procedure

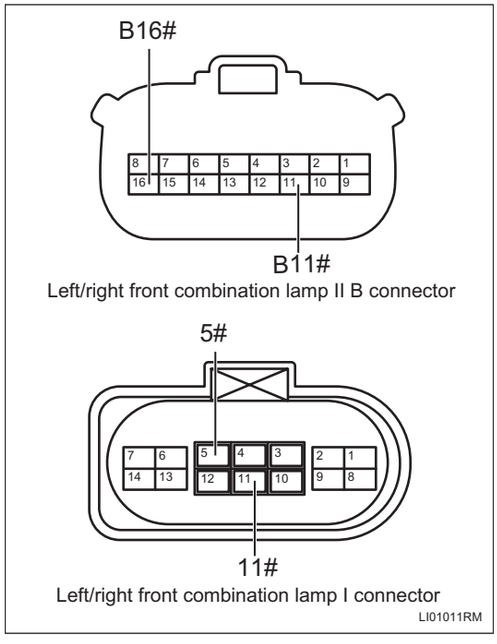
1	**Check left and right position lamps and daytime running lamps**

(a) Check whether left and right position lamps and daytime running lamps are damaged.

NG → **Repair according to the fault**

OK

2	**Check left and right position lamp and daytime running lamp harnesses and connectors for open circuit**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the left and right front combination lamp I connector.

(d) Disconnect the left and right front combination lamp II connector.

(e) Measure the resistance according to the values in the table below.

Standard value

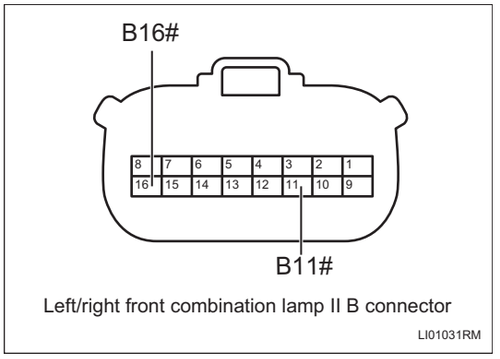
Detector connection	Detection conditions	Specified state
Left front combination lamp II connector B16# - left front combination lamp I connector 11#	Always connected	Less than 1Ω
Left front combination lamp II connector B11# - left front combination lamp I connector 5#	Always connected	Less than 1Ω
Right front combination lamp II connector B16# - right front combination lamp I connector 11#	Always connected	Less than 1Ω
Right front combination lamp II connector B11# - right front combination lamp I connector 5#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check harnesses and connectors of left and right position lamps and daytime running lamp for circuit shorted to ground**

LI



Left/right front combination lamp II B connector

LI01031RM

(a) Measure the resistance according to the values in the table below.

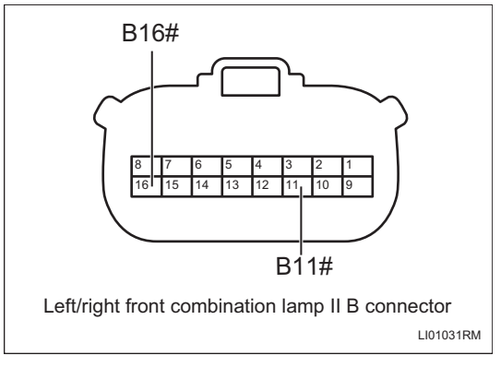
Standard value

Detector connection	Detection conditions	Specified state
Left front combination lamp II connector B16# - body GND	Always connected	10KΩ or greater
Left front combination lamp II connector B11# - body GND	Always connected	10KΩ or greater
Right front combination lamp II connector B16# - body GND	Always connected	10KΩ or greater
Right front combination lamp II connector B11# - body GND	Always connected	10KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check harnesses and connectors of left and right position lamps and daytime running lamp for circuit shorted to power supply**



Left/right front combination lamp II B connector

LI01031RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Left front combination lamp II connector B16# - body GND	The ignition switch is set to "ON"	Less than 1V
Left front combination lamp II connector B11# - body GND	The ignition switch is set to "ON"	Less than 1V
Right front combination lamp II connector B16# - body GND	The ignition switch is set to "ON"	Less than 1V
Right front combination lamp II connector B11# - body GND	The ignition switch is set to "ON"	Less than 1V

NG → **Repair or replace the harness and connector**

OK

5	**Replace left and right front combination lamp I (See page LI-113)**

(a) Replace the left and right front combination lamp I.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace the left and right front combination lamp II (See page LI-115)**

OK

6	**End**

DTC	**B151200**	**Left low beam fault**
DTC	**B151300**	**Left high beam fault**
DTC	**B152200**	**Right low beam fault**
DTC	**B152300**	**Right high beam fault**

Description

When the left and right low beam and high beam fail, light domain control unit records the DTC.

DTC	DTC detection conditions	Faulty location
B151200	(a) Left low beam fault.	• Left front combination lamp II • Harness and connector • Light domain control unit
B151300	(a) Left high beam fault.	• Left front combination lamp II • Harness and connector • Light domain control unit
B152200	(a) Right low beam fault.	• Right front combination lamp II • Harness and connector • Light domain control unit
B152300	(a) Right high beam fault.	• Right front combination lamp II • Harness and connector • Light domain control unit

Inspection procedure

1	**Check left and right front low beam and high beam**

(a) Check whether the left and right low beams and high beams are damaged.

NG → **Repair according to the fault**

OK

2	**Check the left and right front low beam, high beam harnesses and connectors**

(a) Check whether the left and right front low beam and high beam harnesses and connectors are short circuited.

(b) Check whether the left and right front low beam and high beam harnesses and connectors are open circuited.

NG → **Repair or replace the harness and connector**

OK

3	**Replace the left and right front combination lamp II (See page LI-115)**

(a) Replace the left and right front combination lamp II.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace light domain control unit (See page LI-107)**

OK

4	**End**

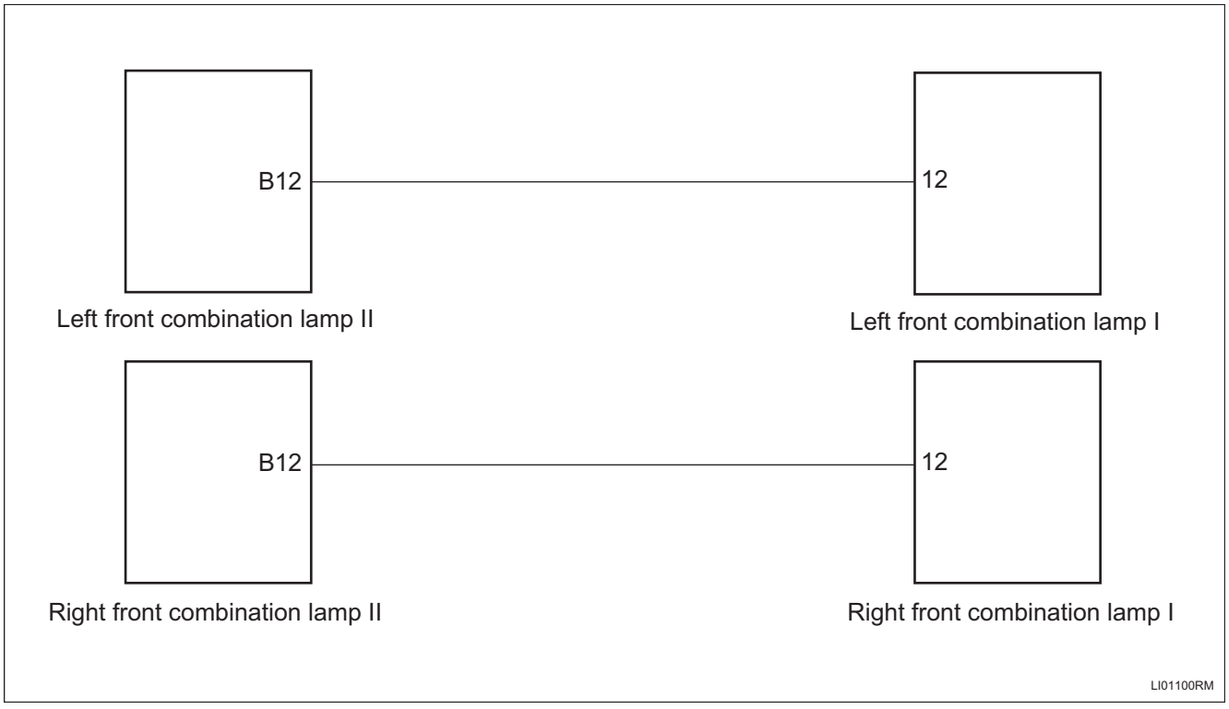
DTC	B151400	Left front turn signal lamp fault
DTC	B152400	Right front turn signal lamp fault

Description

The light domain control unit records a DTC when the left/right front turn signal lamp is faulty.

DTC	DTC detection conditions	Faulty location
B151400	(a) Left front turn signal lamp fault.	• Left front combination lamp II • Harness and connector • Left front combination lamp I
B152400	(a) Right front turn signal lamp fault.	• Right front combination lamp II • Harness and connector • Right front combination lamp I

Circuit diagram



Inspection procedure

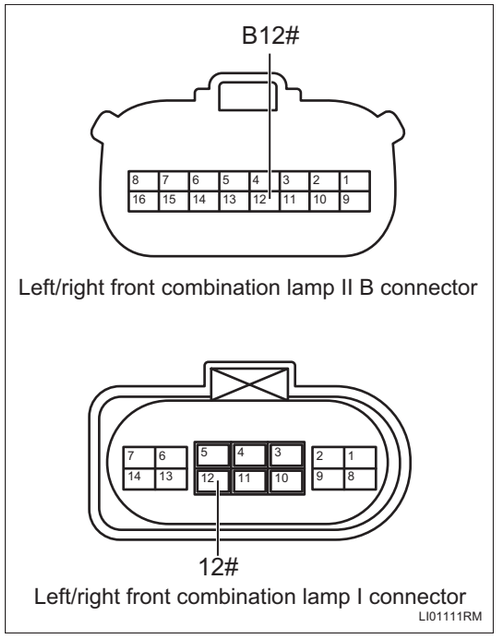
1	Check left and right front turn signal lamps

(a) Check the left and right front turn signal lamps for damage.

NG → **Repair according to the fault**

OK

2	Check left and right front turn signal lamp harnesses and connectors for open circuit



Left/right front combination lamp II B connector

Left/right front combination lamp I connector

LI01111RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the left/right front combination lamp I connector.

(d) Disconnect the left/right front combination lamp II connector.

(e) Measure the resistance according to the values in the table below.

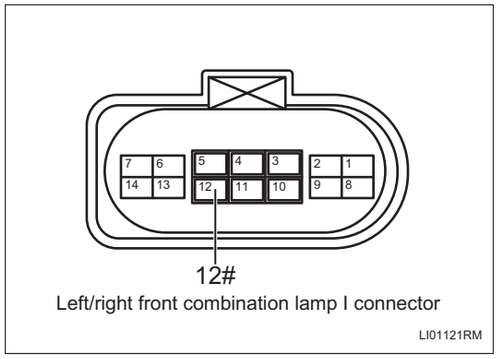
Standard value

Detector connection	Detection conditions	Specified state
Left front combination lamp I connector 12# - left front combination lamp II connector B12#	Always connected	Less than 1Ω
Right front combination lamp I connector 12# - right front combination lamp II connector B12#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check harnesses and connectors of left and right front turn signal lamps for circuit shorted to ground**



Left/right front combination lamp I connector

LI01121RM

(a) Measure the resistance according to the values in the table below.

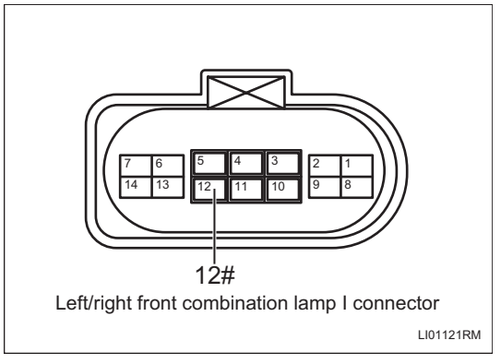
Standard value

Detector connection	Detection conditions	Specified state
Left front combination lamp I connector 12# - body GND	Always connected	10KΩ or greater
Right front combination lamp I connector 12# - body GND	Always connected	10KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check harnesses and connectors of left and right front turn signal lamps for circuit shorted to power supply**



Left/right front combination lamp I connector

LI01121RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Left front combination lamp I connector 12# - body GND	The ignition switch is set to "ON"	Less than 1V
Right front combination lamp I connector 12# - body GND	The ignition switch is set to "ON"	Less than 1V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the left/right front combination lamp I (See page LI-113)**

(a) Replace the left/right front combination lamp I.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace the left/right front combination lamp II (See page LI-115)**

OK

6	**End**

DTC	**B151500**	**Left front fog lamp fault**
DTC	**B151600**	**Left front corner lamp fault**
DTC	**B152500**	**Right front fog lamp fault**
DTC	**B152600**	**Right front corner lamp fault**

Description

When the left and right front fog lamps and corner lamp fail, the light domain control unit records the DTC.

DTC	DTC detection conditions	Faulty location
B151500	(a) Left front fog lamp fault.	• Left front combination lamp II • Harness and connector • Light domain control unit
B151600	(a) Left front corner lamp fault.	• Left front combination lamp II • Harness and connector • Light domain control unit
B152500	(a) Right front fog lamp fault.	• Right front combination lamp II • Harness and connector • Light domain control unit
B152600	(a) Right front corner lamp fault.	• Right front combination lamp II • Harness and connector • Light domain control unit

Inspection procedure

1	**Check left and right front fog lamps and corner lamp**

(a) Check the left and right fog lamps and corner lamps for damage.

NG → **Perform repair according to malfunction**

OK

2	**Check left and right front fog lamp and corner lamp harnesses and connectors**

(a) Check whether the left and right front fog lamps and corner lamp harnesses and connectors are short circuited.

(b) Check whether the left and right front fog lamp and corner lamp harnesses and connectors are open circuited.

NG → **Repair or replace the harness and connector**

OK

3	**Replace the left and right front combination lamp II (See page LI-115)**

(a) Replace the left and right front combination lamp II.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace light domain control unit (See page LI-107)**

OK

4	**End**

DTC	B151700	Left rear brake lamp fault
DTC	B152700	Right rear brake lamp fault

Description

When the left brake lamp and the right brake lamp fail, the light domain control unit records the DTC.

DTC	DTC detection conditions	Faulty location
B151700	(a) Left rear brake lamp fault.	• Left rear combination lamp I • Harness and connector • Light domain control unit
B152700	(a) Right rear brake lamp fault.	• Right rear combination lamp I • Harness and connector • Light domain control unit

Inspection procedure

1	Check left and right brake lamps

(a) Check the left and right brake lamps for damage.

NG → **Repair according to the fault**

OK

2	Check left and right brake lamp harness and connector

(a) Check the harnesses and connectors of left and right brake lamps for short circuit.

(b) Check the harnesses and connectors of left and right brake lamps for open circuit.

NG → **Repair or replace the harness and connector**

OK

3	Replace the left and right rear combination lamp I (See page LI-124)

(a) Replace the left and right rear combination lamp I.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace light domain control unit (See page LI-107)**

OK

4	**End**

DTC	B151800	Left rear reversing lamp fault
DTC	B152800	Right rear reversing lamp fault

Description

When the left reversing lamp and right reversing lamp fail, the light domain control unit records the DTC.

DTC	DTC detection conditions	Faulty location
B151800	(a) Left rear reversing lamp fault.	• Left rear combination lamp I • Harness and connector • Light domain control unit
B152800	(a) Right rear reversing lamp fault.	• Right rear combination lamp I • Harness and connector • Light domain control unit

Inspection procedure

1	Check left and right reversing lamps

(a) Check the left and right reversing lamps for damage.

NG → **Repair according to the fault**

OK

2	Check left and right reversing lamp harness and connector

(a) Check the harnesses and connectors of left and right reversing lamps for short circuit.

(b) Check the harnesses and connectors of left and right reversing lamps for open circuit.

NG → **Repair or replace the harness and connector**

OK

3	Replace left and right rear combination lamp I - left and right rear combination lamp I (See page LI-124)

(a) Replace the left and right rear combination lamp I.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace light domain control unit (See page LI-107)**

OK

4	**End**

DTC	**B151900**	**Left rear lamp assembly 1 position lamp fault**
DTC	**B155A00**	**Left rear lamp assembly 2 position lamp fault**
DTC	**B152900**	**Right rear lamp assembly 1 position lamp fault**
DTC	**B155B00**	**Right rear lamp assembly 2 position lamp fault**

Description

When the left rear position lamp and the right rear position lamp fail, light domain control unit records the DTC.

DTC	DTC detection conditions	Faulty location
B151900	(a) Left rear lamp assembly 1 position lamp fault.	• Left rear combination lamp I • Harness and connector • Light domain control unit
B155A00	(a) Left rear lamp assembly 2 position lamp fault.	• Left rear combination lamp II • Harness and connector • Light domain control unit
B152900	(a) Right rear lamp assembly 1 position lamp fault.	• Right rear combination lamp I • Harness and connector • Light domain control unit
B155B00	(a) Right rear lamp assembly 2 position lamp fault.	• Right rear combination lamp II • Harness and connector • Light domain control unit

Inspection procedure

1	**Check left and right rear position lamps**

(a) Check whether left and right rear position lamps are damaged.

NG → **Repair according to the fault**

OK

2	**Check left and right rear position lamp harness and connector**

(a) Check the harnesses and connectors of left and right rear position lamps for short circuit.

(b) Check the harnesses and connectors of left and right rear position lamps for open circuit.

NG → **Repair or replace the harness and connector**

OK

3	**Replace left/right rear combination lamp I/ II (See page LI-124) (See page LI-126)**

(a) Replace the left/right rear combination lamp I/ II .

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace light domain control unit (See page LI-107)**

OK

4	**End**

DTC	B151A00	Left rear turn signal lamp fault
DTC	B152A00	Right rear turn signal lamp fault

Description

When the left rear turn signal lamp and right rear turn signal lamp fail, light domain control unit records the DTC.

DTC	DTC detection conditions	Faulty location
B151A00	(a) Left rear turn signal lamp fault.	• Left rear combination lamp I • Harness and connector • Light domain control unit
B152A00	(a) Right rear turn signal lamp failure.	• Right rear combination lamp I • Harness and connector • Light domain control unit

Inspection procedure

1	**Check left and right rear turn signal lamps**

(a) Check the left and right rear turn signal lamps for damage.

NG → **Repair according to the fault**

OK

2	**Check left and right rear turn signal lamp harness and connector**

(a) Check the harnesses and connectors of left and right rear turn signal lamps for short circuit.

(b) Check the harnesses and connectors of left and right rear turn signal lamps for open circuit.

NG → **Repair or replace the harness and connector**

OK

3	**Replace the left and right rear combination lamp I (See page LI-124)**

(a) Replace the left and right rear combination lamp I.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace light domain control unit (See page LI-107)**

OK

4	**End**

DTC	B151B00	Left rear fog lamp fault

Description

The light domain control unit records a DTC when there is a failure in the left rear fog lamp.

DTC	DTC detection conditions	Faulty location
B151B00	(a) Left rear fog lamp failure.	• Left rear combination lamp I • Harness and connector • Light domain control unit

Inspection procedure

1	Check left rear fog lamp

(a) Check whether the left rear fog lamp is damaged.

NG → **Repair according to the fault**

OK

2	Check left rear fog lamp harness and connector

(a) Check the left rear fog lamp harness and connector for short circuit.

(b) Check the left rear fog lamp harness and connector for open circuit.

NG → **Repair or replace the harness and connector**

OK

3	Replace left rear combination lamp I (See page LI-124)

(a) Replace the left rear combination lamp I.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace light domain control unit (See page LI-107)**

OK

4	**End**

DTC	B151C00	Left rear license plate lamp fault
DTC	B152C00	Right rear license plate lamp fault

Description

When the left license plate lamp and right license plate lamp fail, the light domain control unit records the DTC.

DTC	DTC detection conditions	Faulty location
B151C00	(a) Left rear license plate lamp fault.	• Left rear license plate lamp (left rear combination lamp II) • Harness and connector • Light domain control unit
B152C00	(a) Right rear license plate lamp fault.	• Right rear license plate lamp (right rear combination lamp II) • Harness and connector • Light domain control unit

Inspection procedure

1	Check left and right license plate lamps

(a) Check whether the left and right license plate lamps are damaged.

NG → **Repair according to the fault**

OK

2	Check left and right license plate lamp harness and connector

(a) Check the harnesses and connectors of left and right license plate lamps for short circuit.

(b) Check the harnesses and connectors of left and right license plate lamps for open circuit.

NG → **Repair or replace the harness and connector**

OK

3	Replace the left and right license plate lamps (See page LI-126)

(a) Replace the left and right license plate lamps.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace light domain control unit (See page LI-107)**

OK

4	**End**

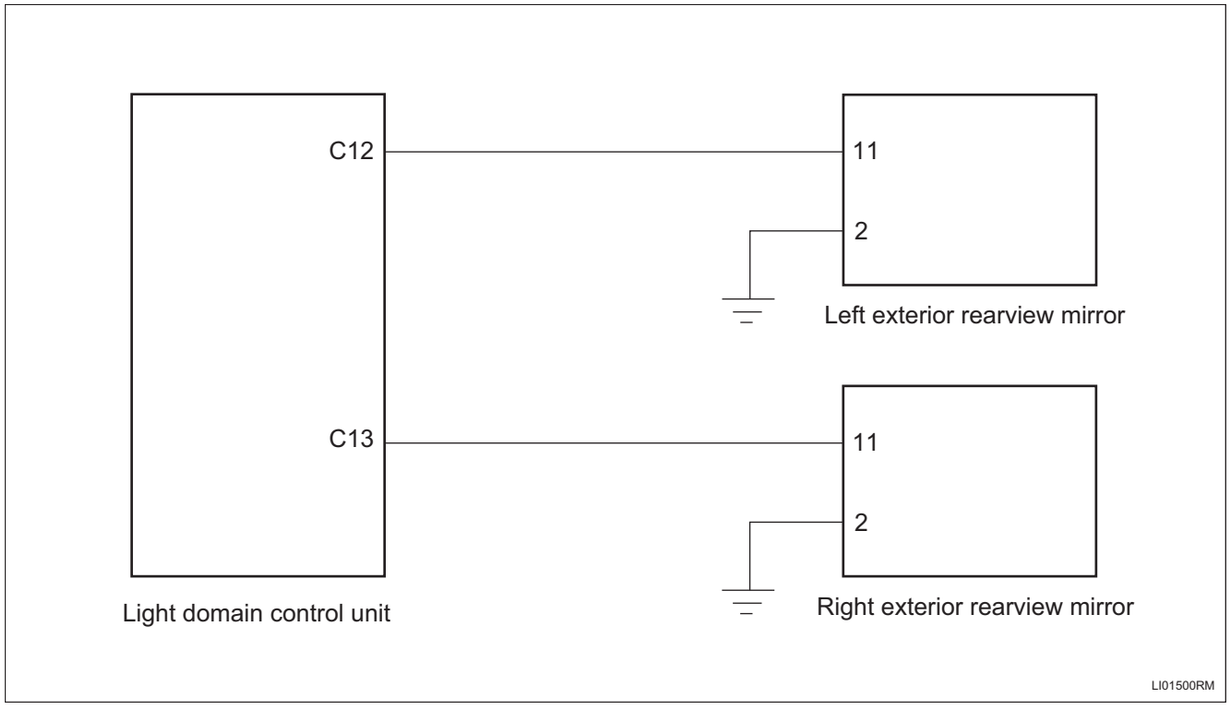
DTC	B152D00	Right side turn signal lamp fault
DTC	B151D00	Left side turn signal lamp fault

Description

The light domain control unit records a DTC when the left/right turn signal lamp is faulty.

DTC	DTC detection conditions	Faulty location
B152D00	(a) Right side turn signal lamp fault.	• Light domain control unit • Left exterior rearview mirror • Harness and connector
B151D00	(a) Left side turn signal lamp fault.	• Light domain control unit • Right exterior rearview mirror • Harness and connector

Circuit diagram



Inspection procedure

1	Check left and right side turn signal lamps

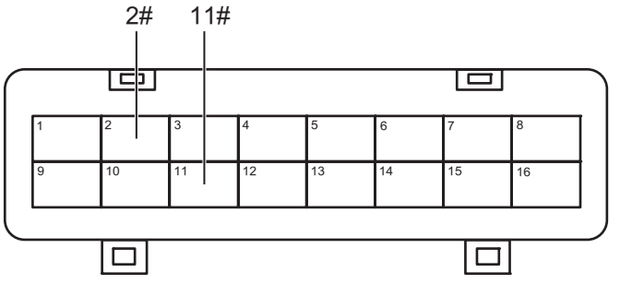
(a) Check the left and right side turn signal lamps for damage.

NG → **Repair according to the fault**

OK

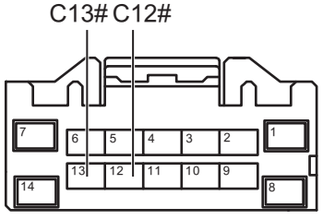
2	Check left and right side turn signal lamp harnesses and connectors for open circuit

LI



Left/right exterior rearview mirror connector

LI01511RM



Light domain control unit C connector

LI01521RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the light domain control unit connector.

(d) Disconnect the left exterior rearview mirror connector.

(e) Disconnect the right exterior rearview mirror connector.

(f) Measure the resistance according to the values in the table below.

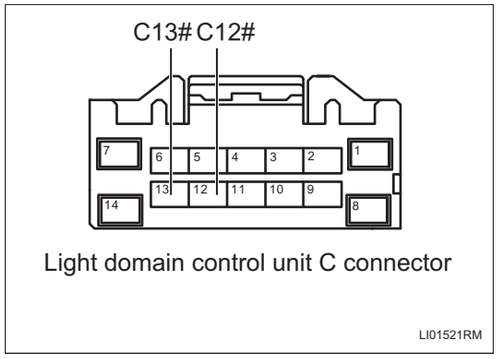
Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector C12# — left exterior rearview mirror connector 11#	Always connected	Less than 1Ω
Left exterior rearview mirror connector 2# — body GND	Always connected	Less than 1Ω
Light domain control unit connector C13# — right exterior rearview mirror connector 11#	Always connected	Less than 1Ω
Right exterior rearview mirror connector 2# — body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check left and right side turn signal lamp harnesses and connectors for circuit shorted to ground**



Light domain control unit C connector

LI01521RM

(a) Measure the resistance according to the values in the table below.

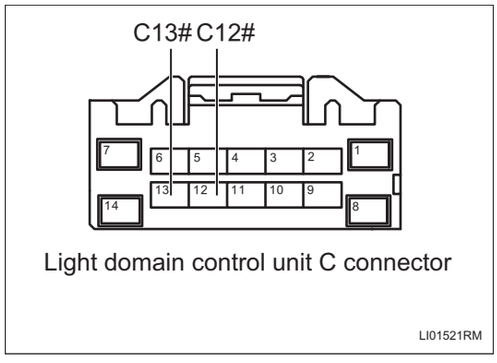
Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector C12# - body GND	Always connected	10KΩ or greater
Light domain control unit connector C13# - body GND	Always connected	10KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check left and right side turn signal lamp harnesses and connectors for circuit shorted to power supply



Light domain control unit C connector

LI01521RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector C12# — body GND	The ignition switch is set to"ON"	Less than 1V
Light domain control unit connector C13# — body GND	The ignition switch is set to"ON"	Less than 1V

NG → **Repair or replace the harness and connector**

OK

5	Replace the left/right exterior rearview mirror (See page IM-3)

(a) Replace the left/right exterior rearview mirror.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace light domain control unit (See page LI-107)**

LI

OK

6	**End**

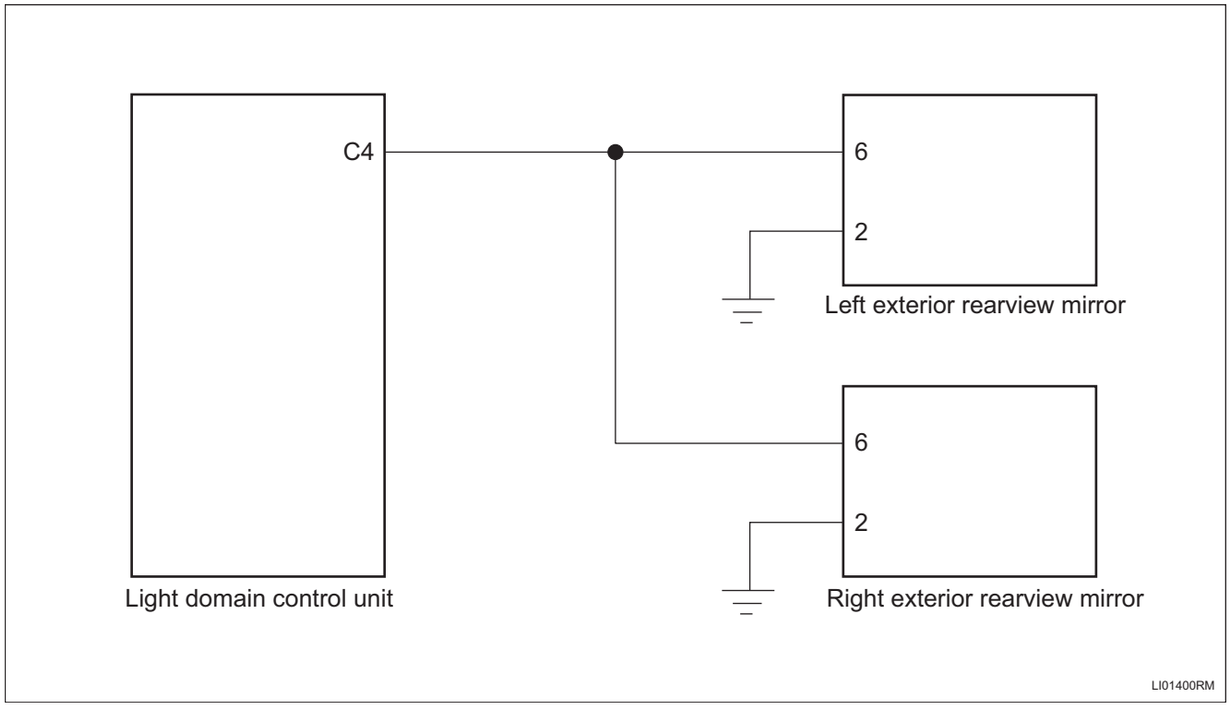
DTC	B152E00	Courtesy lamp fault

Description

The light domain control unit records a DTC when there is a failure in the courtesy lamp.

DTC	DTC detection conditions	Faulty location
B152E00	(a) Courtesy lamp fault.	• Light domain control unit • Left exterior rearview mirror • Right exterior rearview mirror • Harness and connector

Circuit diagram



Inspection procedure

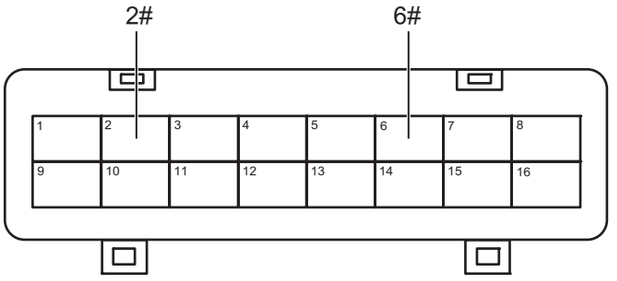
1	Check courtesy lamp

(a) Check whether the courtesy lamp is damaged.

NG → **Repair according to the fault**

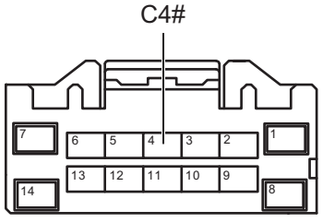
OK

2	Check courtesy lamp harness and connector for open circuit



Left/right exterior rearview mirror connector

LI01411RM



Light domain control unit C connector

LI01421RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the light domain control unit connector.

(d) Disconnect the left exterior rearview mirror connector.

(e) Disconnect the right exterior rearview mirror connector.

(f) Measure the resistance according to the values in the table below.

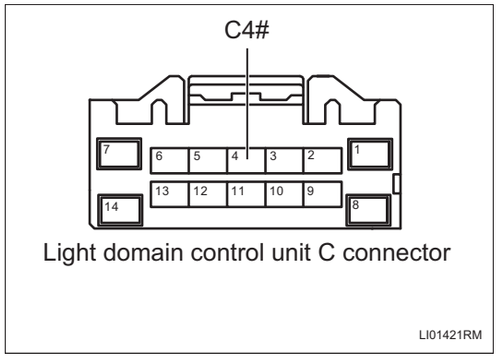
Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector C4# — left exterior rearview mirror connector 6#	Always connected	Less than 1Ω
Left exterior rearview mirror connector 2# — body GND	Always connected	Less than 1Ω
Light domain control unit connector C4# — right exterior rearview mirror connector 6#	Always connected	Less than 1Ω
Right exterior rearview mirror connector 2# — body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check courtesy lamp harness and connector for circuit shorted to ground**



Light domain control unit C connector

(a) Measure the resistance according to the values in the table below.

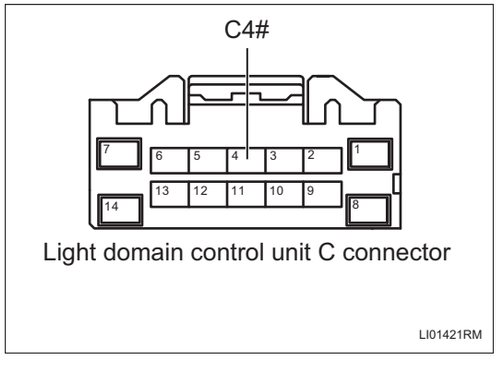
Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector C4# - body GND	Always connected	10KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check courtesy lamp harness and connector for circuit shorted to power supply



Light domain control unit C connector

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector C4# — body GND	The ignition switch is set to"ON"	Less than 1V

NG → **Repair or replace the harness and connector**

OK

5	Replace the left/right exterior rearview mirror (See page IM-3)

(a) Replace the left/right exterior rearview mirror.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace light domain control unit (See page LI-107)**

OK

6	**End**

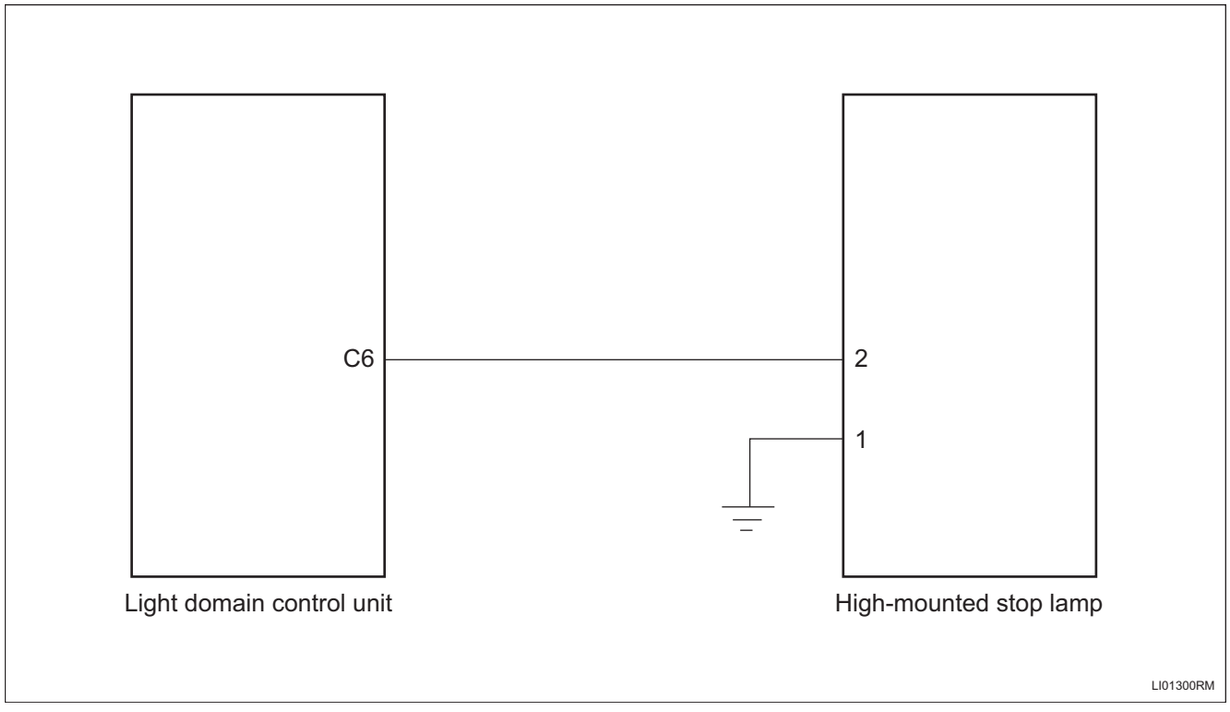
DTC	B152F00	High-mounted stop lamp fault

Description

The light domain control unit records a DTC when there is a failure in the high-mounted stop lamp.

DTC	DTC detection conditions	Faulty location
B152F00	(a) High-mounted stop lamp fault.	• Light domain control unit • High-mounted stop lamp • Harness and connector

Circuit diagram



Inspection procedure

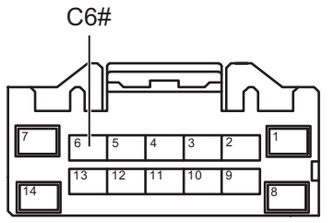
1	Check the high-mounted stop lamp

(a) Check whether the high-mounted stop lamp is damaged.

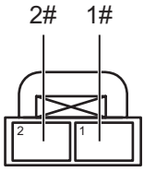
NG → **Repair according to the fault**

OK

2	Check high-mounted stop lamp harness and connector for open circuit



Light domain control unit C connector



High-mounted stop lamp connector

LI01310RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the light domain control unit connector.

(d) Disconnect the high-mounted stop lamp connector.

(e) Measure the resistance according to the values in the table below.

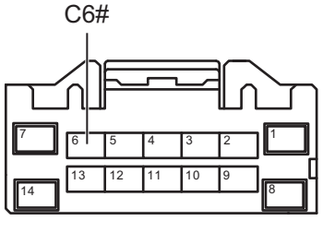
Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector C6# — high-mounted stop lamp connector 2#	Always connected	Less than 1Ω
High-mounted stop lamp connector 1# — body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check high-mounted stop lamp harness and connector for circuit shorted to ground**



Light domain control unit C connector

LI01321RM

(a) Measure the resistance according to the values in the table below.

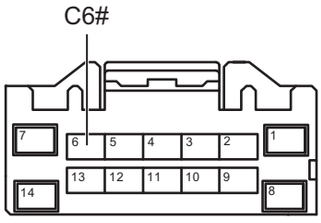
Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector C6# - body GND	Always connected	10KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check high-mounted stop lamp harness and connector for circuit shorted to power supply**



Light domain control unit C connector

LI01321RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector C6# — body GND	The ignition switch is set to"ON"	Less than 1V

NG → **Repair or replace the harness and connector**

OK

5	**Replace high-mounted stop lamp (See page LI-134)**

(a) Replace the high-mounted stop lamp.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

NG → **Replace light domain control unit (See page LI-107)**

OK

6	**End**

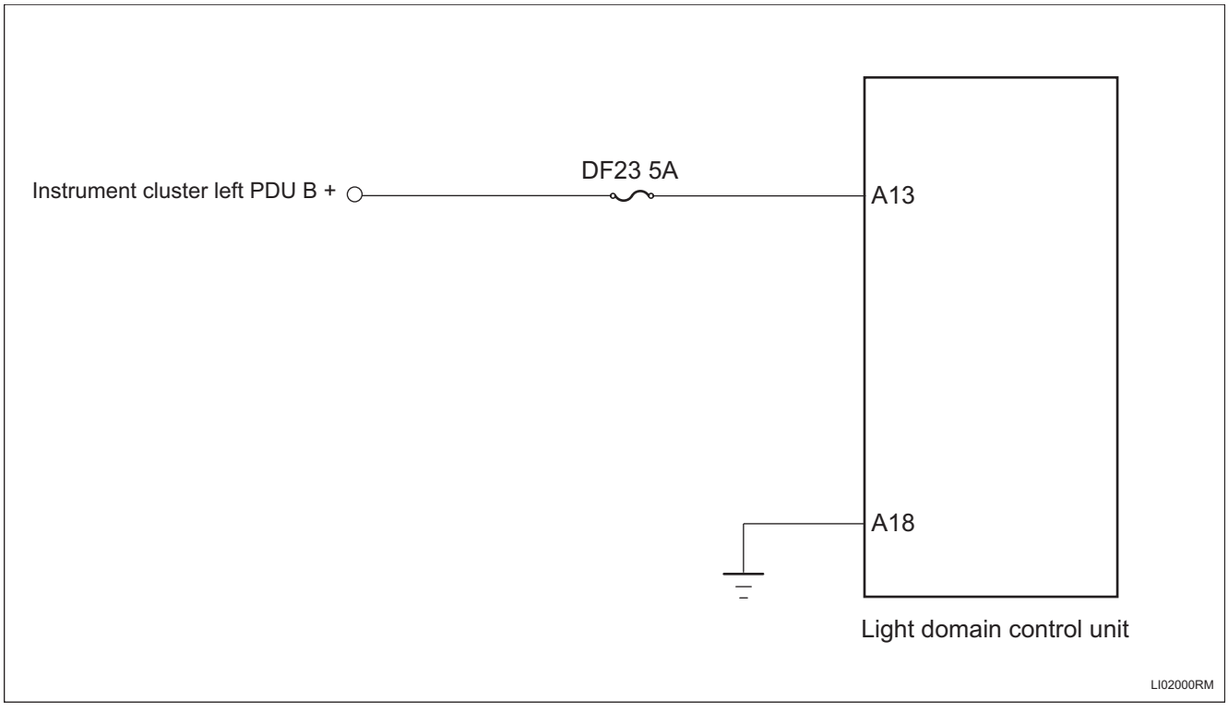
DTC	**B153016**	**KL15 undervoltage**
DTC	**B153017**	**KI 15 overvoltage**
DTC	**B153013**	**KL15 open circuit**
DTC	**B153012**	**KL15 circuit shorted to power supply**

Description

When the light domain control unit KL15 voltage is abnormal or the short circuit or open circuit occurs, the light domain controller records the DTC.

DTC	DTC detection conditions	Faulty location
B153016	(a) KL15 undervoltage.	• Light domain control unit • Harness and connector • Charging system
B153017	(a) KI15 overvoltage.	• Light domain control unit • Harness and connector • Charging system
B153013	(a) KL15 open circuit.	• Light domain control unit • Harness and connector
B153012	(a) KL15 circuit shorted to power supply.	• Light domain control unit • Harness and connector

Circuit diagram



Inspection procedure

1	**Check the light domain control unit fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the light domain control unit fuse.

(d) Measure the resistance according to the values in the table below.

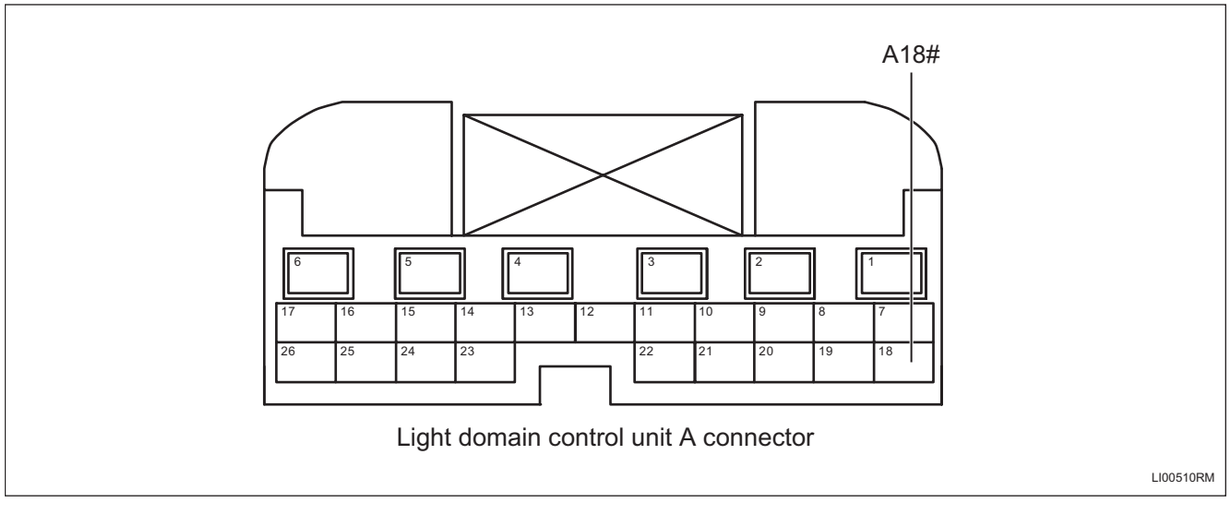
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

2	**Check light domain control unit ground**



Light domain control unit A connector

(a) Disconnect the light domain control unit connector.

(b) Measure the resistance according to the values in the table below.

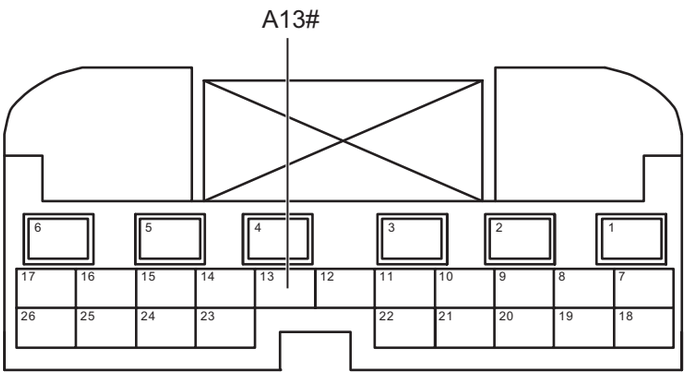
Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector A18# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check the light domain control unit power supply**



Light domain control unit A connector

LI02011RM

(a) Install the fuse.

(b) Connect the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector A13# - body GND	The ignition switch is set to"ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

4	**Replace light domain control unit (See page LI-107)**

DTC	**B153316**	**M2# undervoltage**
DTC	**B153317**	**M2# overvoltage**
DTC	**B153901**	**Left rear lamp assembly 1 voltage output circuit fault**
DTC	**B153A01**	**Left rear lamp assembly 2 voltage output circuit fault**
DTC	**B153416**	**M5# undervoltage**
DTC	**B153417**	**M5# overvoltage**
DTC	**B153D01**	**Right rear lamp assembly 1 voltage output circuit fault**
DTC	**B153E01**	**Right rear lamp assembly 2 voltage output circuit fault**

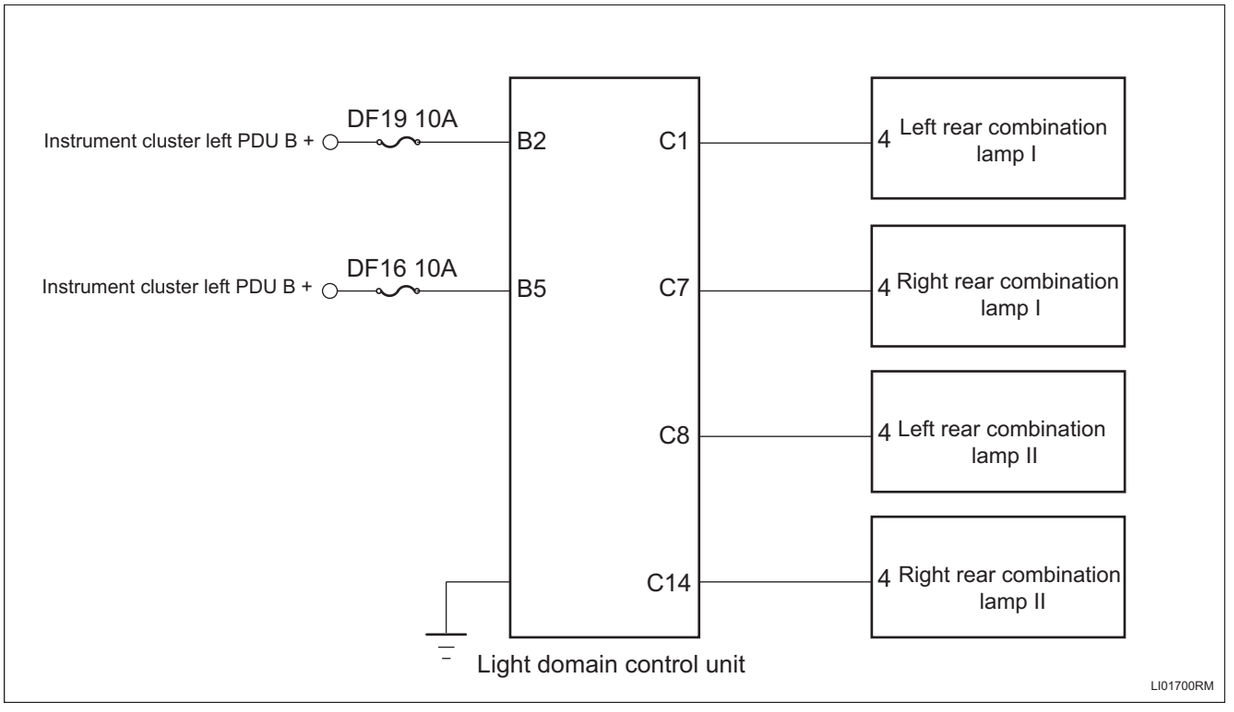
Description

When the rear combination lamp voltage is outside the normal operating range, the light domain control unit records the DTC.

DTC	DTC detection conditions	Faulty location
B153316	(a) M2# undervoltage.	• Light domain control unit • Harness and connector • Left rear combination lamp I • Left rear combination lamp II • Charging system
B153317	(a) M2# overvoltage.	• Light domain control unit • Harness and connector • Left rear combination lamp I • Left rear combination lamp II • Charging system
B153901	(a) Left rear lamp assembly 1 voltage output circuit fault.	• Light domain control unit • Harness and connector • Left rear combination lamp I
B153A01	(a) Left rear lamp assembly 2 voltage output circuit fault.	• Light domain control unit • Harness and connector • Left rear combination lamp II
B153416	(a) M5# undervoltage.	• Light domain control unit • Harness and connector • Right rear combination lamp I • Right rear combination lamp II • Charging system

DTC	DTC detection conditions	Faulty location
B153417	(a) M5# overvoltage.	• Light domain control unit • Harness and connector • Right rear combination lamp I • Right rear combination lamp II • Charging system
B153D01	(a) Right rear lamp assembly 1 voltage output circuit fault.	• Light domain control unit • Harness and connector • Right rear combination lamp I
B153E01	(a) Right rear lamp assembly 2 voltage output circuit fault.	• Light domain control unit • Harness and connector • Right rear combination lamp II

Circuit diagram



Inspection procedure

1	**Check the battery voltage**

(a) Start the engine and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG	**Overhaul the charging system**

LI

OK

2	Check the light domain control unit fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the light domain control unit fuse.

(d) Measure the resistance according to the values in the table below.

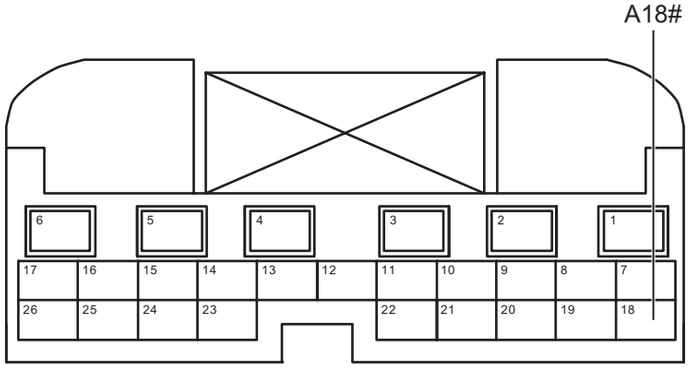
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3	Check light domain control unit ground



Light domain control unit A connector

LI00510RM

(a) Disconnect the light domain control unit connector.

(b) Measure the resistance according to the values in the table below.

Standard value

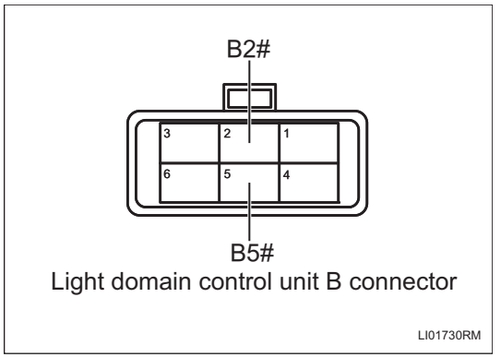
Detector connection	Detection conditions	Specified state
Light domain control unit connector A18# - body GND	Always connected	Less than 1Ω

LI

NG → **Repair or replace the harness and connector**

OK

4 Check the light domain control unit power supply



Light domain control unit B connector

LI01730RM

(a) Install the fuse.

(b) Connect the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

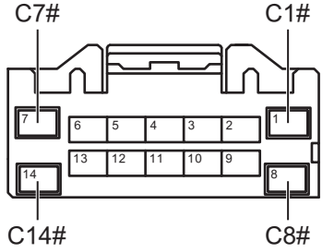
Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector B2# - body GND	The ignition switch is set to"ON"	Battery voltage
Light domain control unit connector B5# - body GND	The ignition switch is set to"ON"	Battery voltage

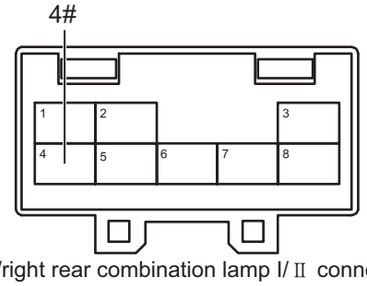
NG → **Repair or replace the harness and connector**

OK

5 Check left rear combination lamp harness and connector for open circuit



Light domain control unit C connector



Left/right rear combination lamp Ⅰ/Ⅱ connector

LI01711RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the left rear combination lamp I connector.

(d) Disconnect the right rear combination lamp I connector.

(e) Disconnect the left rear combination lamp II connector.

(f) Disconnect the right rear combination lamp II connector.

(g) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector C1# - left rear combination lamp I connector 4#	Always connected	Less than 1Ω

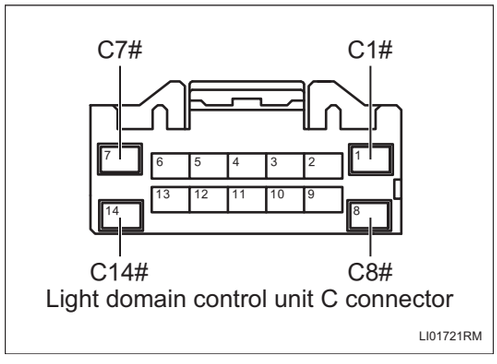
LI

Detector connection	Detection conditions	Specified state
Light domain control unit connector C7# - right rear combination lamp I connector 4#	Always connected	Less than 1Ω
Light domain control unit connector C8# - left rear combination lamp II connector 4#	Always connected	Less than 1Ω
Light domain control unit connector C14# - right rear combination lamp II connector 4#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

6 Check left rear combination lamp harness and connector for circuit shorted to ground



Light domain control unit C connector

LI01721RM

(a) Measure the resistance according to the values in the table below.

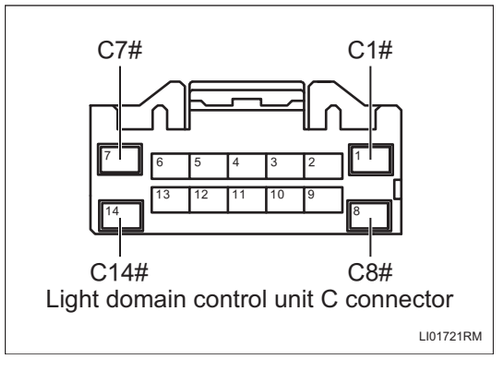
Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector C1# - body GND	Always connected	10KΩ or greater
Light domain control unit connector C7# - body GND	Always connected	10KΩ or greater
Light domain control unit connector C8# - body GND	Always connected	10KΩ or greater
Light domain control unit connector C14# - body GND	Always connected	10KΩ or greater

NG → **Repair or replace the harness and connector**

OK

7 Check left rear combination lamp harness and connector for circuit shorted to power supply



Light domain control unit C connector

LI01721RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

LI

Detector connection	Detection conditions	Specified state
Light domain control unit connector C1# - body GND	The ignition switch is set to"ON"	Less than 1V
Light domain control unit connector C7# - body GND	The ignition switch is set to"ON"	Less than 1V
Light domain control unit connector C8# - body GND	The ignition switch is set to"ON"	Less than 1V
Light domain control unit connector C14# - body GND	The ignition switch is set to"ON"	Less than 1V

NG → **Repair or replace the harness and connector**

OK

8	**Replace left/right rear combination lamp I/ II (See page LI-124) (See page LI-126)**

(a) Replace the left/right rear combination lamp I/ II .

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace light domain control unit (See page LI-107)**

OK

9	**End**

DTC	B153655	ALS control parameter error

Description

When the light domain control unit configuration code is incorrect or the control parameters are incorrect, the light domain controller records the DTC.

DTC	DTC detection conditions	Faulty location
B153655	(a) ALS control parameter error.	• Light domain control unit

Inspection procedure

1	Light domain control unit configuration code

(a) Check whether the light domain control unit configuration code is normal.

Results

Results	Go to
Normal	Abnormal
Abnormal	Execute automatic configuration module program

NG → **Reflash ALS control parameters via bootloader**

OK

2	End

DTC	B154000	Left front lamp assembly circuit fault
DTC	B153716	Left headlamp assembly undervoltage
DTC	B153717	Left headlamp assembly overvoltage
DTC	B155087	Left headlamp assembly node lost
DTC	B154200	Right headlamp assembly circuit fault
DTC	B153B16	Right front lamp assembly undervoltage
DTC	B153B17	Right front lamp assembly overvoltage
DTC	B155187	Right headlamp assembly node lost
DTC	B154400	Left rear lamp assembly 1 circuit fault
DTC	B153916	Left rear lamp assembly 1 undervoltage
DTC	B153917	Left rear lamp assembly 1 overvoltage
DTC	B155287	Left rear lamp assembly 1 node lost
DTC	B154500	Left rear lamp assembly 2 circuit fault
DTC	B153A16	Left rear lamp assembly 2 undervoltage
DTC	B153A17	Left rear lamp assembly 2 overvoltage
DTC	B155387	Left rear lamp assembly 2 node lost
DTC	B154600	Right rear lamp assembly 1 circuit fault
DTC	B153D16	Right rear lamp assembly 1 undervoltage
DTC	B153D17	Right rear lamp assembly 1 overvoltage
DTC	B155487	Right rear lamp assembly 1 node lost
DTC	B154700	Right rear lamp assembly 2 circuit fault
DTC	B153116	Right rear lamp assembly 2 undervoltage
DTC	B153117	Right rear lamp assembly 2 overvoltage
DTC	B155587	Right rear lamp assembly 2 node lost
DTC	B155688	Private CAN bus off
DTC	B155766	CAN1 sleep timeout

Description

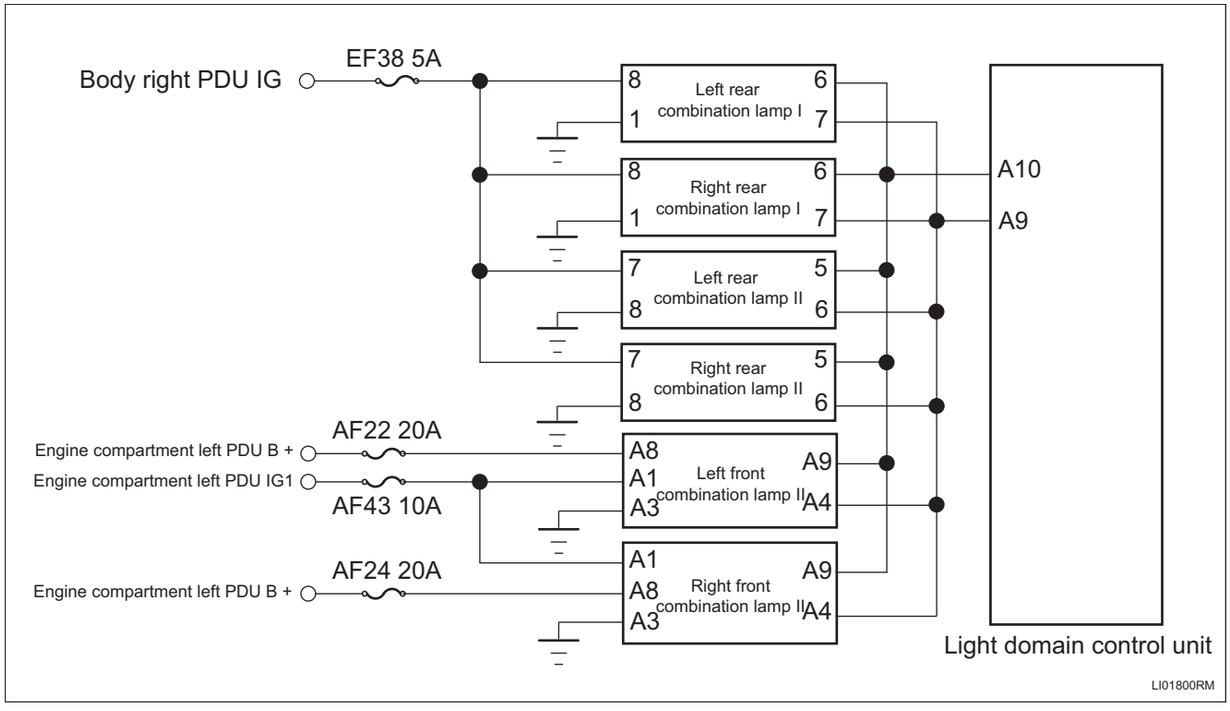
When the communication between the front and rear combination lamps and the light domain control unit is abnormal or interrupted, the light domain control unit records the DTC.

DTC	DTC detection conditions	Faulty location
B154000	(a) Left front lamp assembly circuit fault.	• Left front combination lamp II • Harness and connector • Light domain control unit
B153716	(a) Left headlamp assembly undervoltage.	• Left front combination lamp II • Harness and connector • Light domain control unit
B153717	(a) Left headlamp assembly overvoltage.	• Left front combination lamp II • Harness and connector • Light domain control unit
B155087	(a) Left headlamp assembly node lost.	• Left front combination lamp II • Harness and connector • Light domain control unit
B154200	(a) Right headlamp assembly circuit fault.	• Right front combination lamp II • Harness and connector • Light domain control unit
B153B16	(a) Right headlamp assembly undervoltage.	• Right front combination lamp II • Harness and connector • Light domain control unit
B153B17	(a) Right front lamp assembly overvoltage.	• Right front combination lamp II • Harness and connector • Light domain control unit
B155187	(a) Right headlamp assembly node lost.	• Right front combination lamp II • Harness and connector • Light domain control unit
B154400	(a) Left rear lamp assembly 1 circuit fault.	• Left rear combination lamp I • Harness and connector • Light domain control unit
B153916	(a) Left rear lamp assembly 1 undervoltage.	• Left rear combination lamp I • Harness and connector • Light domain control unit
B153917	(a) Left rear lamp assembly 1 overvoltage.	• Left rear combination lamp I • Harness and connector • Light domain control unit
B155287	(a) Left rear lamp assembly 1 node lost.	• Left rear combination lamp I • Harness and connector • Light domain control unit
B154500	(a) Left rear lamp assembly 2 circuit fault.	• Left rear combination lamp II • Harness and connector • Light domain control unit

DTC	DTC detection conditions	Faulty location
B153A16	(a) Left rear lamp assembly 2 undervoltage.	• Left rear combination lamp II • Harness and connector • Light domain control unit
B153A17	(a) Left rear lamp assembly 2 overvoltage.	• Left rear combination lamp II • Harness and connector • Light domain control unit
B155387	(a) Left rear lamp assembly 2 node lost.	• Left rear combination lamp II • Harness and connector • Light domain control unit
B154600	(a) Right rear lamp assembly 1 circuit fault.	• Right rear combination lamp I • Harness and connector • Light domain control unit
B153D16	(a) Right rear lamp assembly 1 undervoltage.	• Right rear combination lamp I • Harness and connector • Light domain control unit
B153D17	(a) Right rear lamp assembly 1 overvoltage.	• Right rear combination lamp I • Harness and connector • Light domain control unit
B155487	(a) Right rear lamp assembly 1 node lost.	• Right rear combination lamp I • Harness and connector • Light domain control unit
B154700	(a) Right rear lamp assembly 2 circuit fault.	• Right rear combination lamp II • Harness and connector • Light domain control unit
B153116	(a) Right rear lamp assembly 2 undervoltage.	• Right rear combination lamp II • Harness and connector • Light domain control unit
B153117	(a) Right rear lamp assembly 2 overvoltage.	• Right rear combination lamp II • Harness and connector • Light domain control unit
B155587	(a) Right rear lamp assembly 2 node lost.	• Right rear combination lamp II • Harness and connector • Light domain control unit
B155688	(a) Private CAN bus off.	• Left rear combination lamp I • Right rear combination lamp I • Left rear combination lamp II • Right rear combination lamp II • Left front combination lamp II • Right front combination lamp II • Harness and connector • Light domain control unit

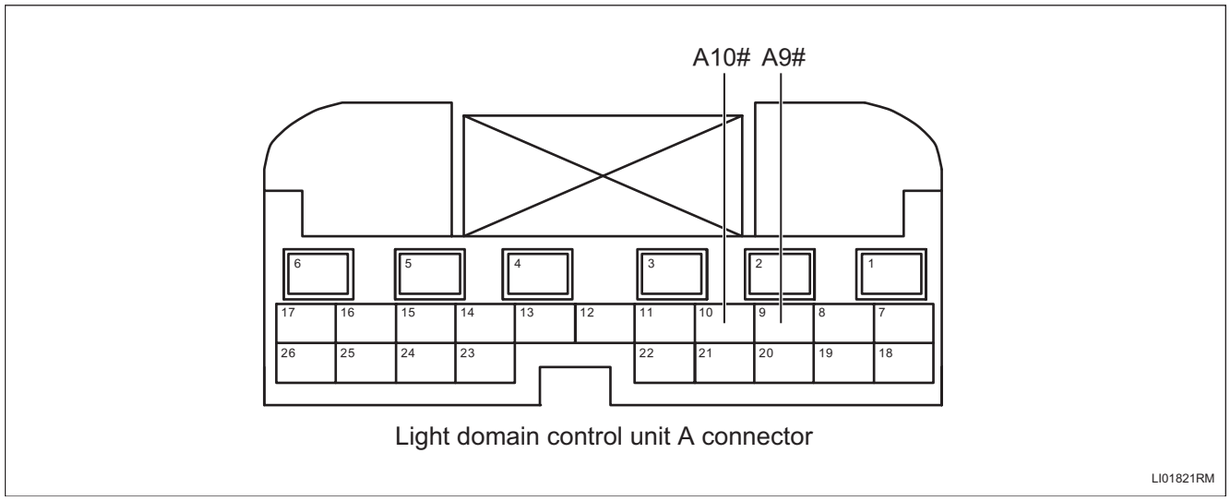
DTC	DTC detection conditions	Faulty location
B155766	(a) CAN1 sleep timeout.	• Left rear combination lamp I • Right rear combination lamp I • Left rear combination lamp II • Right rear combination lamp II • Left front combination lamp II • Right front combination lamp II • Harness and connector • Light domain control unit

Circuit diagram

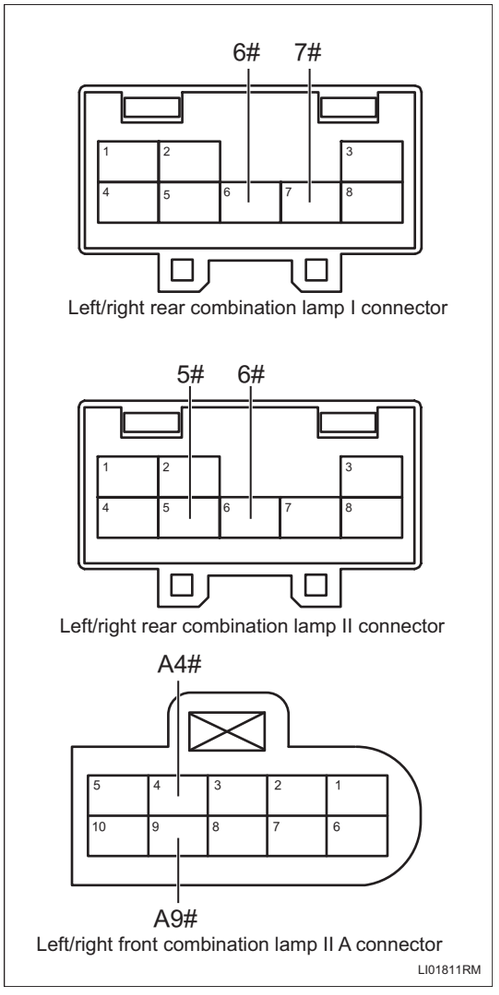


Inspection procedure

1	Check combination lamp harness and connector for open circuit



LI



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the left rear combination lamp I connector.

(d) Disconnect the right rear combination lamp I connector.

(e) Disconnect the left rear combination lamp II connector.

(f) Disconnect the right rear combination lamp II connector.

(g) Disconnect the left front combination lamp II connector.

(h) Disconnect the right front combination lamp II connector.

(i) Disconnect the light domain control unit connector.

(j) Measure the resistance according to the values in the table below.

Standard value

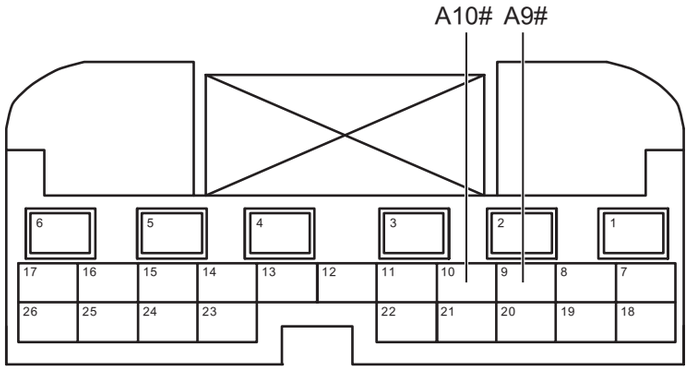
Detector connection	Detection conditions	Specified state
Left rear combination lamp I connector 6# - light domain control unit connector connector A10#	Always connected	Less than 1Ω
Left rear combination lamp I connector 7# - light domain control unit connector connector A9#	Always connected	Less than 1Ω
Right rear combination lamp I connector 6# - light domain control unit connector connector A10#	Always connected	Less than 1Ω
Right rear combination lamp I connector 7# - light domain control unit connector connector A9#	Always connected	Less than 1Ω
Left rear combination lamp II connector 5# - light domain control unit connector connector A10#	Always connected	Less than 1Ω
Left rear combination lamp II connector 6# - light domain control unit connector connector A9#	Always connected	Less than 1Ω
Right rear combination lamp II connector 5# - light domain control unit connector connector A10#	Always connected	Less than 1Ω
Right rear combination lamp II connector 6# - light domain control unit connector connector A9#	Always connected	Less than 1Ω
Left front combination lamp II connector A9# - light domain control unit connector connector A10#	Always connected	Less than 1Ω
Left front combination lamp II connector A4# - light domain control unit connector connector A9#	Always connected	Less than 1Ω

Detector connection	Detection conditions	Specified state
Right front combination lamp II connector A9# - light domain control unit connector connector A10#	Always connected	Less than 1Ω
Right front combination lamp II connector A4# - light domain control unit connector connector A9#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check combination lamp harness and connector for circuit shorted to ground



Light domain control unit A connector

LI01821RM

(a) Measure the resistance according to the values in the table below.

Standard value

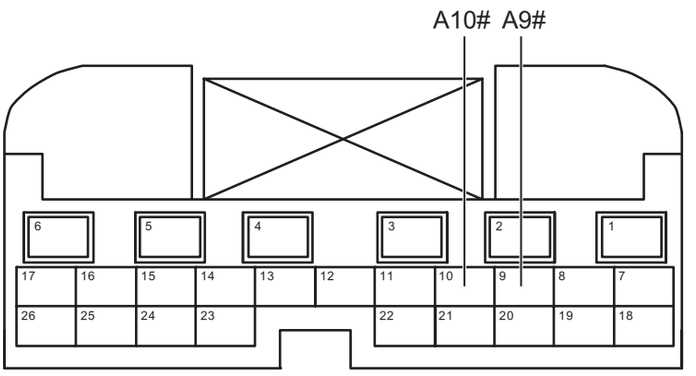
Detector connection	Detection conditions	Specified state
Light domain control unit connector A10# - body GND	Always connected	10KΩ or greater
Light domain control unit connector A9# - body GND	Always connected	10KΩ or greater

NG → **Repair or replace the harness and connector**

LI

OK

3	Check combination lamp harness and connector for circuit shorted to power supply



Light domain control unit A connector

LI01821RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

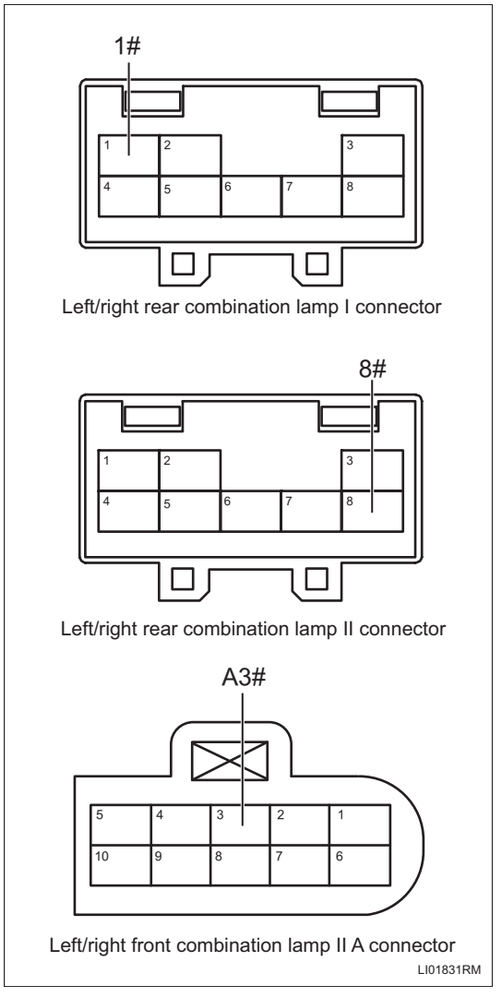
Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector A10# - body GND	The ignition switch is set to "ON"	Less than 1V
Light domain control unit connector A9# - body GND	The ignition switch is set to "ON"	Less than 1V

NG **Repair or replace the harness and connector**

OK

4	**Check combination lamp ground**



Left/right rear combination lamp I connector

Left/right rear combination lamp II connector

Left/right front combination lamp II A connector

(a) Measure the resistance according to the values in the table below.

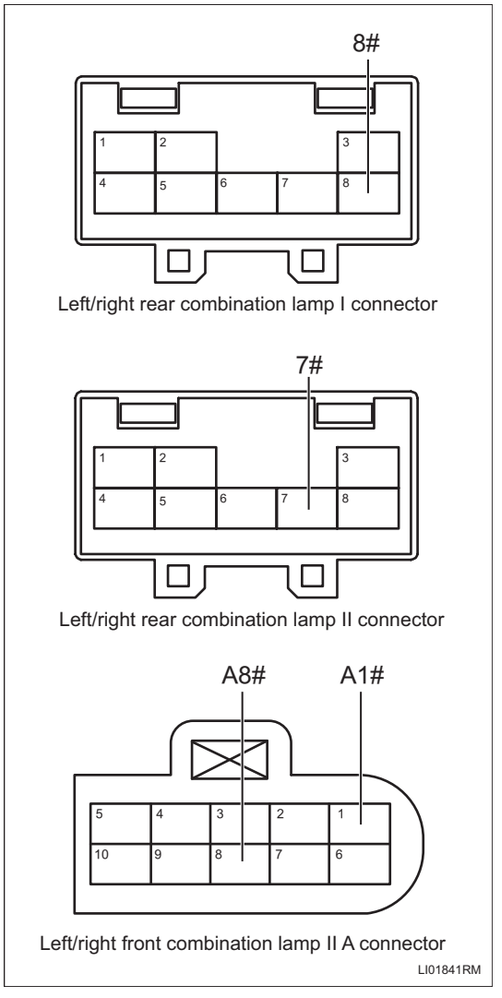
Standard value

Detector connection	Detection conditions	Specified state
Left rear combination lamp I connector 1# - body GND	Always connected	Less than 1Ω
Right rear combination lamp I connector 1# - body GND	Always connected	Less than 1Ω
Left rear combination lamp II connector 8# - body GND	Always connected	Less than 1Ω
Right rear combination lamp II connector 8# - body GND	Always connected	Less than 1Ω
Left front combination lamp II connector A3# - body GND	Always connected	Less than 1Ω
Right front combination lamp II connector A3# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

5	**Check combination lamp power supply**



(a) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Left rear combination lamp I connector 8# - body GND	The ignition switch is set to"ON"	Battery voltage
Right rear combination lamp I connector 8# - body GND	The ignition switch is set to"ON"	Battery voltage
Left rear combination lamp II connector 7# - body GND	The ignition switch is set to"ON"	Battery voltage
Right rear combination lamp II connector 7# - body GND	The ignition switch is set to"ON"	Battery voltage
Left front combination lamp II connector A8# - body GND	The ignition switch is set to"ON"	Battery voltage
Left front combination lamp II connector A1# - body GND	The ignition switch is set to"ON"	Battery voltage
Right front combination lamp II connector A8# -body GND	The ignition switch is set to"ON"	Battery voltage
Right front combination lamp II connector A1# -body GND	The ignition switch is set to"ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

6	**Replace combination lamp (See page LI-115) (See page LI-124) (See page LI-126)**

(a) Replace the combination lamp.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace light domain control unit (See page LI-107)**

OK

7	**End**

DTC	B154816	SBC V1 output voltage low

Description

When the internal power supply management chip of the light domain control unit works abnormally, the light domain controller records the DTC.

DTC	DTC detection conditions	Faulty location
B154816	(a) SBC V1 output voltage low.	• Light domain control unit

Inspection procedure

1	Clear DTC

(a) Connect the HQ-VDS.

(b) Clear the DTC.

(c) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace light domain control unit (See page LI-107)**

OK

2	End

DTC	**B154916**	**Height sensor undervoltage**
DTC	**B154917**	**Height sensor overvoltage**
DTC	**B154A14**	**Front height sensor circuit open or shorted to ground**
DTC	**B154A12**	**Front height sensor circuit shorted to power supply**
DTC	**B154B14**	**Rear height sensor circuit open or shorted to ground**
DTC	**B154B12**	**Rear height sensor circuit shorted to power supply**
DTC	**B154898**	**Overtemperature**
DTC	**B154F55**	**Zero calibration error**

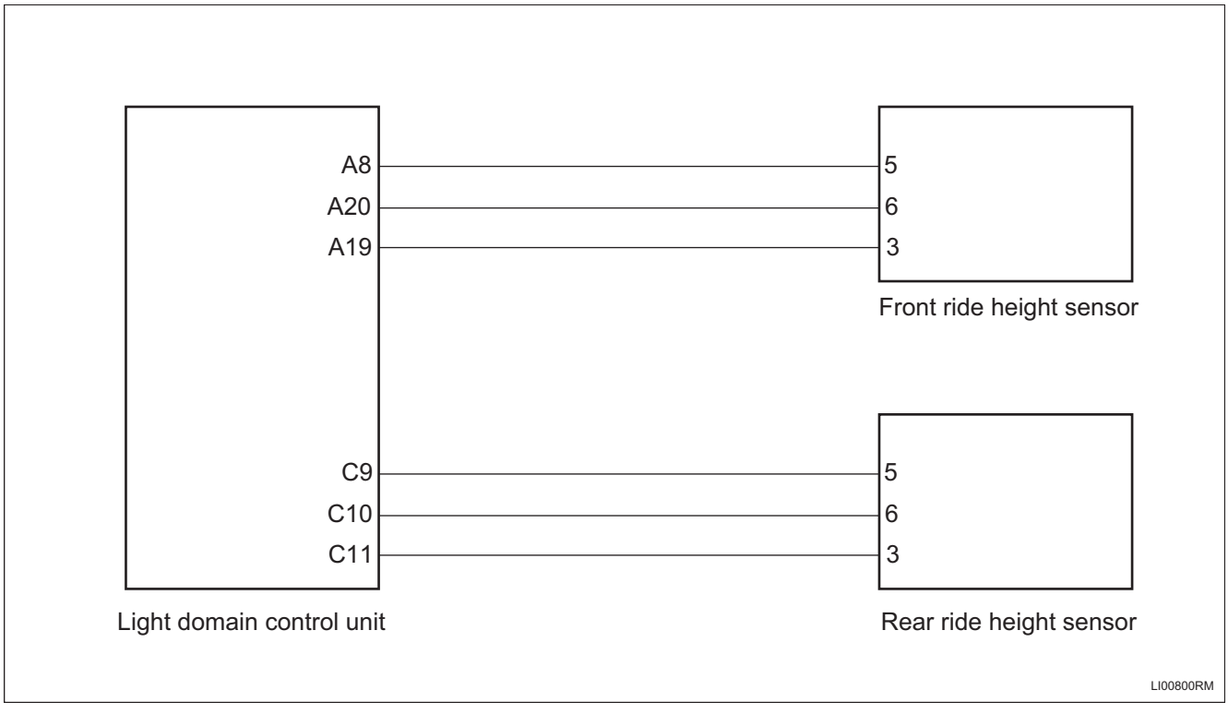
Description

When the ride height sensor line is abnormal or the power supply voltage exceeds the normal operating range, the light domain control unit records the DTC.

DTC	DTC detection conditions	Faulty location
B154916	(a) Height sensor undervoltage.	• Light domain control unit • Harness and connector • Front ride height sensor • Rear ride height sensor
B154917	(a) Height sensor overvoltage.	• Light domain control unit • Harness and connector • Front ride height sensor • Rear ride height sensor
B154A14	(a) Front height sensor circuit open or shorted to ground.	• Light domain control unit • Harness and connector • Front ride height sensor
B154A12	(a) Front height sensor circuit shorted to power supply.	• Light domain control unit • Harness and connector • Front ride height sensor
B154B14	(a) Rear height sensor circuit open or shorted to ground.	• Light domain control unit • Harness and connector • Rear ride height sensor
B154B12	(a) Rear height sensor circuit shorted to power supply.	• Light domain control unit • Harness and connector • Rear ride height sensor

DTC	DTC detection conditions	Faulty location
B154898	(a) Overtemperature.	• Light domain control unit • Harness and connector • Front ride height sensor • Rear ride height sensor
B154F55	(a) Zero calibration error.	• Light domain control unit • Front ride height sensor • Rear ride height sensor

Circuit diagram



Inspection procedure

1	**Check the ride height sensor**

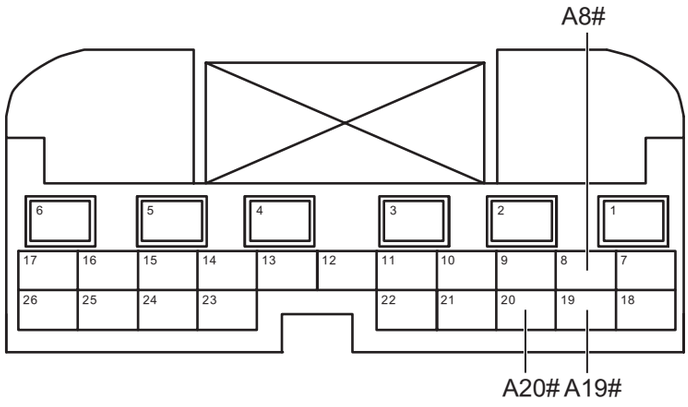
(a) Check whether the ride height sensor is installed normally.

(b) Check whether the ride height sensor is damaged or deformed.

NG → **Repair according to the fault**

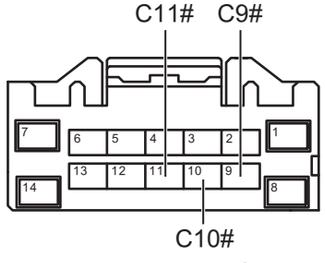
OK

2	**Check ride height sensor harness and connector for open circuit**

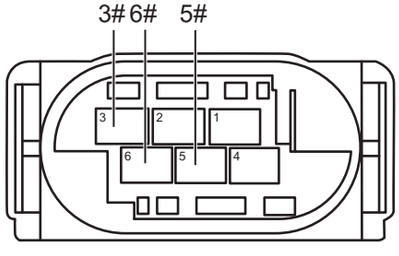


Light domain control unit A connector

LI00811RM



Light domain control unit C connector



Front/rear ride height sensor connector

LI00820RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the light domain control unit connector.

(d) Disconnect the ride height sensor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

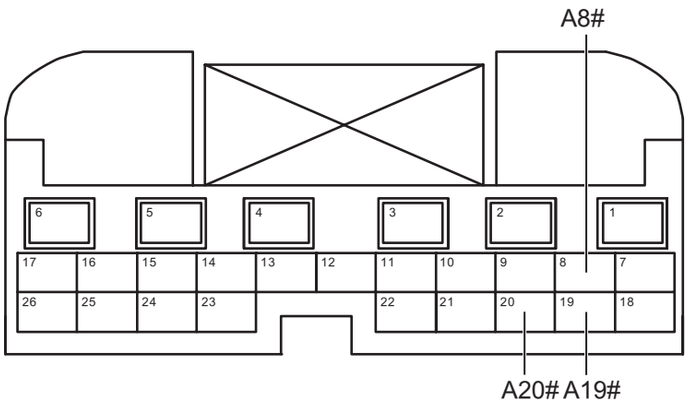
Detector connection	Detection conditions	Specified state
Light domain control unit connector A8# -front ride height sensor connector 5#	Always connected	Less than 1Ω
Light domain control unit connector A20# - front ride height sensor connector 6#	Always connected	Less than 1Ω
Light domain control unit connector A19# - front ride height sensor connector 3#	Always connected	Less than 1Ω
Light domain control unit connector C9# -front ride height sensor connector 5#	Always connected	Less than 1Ω
Light domain control unit connector C10# - front ride height sensor connector 6#	Always connected	Less than 1Ω
Light domain control unit connector C11# - front ride height sensor connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

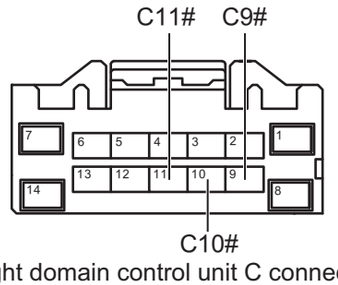
3	**Check ride height sensor harness and connector for circuit shorted to ground**

LI



Light domain control unit A connector

LI00811RM



Light domain control unit C connector

LI00831RM

(a) Measure the resistance according to the values in the table below.

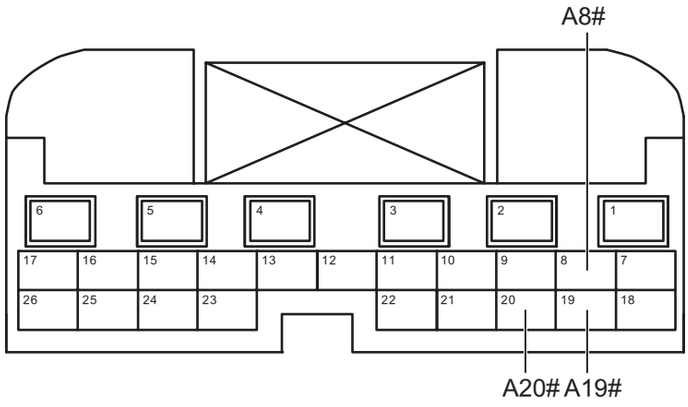
Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector A8# -body GND	Always connected	10KΩ or greater
Light domain control unit connector A20# - body GND	Always connected	10KΩ or greater
Light domain control unit connector A19# - body GND	Always connected	10KΩ or greater
Light domain control unit connector C9# - body GND	Always connected	10KΩ or greater
Light domain control unit connector C10# - body GND	Always connected	10KΩ or greater
Light domain control unit connector C11# - body GND	Always connected	10KΩ or greater

NG → **Repair or replace the harness and connector**

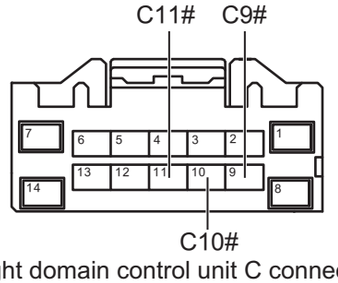
OK

4	**Check ride height sensor harness and connector for circuit shorted to power supply**



Light domain control unit A connector

LI00811RM



Light domain control unit C connector

LI00831RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector A8# -body GND	The ignition switch is set to "ON"	Less than 1V
Light domain control unit connector A20# - body GND	The ignition switch is set to "ON"	Less than 1V
Light domain control unit connector A19# - body GND	The ignition switch is set to "ON"	Less than 1V
Light domain control unit connector C9# - body GND	The ignition switch is set to "ON"	Less than 1V
Light domain control unit connector C10# - body GND	The ignition switch is set to "ON"	Less than 1V
Light domain control unit connector C11# - body GND	The ignition switch is set to "ON"	Less than 1V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the ride height sensor (See page LI-130)**

(a) Replace the ride height sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace light domain control unit (See page LI-107)**

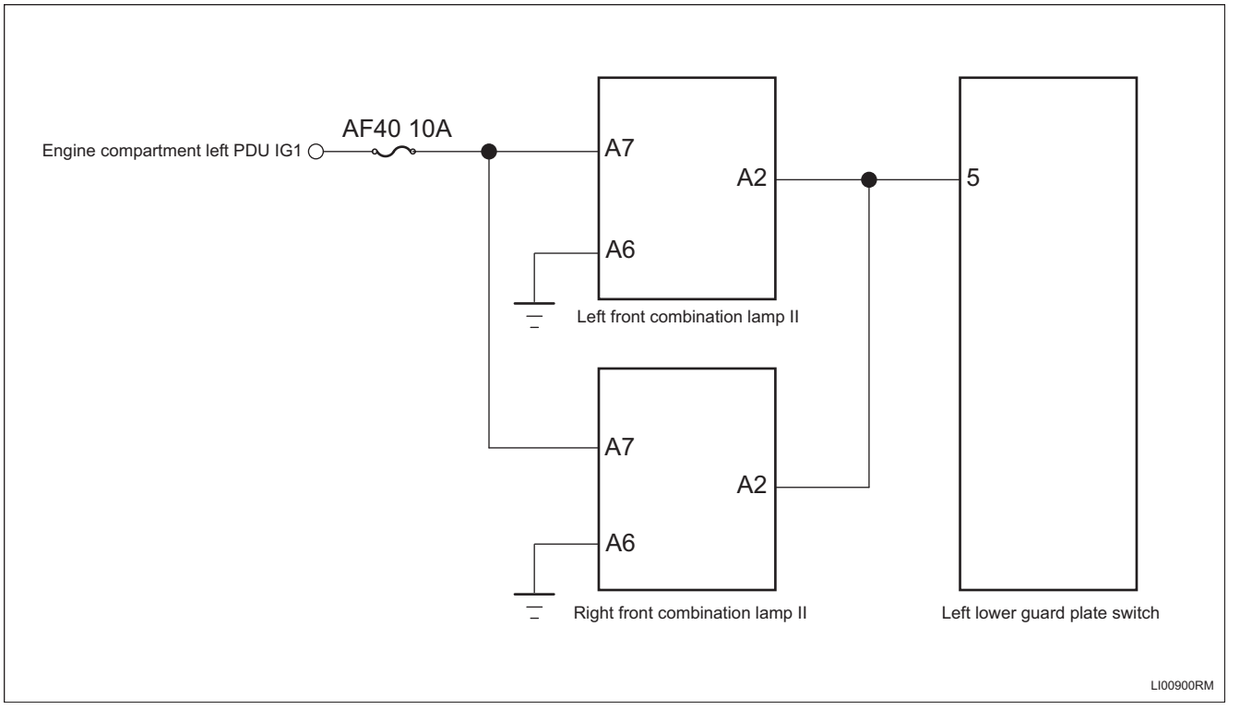
DTC	**B154E06**	**Horizontal motor position process error**
DTC	**B154C16**	**Left dimmer motor undervoltage**
DTC	**B154C17**	**Left dimmer motor overvoltage**
DTC	**B154C13**	**Left dimmer motor open circuit**
DTC	**B154C12**	**Left dimmer motor short circuit**
DTC	**B154D16**	**Right dimmer motor undervoltage**
DTC	**B154D17**	**Right dimmer motor overvoltage**
DTC	**B154D13**	**Right dimmer motor open circuit**
DTC	**B154D12**	**Right dimmer motor short circuit**

Description

When the left and right front combination lamp II headlamp leveling motors work abnormally, light domain control unit records the DTC.

DTC	DTC detection conditions	Faulty location
B154E06	(a) Horizontal motor position process error.	• Left front combination lamp II • Right front combination lamp II • Harness and connector
B154C16	(a) Left dimmer motor undervoltage.	• Left front combination lamp II • Harness and connector • Charging system
B154C17	(a) Left dimmer motor overvoltage.	• Left front combination lamp II • Harness and connector • Charging system
B154C13	(a) Left dimmer motor open circuit.	• Left front combination lamp II • Harness and connector
B154C12	(a) left dimmer motor short circuit.	• Left front combination lamp II • Harness and connector
B154D16	(a) Right dimmer motor undervoltage.	• Right front combination lamp II • Harness and connector • Charging system
B154D17	(a) Right dimmer motor overvoltage.	• Right front combination lamp II • Harness and connector • Charging system
B154D13	(a) right dimmer motor open circuit.	• Right front combination lamp II • Harness and connector
B154D12	(a) right dimmer motor short circuit.	• Right front combination lamp II • Harness and connector

Circuit diagram



Inspection procedure

1	**Check the battery voltage**

(a) Start the engine and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11 ~ 14V

NG → **Overhaul the charging system**

OK

2	**Check left and right front combination lamp II fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the left and right front combination lamp II fuse.

(d) Measure the resistance according to the values in the table below.

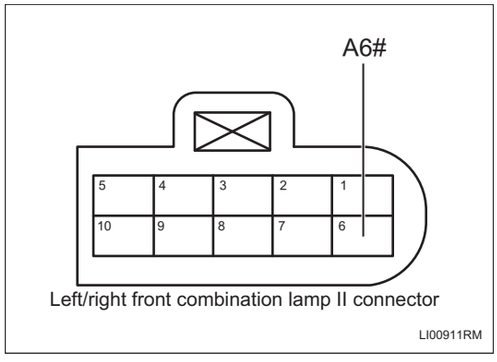
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3 Check left and right front combination lamp II ground



Left/right front combination lamp II connector

LI00911RM

(a) Disconnect the left and right front combination lamp II connector.

(b) Measure the resistance according to the values in the table below.

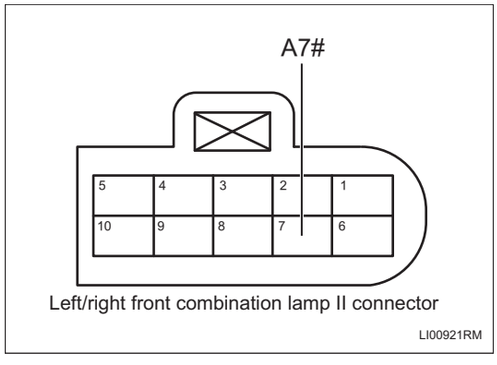
Standard value

Detector connection	Detection conditions	Specified state
Left front combination lamp II A connector A6# -body GND	Always connected	Less than 1Ω
Right front combination lamp II A connector A6# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4 Check left and right front combination lamp II power supply



Left/right front combination lamp II connector

LI00921RM

(a) Install the fuse.

(b) Connect the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

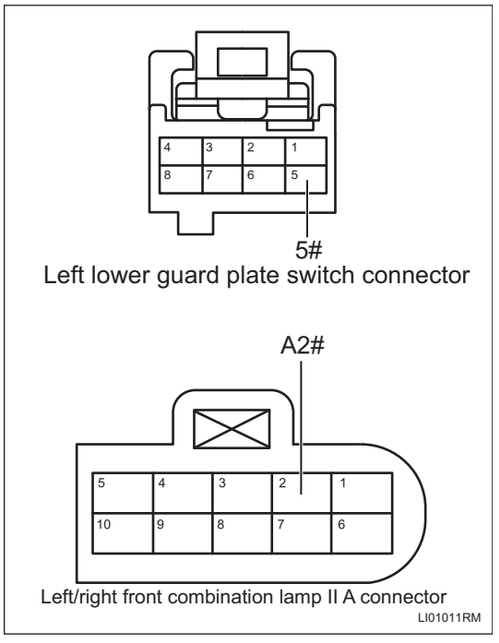
Standard value

Detector connection	Detection conditions	Specified state
Left front combination lamp II A connector A7# -body GND	The ignition switch is set to"ON"	Battery voltage
Left front combination lamp II A connector A7# -body GND	The ignition switch is set to"ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Check front combination lamp height adjustment motor harness and connector for open circuit**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the left lower guard plate switch connector.

(d) Disconnect the left front combination lamp II connector.

(e) Disconnect the right front combination lamp II connector.

(f) Measure the resistance according to the values in the table below.

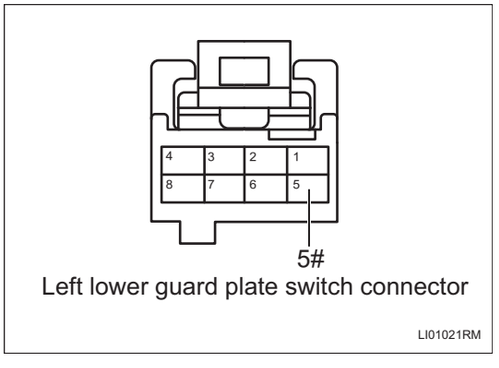
Standard value

Detector connection	Detection conditions	Specified state
Left lower guard plate switch connector 5# - left front combination lamp II A connector A2#	Always connected	Less than 1Ω
Left lower guard plate switch connector 5# - right front combination lamp II A connector A2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

6	**Check front combination lamp height adjustment motor harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

Standard value

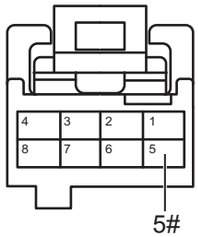
Detector connection	Detection conditions	Specified state
Left lower guard plate switch connector 5# - body GND	Always connected	10KΩ or greater

LI

NG → **Repair or replace the harness and connector**

OK

7	**Check front combination lamp height adjustment motor harness and connector for circuit shorted to power supply**



Left lower guard plate switch connector

LI01021RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Left lower guard plate switch connector 5# - body GND	The ignition switch is set to "ON"	Less than 1V

NG → **Repair or replace the harness and connector**

OK

8	**Replace the left/right front combination lamp II (See page LI-115)**

(a) Replace the left/right front combination lamp II.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace the left lower guard plate switch (See page IP-3)**

OK

9	**End**

LI

DTC	B155887	Grille emblem light node lost
DTC	B155800	Grille emblem light fault

Description

The light domain control unit records a DTC when there is a failure in the grille emblem light.

DTC	DTC detection conditions	Faulty location
B155887	(a) Grille emblem light node lost.	• Grille emblem light • Harness and connector
B155800	(a) Grille emblem light fault.	• Grille emblem light • Harness and connector

Inspection procedure

1	Check grille emblem light

(a) Check whether the grille emblem light is damaged.

NG → **Repair according to the fault**

OK

2	Check grille emblem light harness and connector

(a) Check the grille emblem light harness and connector for short circuit.

(b) Check the grille emblem light harness and connector for open circuit.

NG → **Repair or replace the harness and connector**

OK

3	Replace grille emblem light

DTC	B155987	Engine hood emblem light node lost
DTC	B155900	Engine hood emblem light fault

Description

The light domain control unit records a DTC when there is a failure in the engine hood emblem light.

DTC	DTC detection conditions	Faulty location
B155987	(a) Engine hood emblem light node lost.	• Engine hood emblem light • Harness and connector
B155900	(a) Engine hood emblem light fault.	• Engine hood emblem light • Harness and connector

Inspection procedure

1	Check engine hood emblem light

(a) Check whether the engine hood emblem light is damaged.

NG → **Repair according to the fault**

OK

2	Check engine hood emblem light harness and connector

(a) Check the engine hood emblem light harness and connector for short circuit.

(b) Check the engine hood emblem light harness and connector for open circuit.

NG → **Repair or replace the harness and connector**

OK

3	Replace engine hood emblem light

DTC	**U002888**	**Comfort CAN bus off**
DTC	**U014087**	**BCM1 node lost**
DTC	**U014687**	**GW node lost**
DTC	**U112187**	**ESP message lost**
DTC	**U115587**	**Instrument cluster control unit message lost**
DTC	**U110187**	**TCU message lost**
DTC	**U110087**	**ECM message lost**
DTC	**U129387**	**HCU message lost**

Description

When the communication between the light domain control unit and other systems is abnormal or interrupted, the light domain control unit will record the DTC.

DTC	DTC detection conditions	Faulty location
U002888	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U112187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U129387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

AFS

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Warning:

Before repairing the high voltage system or adjacent high voltage system components, be sure to carefully read the "Instructions and precautions for maintenance work" in the introduction carefully!

2. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

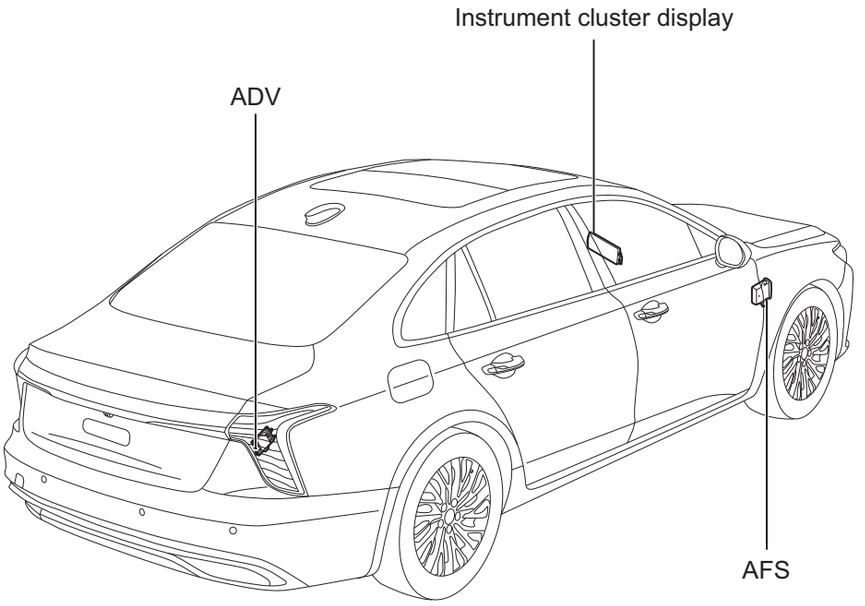
Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

3. General repair instructions

(a) When the part needs to be replaced or the connector needs to be disconnected during maintenance of AFS, disconnect the battery negative cable.

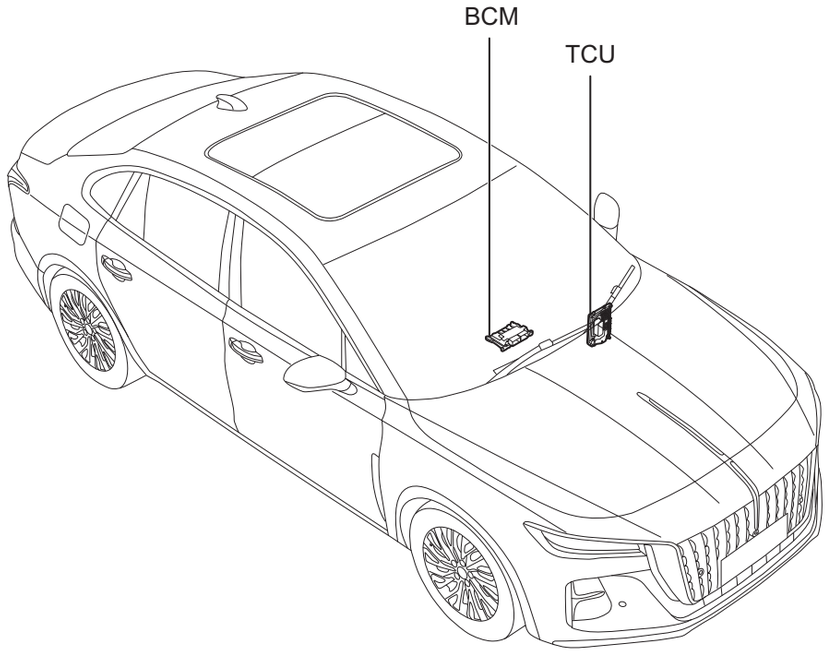
(b) The control systems such as door and seat control systems need to be initialized after reconnecting the battery. And use the HQ-VDS to "clear DTC" for all electronic control systems.

Location of parts



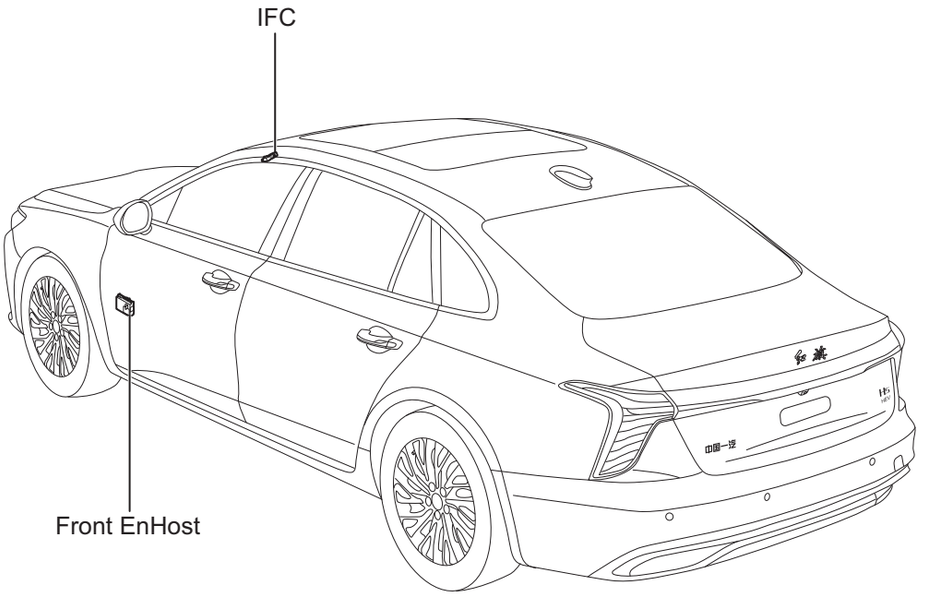
LI00120RM

Location of parts



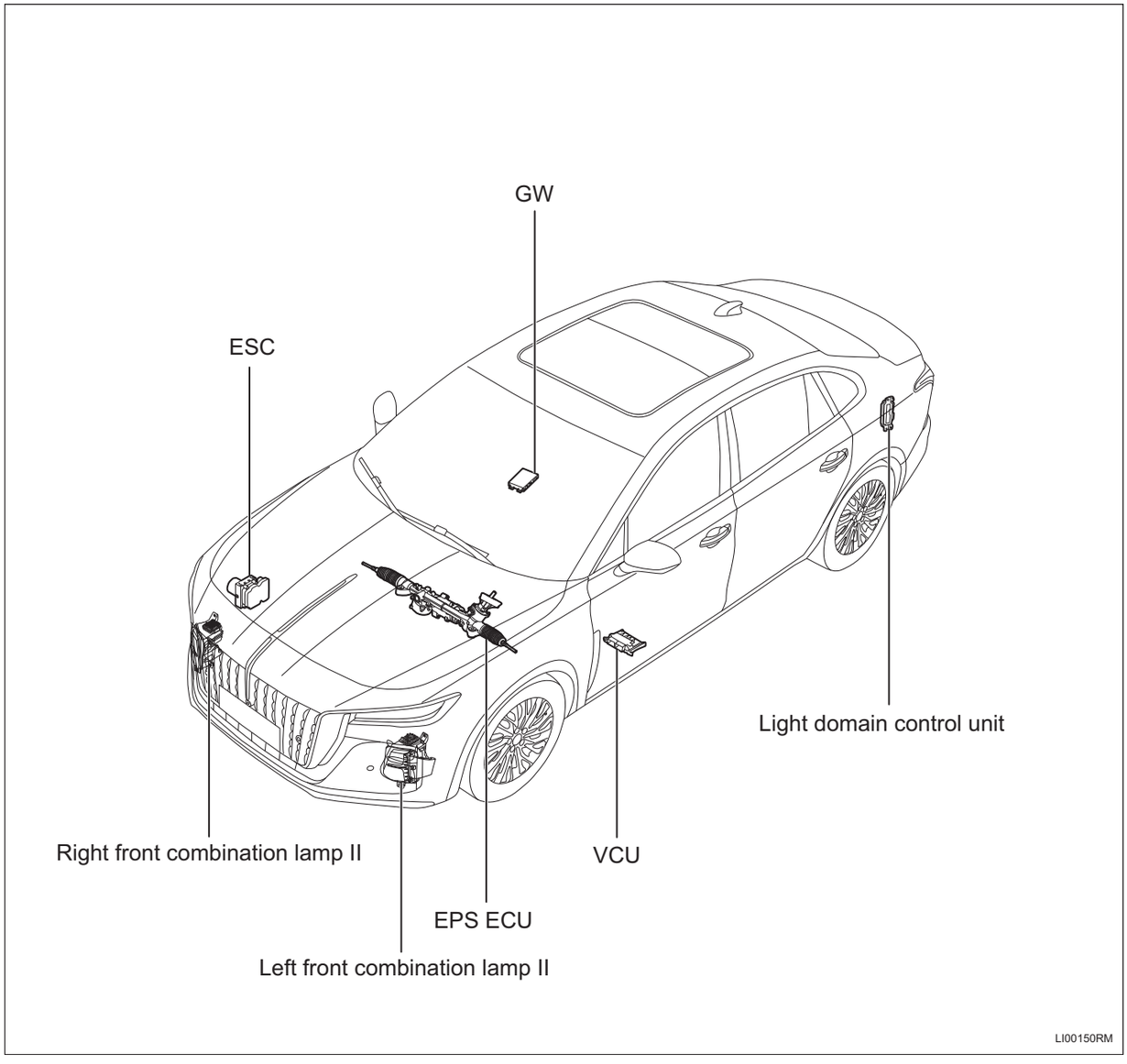
LI00130RM

Location of parts

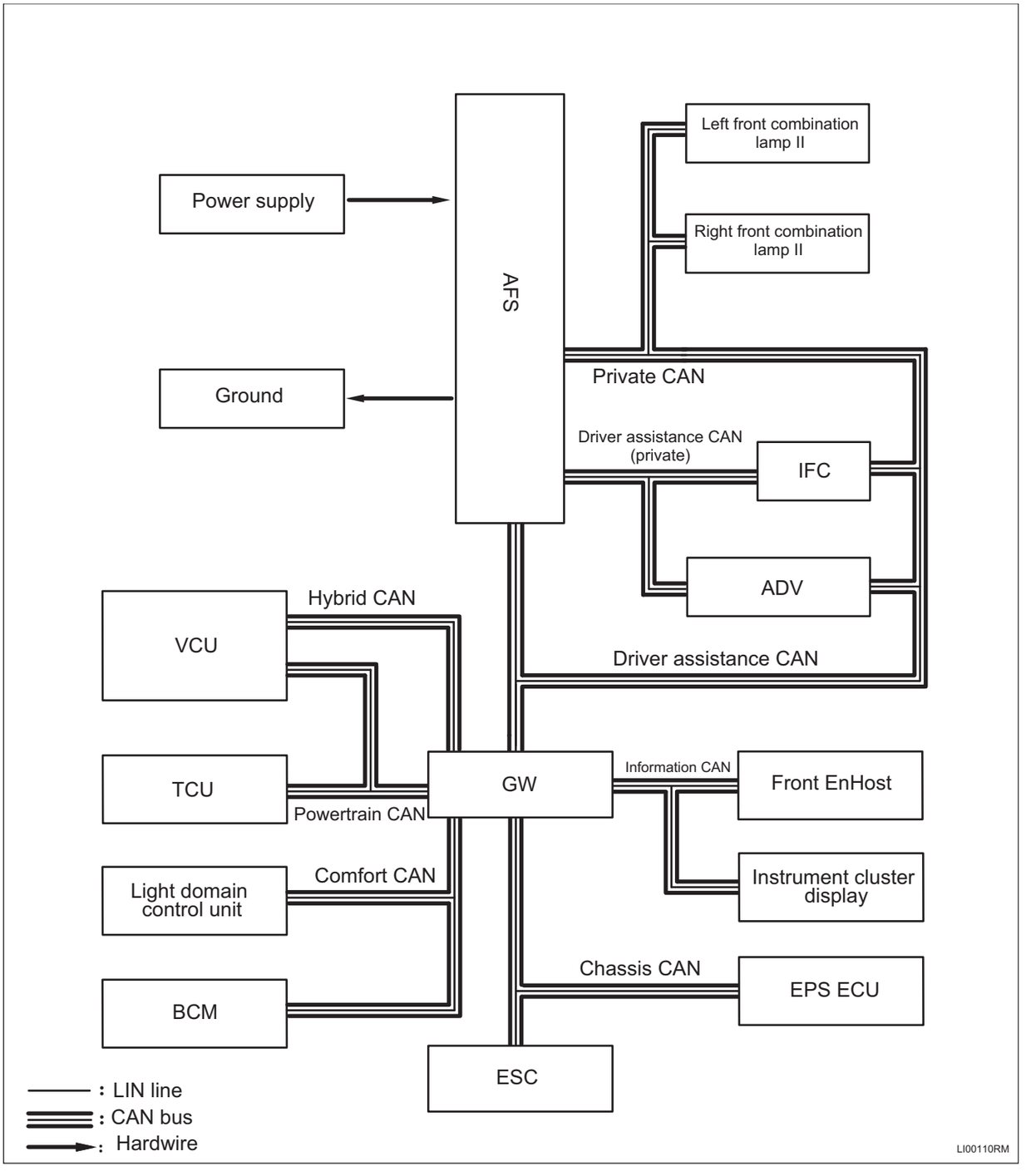


LI00140RM

Location of parts



System diagram



LI

System description

1. AFS overview

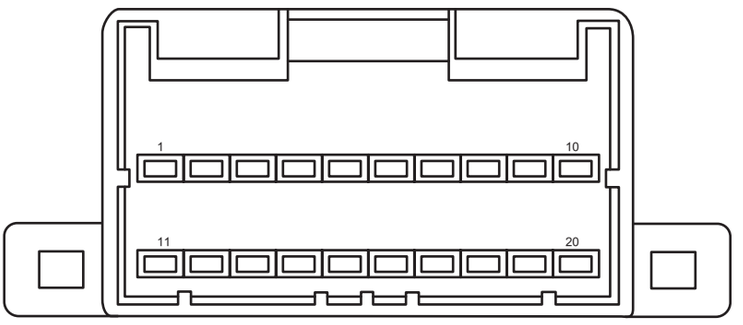
(a) The AFS can automatically turn on and off the high beam according to the judgment of the IFC..

(b) The AFS has a diagnostic function.

Symptom chart

Fault	Possible location
System function failure	• Battery • Related harness and connector • AFS • CAN communication

ECU terminal



AFS

LI00100RM

AFS			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	B+	11	GND
2	IGN	12	-
3	-	13	-
4	-	14	-
5	CAN_L	15	
6	CAN_H	16	-
7	-	17	-
8	-	18	-
9	LDM CAN_L	19	Private IFC CAN_L
10	LDM CAN_H	20	Private IFC CAN_H

DTC chart

DTC	Description	Reference page
B164016	Diagnostic undervoltage	(See page LI-94)
B164017	Diagnostic overvoltage	(See page LI-94)
B165087	Lost communication with LHS	(See page LI-97)
B165101	LHS fault	(See page LI-97)
B165201	LHS LED module fault	(See page LI-97)
B166087	Lost communication with RHS	(See page LI-97)
B166101	RHS fault	(See page LI-97)
B166201	RHS LED module fault	(See page LI-97)
U041582	ABS/ESP/ESPwith APB message content error	(See page LI-104)

DTC	Description	Reference page
U041583	ABS/ESP/ESPwith APB message content error	(See page LI-104)
U042286	BCM 1 message content error	(See page LI-104)
U043386	IFC message content error	(See page LI-104)
U003788	Driver assistance/extension CAN bus off	(See page LI-104)
U007888	ADV-IFC CAN bus OFF	(See page LI-104)
U009088	AFS-light control unit CAN bus off	(See page LI-104)
U014687	GW node lost	(See page LI-104)
U023587	IFC node lost	(See page LI-104)
U112187	ESP message lost	(See page LI-104)
U114087	BCM 1 message lost	(See page LI-104)
U124587	EnHost/IVI message lost	(See page LI-104)
U115587	Instrument cluster control unit message lost	(See page LI-104)
B165301	LHS and ADB communication failure	(See page LI-97)
B165082	LHS message content error (counter)	(See page LI-97)
B165083	LHS message content error (checksum)	(See page LI-97)
B165486	LHS message invalid data (LHS_Status)	(See page LI-97)
B165586	LHS message invalid data (LeftHBLEDStatus)	(See page LI-97)
B165686	LHS message invalid data (LHS_ADB_CommunicationFault)	(See page LI-97)
B166301	RHS and ADB communication failure	(See page LI-97)
B166082	RHS message content error (counter)	(See page LI-97)
B166083	RHS message content error (checksum)	(See page LI-97)
B166486	RHS message invalid data (RHS_Status)	(See page LI-97)
B166586	RHS message invalid data (RightHBLEDStatus)	(See page LI-97)
B166686	RHS message invalid data (RHS_ADB_CommunicationFault)	(See page LI-97)
U113187	EPS ECU message lost	(See page LI-104)
U110187	TCU message lost	(See page LI-104)
U129387	HCU message lost	(See page LI-104)
U042082	SAS message content error	(See page LI-104)
U042083	SAS message content error	(See page LI-104)
B167087	Camera data message lost	(See page LI-104)
B167082	Camera data message content error (counter)	(See page LI-104)
B167083	Camera data message content error (checksum)	(See page LI-104)
B167086	Camera data message invalid	(See page LI-104)

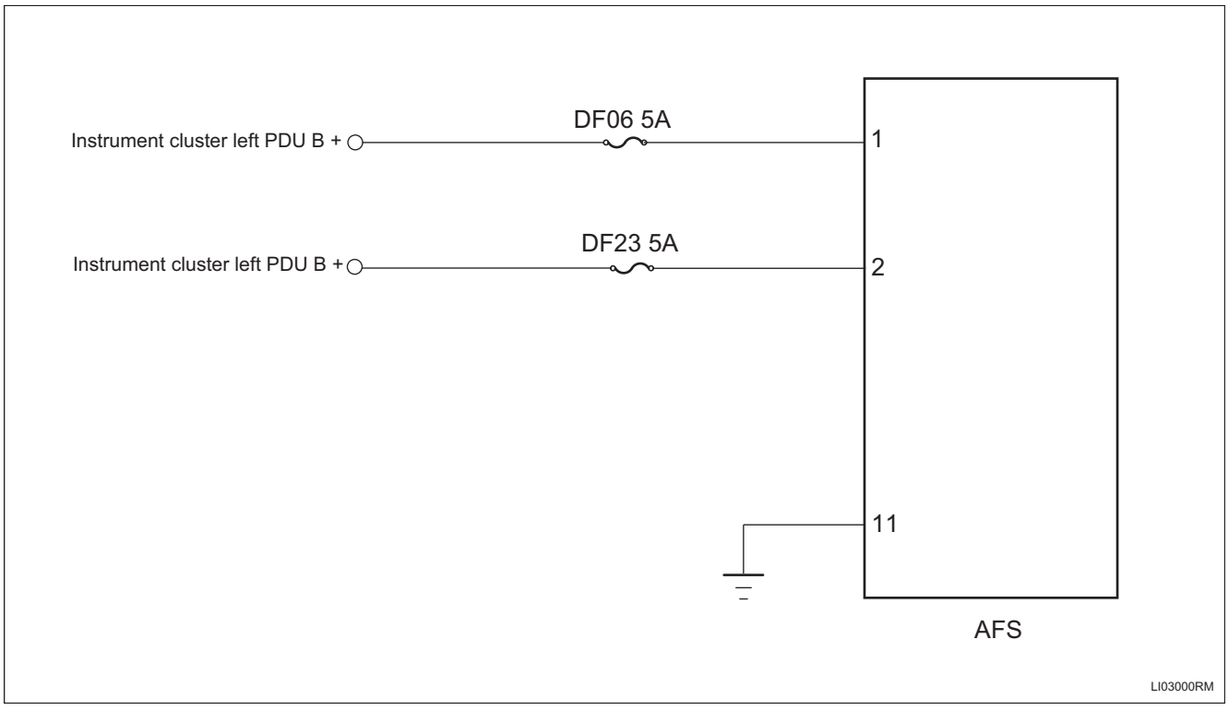
DTC	B164016	Diagnostic undervoltage
DTC	B164017	Diagnostic overvoltage

Description

When the AFS power supply voltage is outside the normal operating range, the AFS records the DTC.

DTC	DTC detection conditions	Faulty location
B164016	(a) Diagnostic undervoltage.	• AFS • Harness and connector • Charging system
B164017	(a) Diagnostic overvoltage.	• AFS • Harness and connector • Charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the engine and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11 ~ 14V

NG	Overhaul the charging system

LI

OK

2	Check AFS fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the AFS fuse.

(d) Measure the resistance according to the values in the table below.

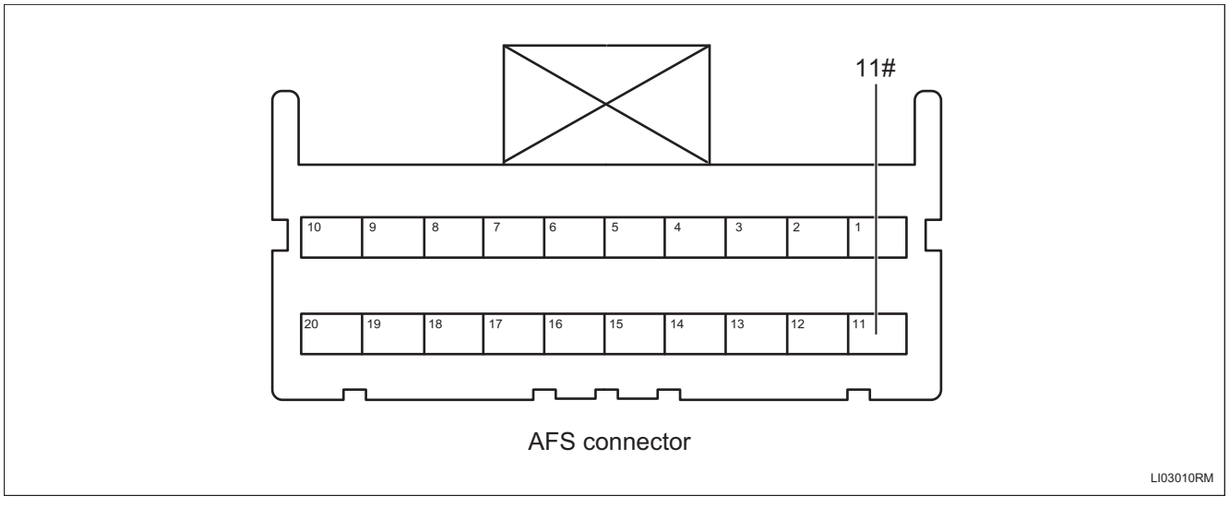
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3	Check AFS ground



AFS connector

LI03010RM

(a) Disconnect the AFS connector.

(b) Measure the resistance according to the values in the table below.

Standard value

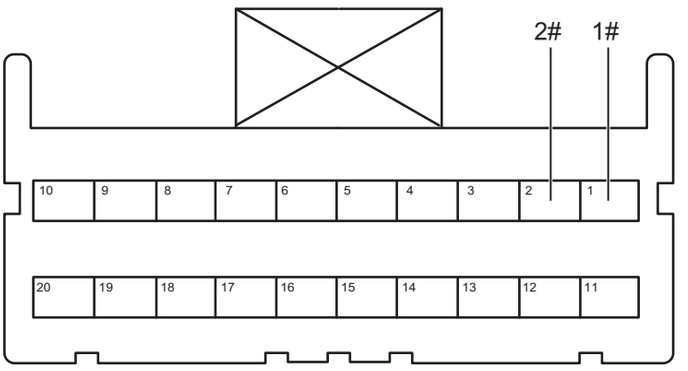
Detector connection	Detection conditions	Specified state
AFS connector 11# -body GND	Always connected	Less than 1Ω

LI

NG → **Check and repair or replace wire harness and connector**

OK

4	Check AFS power supply



AFS connector

LI03021RM

(a) Install the fuse.

(b) Connect the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
AFS connector 1# -body GND	The ignition switch is set to"ON"	Battery voltage
AFS connector 2# -body GND	The ignition switch is set to"ON"	Battery voltage

NG → **Repair or replace the harness and connector**

LI

OK

5	Replace AFS (See page LI-109)

DTC	B165301	LHS and ADB communication failure
DTC	B165082	LHS message content error (counter)
DTC	B165083	LHS message content error (checksum)
DTC	B165486	LHS message invalid data (LHS_Status)
DTC	B165586	LHS message invalid data (LeftHBLEDStatus)
DTC	B165686	LHS message invalid data (LHS_ADB_CommunicationFault)
DTC	B166301	RHS and ADB communication failure
DTC	B166082	RHS message content error (counter)
DTC	B166083	RHS message content error (checksum)
DTC	B166486	RHS message invalid data (RHS_Status)
DTC	B166586	RHS message invalid data (RightHBLEDStatus)
DTC	B166686	RHS message invalid data (RHS_ADB_CommunicationFault)
DTC	B165087	Lost communication with LHS
DTC	B165101	LHS fault
DTC	B165201	LHS LED module fault
DTC	B166087	Lost communication with RHS
DTC	B166101	RHS fault
DTC	B166201	RHS LED module fault

Description

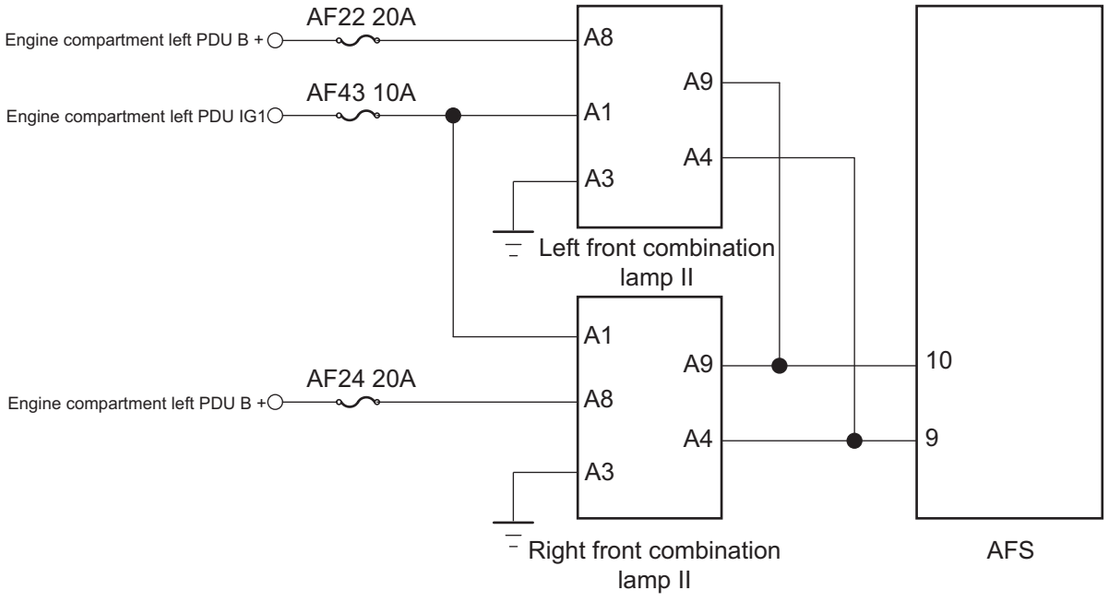
When the front combination lamp Ⅱ fails or the communication with AFS is abnormal or interrupted, AFS will record DTC.

DTC	DTC detection conditions	Faulty location
B165301	(a) LHS and ADB communication failure.	• Left front combination lamp II • Harness and connector • AFS
B165082	(a) LHS message content error.	• Left front combination lamp II • Harness and connector • AFS

DTC	DTC detection conditions	Faulty location
B165083	(a) LHS message content error.	• Left front combination lamp II • Harness and connector • AFS
B165486	(a) LHS message invalid data.	• Left front combination lamp II • Harness and connector • AFS
B165586	(a) LHS message invalid data.	• Left front combination lamp II • Harness and connector • AFS
B165686	(a) LHS message invalid data.	• Left front combination lamp II • Harness and connector • AFS
B166301	(a) RHS and ADB communication failure.	• Right front combination lamp II • Harness and connector • AFS
B166082	(a) RHS message content error.	• Right front combination lamp II • Harness and connector • AFS
B166083	(a) RHS message content error.	• Right front combination lamp II • Harness and connector • AFS
B166486	(a) RHS message invalid data.	• Right front combination lamp II • Harness and connector • AFS
B166586	(a) RHS message invalid data.	• Right front combination lamp II • Harness and connector • AFS
B166686	(a) RHS message invalid data.	• Right front combination lamp II • Harness and connector • AFS
B165087	(a) Lost communication with LHS.	• Right front combination lamp II • Harness and connector • AFS
B165101	(a) LHS failure.	• Right front combination lamp II • Harness and connector • AFS
B165201	(a) LHS LED module failure.	• Right front combination lamp II • Harness and connector • AFS
B166087	(a) Lost communication with RHS.	• Right front combination lamp II • Harness and connector • AFS

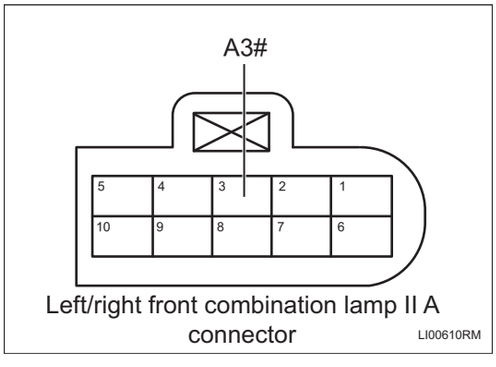
DTC	DTC detection conditions	Faulty location
B166101	(a) RHS failure.	• Right front combination lamp II • Harness and connector • AFS
B166201	(a) HS LED module failure.	• Right front combination lamp II • Harness and connector • AFS

Circuit diagram



Inspection procedure

1	Check left and right front combination lamp II ground



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the left and right front combination lamp II connector.

(d) Measure the resistance according to the values in the table below.

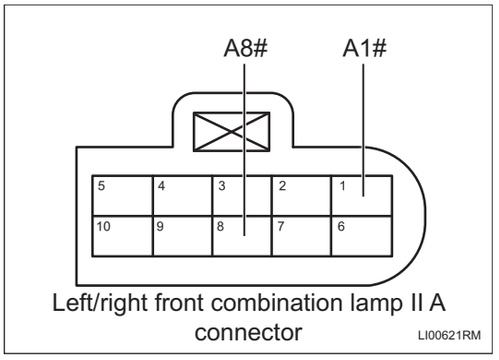
Standard value

Detector connection	Detection conditions	Specified state
Left front combination lamp II A connector A3# -body GND	Always connected	Less than 1Ω
Right front combination lamp II A connector A3# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check left and right front combination lamp II power supply



Left/right front combination lamp II A connector

LI00621RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

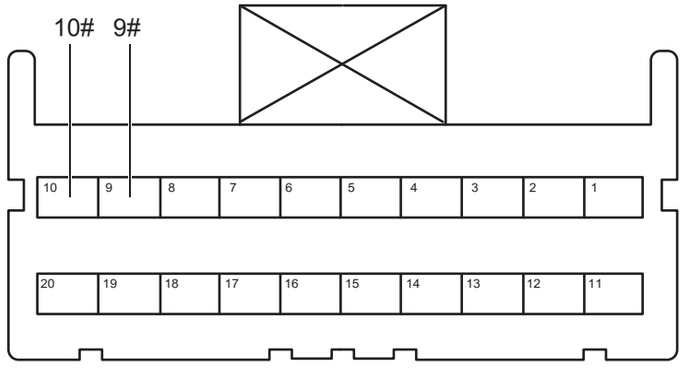
Standard value

Detector connection	Detection conditions	Specified state
Left front combination lamp II A connector A8# -body GND	The ignition switch is set to"ON"	Battery voltage
Left front combination lamp II A connector A1# -body GND	The ignition switch is set to"ON"	Battery voltage
Right front combination lamp II A connector A8# -body GND	The ignition switch is set to"ON"	Battery voltage
Right front combination lamp II A connector A1# -body GND	The ignition switch is set to"ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

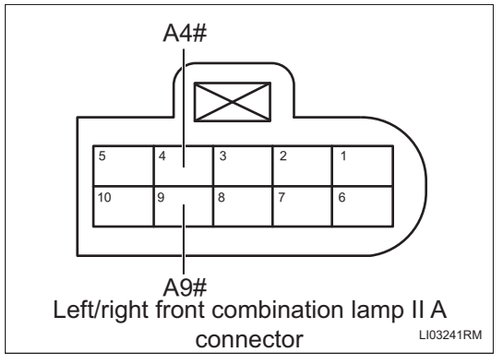
3	Check AFS harness and connector for open circuit



AFS connector

LI03231RM

LI



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the AFS connector.

(d) Measure the resistance according to the values in the table below.

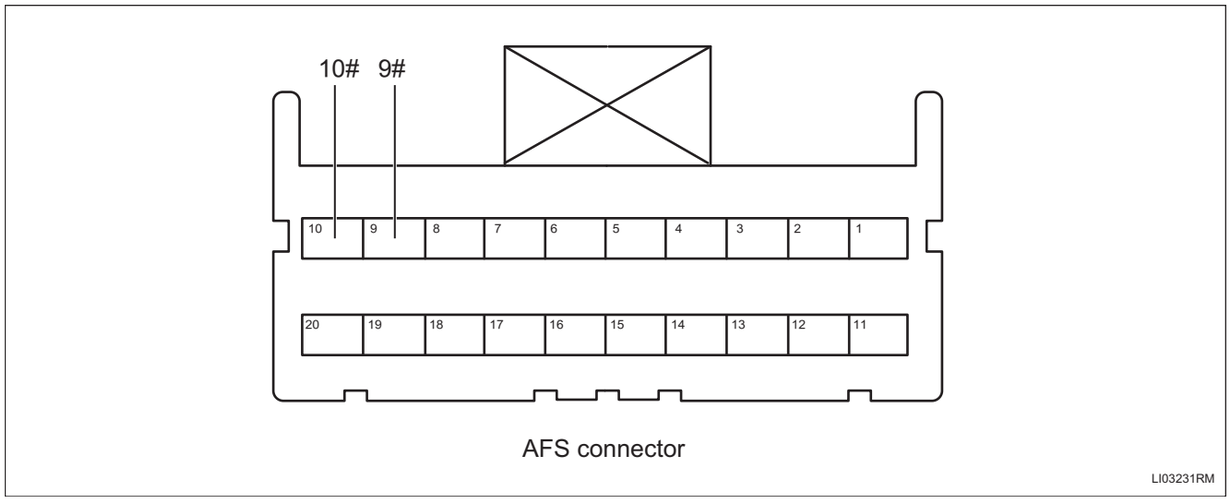
Standard value

Detector connection	Detection conditions	Specified state
AFS connector 10# - left front combination lamp IIA connector A9#	Always connected	Less than 1Ω
AFS connector 9# - left front combination lamp IIA connector A4#	Always connected	Less than 1Ω
AFS connector 10# - right front combination lamp IIA connector A9#	Always connected	Less than 1Ω
AFS connector 9# - right front combination lamp IIA connector A4#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

4	Check AFS harness and connector for circuit shorted to ground



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
AFS connector 10# -body GND	Always connected	10KΩ or greater

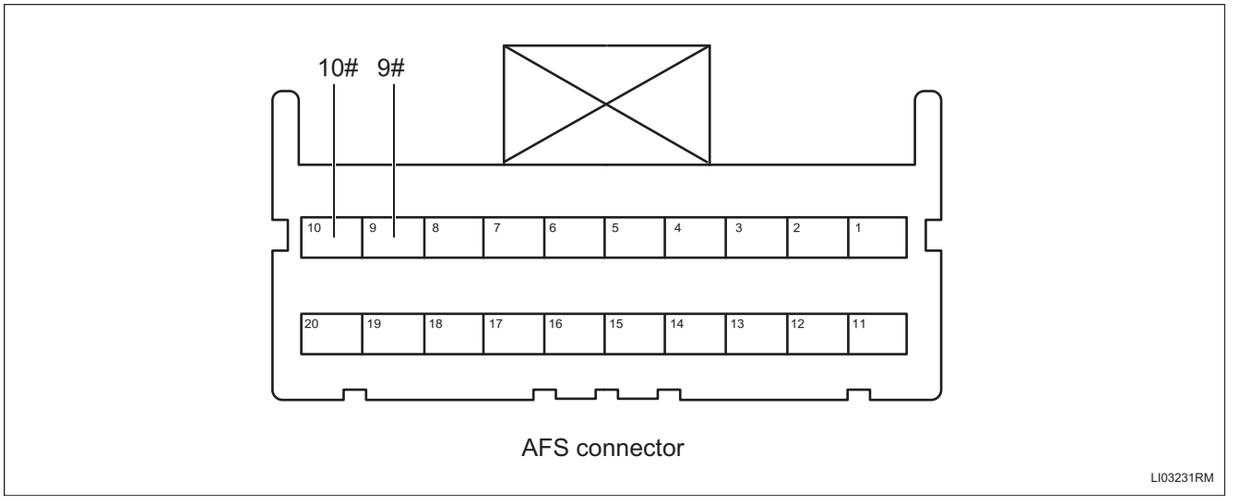
LI

Detector connection	Detection conditions	Specified state
AFS connector 9# -body GND	Always connected	10KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	Check AFS harness and connector for circuit shorted to power supply



AFS connector

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
AFS connector 10# -body GND	The ignition switch is set to "ON"	Less than 1V
AFS connector 9# -body GND	The ignition switch is set to "ON"	Less than 1V

LI

NG → **Repair or replace the harness and connector**

OK

6	Replace the left/right front combination lamp II (See page LI-115)

(a) Replace the left/right front combination lamp II.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace AFS (See page LI-109)**

OK

7	**End**

DTC	U041582	ABS/ESP/ESPwith APB message content error
DTC	U041583	ABS/ESP/ESPwith APB message content error
DTC	U042286	BCM 1 message content error
DTC	U043386	IFC message content error
DTC	U003788	Driver assistance/extension CAN bus off
DTC	U007888	ADV-IFC CAN bus OFF
DTC	U009088	AFS-light control unit CAN bus off
DTC	U014687	GW node lost
DTC	U023587	IFC node lost
DTC	U112187	ESP message lost
DTC	U114087	BCM 1 message lost
DTC	U124587	EnHost/IVI message lost
DTC	U115587	Instrument cluster control unit message lost
DTC	U113187	EPS ECU message lost
DTC	U110187	TCU message lost
DTC	U129387	HCU message lost
DTC	U042082	SAS message content error
DTC	U042083	SAS message content error
DTC	B167087	Camera data message lost
DTC	B167082	Camera data message content error (counter)
DTC	B167083	Camera data message content error (check-sum)
DTC	B167086	Camera data message invalid

Description

When the communication between AFS and other systems is abnormal or interrupted, AFS will record DTC.

DTC	DTC detection conditions	Faulty location
U041582	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041583	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042286	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U043386	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U003788	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U007888	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U009088	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U023587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U112187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U124587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U113187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U129387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042082	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042083	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
B167087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
B167082	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
B167083	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

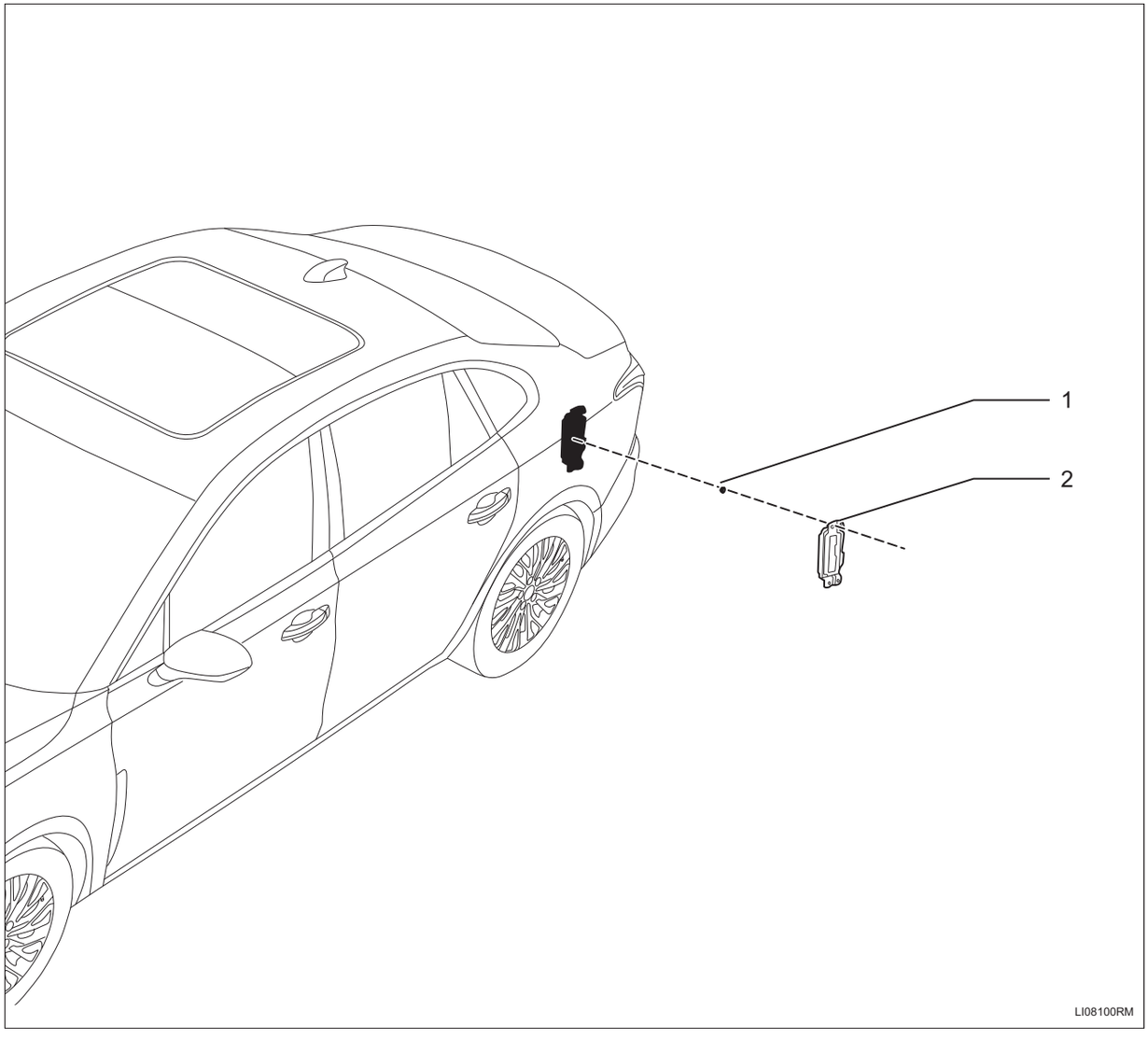
DTC	DTC detection conditions	Faulty location
B167086	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

Lighting control unit assembly

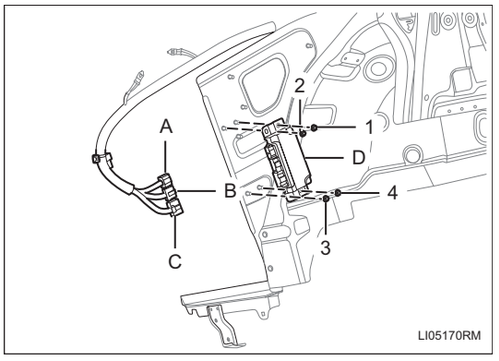
Parts



1. **Hexagon flange nut**
   - X4
   - Torque: 6 ~ 8 N·m
2. **Lighting control unit assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove left trunk covering (See page IR-33)**
3. **Remove lighting control unit assembly**



(a) Disconnect the lighting control unit assembly harness connector-A-C-.

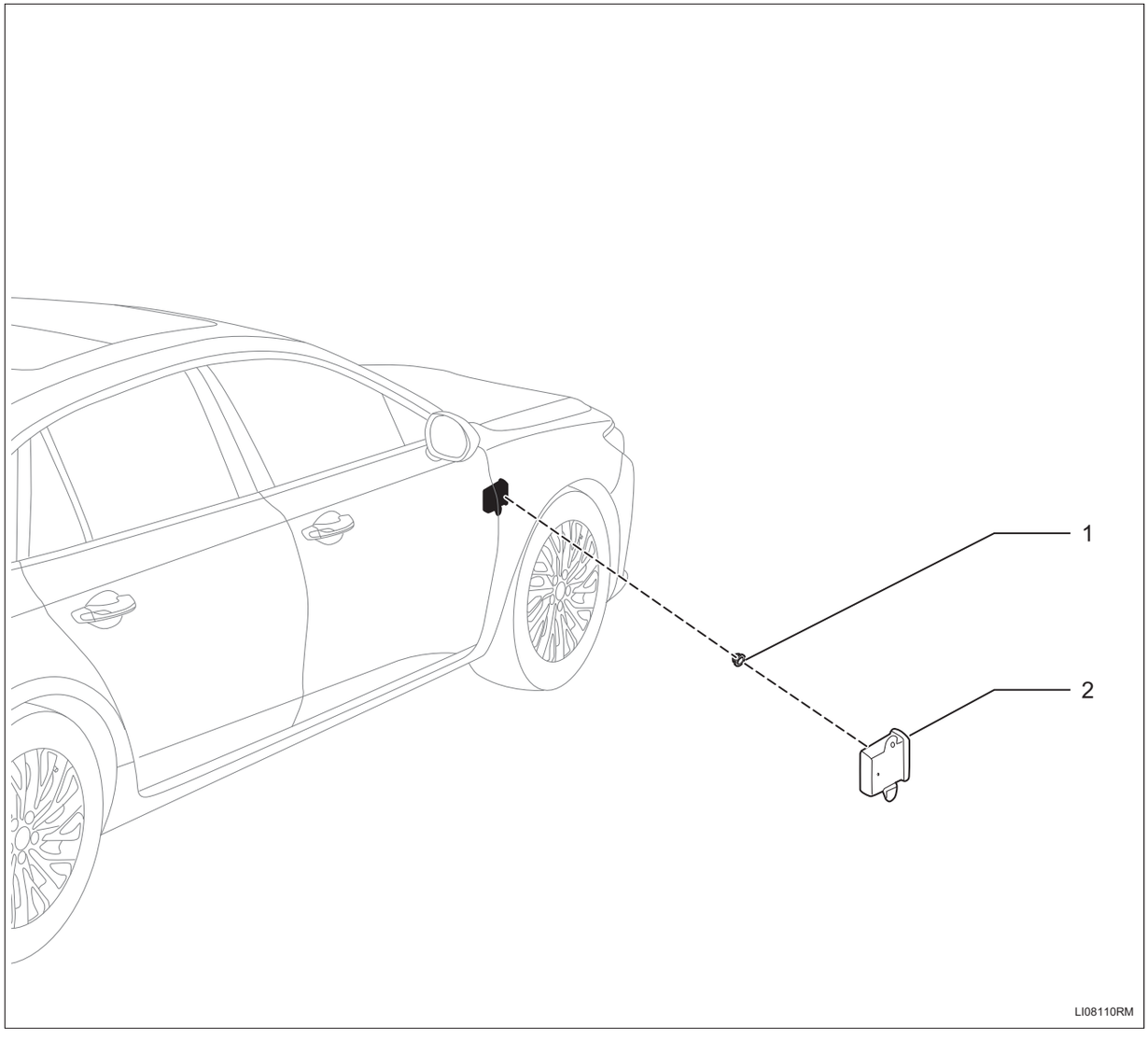
(b) Remove the nut -1-4- and the lighting control unit assembly-D-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

AFS assembly

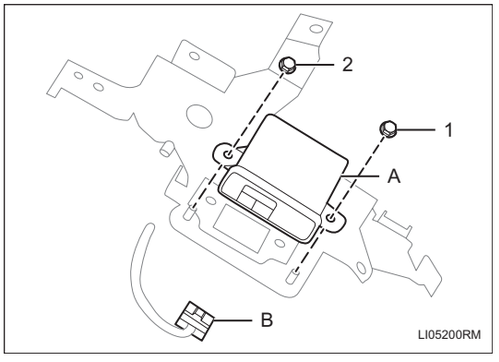
Parts



1. **Hexagon flange nut**
   - X2
   - Torque: 6 ~ 8 N·m
2. **AFS assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the instrument panel assembly (See page IP-3)**
3. **Remove AFS assembly**



(a) Disconnect the harness connector-B-.

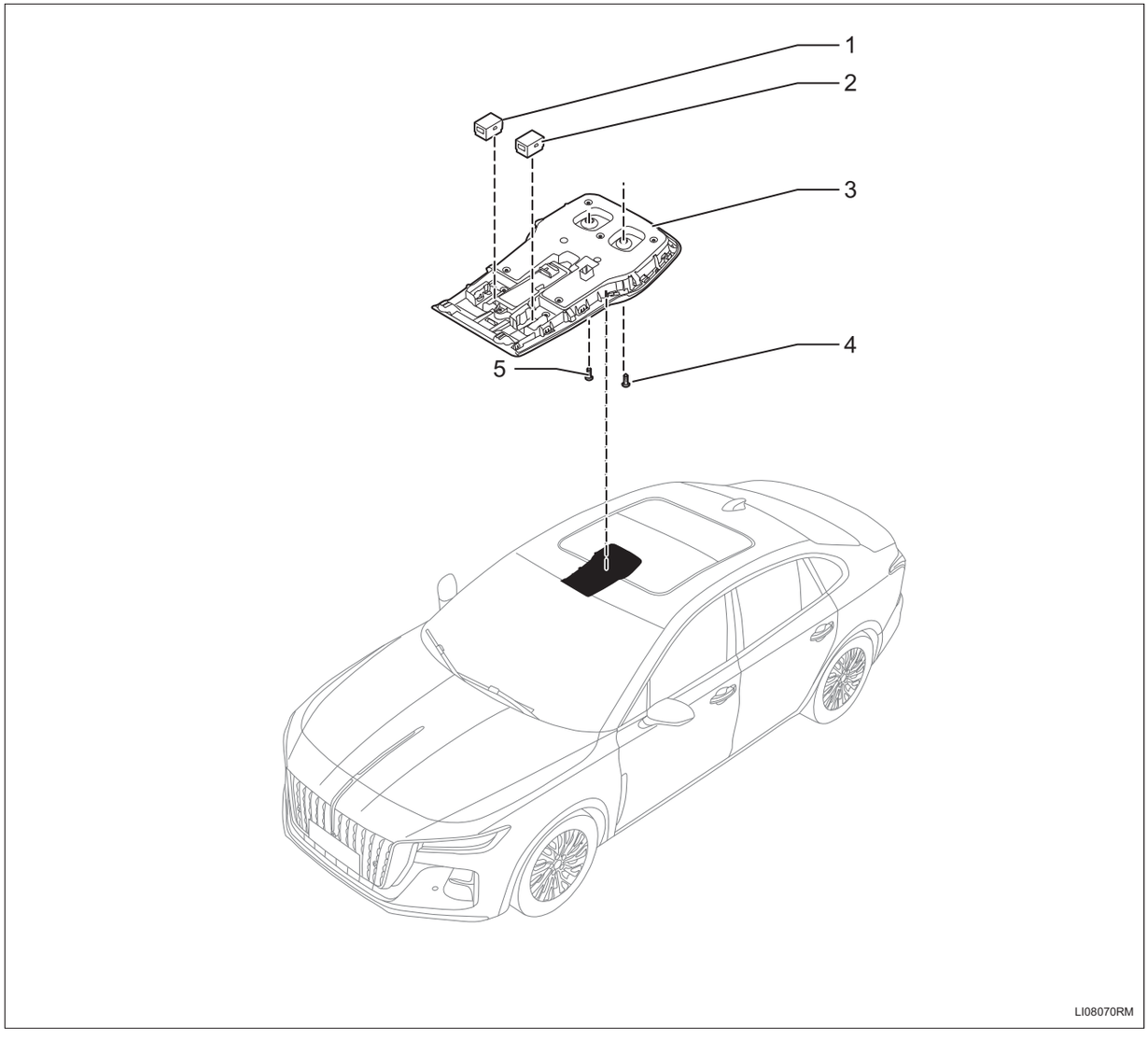
(b) Remove the nut -1-2- and remove the AFS assembly-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Front interior lamp assembly

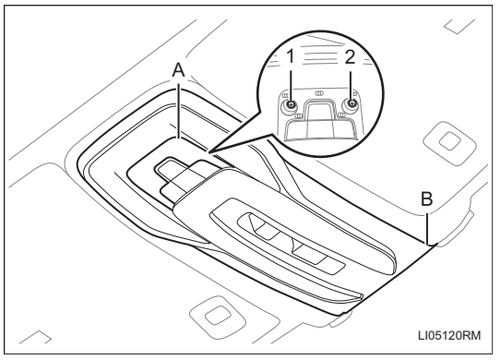
Parts



1. **Microphone assembly**
2. **Microphone assembly**
3. **Front interior lamp assembly**
4. **Screw**
5. **Screw**

Removal

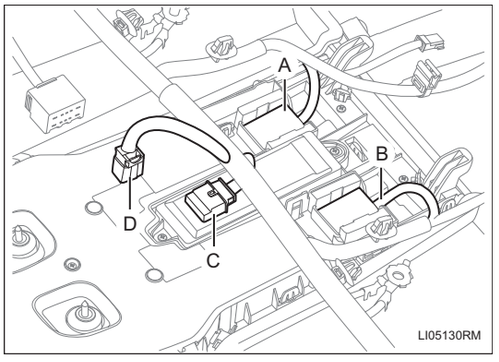
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove front interior lamp assembly**



(a) Remove the lamp small cover plate -A-.

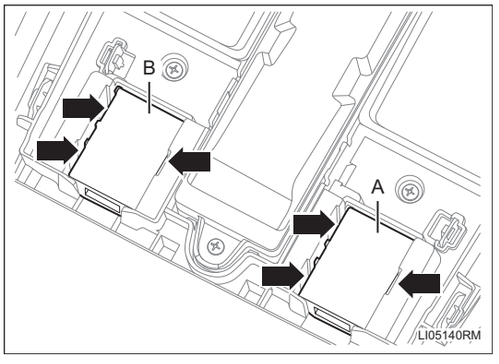
(b) Remove the screws -1-2- and detach the front interior lamp assembly -B-.

(c) Disconnect the harness connectors -A-D- and remove the front interior lamp assembly.



3. **Remove microphone assembly**

(a) Detach the claw -arrow- and remove the microphone assemblies -A-B-.

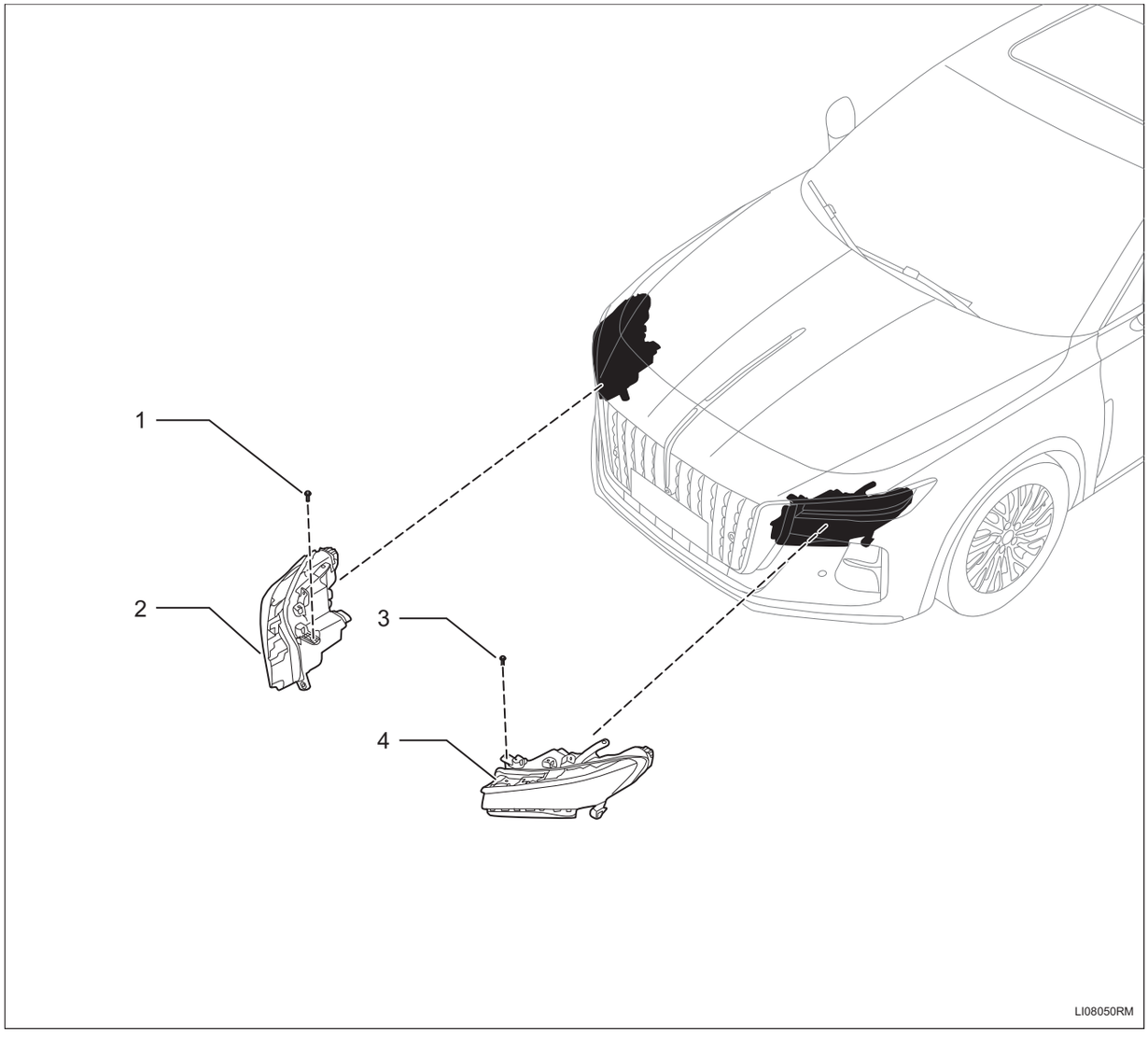


Installation

1. **The installation procedure is the reverse of removal procedure.**

Front combination lamp I assembly

Parts



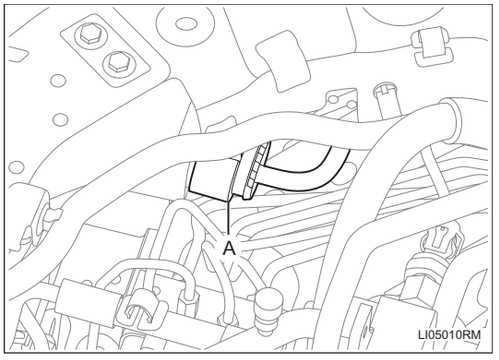
1. **Hexagon flange bolt**
   - X4
   - Torque: 8 ~ 12 N·m
2. **Right front combination lamp I assembly**
3. **Hexagon flange bolt**
   - X4
   - Torque: 8 ~ 12 N·m
4. **Left front combination lamp I assembly**

Removal

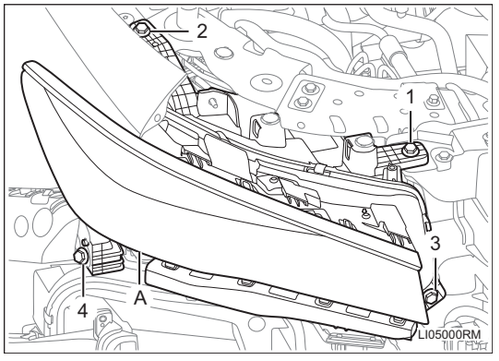
Hint:

The removal sequence on the right side is the same as that on the left side.

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove front bumper (See page ET-7)**
3. **Remove front combination lamp I assembly**



(a) Disconnect the front combination lamp I assembly harness connector-A-.



(b) Remove the bolts -1-4- and take the front combination lamp I assembly-A- forward out of the body.

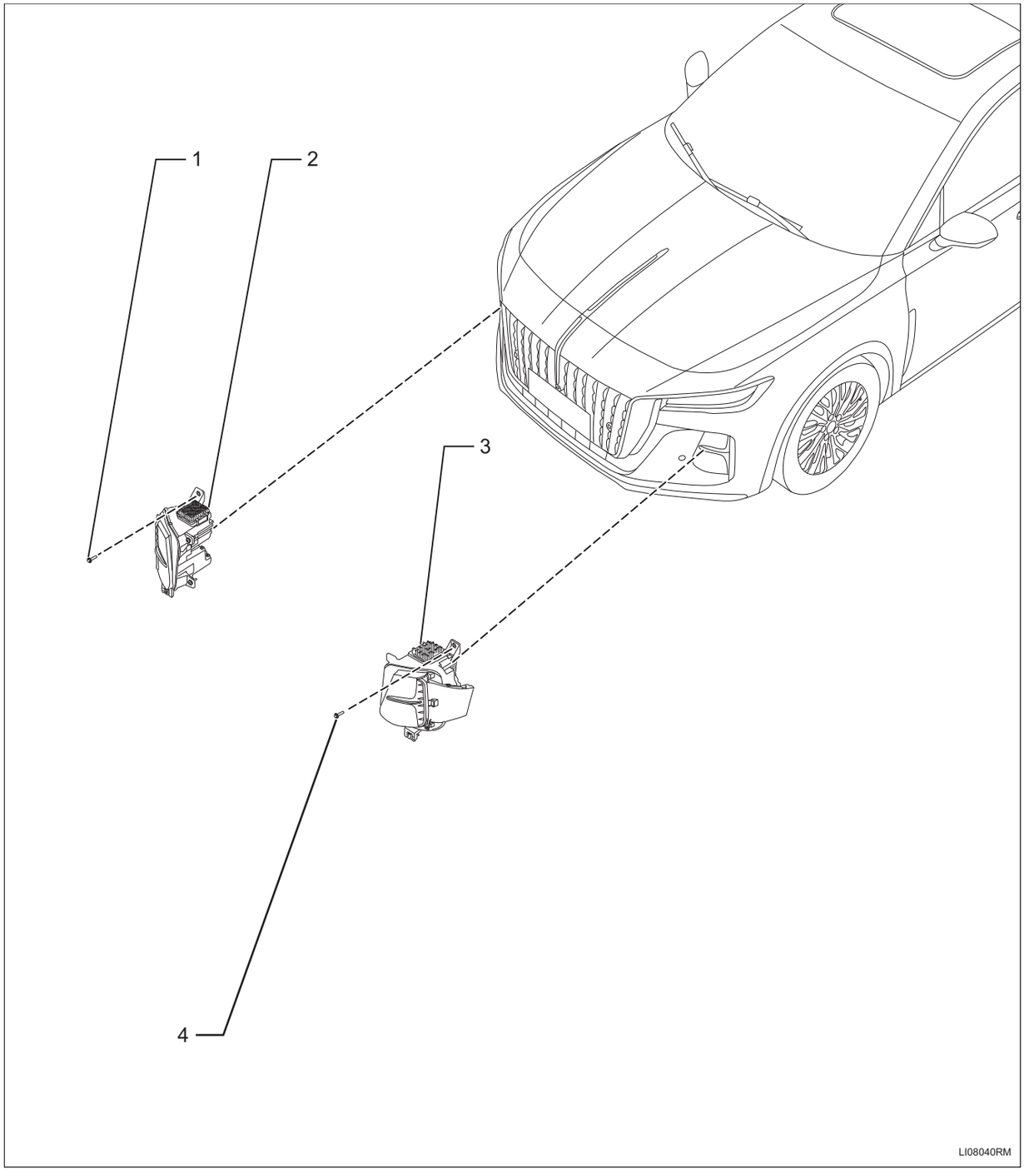
Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

(a) Align the headlamp with the outline of the body and front bumper, and check the gap size after installation.

Front combination lamp II assembly

Parts



1. **Hexagon flange bolt**
2. **Right front combination lamp II assembly**
   - X3

- Torque: 6 ~ 8 N·m

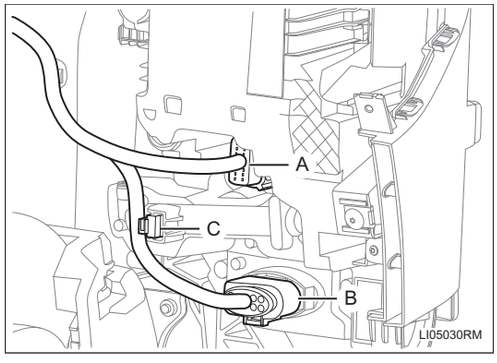
3. **Hexagon flange bolt**
4. **Left front combination lamp II assembly**
   - X3
   - Torque: 6 ~ 8 N·m

Removal

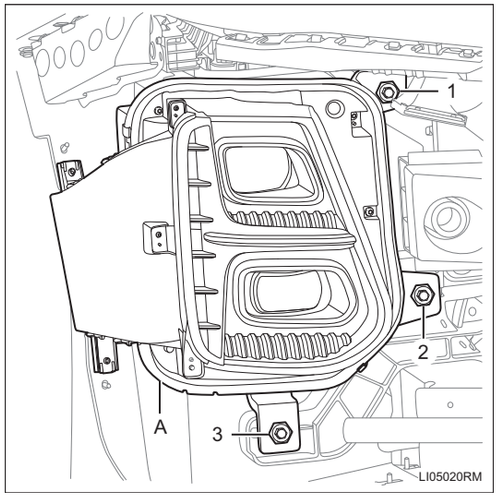
Hint:

The removal sequence on the right side is the same as that on the left side.

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove front bumper (See page ET-7)**
3. **Remove front combination lamp II assembly**



(a) Disconnect the harness connector-A-B- and harness fixing clip-A-.



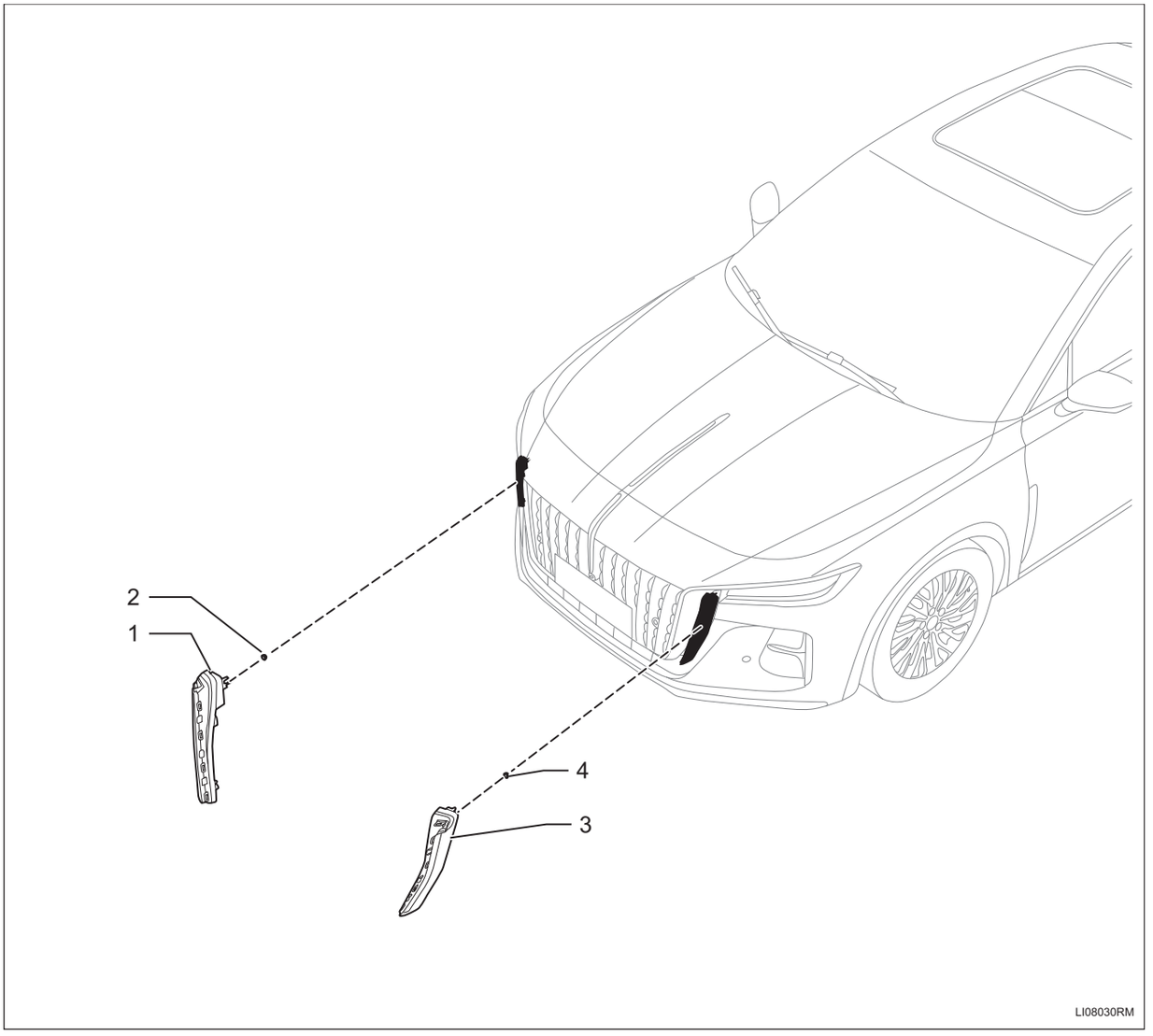
(b) Remove the bolts -1-3- and take the front combination lamp II assembly-A- forward out of the body.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Front combination lamp III assembly

Parts



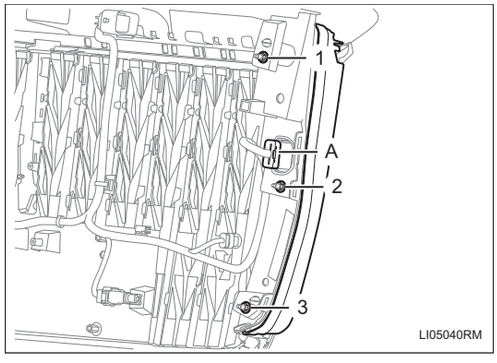
1. **Right front combination lamp III assembly**
2. **Hexagon flange nut**
   - X3
   - Torque: 8 ~ 12 N·m
3. **Left front combination lamp III assembly**
4. **Hexagon flange nut**
   - X3
   - Torque: 8 ~ 12 N·m

Removal

Hint:

The removal sequence on the right side is the same as that on the left side.

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the radiator grille (See page ET-29)**
3. **Remove front combination lamp III assembly**



(a) Disconnect the front combination lamp III assembly harness connector-A-.

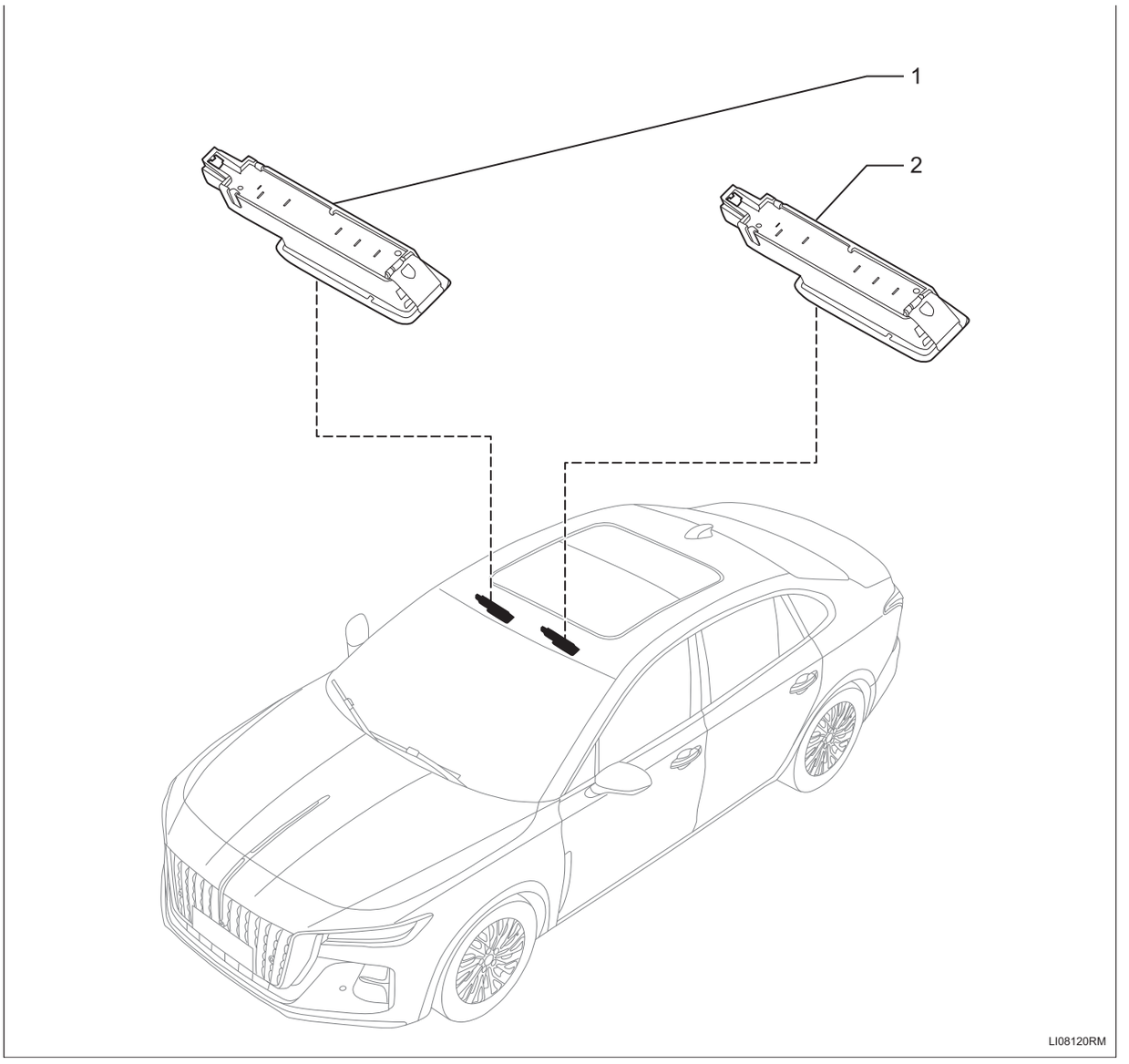
(b) Remove the nut -1-3- and remove the front combination lamp III assembly.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Vanity mirror lamp assembly

Parts



1. **Vanity mirror lamp assembly**
2. **Vanity mirror lamp assembly**

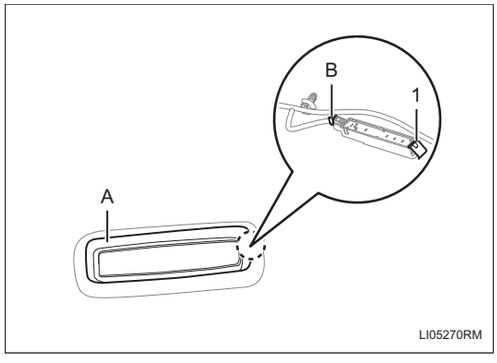
Removal

Hint:

The removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove vanity mirror lamp assembly**
   (a) Detach claw -1-.



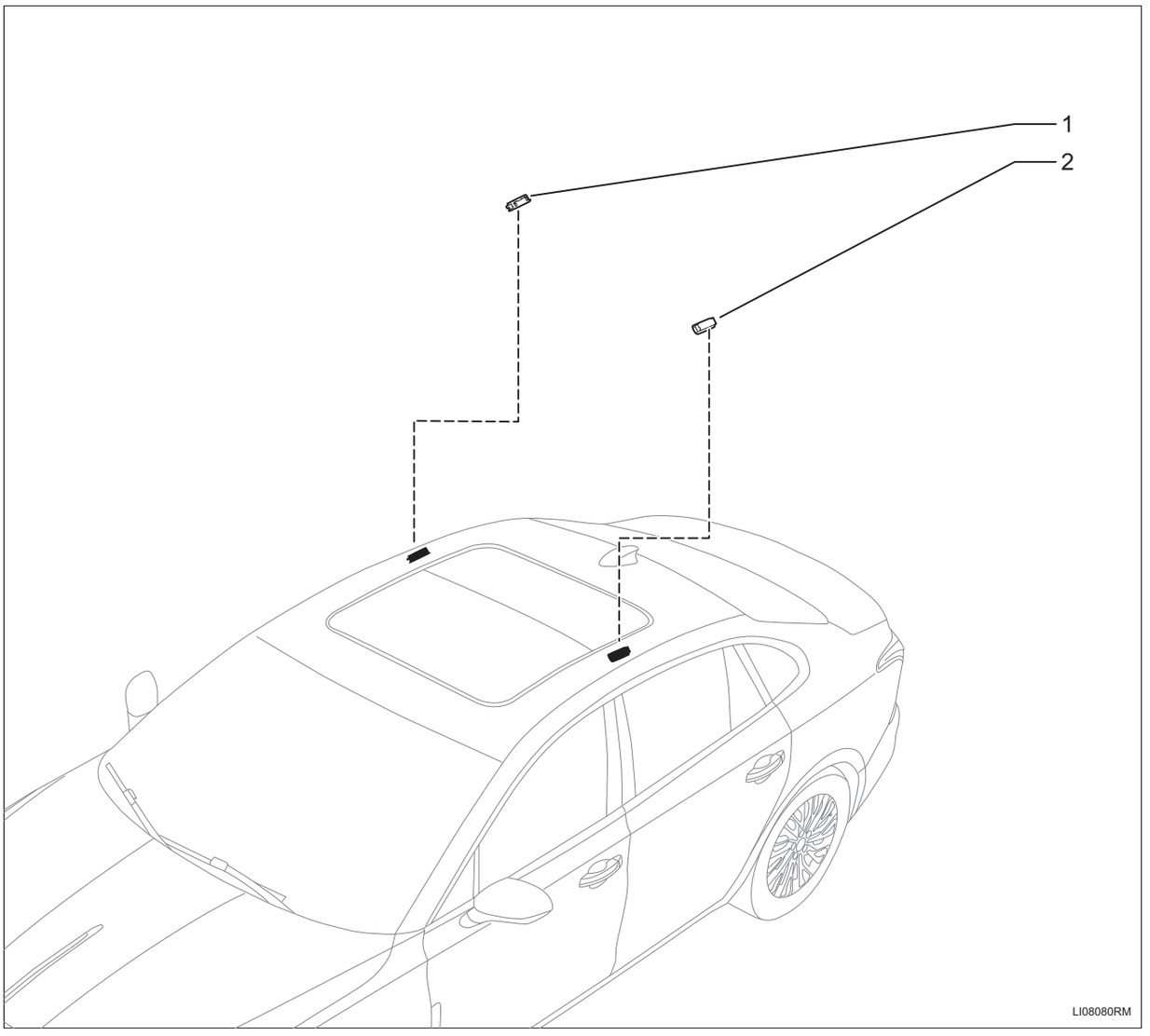
   (b) Disconnect the harness connector -B-, and remove the vanity mirror lamp assembly -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Rear interior lamp assembly

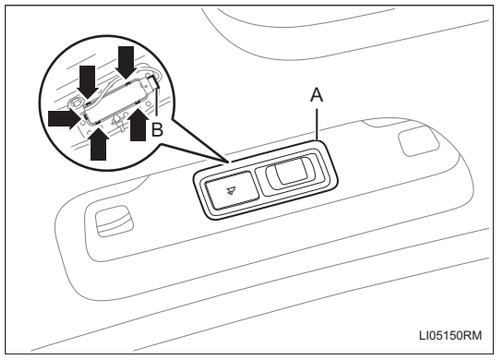
Parts



1. **Right rear interior lamp assembly**
2. **Left rear interior lamp assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove rear interior lamp assembly**



(a) Detach fixing claw -arrow- of rear interior lamp assembly.

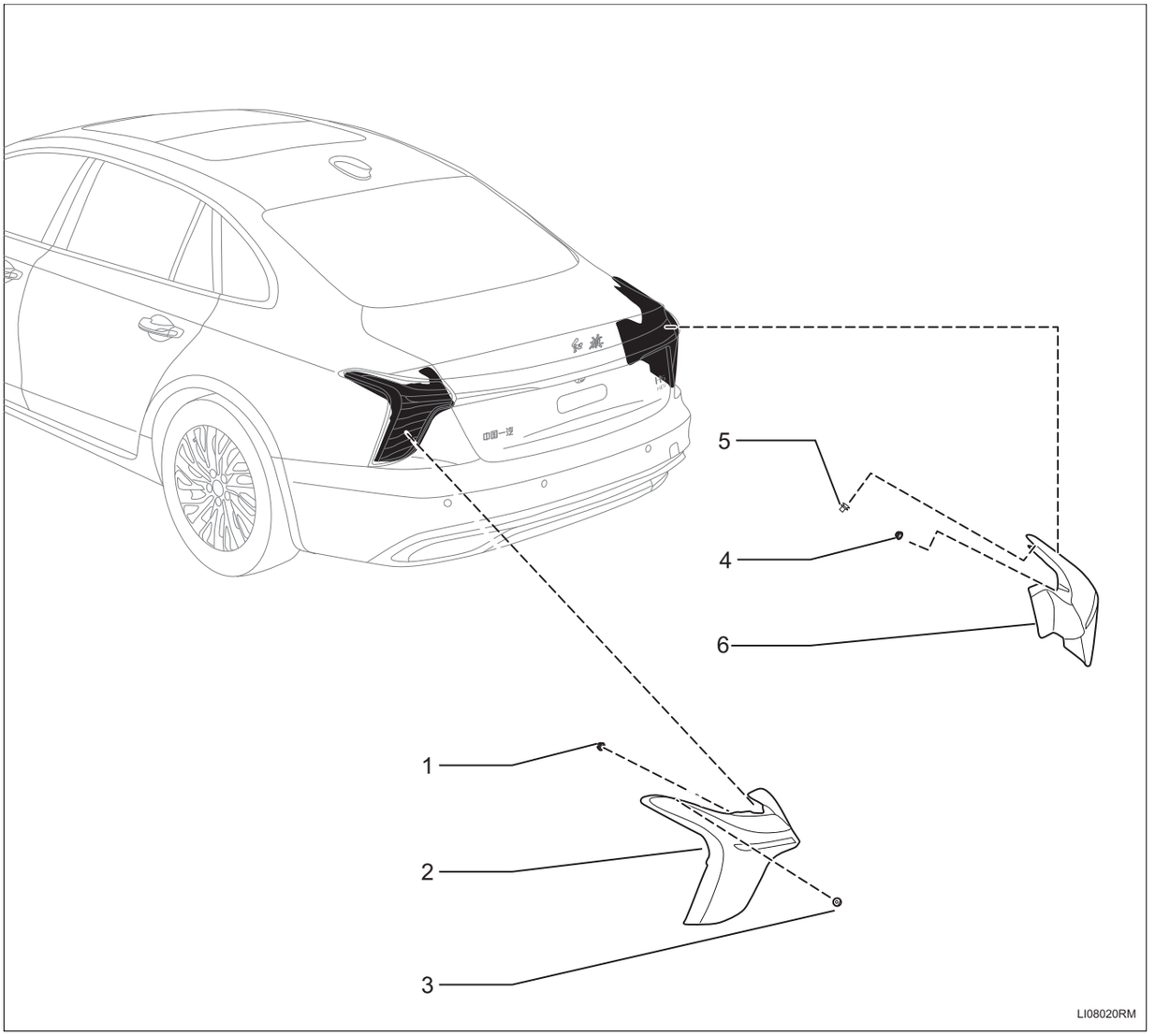
(b) Disconnect the harness connector -B-, and remove the rear interior lamp assembly -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Rear combination lamp I assembly

Parts



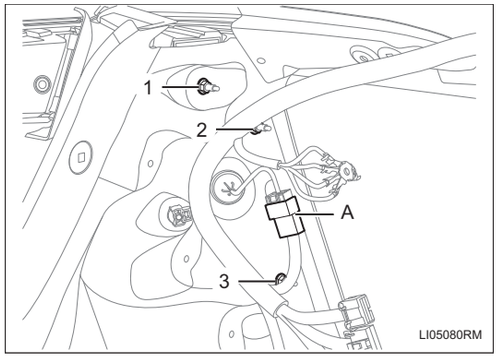
1. **Hexagon flange nut**
   - X3
   - Torque: 2.5 ~ 3.5 N·m
2. **Left rear combination lamp I assembly**
3. **Clip**
4. **Hexagon flange nut**
   - X3
   - Torque: 2.5 ~ 3.5 N·m
5. **Clip**
6. **Right rear combination lamp I assembly**

Removal

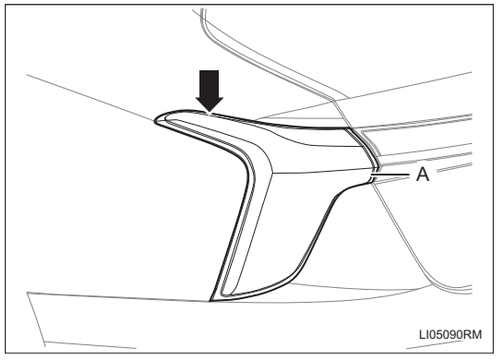
Hint:

the removal sequence on the right side is the same as that on the left side.

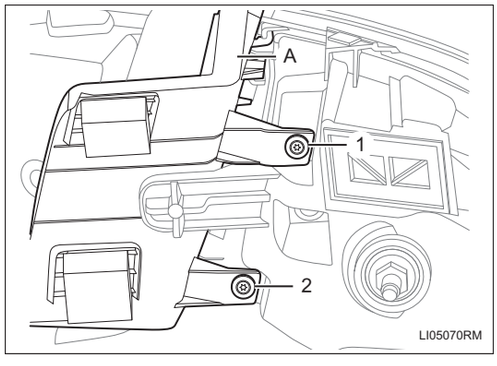
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove trunk covering (See page IR-33)**
3. **Remove rear combination lamp I assembly**



(a) Disconnect the harness connector-A-, and remove nut -1-3-.



(b) Detach the rear combination lamp I assembly limit clip -arrow-, and take the rear combination lamp I assembly-A- out of the vehicle body.



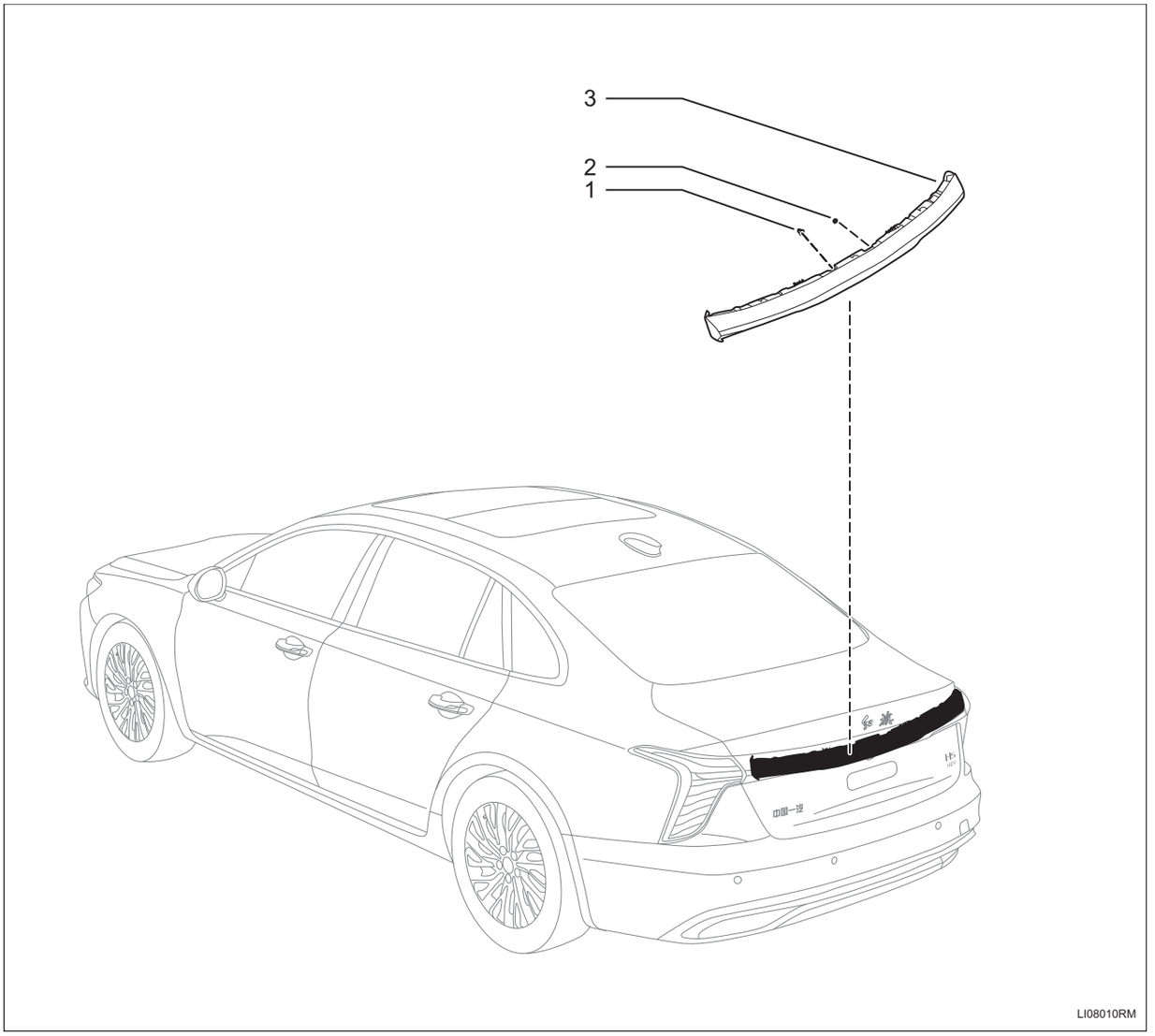
(c) Remove the screws -1-2- and remove the trim cover of the combination lamp I assembly.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Rear combination lamp II assembly

Parts

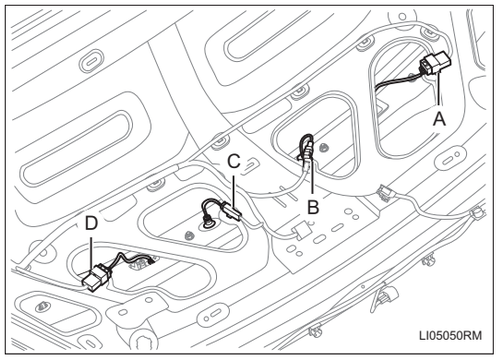


1. **Clip**
2. **Hexagon flange nut**
   - X6
   - Torque: 2.5 ~ 3.5 N·m
3. **Rear combination lamp II assembly**

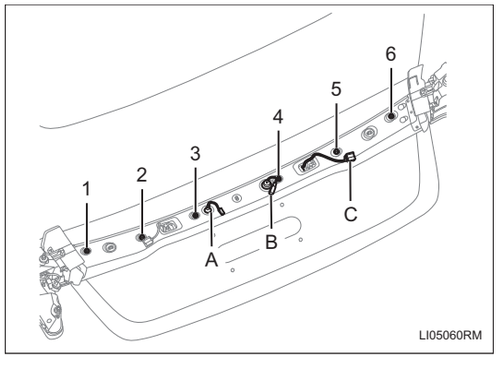
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove trunk lid guard plate (See page IR-33)**
3. **Remove the rear combination lamp II assembly**

(a) Disconnect the harness connector-A-D-.



(b) Detach the harness protective sleeves - A-C - of rear combination lamp II assembly.



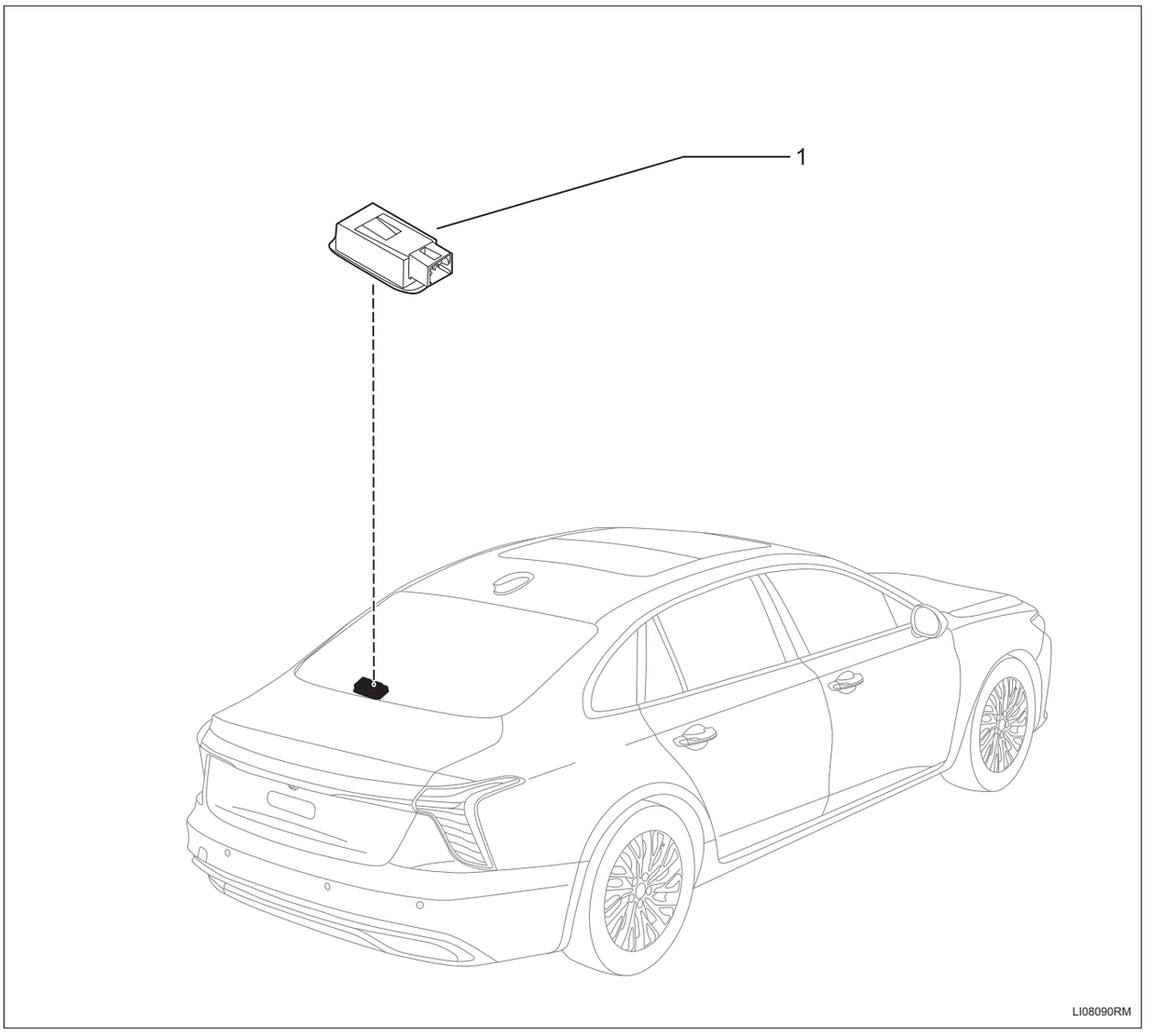
(c) Remove the nut -1-6- and take the rear combination lamp II assembly out of the trunk lid.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Trunk lamp assembly

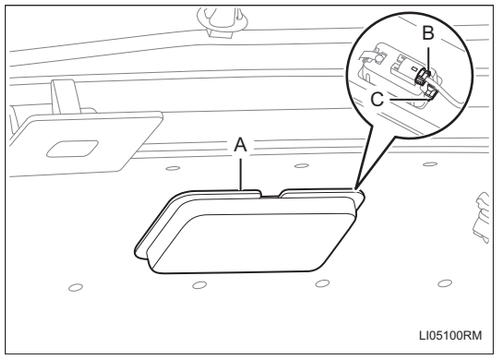
Parts



1. Trunk lamp assembly

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove trunk lamp assembly**



(a) Pry claw -C-.

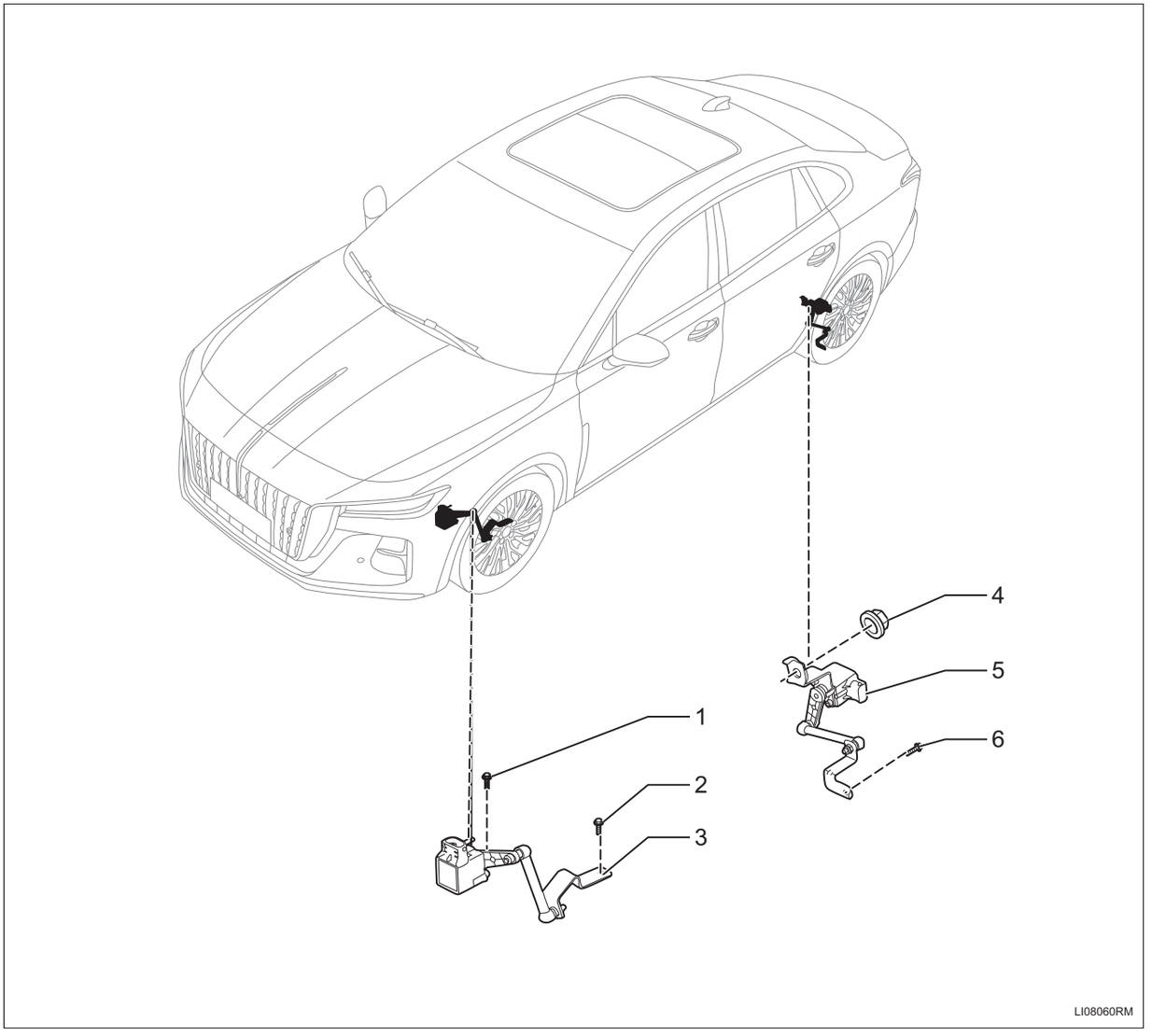
(b) Disconnect the harness connector -B- and remove trunk lamp assembly -A- from the parcel shelf downwards.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Ride height sensor

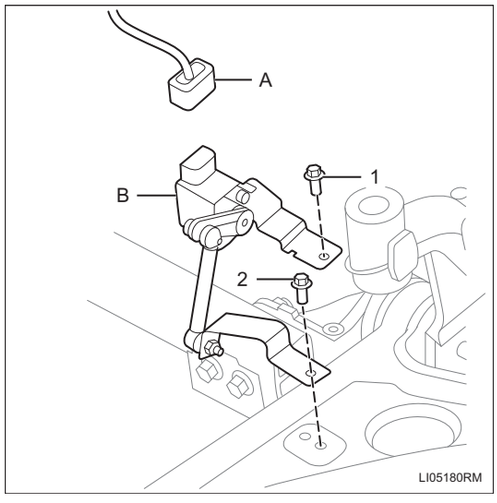
Parts



1. **Hexagon flange bolt**
   - Torque: 8 ~ 12 N·m
2. **Hexagon flange bolt**
   - Torque: 8 ~ 12 N·m
3. **Front ride height sensor**
4. **Hexagon flange nut**
   - Torque: 8 ~ 12 N·m
5. **Front ride height sensor**
6. **Hexagon flange bolt**
   - Torque: 8 ~ 12 N·m

Removal

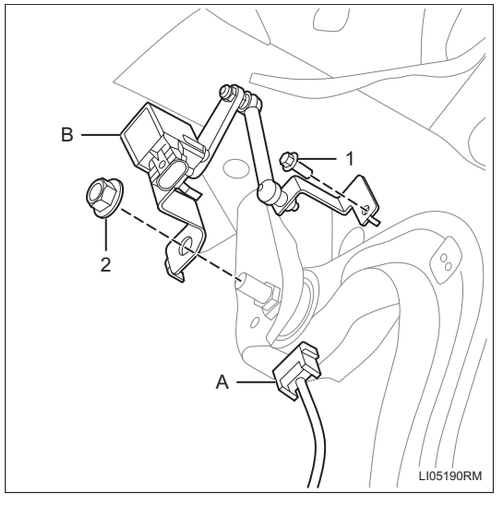
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove front ride height sensor**



(a) Disconnect the harness connector-A-.

(b) Remove the bolt -1-2- and the front ride height sensor-B-.

3. **Remove rear ride height sensor**



(a) Disconnect the harness connector-A-.

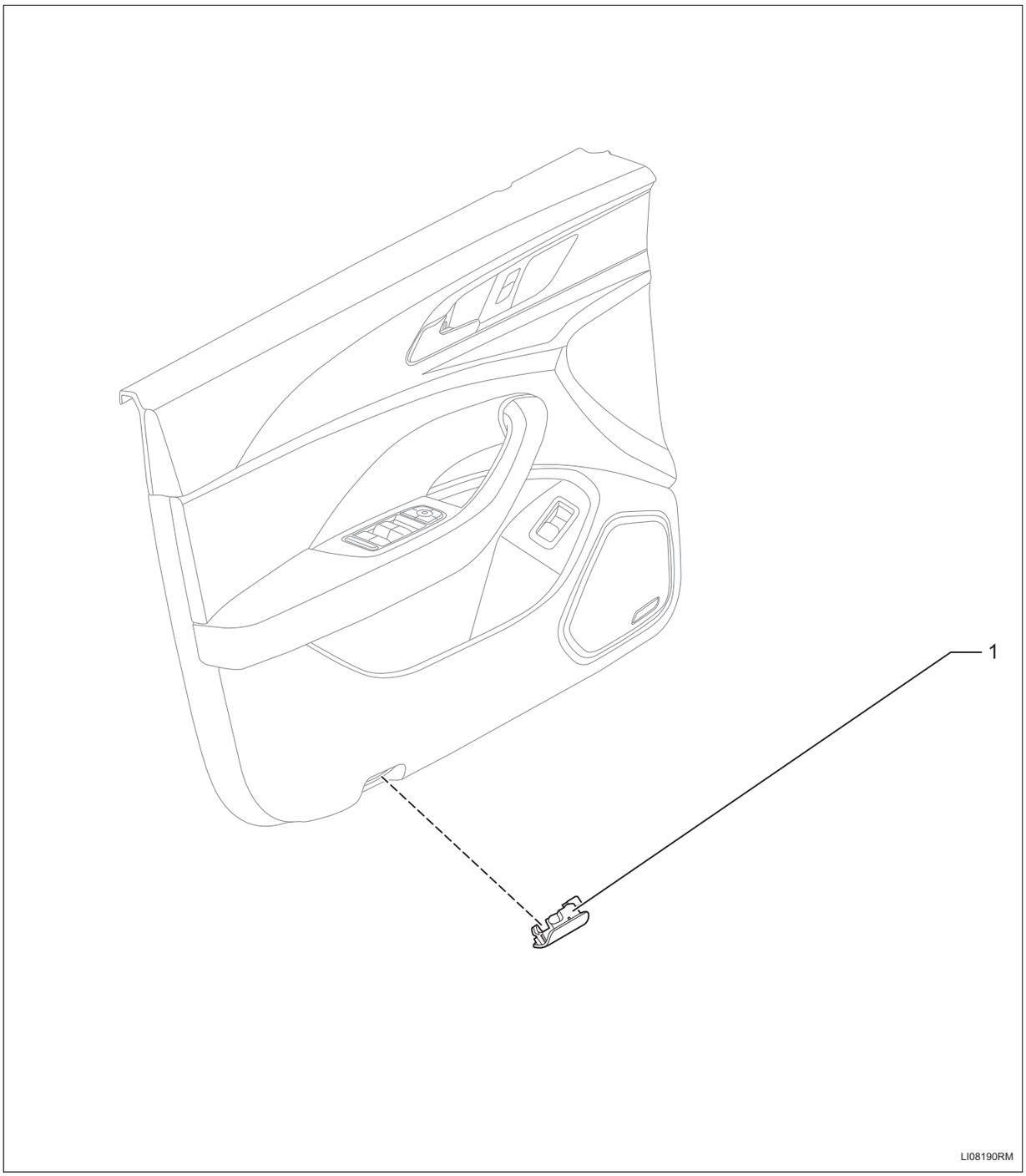
(b) Remove nut -2- and bolt -1-, and remove rear ride height sensor -B-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Door lamp assembly

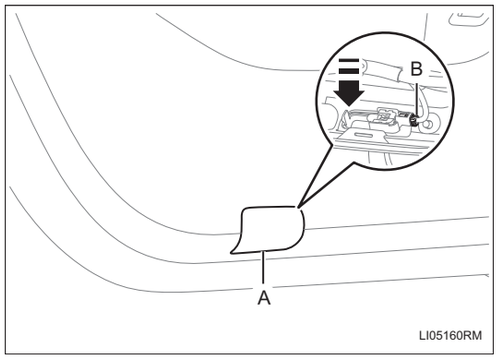
Parts



1. Door lamp assembly

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove door lamp assembly**



(a) Pry claw as arrowed, to take out the door lamp assembly.

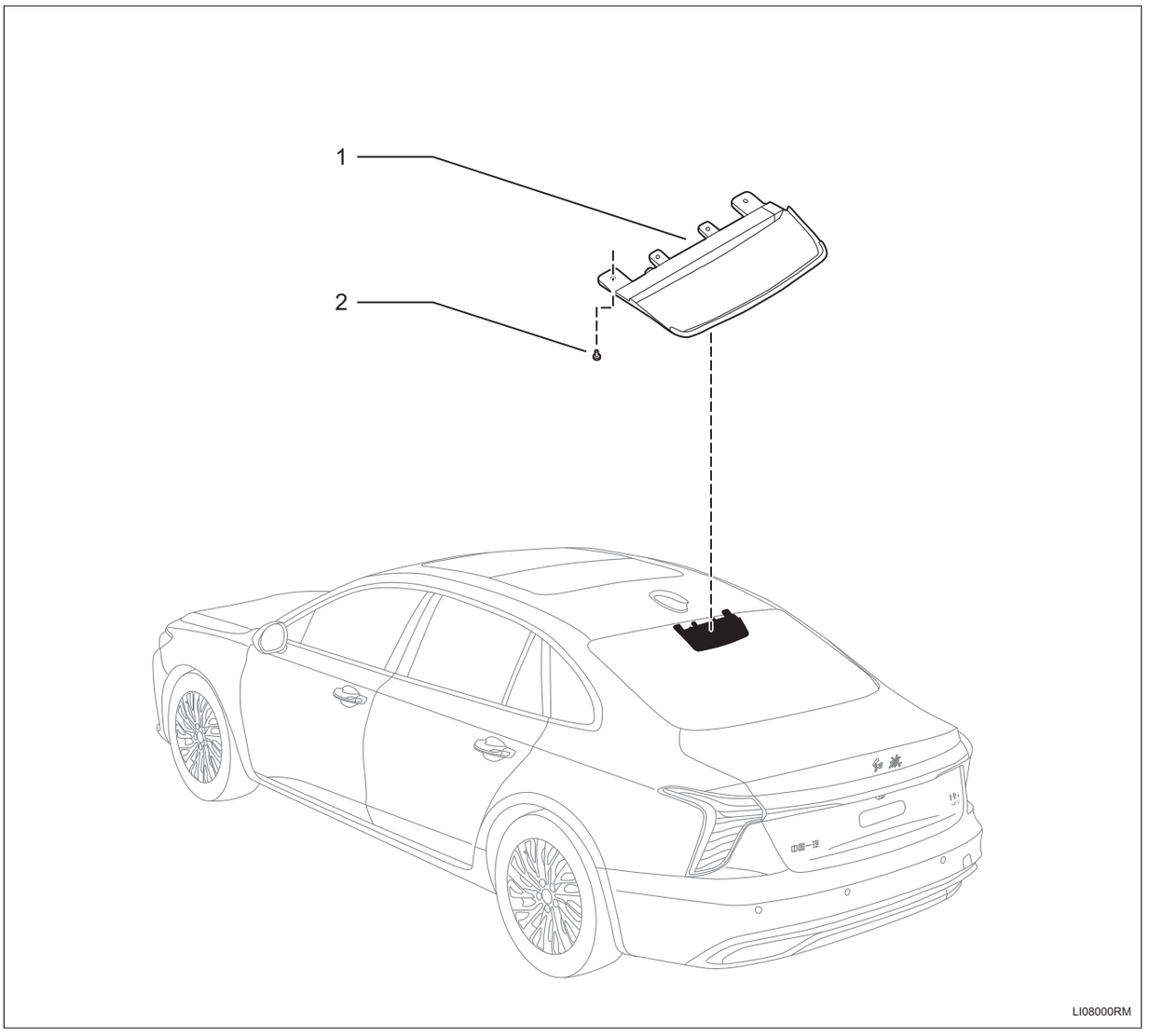
(b) Disconnect the harness connector-A-, and remove the door lamp assembly.

Installation

1. **The installation procedure is the reverse of removal procedure.**

High-mounted stop lamp

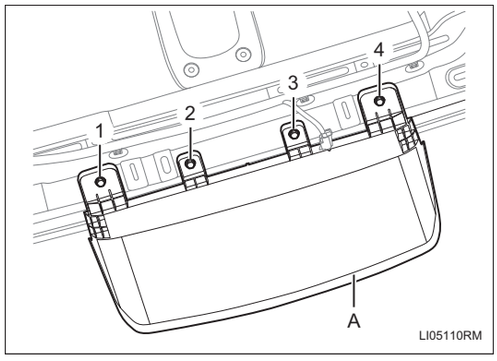
Parts



1. **High-mounted stop lamp**
2. **Hexagon flange nut**
   - X4
   - Torque: 4 ~ 6 N·m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove roof assembly assembly (See page IR-44)**
3. **Remove the high-mounted stop lamp**



(a) Disconnect the harness connector-A-.

(b) Remove the bolt -1-4- and the high-mounted stop lamp-A-.

Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

   Hint:

   If the LED lamp is broken, the entire high-mounted stop signal lamp should be replaced.

Forward MMW radar system

RA

Forward MMW radar RA-1
Precautions RA-1
Location of parts RA-3
System diagram RA-5
System description RA-6
ECU terminal RA-6
DTC chart RA-7
C12E017 .....RA-8
C12E016 .....RA-8
C12E294 .....RA-11
C12E398 .....RA-12
C12E464 .....RA-13
C12E554 .....RA-14
C12E676 .....RA-15
U008388 .....RA-16
U003788 .....RA-20
U008388 .....RA-20
U014687 .....RA-20
U114687 .....RA-20
U112187 .....RA-20
U113187 .....RA-20
U115587 .....RA-20
U110187 .....RA-20
U129387 .....RA-20
U040282 .....RA-20
U040283 .....RA-20
U059482 .....RA-20
U059483 .....RA-20
U042082 .....RA-20
U042083 .....RA-20
U041582 .....RA-20
U041583 .....RA-20
Forward MMW radar assembly RA-22
Parts RA-22
Removal RA-23
Installation RA-23

Forward MMW radar

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Warning:

Before repairing the high voltage system or adjacent high voltage system components, be sure to carefully read the "Instructions and precautions for maintenance work" in the introduction carefully!

2. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

3. when the battery cable is disconnected and reconnected, some systems require initialization.

4. General repair instructions

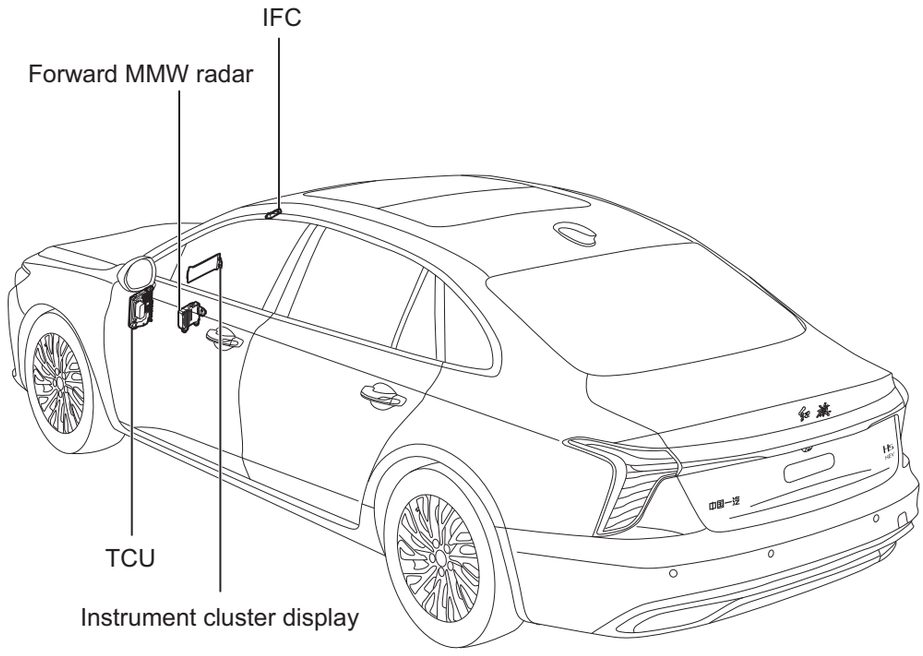
(a) When checking the MMW radar control system, it may affect the operation of the airbag. Therefore, before carrying out maintenance work, be sure to carefully read and confirm the "precautions" for airbag.

(b) When the part needs to be replaced or the connector needs to be disconnected during maintenance of MMW radar control system, disconnect the battery negative cable.

(c) The door control system needs to be initialized after reconnecting the battery. And use the HQ-VDS to "clear the DTC" for all electronic control systems.

5. **Calibration with HQ-VDS is required after replacing the MMW radar.**

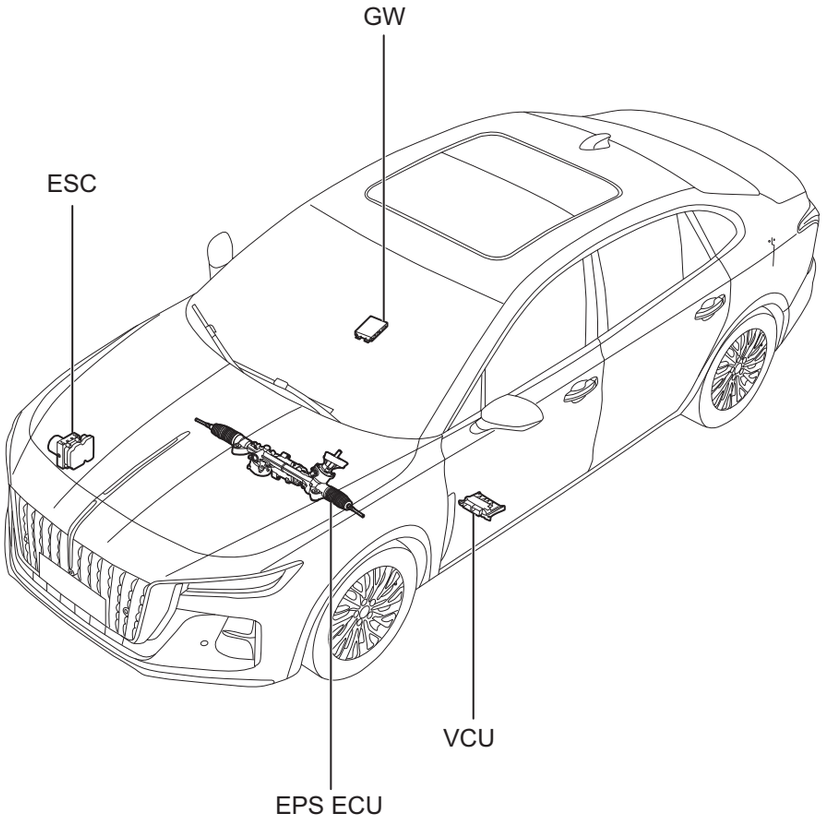
Location of parts



RA00030RM

Location of parts

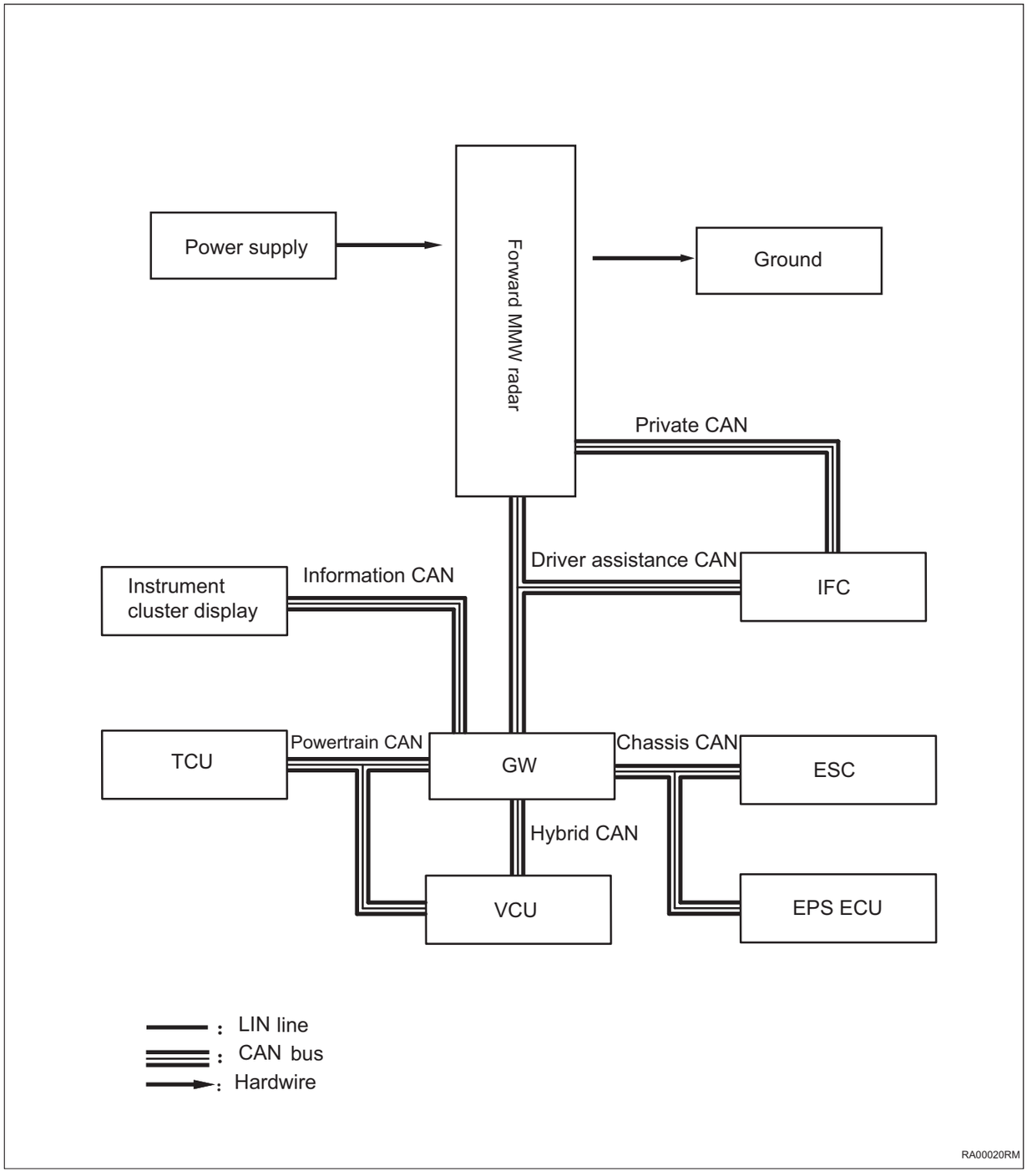
RA



RA00040RM

System diagram

Forward MMW radar



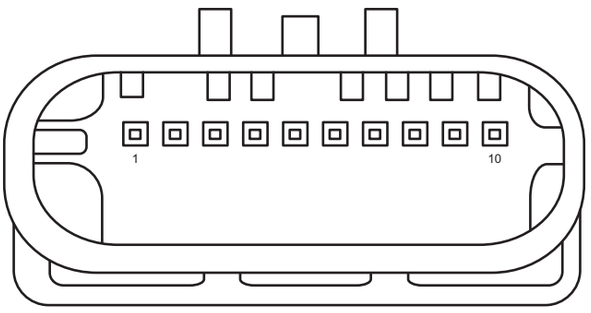
RA

System description

1. MMW radar system

(a) The system automatically determines the collision risk level through the relative distance, relative speed and relative acceleration between the vehicle and the target vehicle. If the conditions are met, the system will give an alarm, thus improving the driving safety of the vehicle.

ECU terminal



Forward MMW radar

RA00010RM

Forward MMW radar

Forward MMW radar	
Pin No.	**DEFINITIONS**
1	CAN-H
2	CAN-L
3	Private CAN_L
4	Private CAN_H
5	-
6	-
7	-
8	-
9	IG
10	GND

DTC chart

DTC	Description	Reference page
C12E017	Overvoltage	(See page RA-8)
C12E016	Undervoltage	(See page RA-8)
C12E554	Radar not calibrated	(See page RA-14)
C12E464	AM-PM coefficient error	(See page RA-13)
C12E398	Radar overtemperature	(See page RA-12)
C12E294	Radar blocked	(See page RA-11)
C12E676	Radar deviation	(See page RA-15)
U003788	Driver assistance/extension CAN bus off	(See page RA-20)
U008388	Front MMW radar-IFC CAN bus OFF	(See page RA-16)
U014687	GW node lost	(See page RA-20)
U114687	GW node lost	(See page RA-20)
U112187	ESP message lost	(See page RA-20)
U113187	EPS ECU message lost	(See page RA-20)
U115587	Instrument cluster control unit message lost	(See page RA-20)
U110187	TCU message lost	(See page RA-20)
U129387	HCU message lost	(See page RA-20)
U040282	TCU message content error	(See page RA-20)
U040283	TCU message content error	(See page RA-20)
U059482	HCU message content error	(See page RA-20)
U059483	HCU message content error	(See page RA-20)
U042082	EPS ECU message content error	(See page RA-20)
U042083	EPS ECU message content error	(See page RA-20)
U041582	ABS/ESP/ESP with APB message content error	(See page RA-20)
U041583	ABS/ESP/ESP with APB message content error	(See page RA-20)

RA

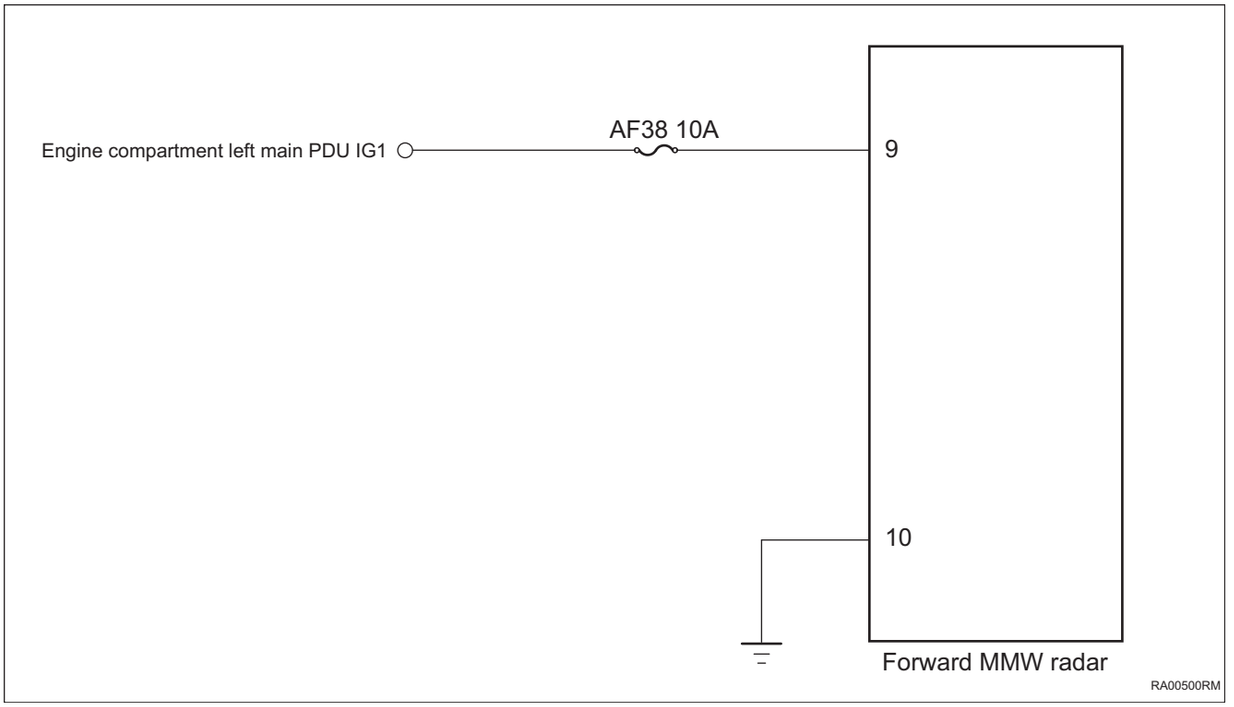
DTC	C12E017	Overvoltage
DTC	C12E016	Undervoltage

Description

When the power supply voltage of the forward MMW radar is too high or too low, the forward MMW radar records the DTC.

DTC	DTC detection conditions	Faulty location
C12E017	(a) Overvoltage.	• Forward MMW radar • Harness and connector • Battery/charging system
C12E016	(a) Undervoltage.	• Forward MMW radar • Fuse • Harness and connector • Battery/charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery + - battery -	Always connected	About 11 ~ 14V

NG → **Overhaul the charging system**

OK

2 **Check forward MMW radar fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the forward MMW radar fuse.

(d) Measure the resistance according to the values in the table below.

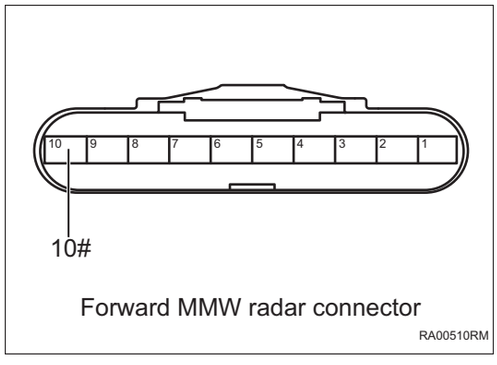
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3 **Check forward MMW radar ground**



Forward MMW radar connector

RA00510RM

(a) Measure the resistance according to the values in the table below.

Standard value

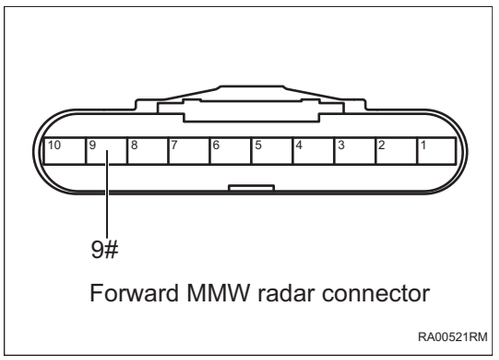
Detector connection	Detection conditions	Specified state
Forward MMW radar connector 10# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4 **Check forward MMW radar power supply**

RA



(a) Install the fuse.

(b) Connect the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Forward MMW radar connector 9# -body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace forward MMW radar (See page RA-22)**

DTC	C12E294	Radar blocked

Description

When the forward MMW radar is dirty or obscured, the forward MMW radar records the DTC.

DTC	DTC detection conditions	Faulty location
C12E294	(a) Radar blocked.	• Forward MMW radar

Inspection procedure

1	Check forward MMW radar

(a) Check whether the forward MMW radar is dirty.

(b) Check if the forward MMW radar is obscured.

NG → **Clean forward MMW radar or remove obstructions**

OK

2	Replace forward MMW radar (See page RA-22)

DTC	C12E398	Radar overtemperature

RA

Description

When the operating temperature of the forward MMW radar is too high, the forward MMW radar records the DTC.

DTC	DTC detection conditions	Faulty location
C12E398	(a) Radar overtemperature.	• Forward MMW radar • Ambient temperature

Inspection procedure

1	Power off or cool down the forward MMW radar

(a) Reduce the forward MMW radar temperature to the normal operating temperature.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace forward MMW radar (See page RA-22)**

OK

2	End

DTC	C12E464	AM-PM coefficient error

Description

When the function of forward MMW radar fails, the forward MMW radar records the DTC.

DTC	DTC detection conditions	Faulty location
C12E464	(a) AM-PM coefficient error.	• Forward MMW radar

Inspection procedure

1	Clear DTC

(a) Connect the HQ-VDS.

(b) Clear the DTC.

(c) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace forward MMW radar (See page RA-22)**

OK

2	End

DTC	C12E554	Radar not calibrated

RA

Description

When the forward MMW radar is not calibrated, the forward MMW radar records the DTC.

DTC	DTC detection conditions	Faulty location
C12E554	(a) Radar is not calibrated.	• Forward MMW radar

Inspection procedure

1	Clear DTC

(a) Connect the HQ-VDS.

(b) Clear the DTC.

(c) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Calibrate forward MMW radar**

OK

2	Replace forward MMW radar (See page RA-22)

DTC	C12E676	Radar deviation

Description

When the installation angle of the forward MMW radar exceeds the range, the forward MMW radar records the DTC.

DTC	DTC detection conditions	Faulty location
C12E676	(a) Radar deviation.	• Forward MMW radar

Inspection procedure

1	Check forward MMW radar

(a) Check whether the installation angle of the forward MMW radar is correct.

(b) Check if the forward MMW radar is firmly installed.

NG → **Repair according to the fault**

OK

2	Calibrate forward MMW radar

(a) Calibrate the forward MMW radar.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace forward MMW radar (See page RA-22)**

OK

3	End

DTC	U008388	Front MMW radar-IFC CAN bus OFF

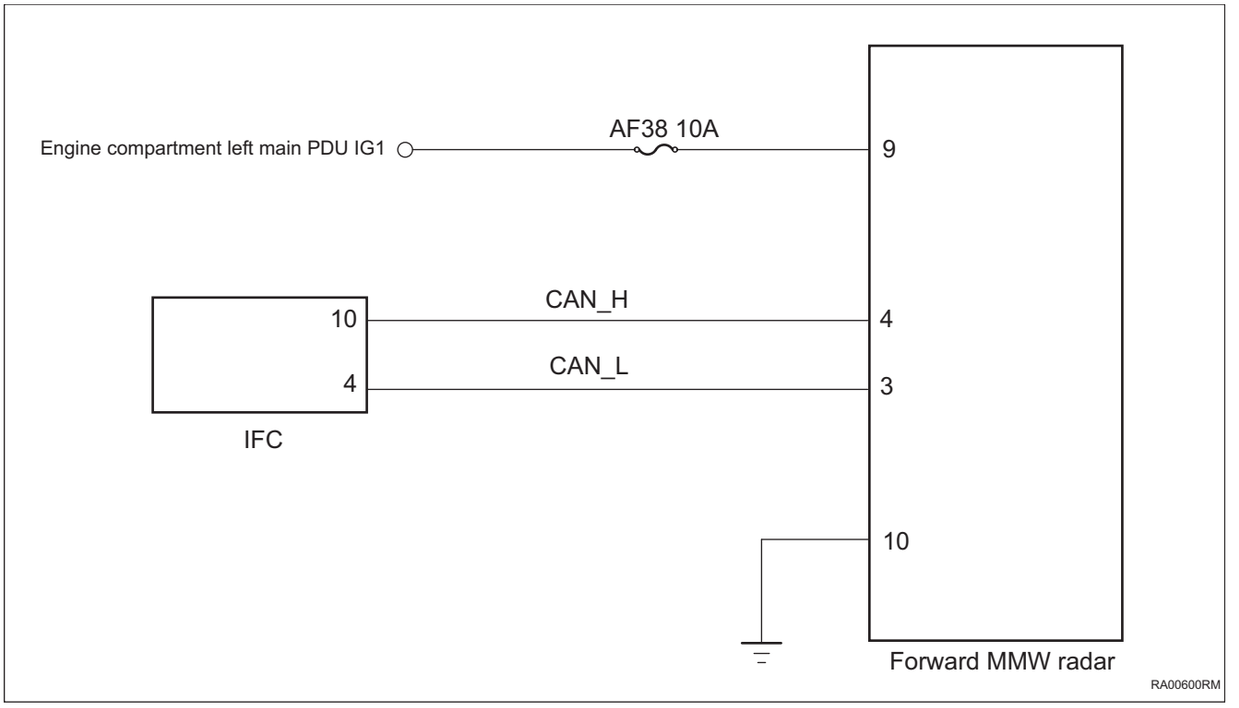
RA

Description

When the communication between the IFC and the forward MMW radar is abnormal or interrupted, the forward MMW radar records the DTC.

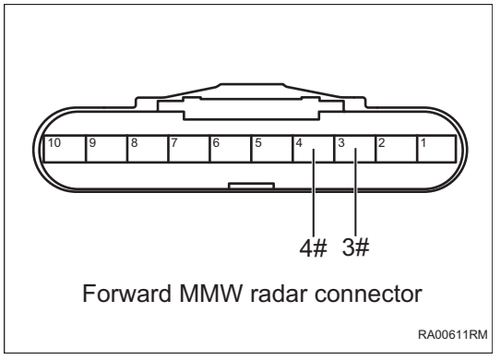
DTC	DTC detection conditions	Faulty location
U008388	(a) Front MMW radar-IFC CAN bus OFF	• IFC • Harness and connector • Forward MMW radar

Circuit diagram



Inspection procedure

1	Check whether there is short circuit between the private CAN bus CAN-L and CAN-H



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the forward MMW radar connector.

(d) Disconnect the IFC connector.

(e) Measure the resistance according to the values in the table below.

Standard value

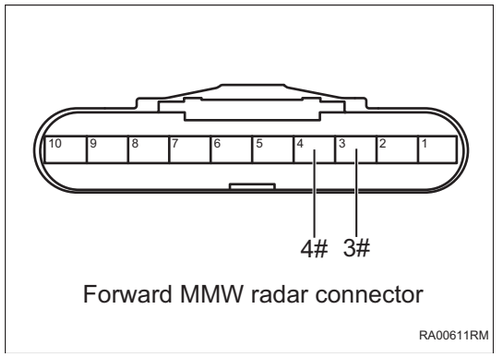
Detector connection	Detection conditions	Specified state
Forward MMW radar connector 4# -forward MMW radar connector 3#	Always connected	10KΩ or greater

NG → **Repair or replace the harness and connector**

RA

OK

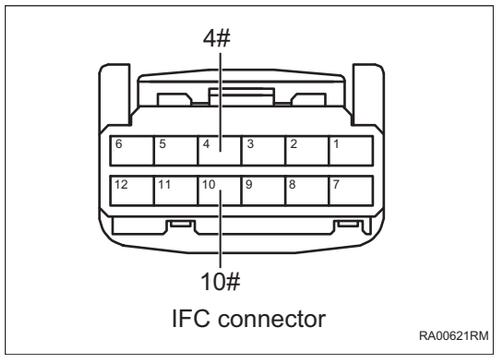
2 Check whether private CAN bus circuit is open (IFC-forward MMW radar)



(a) Measure the resistance according to the values in the table below.

Standard value

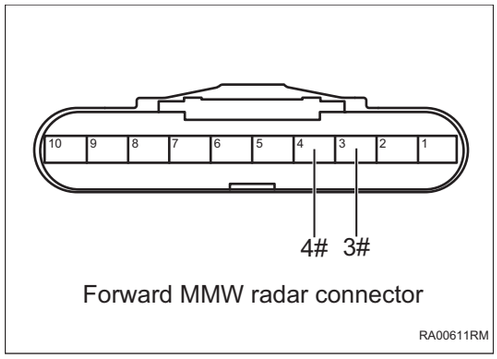
Detector connection	Detection conditions	Specified state
Forward MMW radar connector 3# -IFC connector 4#	Always connected	Less than 1Ω
Forward MMW radar connector 4# -IFC connector 10#	Always connected	Less than 1Ω



NG → **Repair or replace the harness and connector**

OK

3 Check the private CAN bus for circuit shorted to ground (IFC - forward MMW radar)



(a) Measure the resistance according to the values in the table below.

Standard value

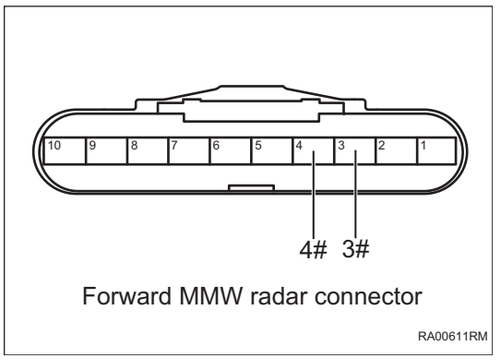
Detector connection	Detection conditions	Specified state
Forward MMW radar connector 4# -body GND	Always connected	10 KΩ or greater
Forward MMW radar connector 3# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

RA

OK

4	**Check the private CAN bus for circuit shorted to power supply (IFC - forward MMW radar)**



Forward MMW radar connector

RA00611RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

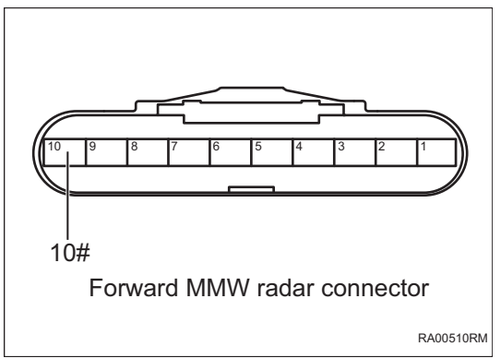
Standard value

Detector connection	Detection conditions	Specified state
Forward MMW radar connector 4# -body GND	Set the ignition switch to "ON"	Less than 1 V
Forward MMW radar connector 3# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Check forward MMW radar ground**



Forward MMW radar connector

RA00510RM

(a) Measure the resistance according to the values in the table below.

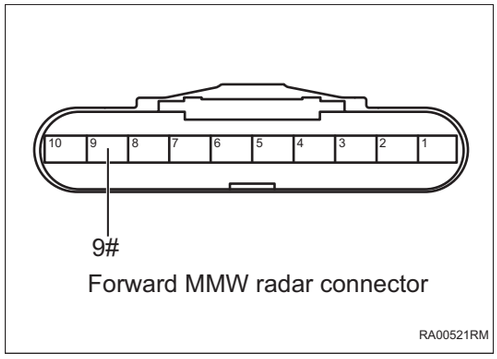
Standard value

Detector connection	Detection conditions	Specified state
Forward MMW radar connector 10# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

6	**Check forward MMW radar power supply**



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Forward MMW radar connector 9# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

7	**Replace the IFC (See page CC-34)**

(a) Replace the IFC.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace forward MMW radar (See page RA-22)**

OK

8	**End**

RA

DTC	**U003788**	**Driver assistance/extension CAN bus off**
DTC	**U008388**	**Front MMW radar-IFC CAN bus OFF**
DTC	**U014687**	**GW node lost**
DTC	**U114687**	**GW node lost**
DTC	**U112187**	**ESP message lost**
DTC	**U113187**	**EPS ECU message lost**
DTC	**U115587**	**Instrument cluster control unit message lost**
DTC	**U110187**	**TCU message lost**
DTC	**U129387**	**HCU message lost**
DTC	**U040282**	**TCU message content error**
DTC	**U040283**	**TCU message content error**
DTC	**U059482**	**HCU message content error**
DTC	**U059483**	**HCU message content error**
DTC	**U042082**	**EPS ECU message content error**
DTC	**U042083**	**EPS ECU message content error**
DTC	**U041582**	**ABS/ESP/ESP with APB message content error**
DTC	**U041583**	**ABS/ESP/ESP with APB message content error**

Description

When the communication between the forward MMW radar and other systems is abnormal or interrupted, the forward MMW radar records the DTC.

DTC	DTC detection conditions	Faulty location
U003788	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U008388	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U112187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

DTC	DTC detection conditions	Faulty location
U113187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U129387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U040282	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U040283	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059482	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059483	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042082	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042083	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041582	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041583	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

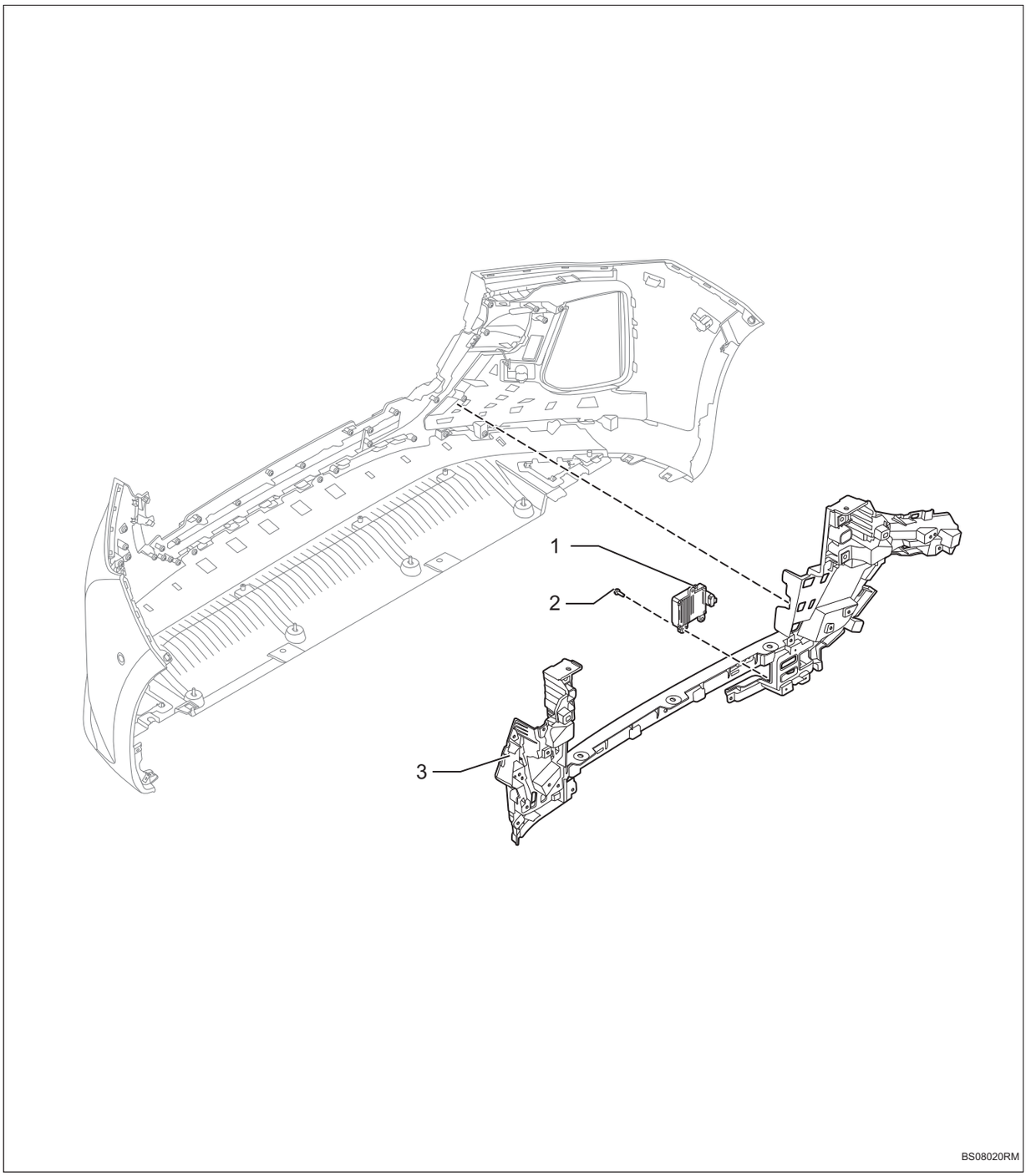
Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

Forward MMW radar assembly

Parts

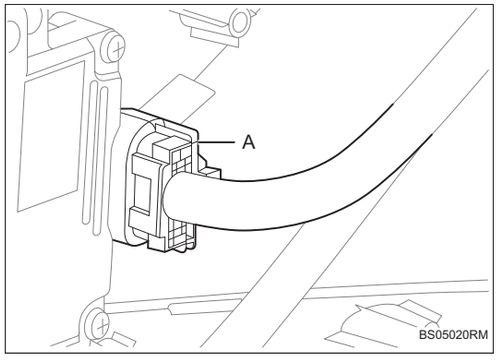
RA



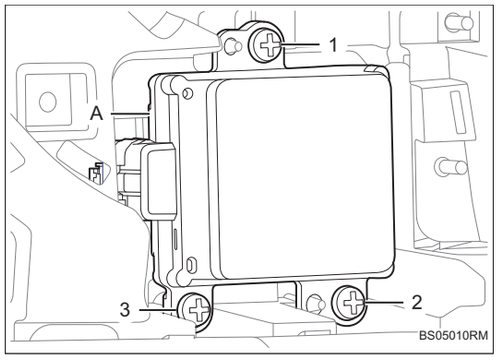
1. **Forward MMW radar assembly**
2. **Tapping screw and flat washer assembly**
   - X3
3. **Front bumper middle bracket**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove front bumper assembly (See page ET-7)**
3. **Remove front bumper middle bracket (See page ET-7)**
4. **Remove forward MMW radar assembly**



(a) Disconnect the harness connector-A-.



(b) Remove the screw -1-3- and remove the forward MMW radar assembly-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

LCDA

Rear corner MMW radar BS-1
Precautions BS-1
Location of parts BS-3
System diagram BS-6
System description BS-6
Symptom chart BS-7
ECU terminal BS-8
DTC chart BS-9
B16C017 ..... BS-11
B16C016 ..... BS-11
B16CC54 ..... BS-14
B16CF01 ..... BS-15
U003788 ..... BS-16
U014687 ..... BS-16
U023387 ..... BS-16
U110087 ..... BS-16
U110187 ..... BS-16
U129387 ..... BS-16
U112187 ..... BS-16
U113187 ..... BS-16
U114087 ..... BS-16
U119987 ..... BS-16
U120087 ..... BS-16
U120187 ..... BS-16
U120287 ..... BS-16
U115587 ..... BS-16
U124587 ..... BS-16
U040182 ..... BS-16
U040183 ..... BS-16
U040186 ..... BS-16
U040282 ..... BS-16
U040283 ..... BS-16
U040286 ..... BS-16
U059482 ..... BS-16
U059483 ..... BS-16
U059486 ..... BS-16
U041582 ..... BS-16
U041583 ..... BS-16
U041586 ..... BS-16

U042082 ..... BS-16
U042083 ..... BS-17
U042086 ..... BS-17
Rear corner MMW radar BS-19
Parts BS-19
Removal BS-20
Installation BS-20
Calibration BS-20

Rear corner MMW radar

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Warning:

Before repairing the high voltage system or adjacent high voltage system components, be sure to carefully read the "Instructions and precautions for maintenance work" in the introduction carefully!

2. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

3. General repair instructions

(a) When the part needs to be replaced or the connector needs to be disconnected during maintenance of rear corner MMW radar electronic control system, disconnect the battery negative cable.

(b) The door control system needs to be initialized after reconnecting the battery. And use the HQ-VDS to "clear the DTC" for all electronic control systems.

4. Precautions of SRS during rear corner MMW radar electronic control system operation:

(a) Some maintenance operations will affect the SRS airbag. Be sure to read the "precautions" of the SRS airbag before maintenance.

5. **The rear corner MMW radar electronic control system is installed on both sides of the rear bumper of the vehicle. In case of vehicle collision and scratch, it is necessary to confirm whether the control unit is affected. If it is affected, it shall be re calibrated.**

6. **The system shall be adjusted after replacement or removal of rear corner MMW radar electronic control system.**

7. **Radar calibration has the following requirements for vehicle:**

   (a) Correct tire pressure;

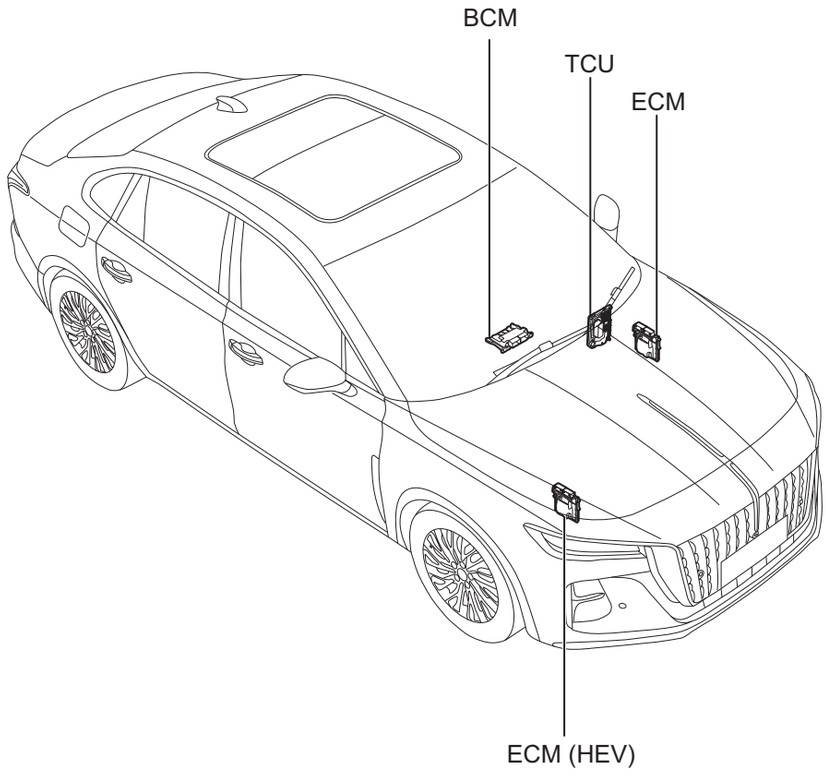
   (b) Make the vehicle under no load at the time of calibration;

   (c) Parking brake activation (optional)

8. **General precautions:**

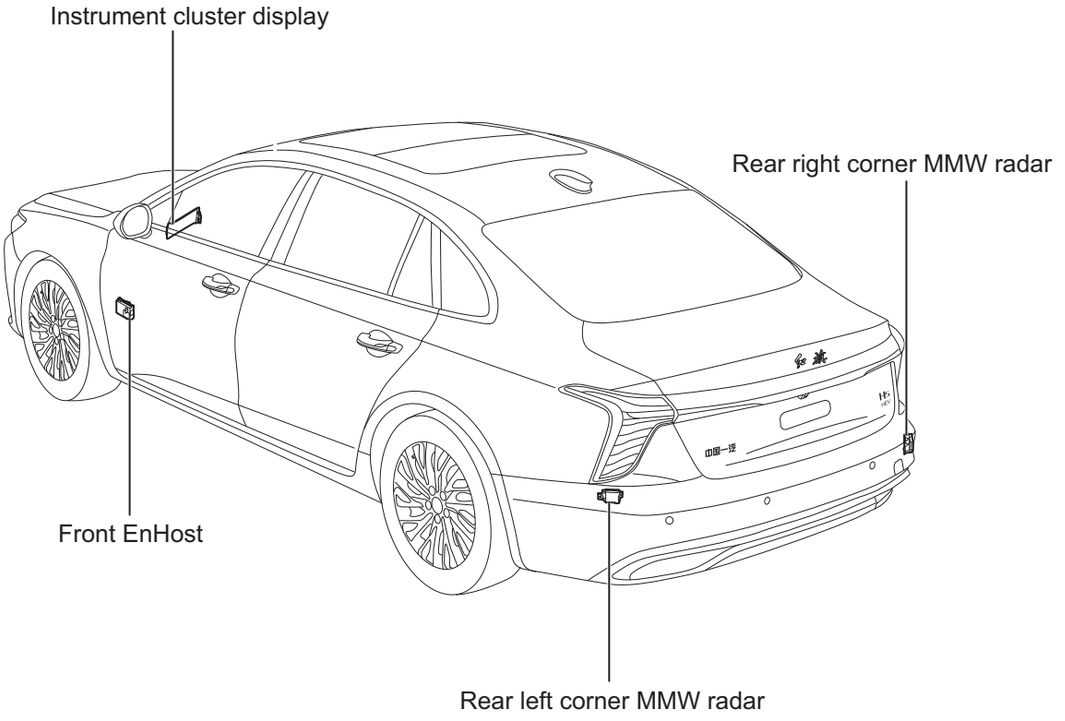
   (a) When detecting the battery voltage during the test, do not keep the positive and negative probes of the detector too close to avoid short circuit.

Location of parts

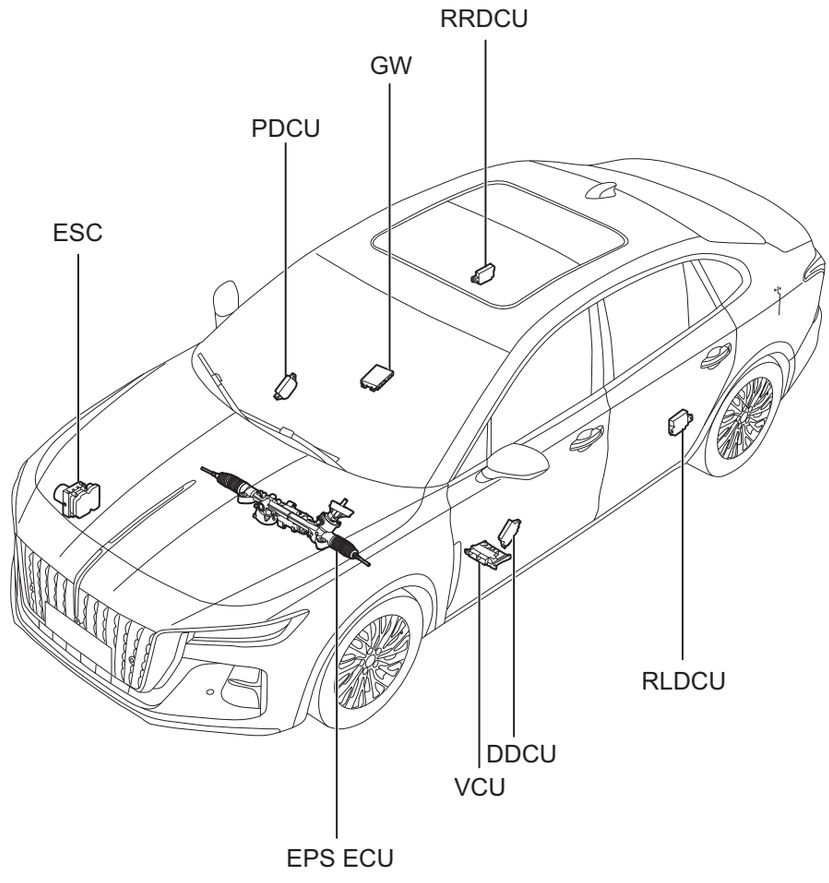


BS00030RM

BS



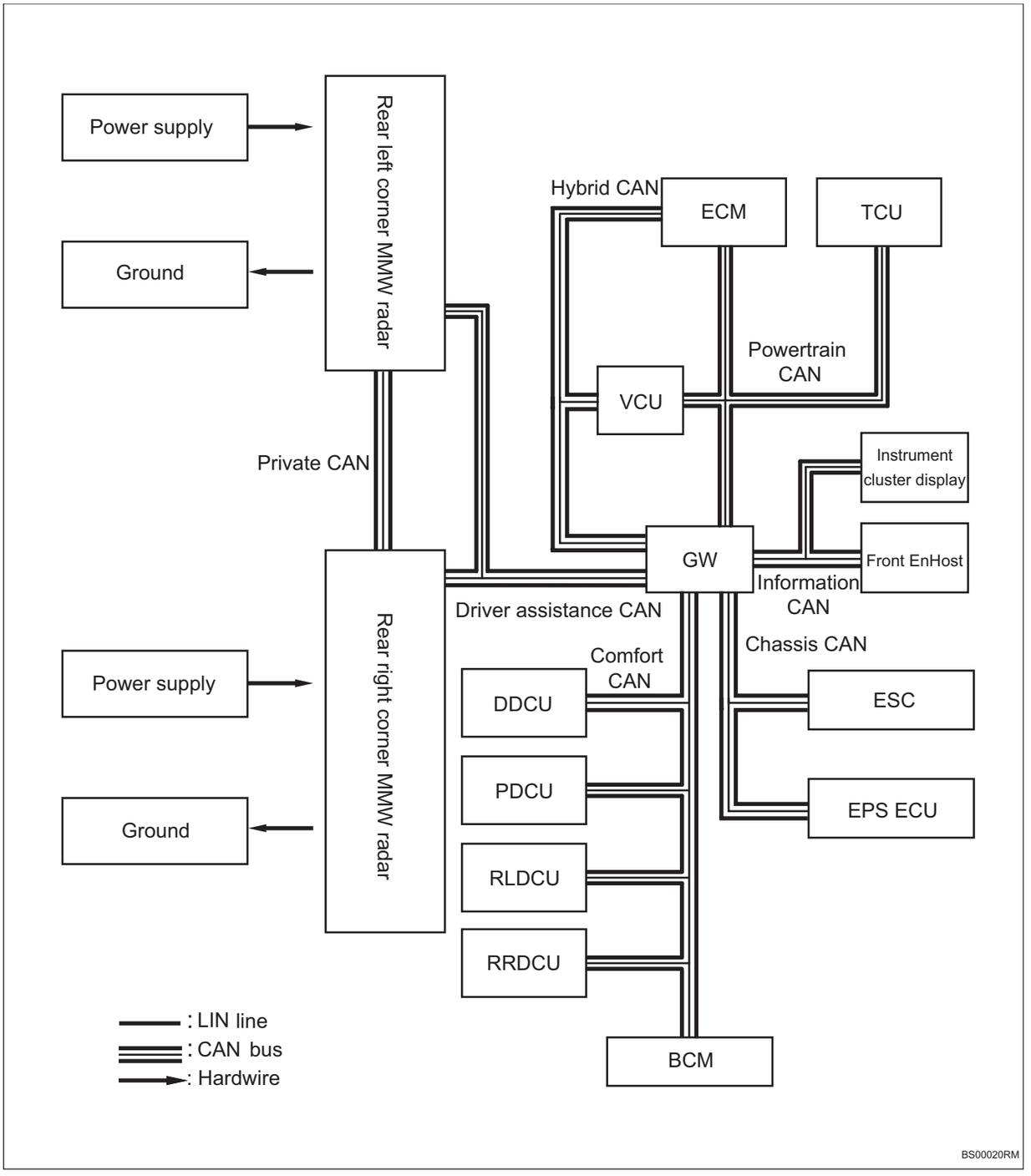
BS00040RM



BS00050RM

BS

System diagram



System description

1. LCDA

(a) The LCDA has the functions of blind spot detection, lane change assistance, rear crossing traffic alert and backward collision warning to provide driving assistance.

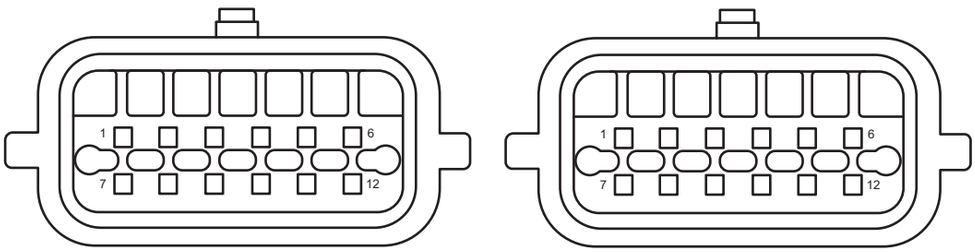
2. LCDA ON/OFF

(a) Turn on and off each function of the blind spot detection system in the vehicle settings interface of the IVI.

Symptom chart

Fault	Possible location
System function shutdown	• Power supply voltage • Rear left corner MMW radar • Rear right corner MMW radar • Communication failure

ECU terminal



Rear left MMW radar

Rear right MMW radar

BS00010RM

Rear left corner MMW radar	
Pin No.	**DEFINITIONS**
1	VPOWER
2	CAN-H
3	—
4	FD_CAN-H
5	—
6	—
7	CAN-L
8	—
9	FD_CAN-L
10	GND
11	—
12	—

Rear right corner MMW radar	
Pin No.	**DEFINITIONS**
1	VPOWER
2	CAN-H
3	—
4	FD_CAN-H
5	—
6	—
7	CAN-L
8	—
9	F-D_CAN-L

Rear right corner MMW radar	
Pin No.	**DEFINITIONS**
10	GND
11	—
12	—

DTC chart

DTC	Description	Reference page
B16C017	Input 12 V power supply overvoltage	(See page BS-11)
B16C016	Input 12 V power supply undervoltage	(See page BS-11)
B16CC54	Radar not calibrated or calibrated incorrectly	(See page BS-14)
B16CF01	Master software version check error	(See page BS-15)
U003788	Driver assistance CAN bus off	(See page BS-17)
U014687	GW node lost	(See page BS-17)
U023387	Right lane change assist control unit node lost	(See page BS-17)
U110087	ECM message lost	(See page BS-17)
U110187	TCU message lost	(See page BS-17)
U129387	HCU message lost	(See page BS-17)
U112187	ESP message lost	(See page BS-17)
U113187	EPS ECU message lost	(See page BS-17)
U114087	BCM 1 message lost	(See page BS-17)
U119987	Driver door module message lost	(See page BS-17)
U120087	Passenger door module message lost	(See page BS-17)
U120187	Rear left door module message lost	(See page BS-17)
U120287	Rear right door module message lost	(See page BS-17)
U115587	Instrument cluster control unit message lost	(See page BS-17)
U124587	EnHost message lost	(See page BS-17)
U040182	ECM message content error	(See page BS-17)
U040183	ECM message content error	(See page BS-17)
U040186	ECM message content error	(See page BS-17)
U040282	TCU message content error	(See page BS-17)
U040283	TCU message content error	(See page BS-17)
U040286	TCU message content error	(See page BS-17)
U059482	HCU message content error	(See page BS-17)
U059483	HCU message content error	(See page BS-17)
U059486	HCU message content error	(See page BS-17)
U041582	ESP message content error	(See page BS-17)
U041583	ESP message content error	(See page BS-17)
U041586	ESP message content error	(See page BS-17)

DTC	Description	Reference page
U042082	EPS ECU message content error	(See page BS-17)
U042083	EPS ECU message content error	(See page BS-17)
U042086	EPS ECU message content error	(See page BS-17)

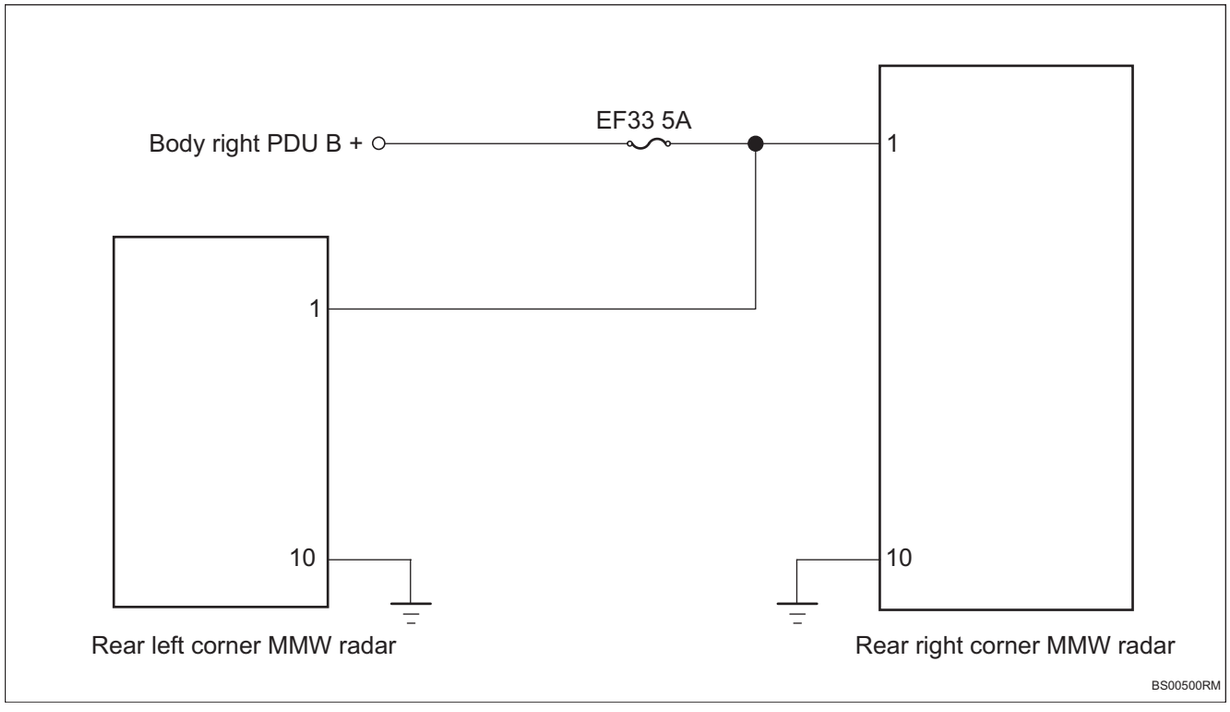
DTC	B16C017	Input 12 V power supply overvoltage
DTC	B16C016	Input 12 V power supply undervoltage

Description

When the input voltages of the rear left and right corner MMW radars are too high or too low, the rear left and right corner MMW radars record the DTC.

DTC	DTC detection conditions	Faulty location
B16C017	(a) Input 12 V power supply overvoltage.	• Rear left corner MMW radar • Rear right corner MMW radar • Harness and connector • Battery/charging system
B16C016	(a) Input 12 V power supply undervoltage.	• Rear left corner MMW radar • Rear right corner MMW radar • Harness and connector • Battery/charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the engine and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery + - battery -	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2 Check rear left/right corner MMW radar fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the rear left/right corner MMW radar fuse.

(d) Measure the resistance according to the values in the table below.

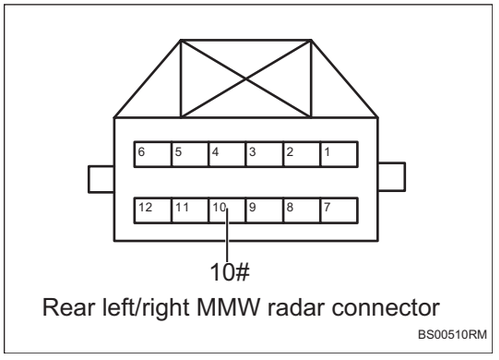
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3 Check rear left/right corner MMW radar ground



Rear left/right MMW radar connector

(a) Disconnect the rear left and right corner MMW radar connector.

(b) Measure the resistance according to the values in the table below.

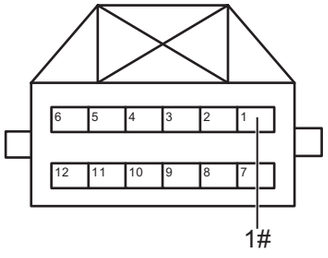
Standard value

Detector connection	Detection conditions	Specified state
Rear left corner MMW radar connector 10# - body GND	Always connected	Less than 1Ω
Rear right corner MMW radar connector 10# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check rear left/right corner MMW radar power supply**



Rear left/right MMW radar connector

BS00521RM

(a) Install the rear left/right corner MMW radar fuse.

(b) Connect the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Rear left corner MMW radar connector 1# - body GND	The ignition switch is set to "ON"	Battery voltage
Rear right corner MMW radar connector 1# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace rear left/right corner MMW radar (See page BS-19)**

BS

DTC	B16CC54	Radar not calibrated or calibrated incorrectly

Description

When the calibration of the rear left and right corner MMW radar fails, the rear left and right corner MMW radars record the DTC.

DTC	DTC detection conditions	Faulty location
B16CC54	(a) The radar is not calibrated or is not calibrated correctly.	• Rear left corner MMW radar • Rear right corner MMW radar

Inspection procedure

1	Perform calibration procedures for rear left/right corner MMW radar

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC.

(d) Perform calibration procedures for rear left/right corner MMW radar.

(e) Re-read the DTC.

Criteria:

No DTC is output.

YES → **Replace rear left/right corner MMW radar (See page BS-19)**

OK

2	End

DTC	B16CF01	Master software version check error

Description

When the internal data or hardware of the rear left and right corner MMW radars is faulty, the rear left and right corner MMW radars record DTC.

DTC	DTC detection conditions	Faulty location
B16CF01	(a) Master software version check error.	• Rear left corner MMW radar • Rear right corner MMW radar

Inspection procedure

1	Rear left and right corner MMW radar main software version check error

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Check whether other ECUs have this fault.

(d) Clear the DTC.

(e) Re-read the DTC.

Criteria:

No DTC is output.

YES → **Replace the corresponding rear lef/right corner MMW radar (See page BS-19)**

OK

2	End

DTC	U003788	Driver assistance CAN bus off
DTC	U014687	GW node lost
DTC	U023387	Right lane change assist control unit node lost
DTC	U110087	ECM message lost
DTC	U110187	TCU message lost
DTC	U129387	HCU message lost
DTC	U112187	ESP message lost
DTC	U113187	EPS ECU message lost
DTC	U114087	BCM 1 message lost
DTC	U119987	Driver door module message lost
DTC	U120087	Passenger door module message lost
DTC	U120187	Rear left door module message lost
DTC	U120287	Rear right door module message lost
DTC	U115587	Instrument cluster control unit message lost
DTC	U124587	EnHost message lost
DTC	U040182	ECM message content error
DTC	U040183	ECM message content error
DTC	U040186	ECM message content error
DTC	U040282	TCU message content error
DTC	U040283	TCU message content error
DTC	U040286	TCU message content error
DTC	U059482	HCU message content error
DTC	U059483	HCU message content error
DTC	U059486	HCU message content error
DTC	U041582	ESP message content error
DTC	U041583	ESP message content error
DTC	U041586	ESP message content error
DTC	U042082	EPS ECU message content error

DTC	U042083	EPS ECU message content error
DTC	U042086	EPS ECU message content error

Description

When the communication between the rear left and right corner MMW radar and other systems is abnormal or interrupted, the rear left and right corner MMW radars record the DTC.

DTC	DTC detection conditions	Faulty location
U003788	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U023387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U129387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U112187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U113187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U119987	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U120087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U120187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U120287	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U124587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U040182	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U040183	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U040186	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

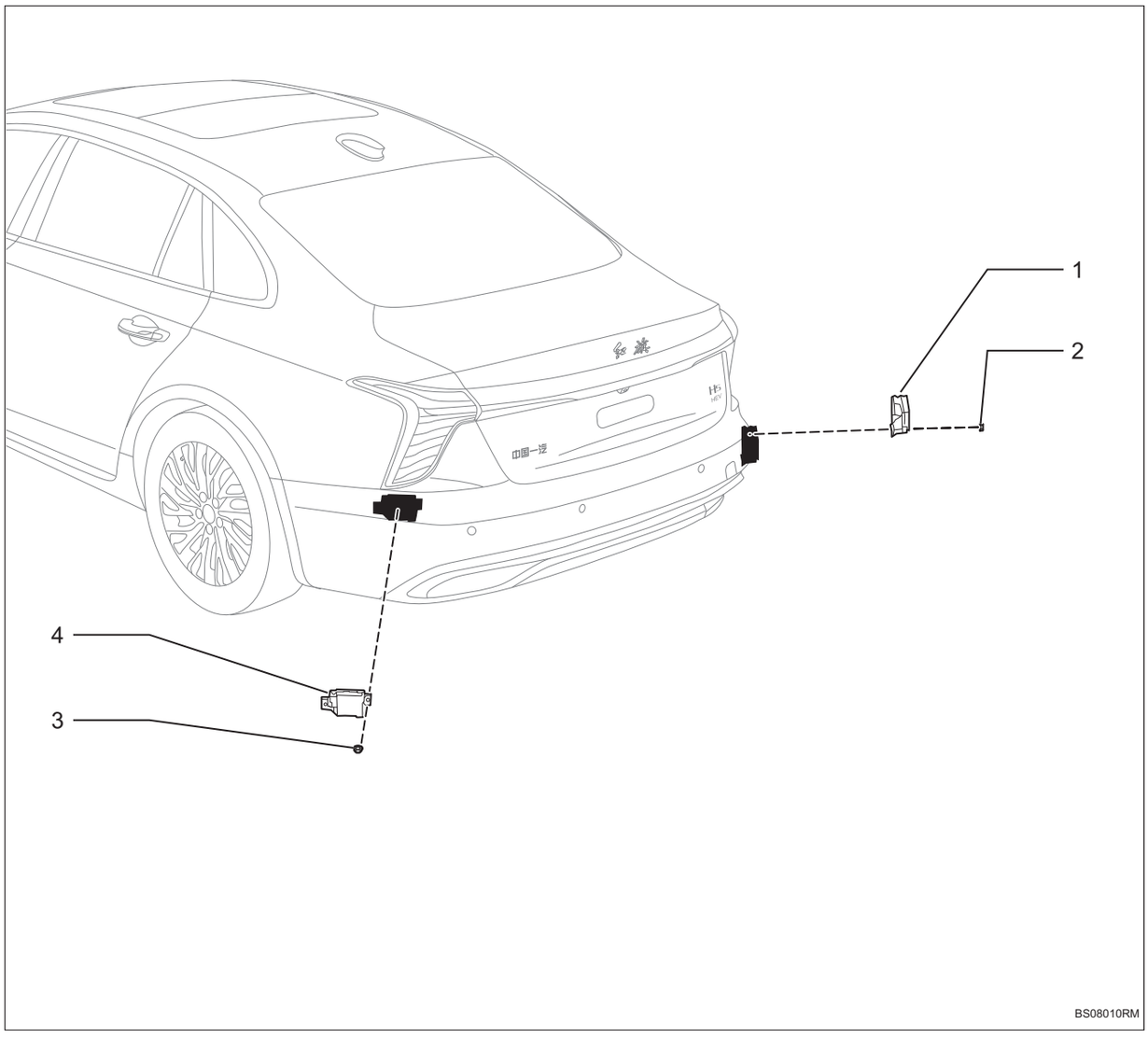
DTC	DTC detection conditions	Faulty location
U040282	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U040283	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U040286	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059482	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059483	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059486	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041582	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041583	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041586	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042082	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042083	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042086	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

Rear corner MMW radar

Parts



1. **Rear right corner MMW radar assembly**
2. **Hexagon flange nut**
   - X3
   - Torque: 8~12 N · m
3. **Hexagon flange nut**
   - X3
   - Torque: 8~12 N · m
4. **Rear left corner MMW radar assembly**

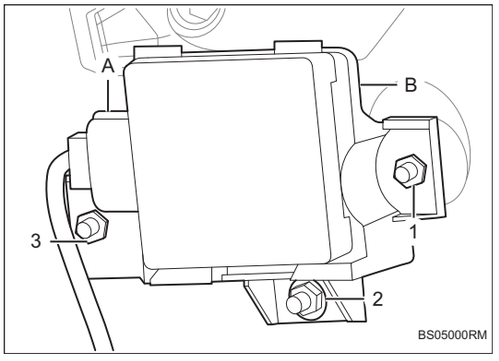
Removal

Hint:

The removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove rear bumper assembly (See page ET-21)**
3. **Remove the left rear corner MMW radar**



(a) Disconnect the harness connector-A-.

(b) Remove the nut -1-3-, and remove the left rear corner MMW radar assembly-B-.

Installation

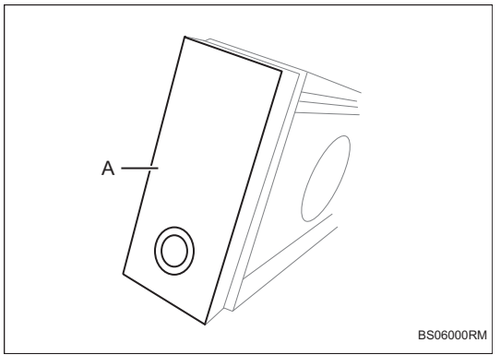
1. **The installation procedure is the reverse of removal procedure.**

Calibration

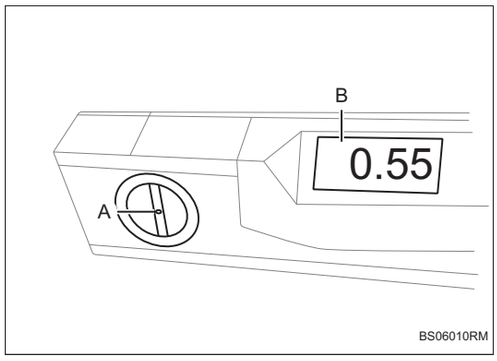
1. **Vertical angle measurement and correction**

(a) Open the level gauge;

(b) After checking the attachment end is free of debris, gently attach the level gauge -A- to the LCDA upper cover plane, and then gently move it twice to confirm whether it is completely attached;



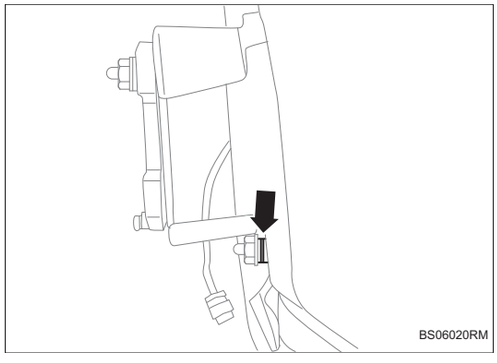
(c) After successful attachment, read the data on the level gauge-A-B;

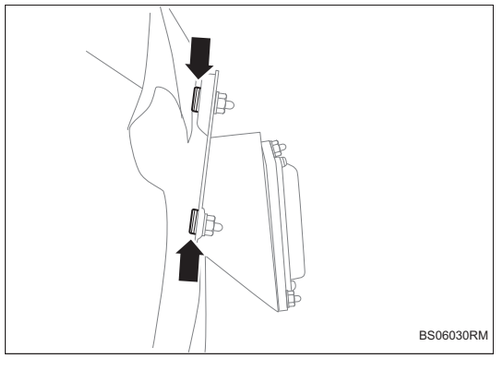


(d) If the angle error is within the range of 90±1 °, it is not necessary to adjust those that are considered acceptable (upward elevation is positive and downward elevation is negative); and then adjust those that are not acceptable in installation. (Adjustment method: shims can be set on the studs of LCDA bracket)

Hint:

When the radar is tilted down, a shim with a size of M6 and a thickness of 1mm can be placed at the lower screw. When the radar is tilted up, a shim with a size of M6 and a thickness of 1mm can be placed at the upper screw.





2. Horizontal angle calibration process

(a) Calibration requirements

(1) Ensure that the wheel alignment has been done before the radar calibration.

(2) Correct tire pressure.

(3) The vehicle shall be parked steadily in the calibrated position with the ground as level as possible.

(4) During calibration, 1 person is seated in the driver seat.

(5) Parking brake activation.

(6) The vehicle is in the IG ON power-on state.

(b) Calibration equipment

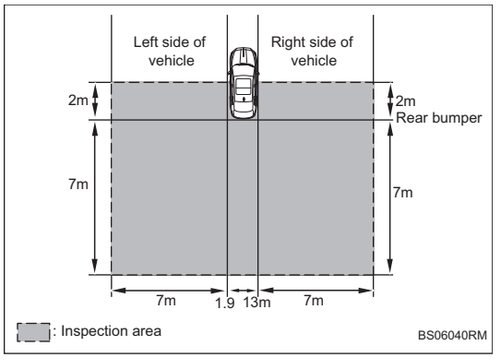
(1) Radar simulator and bracket.

(2) HQ-VDS.

(3) Absorbing material wall.

(c) Calibration environment

(1) The calibration circumstance diagram.



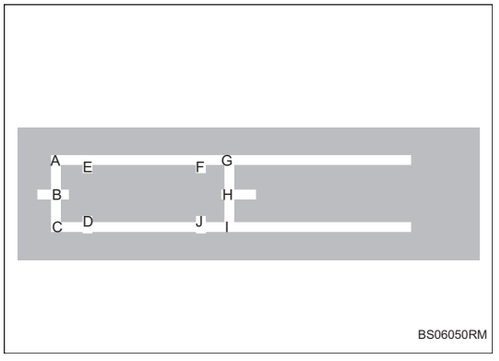
Warning:

(1) Only single targets of radar simulators are allowed in thecalibration environment;

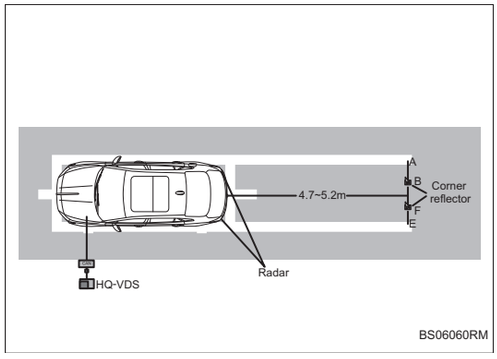
(2) No person is allowed to enter the test area duringcalibration.

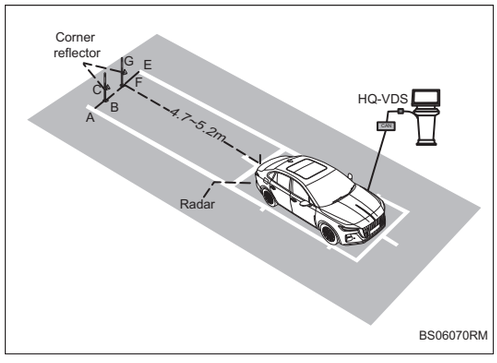
(3) Absorbing material shall be placed on the 7 m boundaryline to block out the surroundings, and the absorbing material walls shall be arranged on the 7 m ×7 m boundary behind the rear bumper.

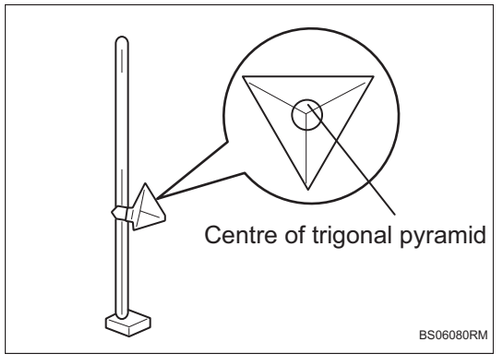
(2) Schematic diagram of the aboveground marking line on the calibration site.



Model	Name	Symbol	Value in mm
NEW H5	Length	AG、CI	4989
	Width	AC、GI	1873
	Front overhang	AE、CD	962
	Rear overhang	FG、JI	1107
	Center width	AB、BC、GH、HI	936.5







(3) Calibration renderings, showing layout of radar simulators.

Model	Name		Symbol	Value in mm
NEW H5	Distance from corner reflector to left parking bay line		EF	225
	Distance from corner reflector to right parking bay line		AB	222
	Height of left corner reflector	20TD+8AT+R 18 Tire	FG	586
		15TD+HEV+ R18 Tire		582
		15TD+7DCT+ R17 Tire		587
	Height of right corner reflector	20TD+8AT+R 18 Tire	BC	589
		15TD+HEV+ R18 Tire		584
		15TD+7DCT+ R17 Tire		589
	Distance from corner reflector to radar		CD	5000

(4) Radar simulator bracket diagram.

Hint:

The radar simulator bracket can adjust the height of the radar simulator according to different vehicle models to ensure that the height of the radar simulator is the same as that of the radar, and there are fixing devices on the radar pillars.

(d) Calibration steps

(1) Ensure that the vehicle state is good.

(2) Drive the vehicle to be calibrated into the calibration line.

(3) Place the radar simulator directly behind the left radar according to the placement position.

(4) After determining the radar simulator calibration point, connect the HQ-VDS and issue the automatic calibration command to the radar.

(5) Repeat the above procedures, and calibrate the right radar.

(e) Communication mode

(1) Communication mode: CAN.

(2) Baud rate: 500 kb.

(3) The HQ-VDS issues the calibration command. At this time, the radar enters the calibration mode. After the radar is successfully calibrated, it returns to the calibration end mark and the calibration state, and the radars on both sides are calibrated in turn.

(f) Calibration results

After the radar calibration is completed, the results will be fed back to the upper computer to determine whether to calibrate the next vehicle or to perform manual intervention to correct the deviation.

Radar calibration results:

1	Master radar calibration succeeded
2	Slave radar calibration succeeded
3	Main radar calibration failure (X degrees to the left)
4	Main radar calibration failure (X degrees to the right)
5	Slave radar calibration failure (X degrees to the left)
6	Slave radar calibration failure (X degrees to the right)

(g) Calibration errors

The contributing factors of radar errors include:

Error composition	Horizontal direction	Vertical direction
Radar installation error	±3°	-1°~1°
Angle between the vehicle and the longitudinal centerline of the X axis	±0.1°	-
Corner reflector vertical and horizontal inclination angle error	±0.5°	±0.5°
Corner reflector lateral distance error	±2mm	±2mm
Corner reflector vertical distance error	±2mm	±2mm

Caution:

(1) When the radar is installed in front of bumper made of different materials and there is reflection interference from other targets, additional errors may occur.

(2) Radar installation error refers to the angle error caused by the bracket and installation problems when the radar is installed on the bracket.

(h) Calibration failure reasons

Automatic angle calibration may fail in the following cases

(1) The calibration equipment fails.

(2) The corner reflector is not placed directly in front of the radar.

(3) The radar wave transmitted to the radar simulator is blocked.

(4) Excessive deviation of radar simulator placement.

(5) Excessive radar installation deviation.

(6) There is reflected interference from other targets similar to the radar simulator radial distance.

(7) There are stronger reflections from other targets within the target area.

(8) The vehicle is not in IG ON state during calibration.

(9) Absorbing materials are not placed as required.

IVI

Front EnHost AV-1
Precautions AV-1
Location of parts AV-3
System diagram AV-7
System description AV-9
Symptom chart AV-10
ECU terminal AV-11
DTC chart AV-12
B140017 ..... AV-14
B140016 ..... AV-14
B140104 ..... AV-18
B140201 ..... AV-22
B140501 ..... AV-22
B14034B AV-24
B140401 ..... AV-25
B140B01 ..... AV-25
B140901 ..... AV-27
B140A01 ..... AV-27
U101388 ..... AV-28
U02FA87 ..... AV-28
U131386 ..... AV-28
U14468A AV-32
U004688 ..... AV-35
U015587 ..... AV-35
U014687 ..... AV-35
U112187 ..... AV-35
U115187 ..... AV-35
U114087 ..... AV-35
U116487 ..... AV-35
U113187 ..... AV-35
U119987 ..... AV-35
U120087 ..... AV-35
U120187 ..... AV-35
U120287 ..... AV-35
U129387 ..... AV-35
U015887 ..... AV-35
U024887 ..... AV-35
U12E187 ..... AV-35
U124387 ..... AV-35

U123A87 ..... AV-35
U115987 ..... AV-35
U113887 ..... AV-35
U124687 ..... AV-35
U110087 ..... AV-35
U110187 ..... AV-35
U123587 ..... AV-35
U123287 ..... AV-35
U114687 ..... AV-35
U14A18E AV-35
U14A78E AV-35
U12D587 ..... AV-36

Squawker and tweeter assembly AV-38
Parts AV-38
Removal AV-40
Installation AV-41

Front door speaker assembly AV-42
Parts AV-42
Removal AV-44
Installation AV-45

Main display assembly AV-46
Parts AV-46
Removal AV-47
Installation AV-47

IVI assembly AV-48
Parts AV-48
Removal AV-49
Installation AV-49

Power amplifier AV-50
Parts AV-50
Removal AV-51
Installation AV-51

Woofer assembly AV-52
Parts AV-52
Removal AV-53
Installation AV-53

Front EnHost

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Warning:

Before repairing the high voltage system or adjacent high voltage system components, be sure to carefully read the "Instructions and precautions for maintenance work" in the introduction carefully!

2. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

3. When checking and replacing electronic components, make sure to disconnect the battery - to repair the system.

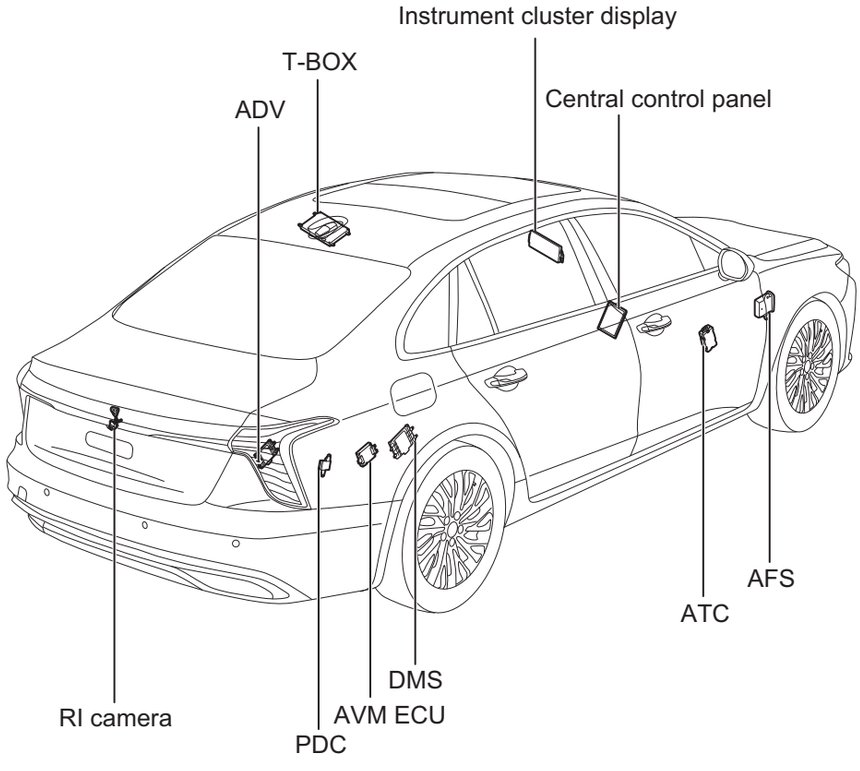
4. General repair instructions

(a) When checking the IVI, it may affect the operation of the airbag. Therefore, before carrying out maintenance work, be sure to carefully read and confirm the precautions for airbag.

(b) When the part needs to be replaced or the connector needs to be disconnected during maintenance of IVI, disconnect the battery negative cable.

(c) The door control system needs to be initialized after reconnecting the battery. And use the HQ-VDS to "clear the DTC" for all electronic control systems.

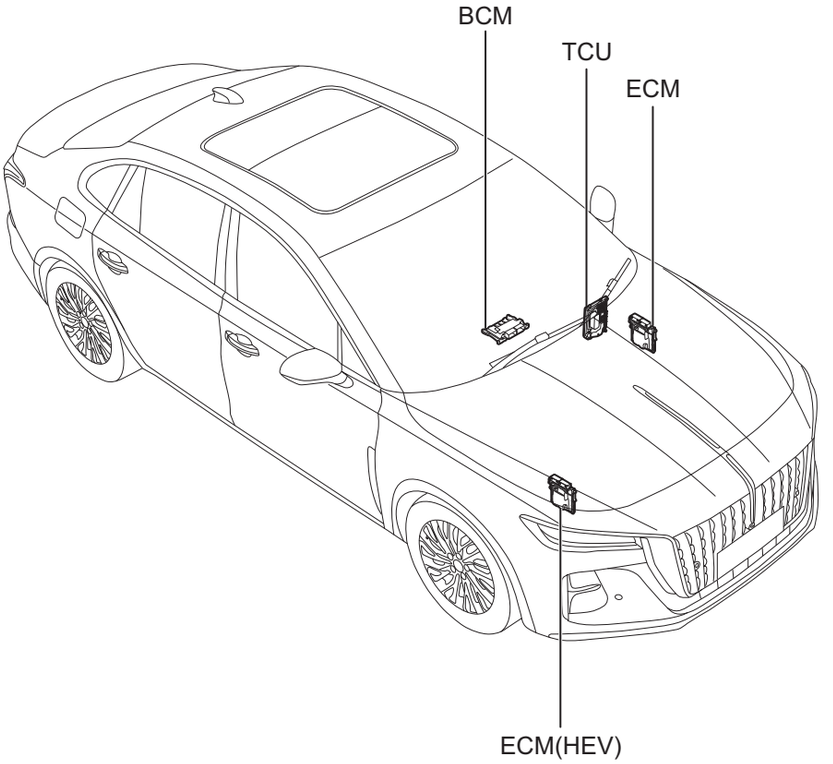
Location of parts



AV00050RM

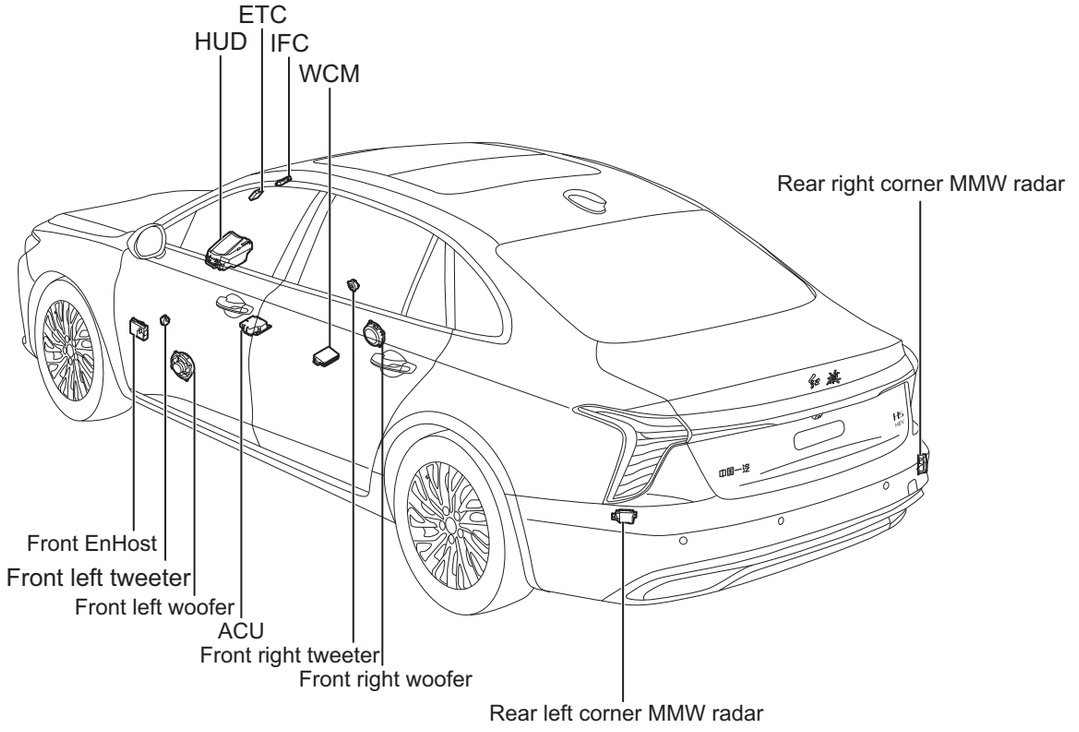
Location of parts

AV



AV00060RM

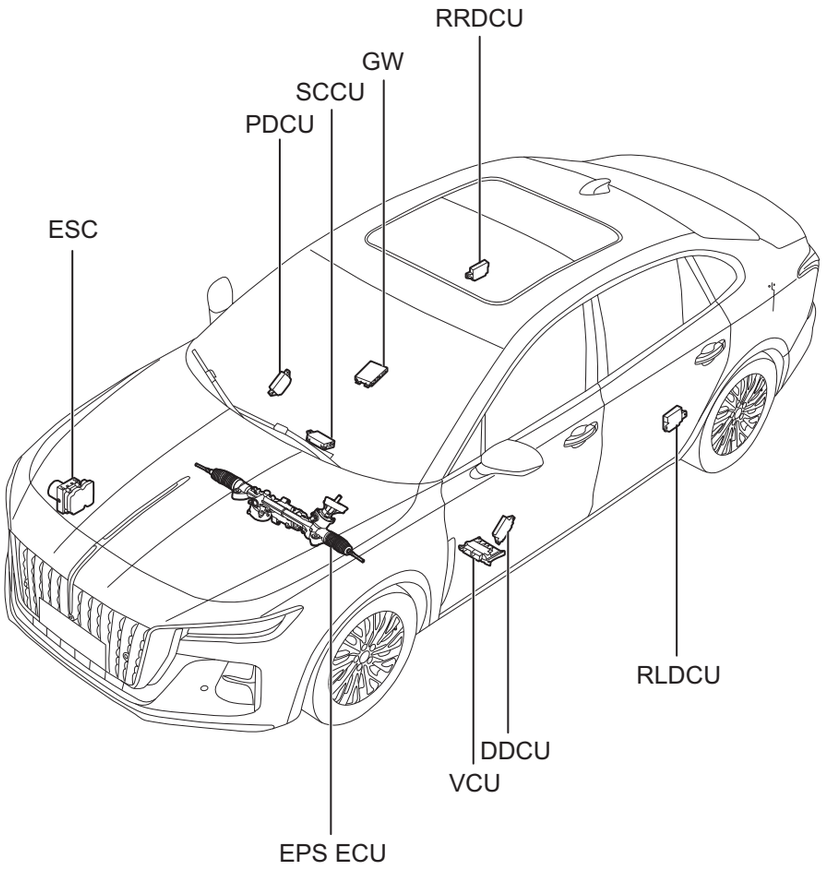
Location of parts



AV00070RM

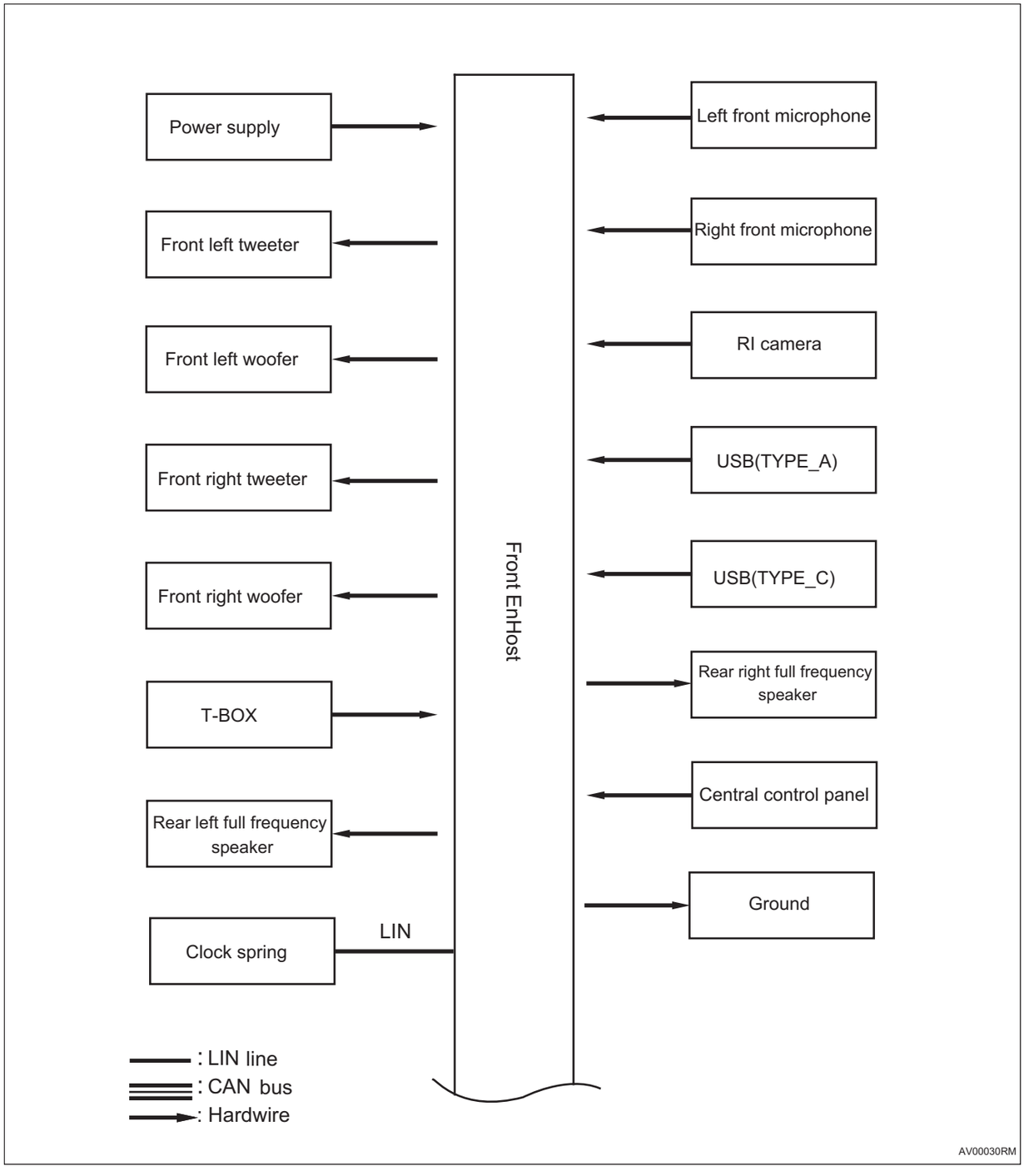
AV

Location of parts

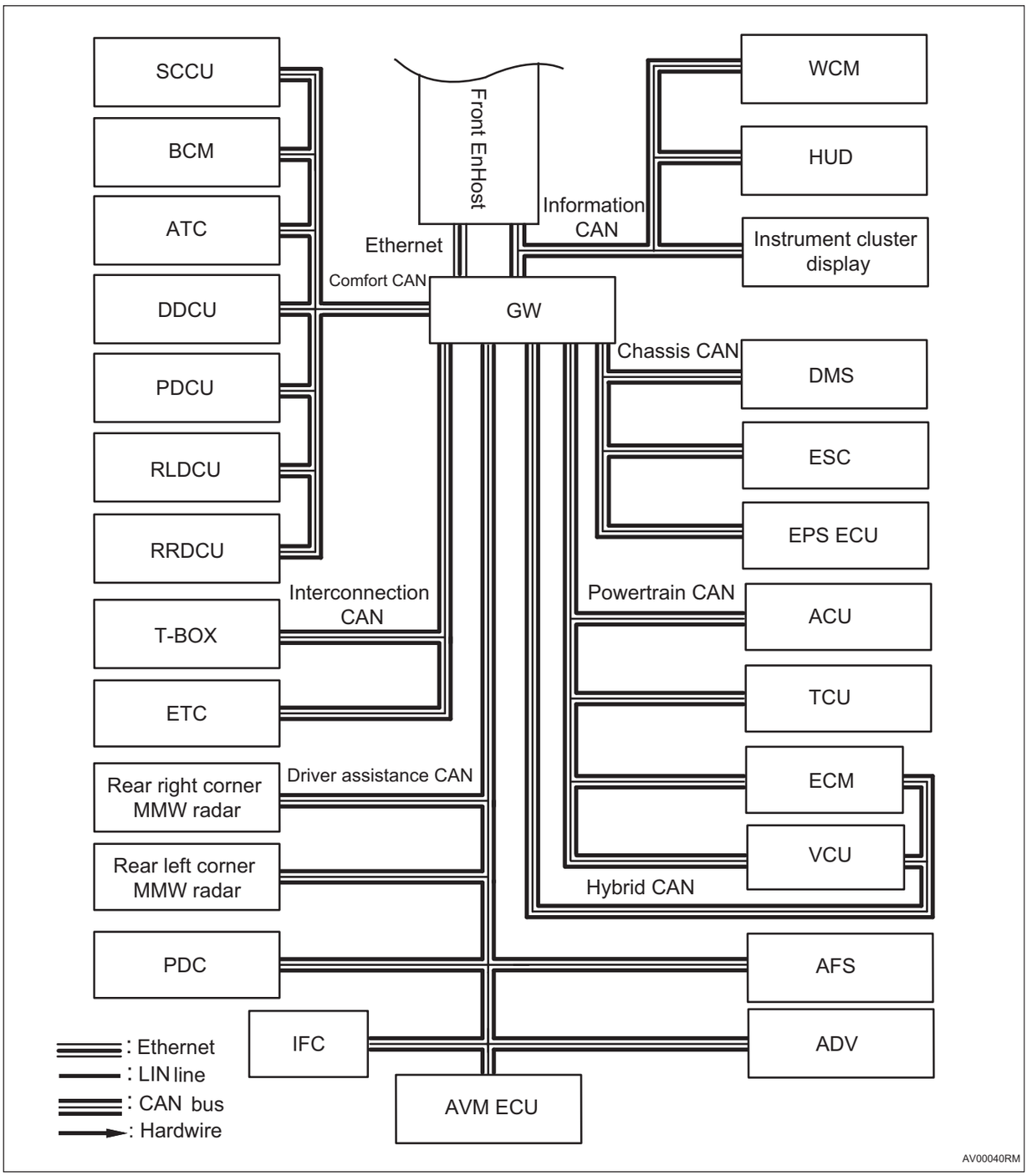


AV00080RM

System diagram



AV


SCCU
BCM
ATC
DDCU
PDCU
RLDCU
RRDCU
T-BOX
ETC
Rear right corner MMW radar
Rear left corner MMW radar
PDC
IFC
AVM ECU
Front EnHost
Ethernet
Comfort CAN
GW
Information CAN
WCM
HUD
Instrument cluster display
Chassis CAN
DMS
ESC
EPS ECU
Powertrain CAN
ACU
TCU
ECM
VCU
Hybrid CAN
Interconnection CAN
Driver assistance CAN
AFS
ADV
: Ethernet
: LIN line
: CAN bus
: Hardwire
AV00040RM

System description

1. Function brief description

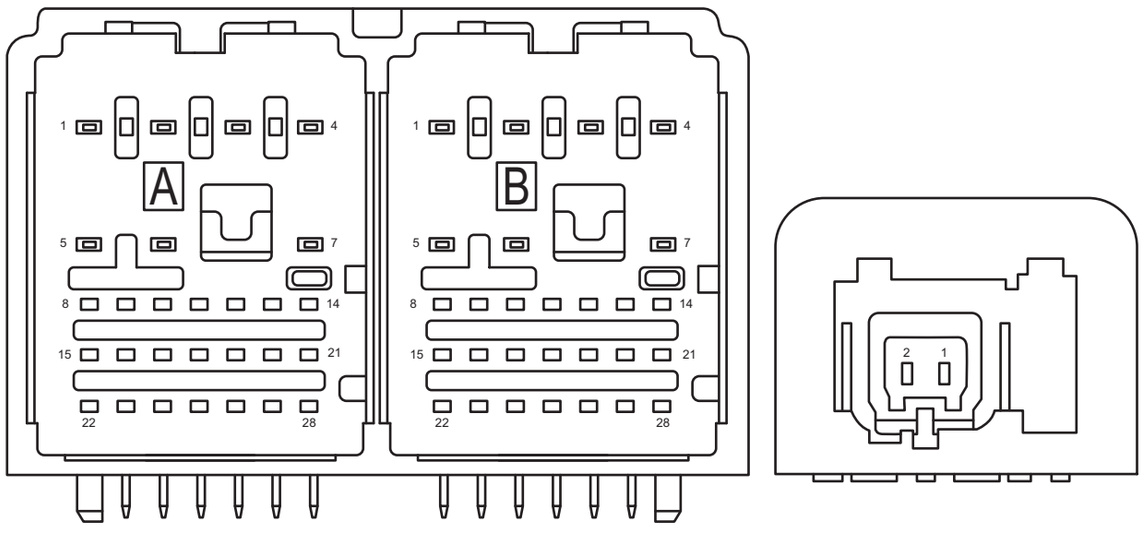
(a) Navigation, telephone, radio, music, vehicle settings and other functions are operated by the multimedia display.

Symptom chart

Fault	Possible location
Display inoperative	• Related harness and connector • Battery • Front EnHost • Main display

ECU terminal

Front EnHost



Front EnHost A Front EnHost B Front EnHost F

AV00010RM

Front EnHost-A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	A/V rear right channel -	15	External power amplifier switch enable signal
2	A/V rear right channel +	16	External power amplifier GND
3	A/V rear left channel -	17	-
4	A/V rear left channel +	18	Microphone ground 1
5	Main power supply ground	19	Microphone 1+
6	Main power supply ground	20	Microphone ground 2
7	IGN	21	Microphone 2+
8	Feedback tone LF_H_REF-	22	-
9	Feedback tone LF_H_REF +	23	-
10	Feedback tone LF_L_REF-	24	-
11	Feedback tone LF_L_REF +	25	Feedback tone RF_L_REF-
12	-	26	Feedback tone RF_H_REF +
13	External power amplifier control signal	27	Feedback tone RF_L_REF-
14	External power amplifier GND	28	Feedback tone RF_L_REF +

Front EnHost-B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	A/V front right channel +	15	-
2	A/V front right channel -	16	CAN-L
3	A/V front left channel +	17	CAN-H
4	A/V front left channel -	18	-
5	B+	19	-
6	B+	20	-
7	-	21	LIN
8	TBOX microphone output-	22	-
9	TBOX microphone output+	23	-
10	T-BOX GND	24	-
11	TBOX audio input+	25	-
12	TBOX audio input-	26	-
13	T-BOX GND	27	-
14	External TBOX input MUTE	28	-

Front EnHost-F			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Ethernet +	2	Ethernet-

DTC chart

Front EnHost

DTC	Description	Reference page
B140017	Overvoltage	(See page AV-14)
B140016	Undervoltage	(See page AV-14)
B140104	Microphone fault	(See page AV-18)
B140201	RVC power supply failure	(See page AV-22)
B14034B	System overtemperature	(See page AV-24)
B140401	Screen communication failure	(See page AV-25)
B140B01	Touch communication failure	(See page AV-25)
B140501	No RVC video input	(See page AV-22)
B140901	Left micro switch jamming	(See page AV-27)
B140A01	Right micro switch jamming	(See page AV-27)
U004688	Information CAN bus off	(See page AV-36)
U015587	IPC node lost	(See page AV-36)
U014687	GW node lost	(See page AV-36)
U112187	ESP message lost	(See page AV-36)
U115187	ACU message lost	(See page AV-36)
U114087	BCM 1 message lost	(See page AV-36)

DTC	Description	Reference page
U116487	A/C control unit message lost	(See page AV-36)
U113187	EPS ECU message lost	(See page AV-36)
U119987	Driver door module message lost	(See page AV-36)
U120087	Passenger door module message lost	(See page AV-36)
U120187	Rear left door module message lost	(See page AV-36)
U120287	Rear right door module message lost	(See page AV-36)
U129387	HCU message lost	(See page AV-36)
U14468A	VI1 ETH1 connection failure	(See page AV-32)
U101388	LIN1 physical bus error	(See page AV-28)
U02FA87	MFS node lost	(See page AV-28)
U131386	Multi-function steering wheel LIN communication error	(See page AV-28)
U015887	HUD node lost	(See page AV-36)
U024887	WCM node lost	(See page AV-36)
U12E187	IHC message lost	(See page AV-36)
U124387	ADV message lost	(See page AV-36)
U123A87	AVM ECU message lost	(See page AV-36)
U115987	PDC message lost	(See page AV-36)
U113887	Driving mode selection control unit message lost	(See page AV-36)
U124687	SCCU message lost	(See page AV-36)
U110087	ECM message lost	(See page AV-36)
U110187	TCU message lost	(See page AV-36)
U123587	IFC message lost	(See page AV-36)
U123287	LCDA message lost	(See page AV-36)
U114687	GW message lost	(See page AV-36)
U14A18E	TBox SOMEIP no response	(See page AV-36)
U14A78E	IC SOMEIP no response	(See page AV-36)
U12D587	ETC system message lost	(See page AV-36)

DTC	B140017	Overvoltage
DTC	B140016	Undervoltage

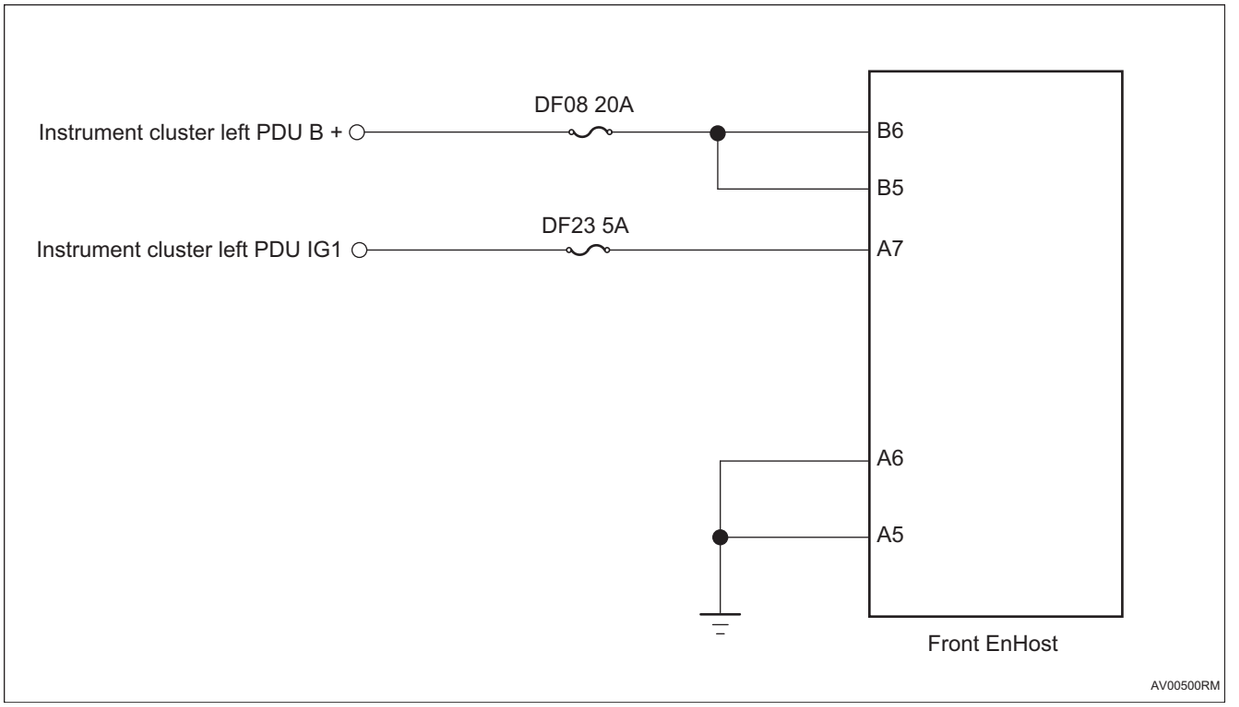
Description

AV

When the voltage of front EnHost power supply is too high or too low, the front EnHost records the DTC.

DTC	DTC detection conditions	Faulty location
B140017	(a) Overvoltage.	• Front EnHost • Harness and connector • Battery/charging system
B140016	(a) Undervoltage.	• Front EnHost • Fuse • Harness and connector • Battery/charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery + - battery -	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2 Check front EnHost fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the front EnHost fuse.

(d) Measure the resistance according to the values in the table below.

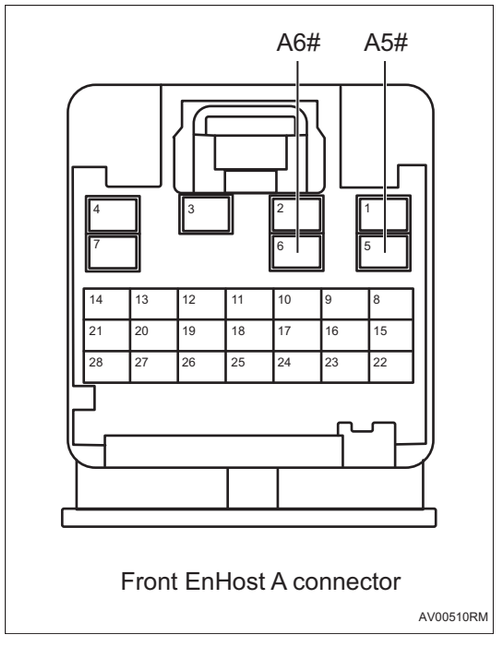
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3 Check front EnHost ground



Front EnHost A connector

AV00510RM

(a) Disconnect the front EnHost connector.

(b) Measure the resistance according to the values in the table below.

Standard value

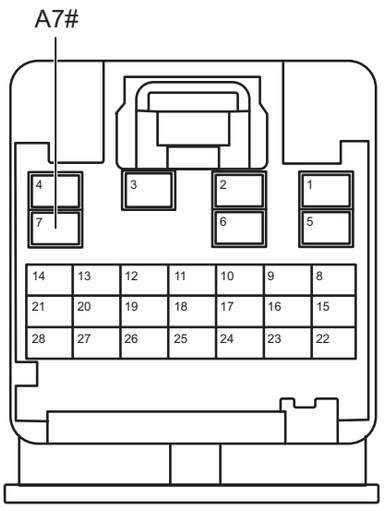
Detector connection	Detection conditions	Specified state
Front EnHost connector A6# -body GND	Always connected	Less than 1Ω
Front EnHost connector A5# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

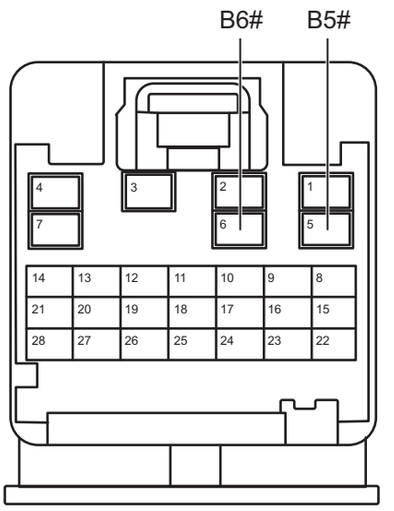
OK

4	Check front EnHost power supply

AV



Front EnHost A connector



Front EnHost B connector

AV00521RM

(a) Install the fuse.

(b) Connect the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Front EnHost connector B6# -body GND	The ignition switch is set to "ON"	Battery voltage
Front EnHost connector B5# -body GND	The ignition switch is set to "ON"	Battery voltage
Front EnHost connector A7# - body GND	The ignition switch is set to "ON"	Battery voltage

NG

Repair or replace the harness and connector

OK

5	**Replace front EnHost (See page AV-48)**

DTC	B140104	Microphone fault

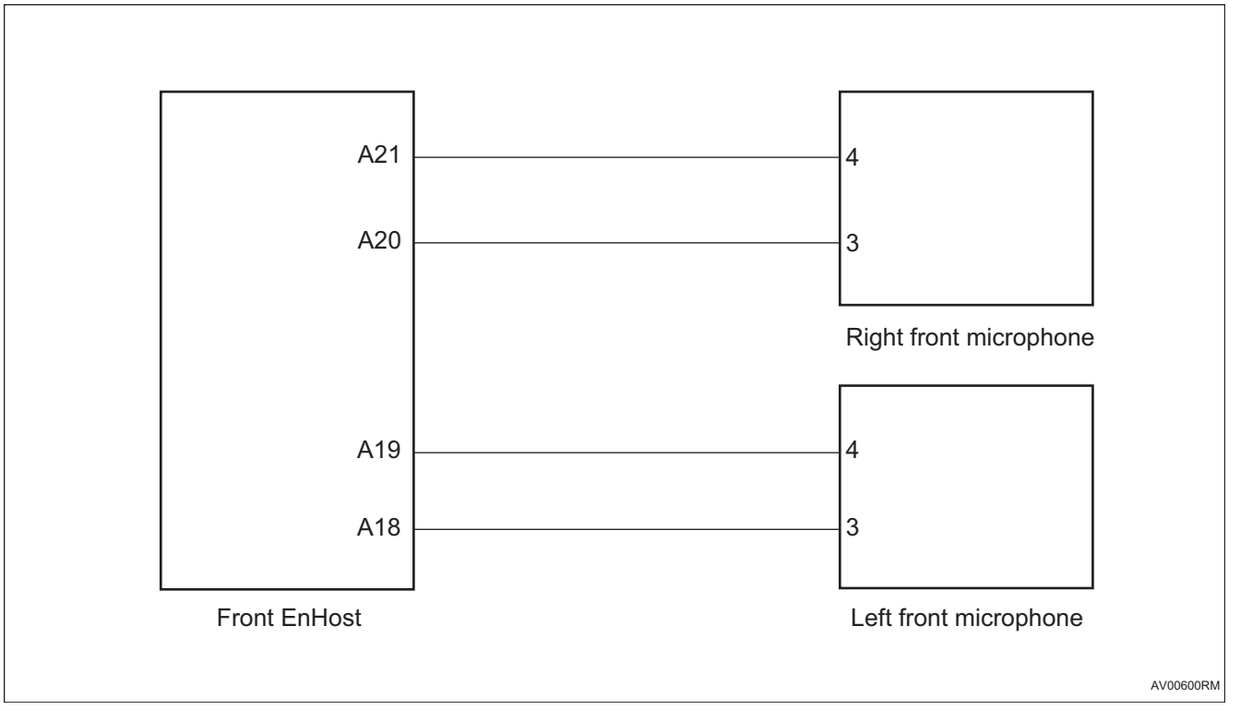
Description

When the microphone circuit is shorted or open, the front EnHost would record the DTC.

AV

DTC	DTC detection conditions	Faulty location
B140104	(a) Microphone fault.	• Front EnHost • Harness and connector • Left front microphone • Right front microphone

Circuit diagram



Inspection procedure

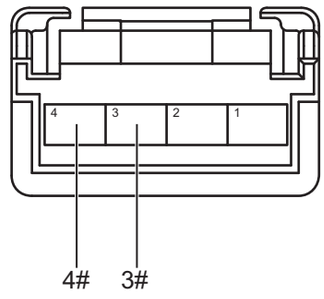
1	Check microphone connector

(a) Check whether the microphone connector is connected correctly.

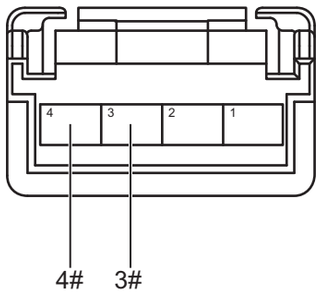
NG → **Repair according to the fault**

OK

2	Check microphone harness and connector for open circuit

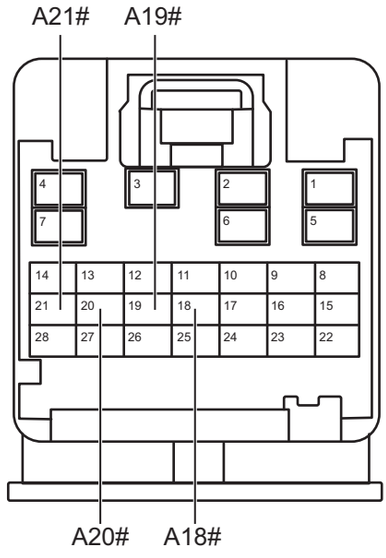


Right front microphone connector



Left front microphone connector

AV00610RM



Front EnHost A connector

AV00621RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the front EnHost connector.

(d) Disconnect the right front microphone connector.

(e) Disconnect the left front microphone connector.

(f) Measure the resistance according to the values in the table below.

Standard value

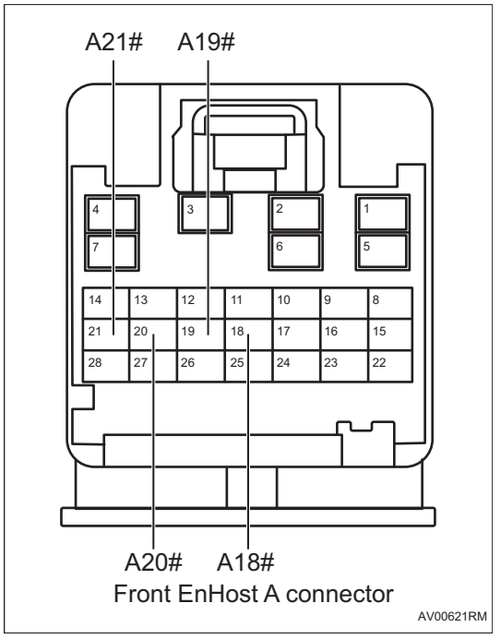
Detector connection	Detection conditions	Specified state
Front EnHost connector A20# -right front microphone connector 3#	Always connected	Less than 1Ω
Front EnHost connector A21# -right front microphone connector 4#	Always connected	Less than 1Ω
Front EnHost connector A19# -left front microphone connector 4#	Always connected	Less than 1Ω
Front EnHost connector A18# -left front microphone connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check microphone harness and connector for circuit shorted to ground**

AV



(a) Measure the resistance according to the values in the table below.

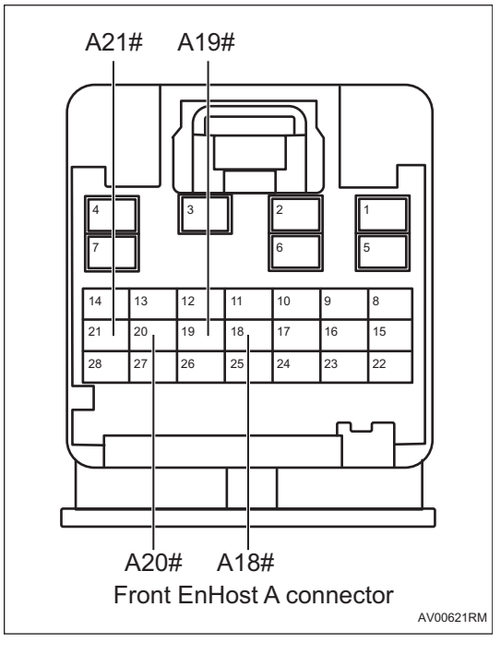
Standard value

Detector connection	Detection conditions	Specified state
Front EnHost connector A20# - body GND	Always connected	10 KΩ or greater
Front EnHost connector A21# - body GND	Always connected	10 KΩ or greater
Front EnHost connector A19# - body GND	Always connected	10 KΩ or greater
Front EnHost connector A18# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check microphone harness and connector for circuit shorted to power supply



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Front EnHost connector A20# - body GND	The ignition switch is set to "ON"	Less than 1 V
Front EnHost connector A21# - body GND	The ignition switch is set to "ON"	Less than 1 V
Front EnHost connector A19# - body GND	The ignition switch is set to "ON"	Less than 1 V
Front EnHost connector A18# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the right front microphone and left front microphone (See page LI-111)**

(a) Replace the right front microphone and left front microphone.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace front EnHost (See page AV-48)**

OK

6	**End**

DTC	B140201	RVC power supply failure
DTC	B140501	No RVC video input

Description

AV

When the RI camera power supply is abnormal or the video signal line is short circuited or open circuited, the front EnHost records the DTC.

DTC	DTC detection conditions	Faulty location
B140201	(a) RVC power supply failure.	• Front EnHost • Harness and connector • RI camera
B140501	(a) RVC video has no input.	• Front EnHost • Harness and connector • RI camera

Inspection procedure

1	Check reversing camera connector

(a) Check whether the reversing camera connector is fixed.

(b) Check whether the reversing camera connector is broken and aging.

NG → **Repair or replace the harness and connector**

OK

2	Check reversing camera harness and connector

(a) Check the reversing camera harness for short circuit or open circuit.

(b) Check whether the reversing camera power supply is normal.

(c) Check whether the reversing camera is grounded normally.

NG → **Repair or replace the harness and connector**

OK

3	Replace reversing camera

(a) Replace the reversing camera.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace front EnHost (See page AV-48)**

OK

4	**End**

DTC	B14034B	System overtemperature

Description

When the temperature of the front EnHost is too high, the front EnHost records the DTC.

DTC	DTC detection conditions	Faulty location
B14034B	(a) System overtemperature.	• Front EnHost • Ambient temperature

Inspection procedure

1	Power off or cool down the front EnHost

(a) Reduce the front EnHost temperature to normal operating temperature.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace front EnHost (See page AV-48)**

OK

2	End

DTC	B140401	Screen communication failure
DTC	B140B01	Touch communication failure

Description

When the communication between the central control panel and the front EnHost is abnormal, the front EnHost records the DTC.

DTC	DTC detection conditions	Faulty location
B140401	(a) Screen communication failure.	• Front EnHost • Harness and connector • Central control panel
B140B01	(a) Touch communication failure.	• Front EnHost • Harness and connector • Central control panel

Inspection procedure

1	Check central control panel connector

(a) Check whether the central control panel connector is fixed.

(b) Check whether the central control panel connector is broken and aging.

NG → **Repair or replace the harness and connector**

OK

2	Check central control panel harness and connector

(a) Check the central control panel harness for short circuit or open circuit.

NG → **Repair or replace the harness and connector**

OK

3	Replace the central control panel (See page AV-46)

(a) Replace the central control panel.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace front EnHost (See page AV-48)**

OK

AV

4	End

DTC	B140901	Left micro switch jamming
DTC	B140A01	Right micro switch jamming

Description

The front EnHost records DTC when a microswitch is stuck.

DTC	DTC detection conditions	Faulty location
B140901	(a) Left micro switch jamming.	• Front EnHost • Harness and connector • Left button of the steering wheel
B140A01	(a) Right micro switch jamming.	• Front EnHost • Harness and connector • Right button of the steering wheel

Inspection procedure

1	Check the left and right buttons of the steering wheel

(a) Check the left and right buttons of steering wheel for foreign matter.

(b) Operate the left and right buttons of the steering wheel to check whether they are stuck.

NG → **Repair according to the fault**

OK

2	Replace the left or right button of the steering wheel

(a) Replace the left or right button of the steering wheel.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replacing the front EnHost (See page AV-48)**

OK

3	End

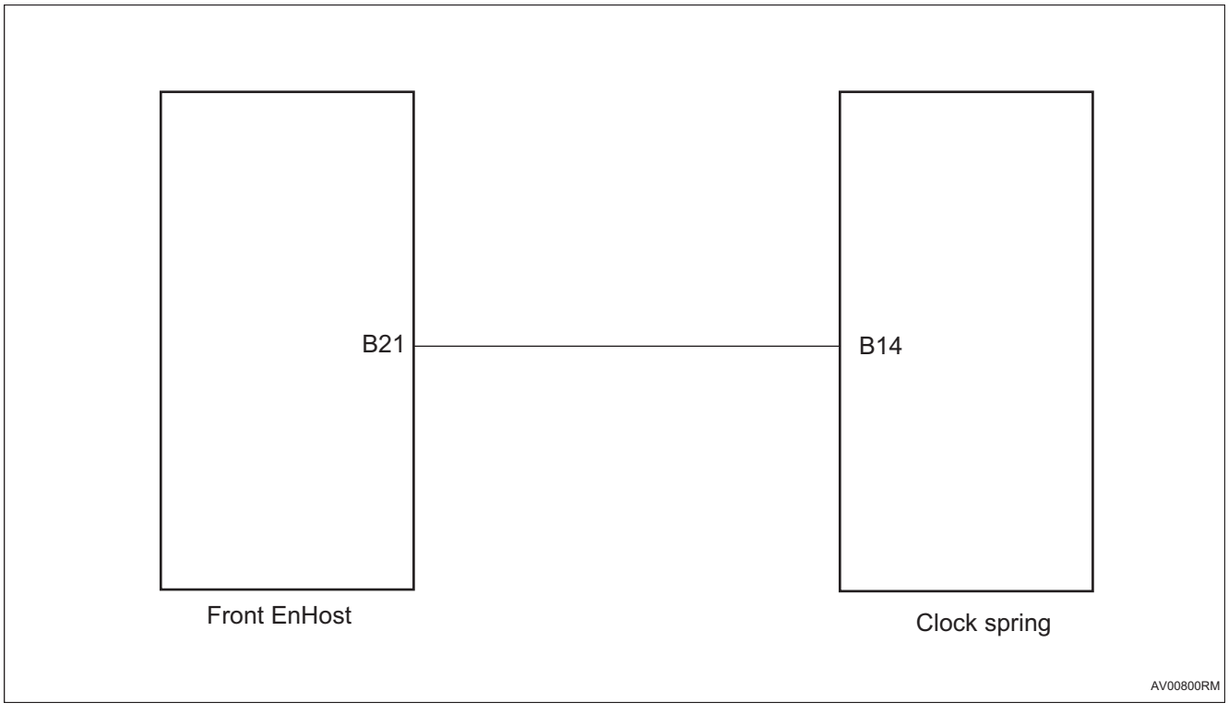
DTC	U101388	LIN1 physical bus error
DTC	U02FA87	MFS node lost
DTC	U131386	Multi-function steering wheel LIN communication error

Description

When the communication between the front EnHost and the clock spring is abnormal, the front EnHost records the DTC.

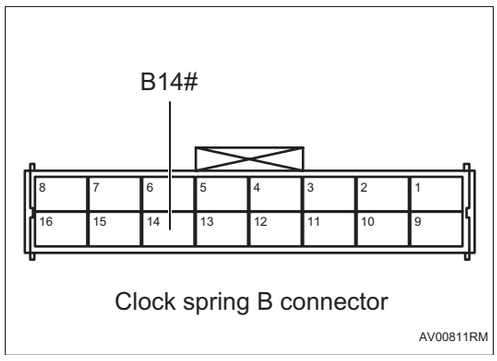
DTC	DTC detection conditions	Faulty location
U101388	(a) LIN1 physical bus error.	• Front EnHost • Harness and connector • Clock spring
U02FA87	(a) The multi-function steering wheel node is lost.	• Front EnHost • Harness and connector • Clock spring
U131386	(a) Multi-function steering wheel LIN communication error.	• Front EnHost • Harness and connector • Clock spring

Circuit diagram



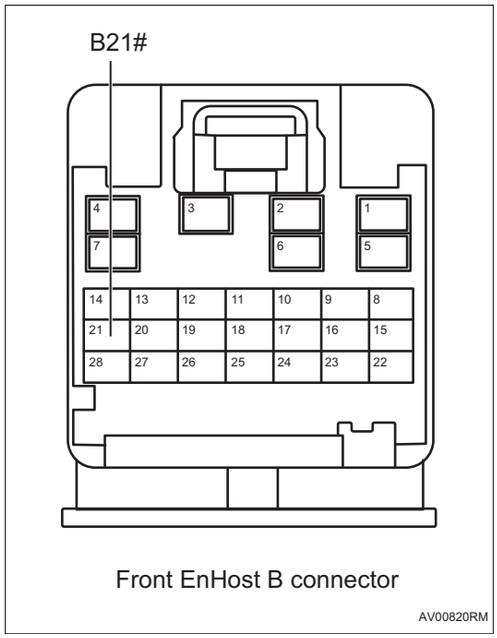
Inspection procedure

1	Check front EnHost harness and connector for open circuit



Clock spring B connector

AV00811RM



Front EnHost B connector

AV00820RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the front EnHost connector.

(d) Disconnect the clock spring connector.

(e) Measure the resistance according to the values in the table below.

AV

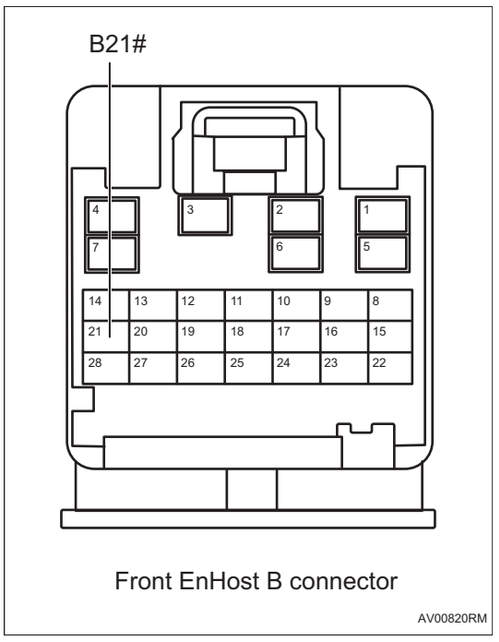
Standard value

Detector connection	Detection conditions	Specified state
Front EnHost connector B21# -clock spring connector B14#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check front EnHost harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

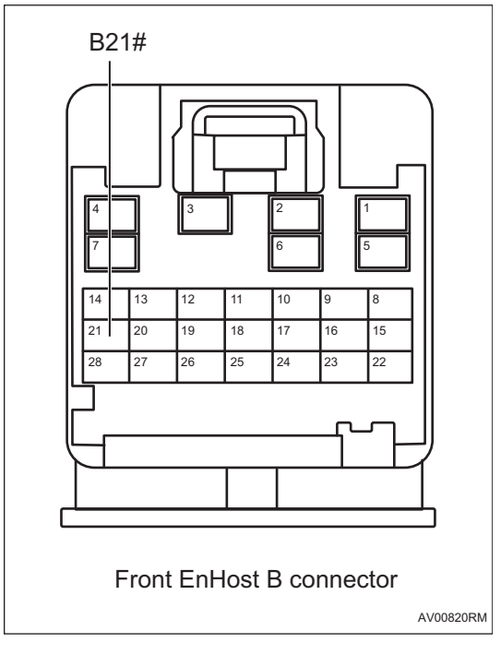
Standard value

Detector connection	Detection conditions	Specified state
Front EnHost connector B21# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	Check front EnHost harness and connector for circuit shorted to power supply



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Front EnHost connector B21# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the clock spring (See page SR-5)**

(a) Replace the clock spring.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace front EnHost (See page AV-48)**

OK

5	**End**

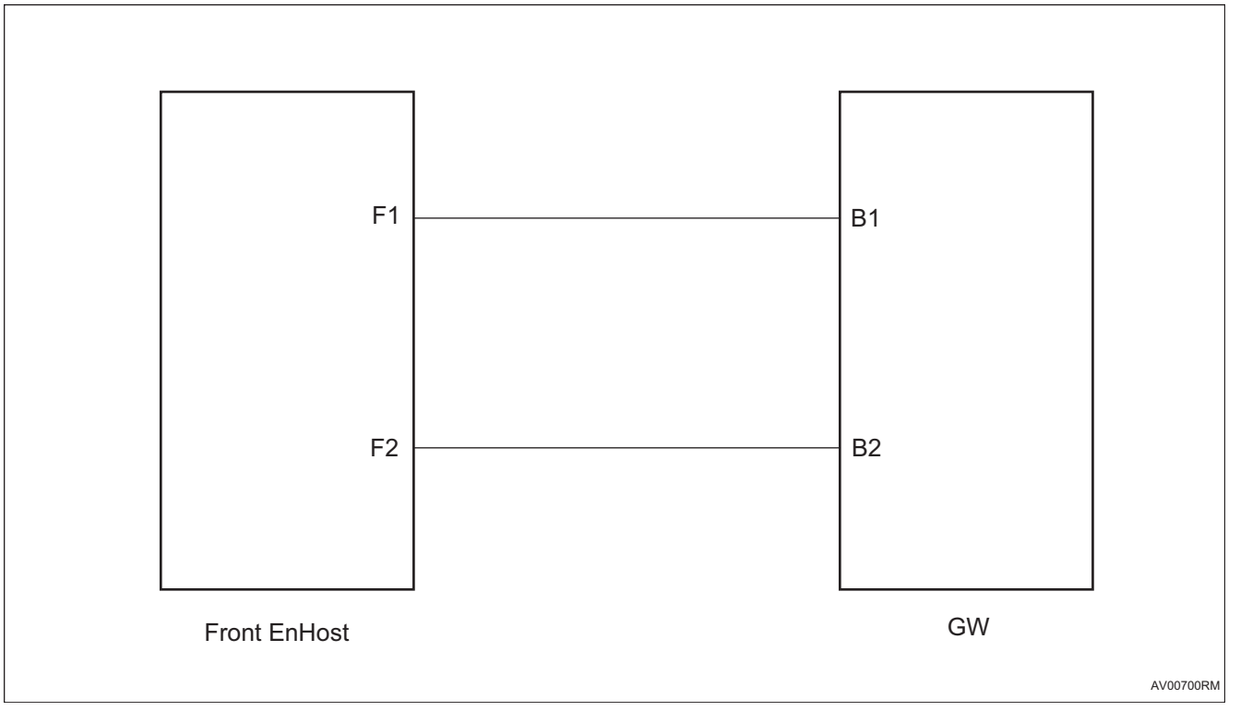
DTC	U14468A	IVI1 ETH1 connection failure

Description

When the front EnHost Ethernet circuit is shorted or open, the front EnHost records the DTC.

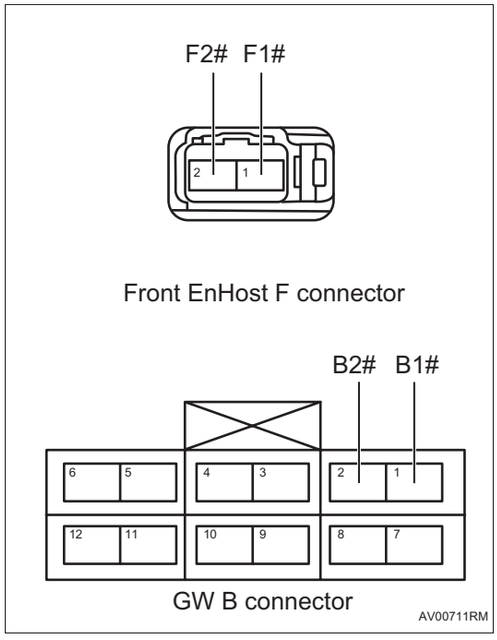
DTC	DTC detection conditions	Faulty location
U14468A	(a) ETH1 connection failure.	• Front EnHost • Harness and connector • GW

Circuit diagram



Inspection procedure

1	**Check front EnHost harness and connector for open circuit**



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the front EnHost connector.

(d) Disconnect the GW connector.

(e) Measure the resistance according to the values in the table below.

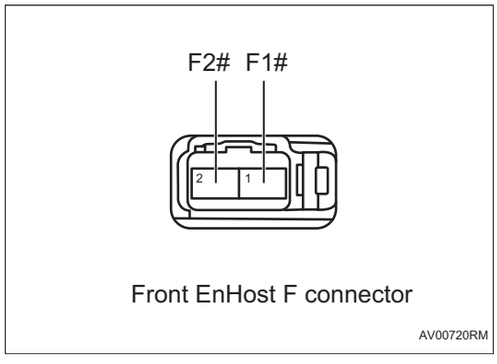
Standard value

Detector connection	Detection conditions	Specified state
Front EnHost connector F1# -GW connector B1#	Always connected	Less than 1Ω
Front EnHost connector F2# -GW connector B2#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check front EnHost harness and connector for circuit shorted to ground



(a) Measure the resistance according to the values in the table below.

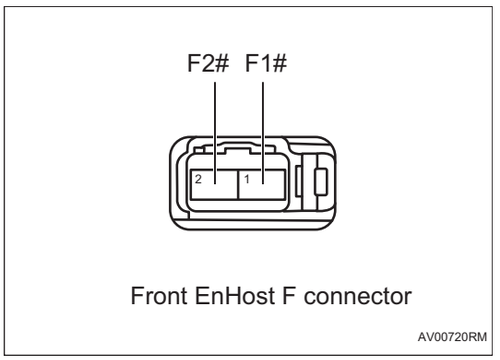
Standard value

Detector connection	Detection conditions	Specified state
Front EnHost connector F1# - body GND	Always connected	10 KΩ or greater
Front EnHost connector F2# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	Check front EnHost harness and connector for circuit shorted to power supply



Front EnHost F connector

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Front EnHost connector F1# - body GND	The ignition switch is set to "ON"	Less than 1 V
Front EnHost connector F2# - body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace GW (See page CA-256)**

(a) Replace the GW.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace front EnHost (See page AV-48)**

OK

5	**End**

DTC	U004688	Information CAN bus off
DTC	U015587	IPC node lost
DTC	U014687	GW node lost
DTC	U112187	ESP message lost
DTC	U115187	ACU message lost
DTC	U114087	BCM 1 message lost
DTC	U116487	A/C control unit message lost
DTC	U113187	EPS ECU message lost
DTC	U119987	Driver door module message lost
DTC	U120087	Passenger door module message lost
DTC	U120187	Rear left door module message lost
DTC	U120287	Rear right door module message lost
DTC	U129387	HCU message lost
DTC	U015887	HUD node lost
DTC	U024887	WCM node lost
DTC	U12E187	IHC message lost
DTC	U124387	ADV message lost
DTC	U123A87	AVM ECU message lost
DTC	U115987	PDC message lost
DTC	U113887	Driving mode selection control unit message lost
DTC	U124687	SCCU message lost
DTC	U110087	ECM message lost
DTC	U110187	TCU message lost
DTC	U123587	IFC message lost
DTC	U123287	LCDA message lost
DTC	U114687	GW message lost
DTC	U14A18E	TBox SOMEIP no response
DTC	U14A78E	IC SOMEIP no response

DTC	U12D587	ETC system message lost

Description

When the communication between the front EnHost and other systems is abnormal or interrupted, the front EnHost records the DTC.

DTC	DTC detection conditions	Faulty location
U004688	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U015587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U112187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U116487	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U113187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U119987	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U120087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U120187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U120287	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U129387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U015887	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U024887	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U12E187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U124387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U123A87	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

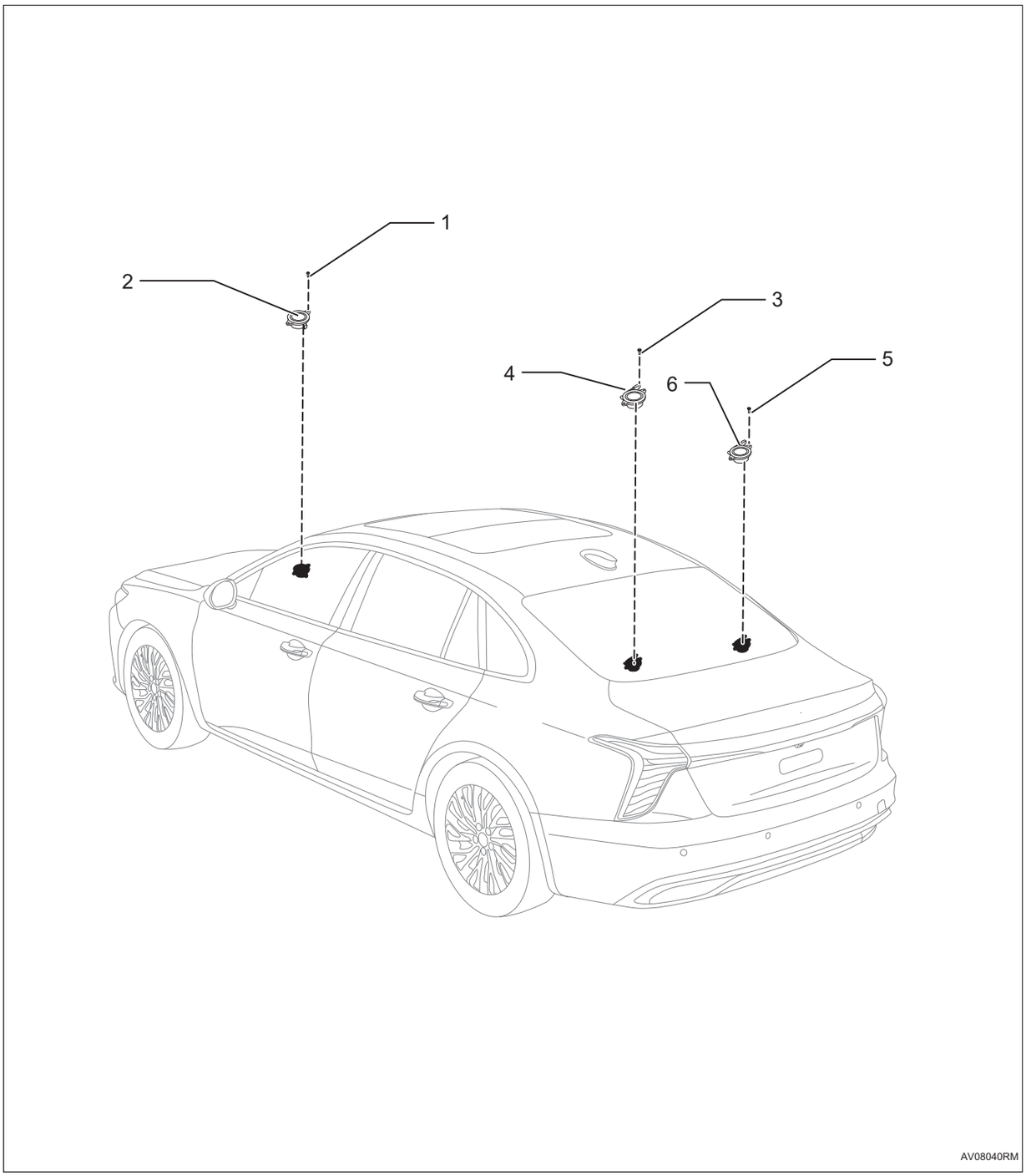
DTC	DTC detection conditions	Faulty location
U115987	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U113887	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U124687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U123587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U123287	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U14A18E	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U14A78E	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U12D587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

Squawker and tweeter assembly

Parts



1. **Screw**
   - X2
2. **Instrument panel squawker and tweeter assembly**
3. **Screw**
   - X2

4. **Left parcel shelf squawker and tweeter assembly**
5. **Screw**
   - X2
6. **Right parcel shelf squawker and tweeter assembly**

AV

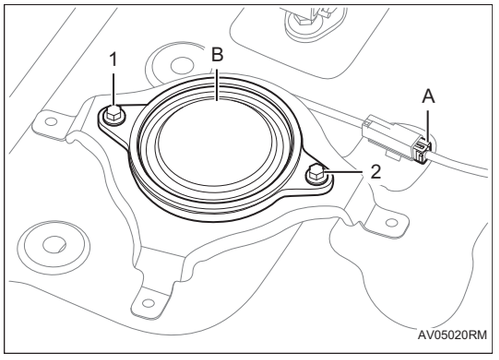
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove parcel shelf guard plate (See page IR-16)**
3. **Remove squawker and tweeter assembly in the parcel shelf**

   Hint:

   The removal sequence on the right side is the same as that on the left side.

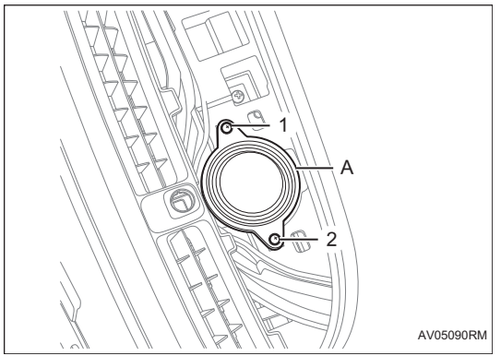
   (a) Disconnect the harness connector-A-.



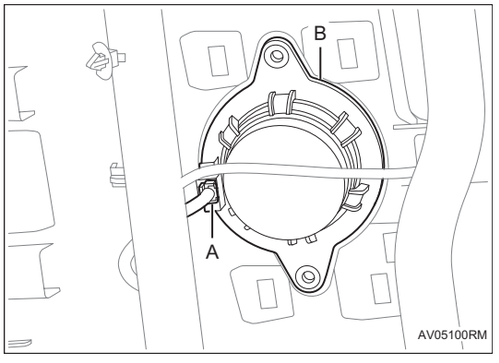
   (b) Remove the screw -1-2-, and remove the parcel shelf squawker and tweeter assembly-B-.

4. **Remove center speaker cover (See page IP-5)**
5. **Remove squawker and tweeter assembly in the instrument panel**

   (a) Remove screw-1-2- and remove squawker and tweeter assembly -A- in the instrument panel.



   (b) Disconnect the harness connector -A-, and remove the instrument panel center speaker assembly -B-.

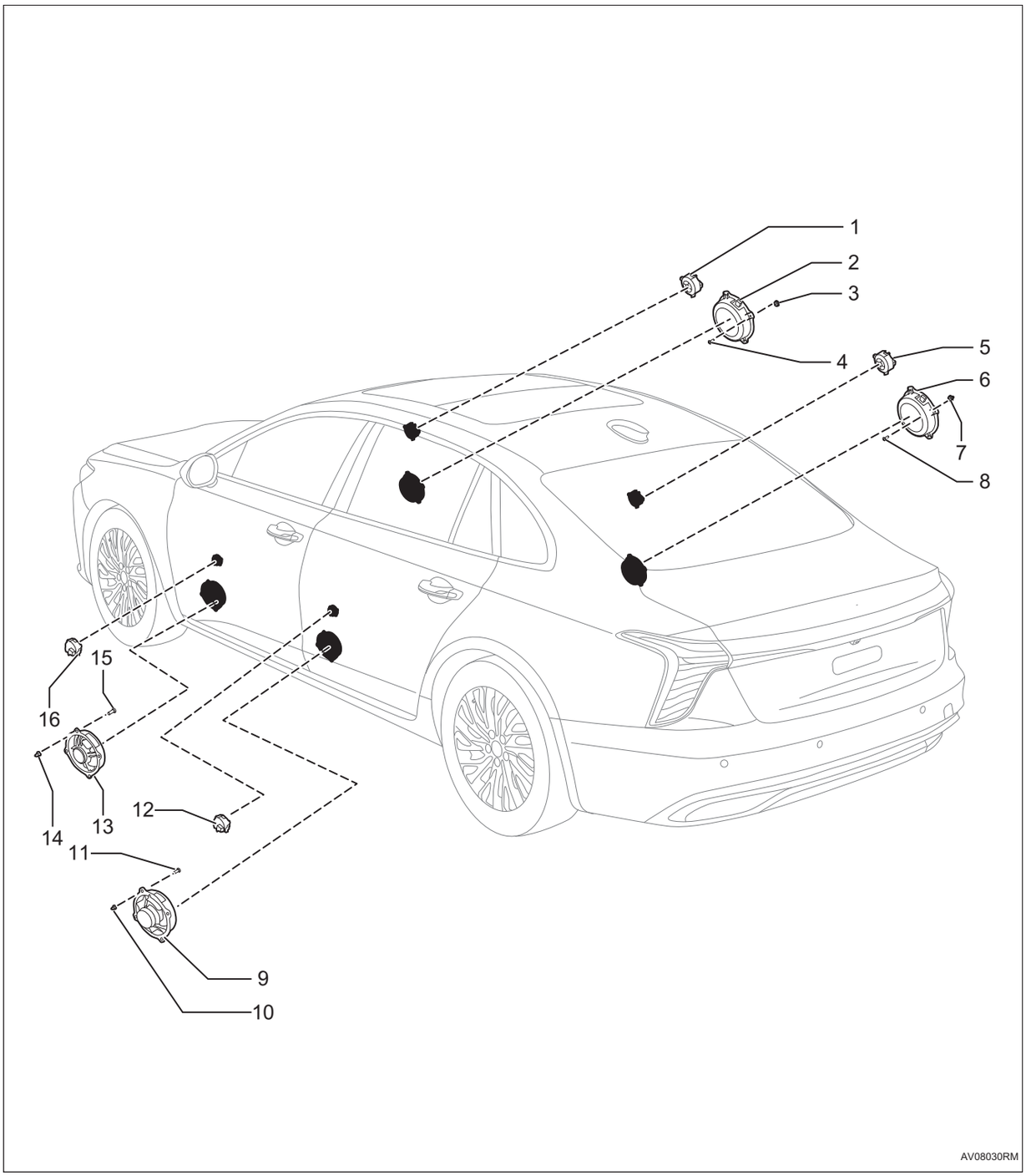


Installation

1. **The installation procedure is the reverse of removal procedure.**

Front door speaker assembly

Parts



1. **Passenger door tweeter**
2. **Passenger door speaker assembly**
3. **Insert nut**
   - X4
4. **Screw**

- X4

5. **Rear right door tweeter**
6. **Rear right door speaker assembly**
7. **Insert nut**
   - X4
8. **Screw**
   - X4
9. **Rear left door speaker assembly**
10. **Insert nut**
    - X4
11. **Screw**
    - X4
12. **Rear left door tweeter**
13. **Drive door speaker assembly**
14. **Insert nut**
    - X4
15. **Screw**
    - X4
16. **Driver door tweeter**

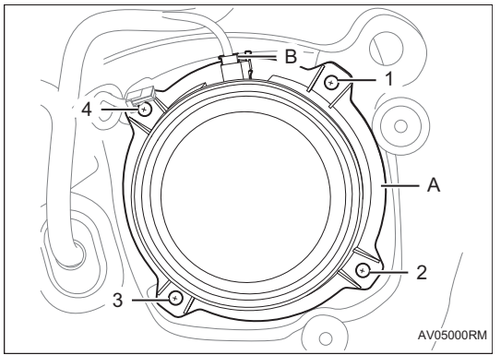
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove front door guard plate assembly (See page IR-8)**
3. **Remove front door speaker assembly**

Hint:

The removal sequence on the right side is the same as that on the left side.

The removal sequence of rear door speaker is the same as that of front door speaker.



(a) Disconnect the harness connector-B-.

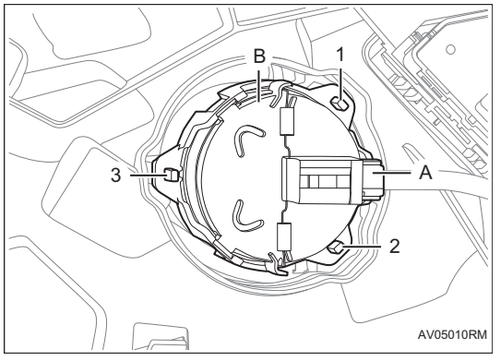
(b) Remove the screw -1-4- and the front door speaker assembly-A-.

4. **Remove front door tweeter assembly**

Hint:

the removal sequence on the right side is the same as that on the left side.

The removal sequence of front door tweeter is the same as that of rear door tweeter.



(a) Disconnect the harness connector-A-.

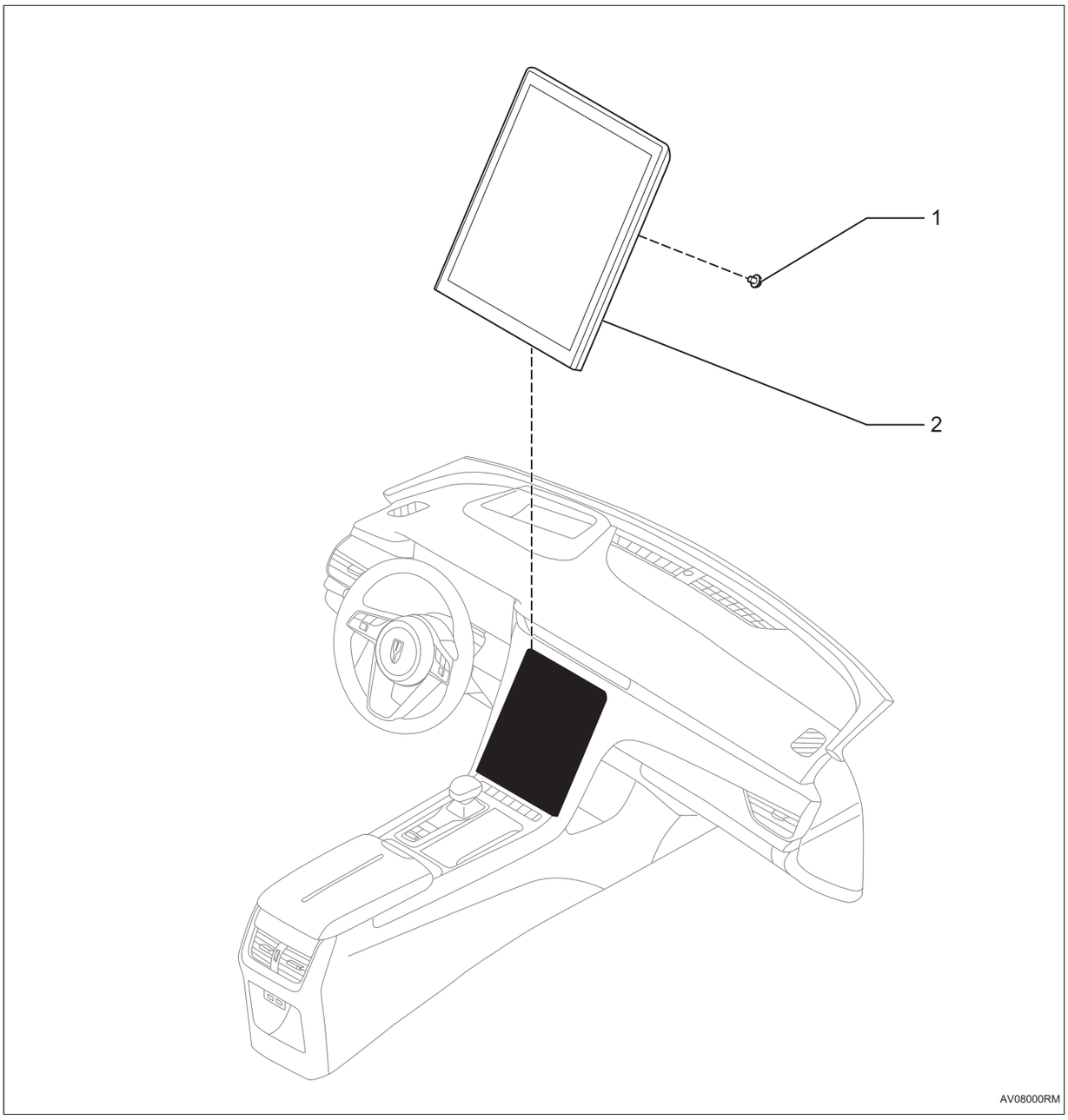
(b) Detach weld claws -1-3- and remove front door tweeter assembly-B-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Main display assembly

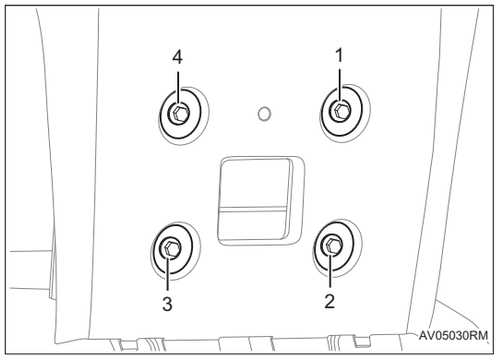
Parts



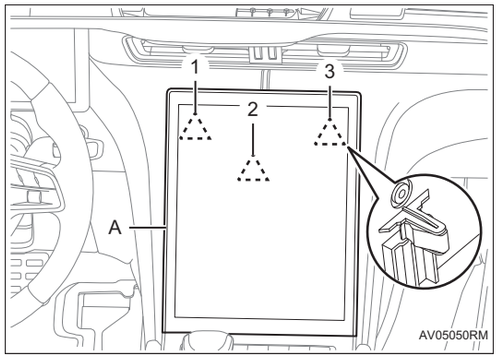
1. **Hexagon flange bolt**
   - X4
   - Torque: 6~8 N · m
2. **Main display assembly**

Removal

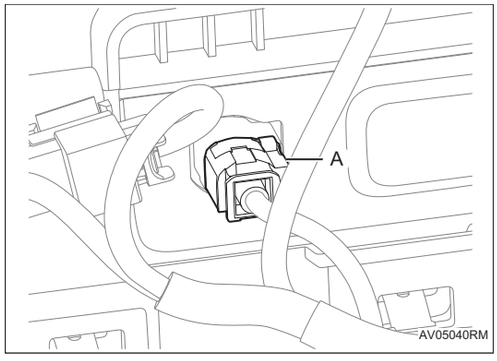
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove main display assembly**



(a) Remove the bolt -1-4-.



(b) Detach the claw -1-3-and pull out the main display assembly-A-.



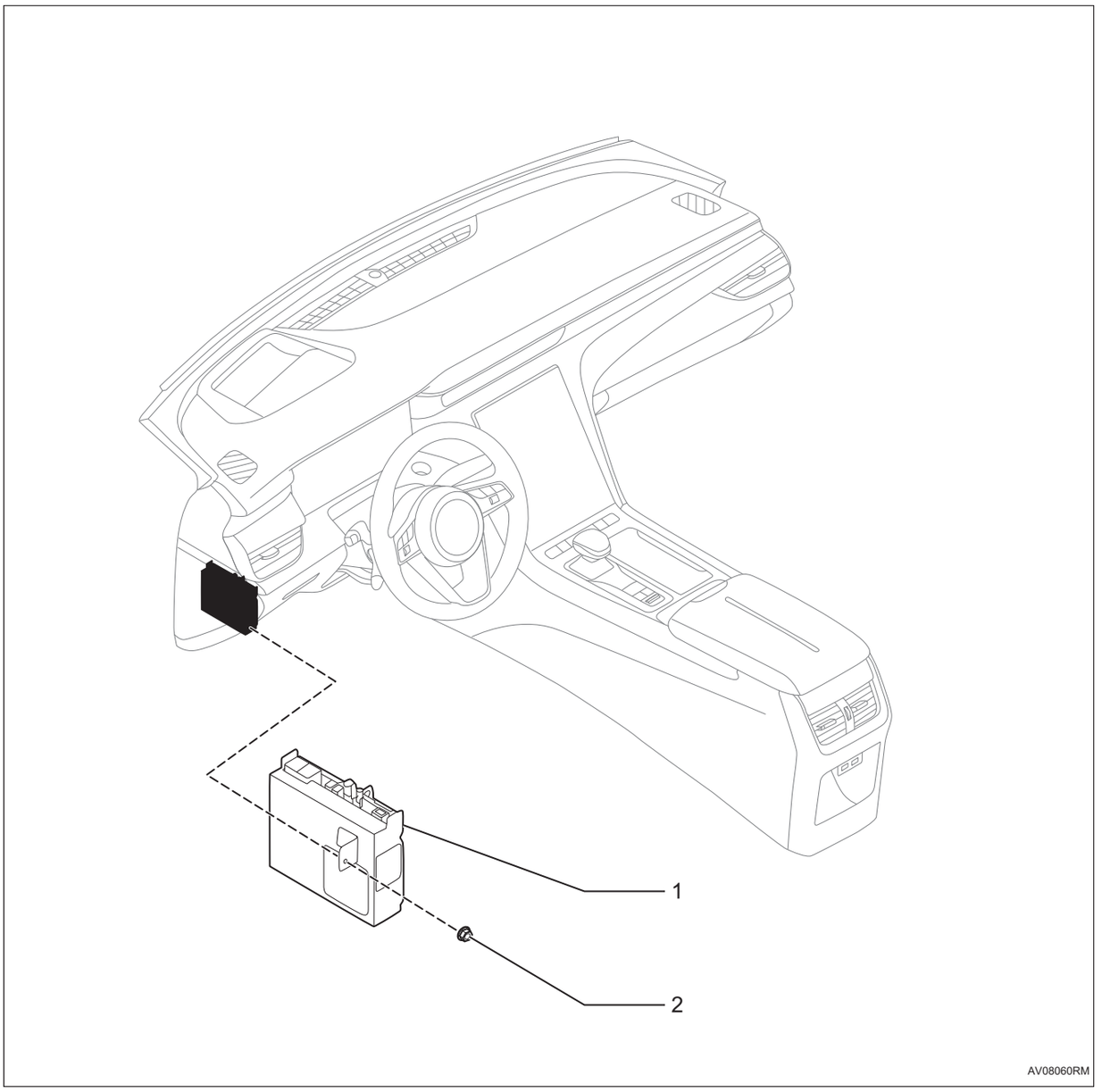
(c) Disconnect the harness connector-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

IVI assembly

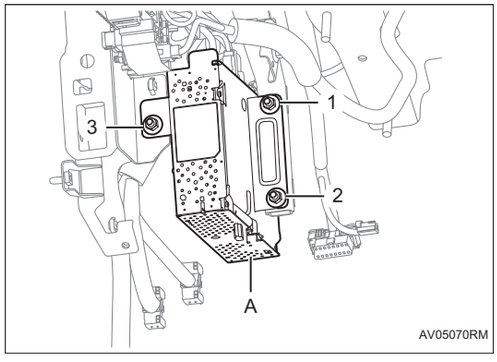
Parts



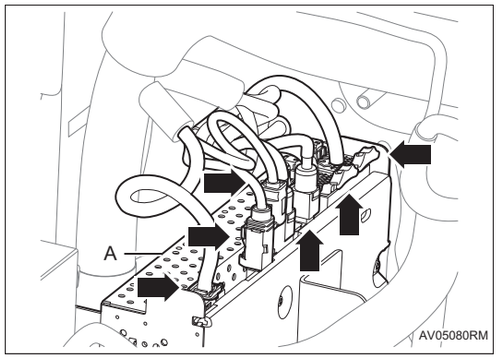
1. **Hexagon flange nut**
   - X3
   - Torque: 6~8 N · m
2. **IVI assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove left lower guard plate assembly (See page IP-5)**
3. **Removal IVI assembly**



(a) Remove the nut -1-3-, and pull out the IVI assembly -A-.



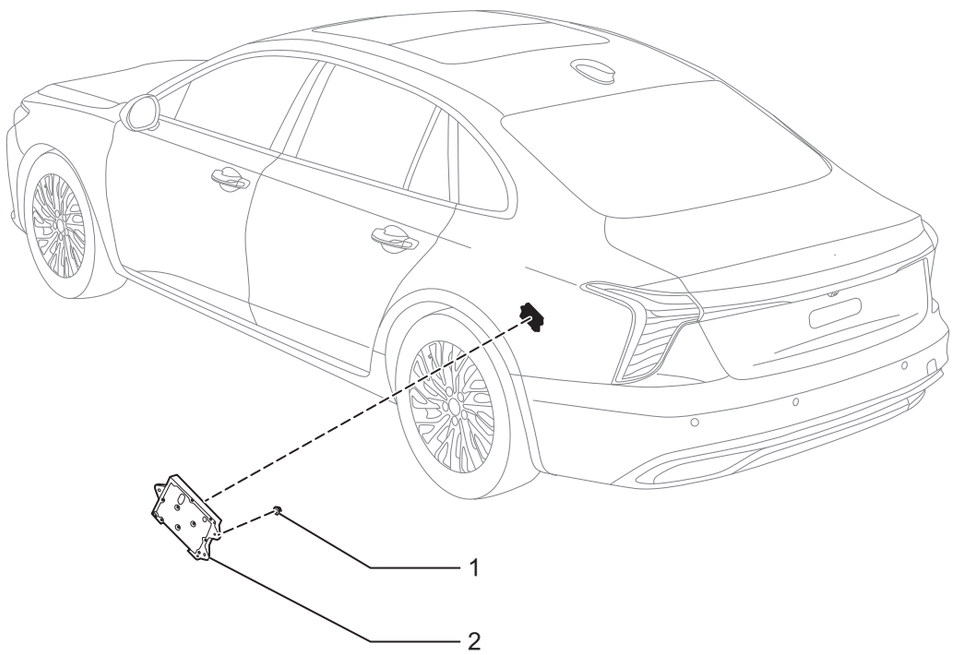
(b) Disconnect the harness connector -arrow-, and remove the IVI assembly-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Power amplifier

Parts

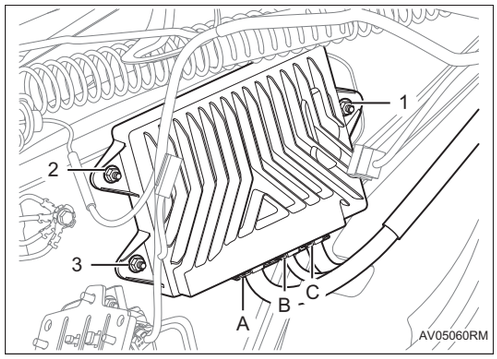


AV08050RM

1. **Hexagon flange nut**
   - X3
   - Torque: 8~12 N · m
2. **Power amplifier**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove trunk left covering (See page IR-33)**
3. **Remove power amplifier**



(a) Disconnect the harness connector-A-C-.

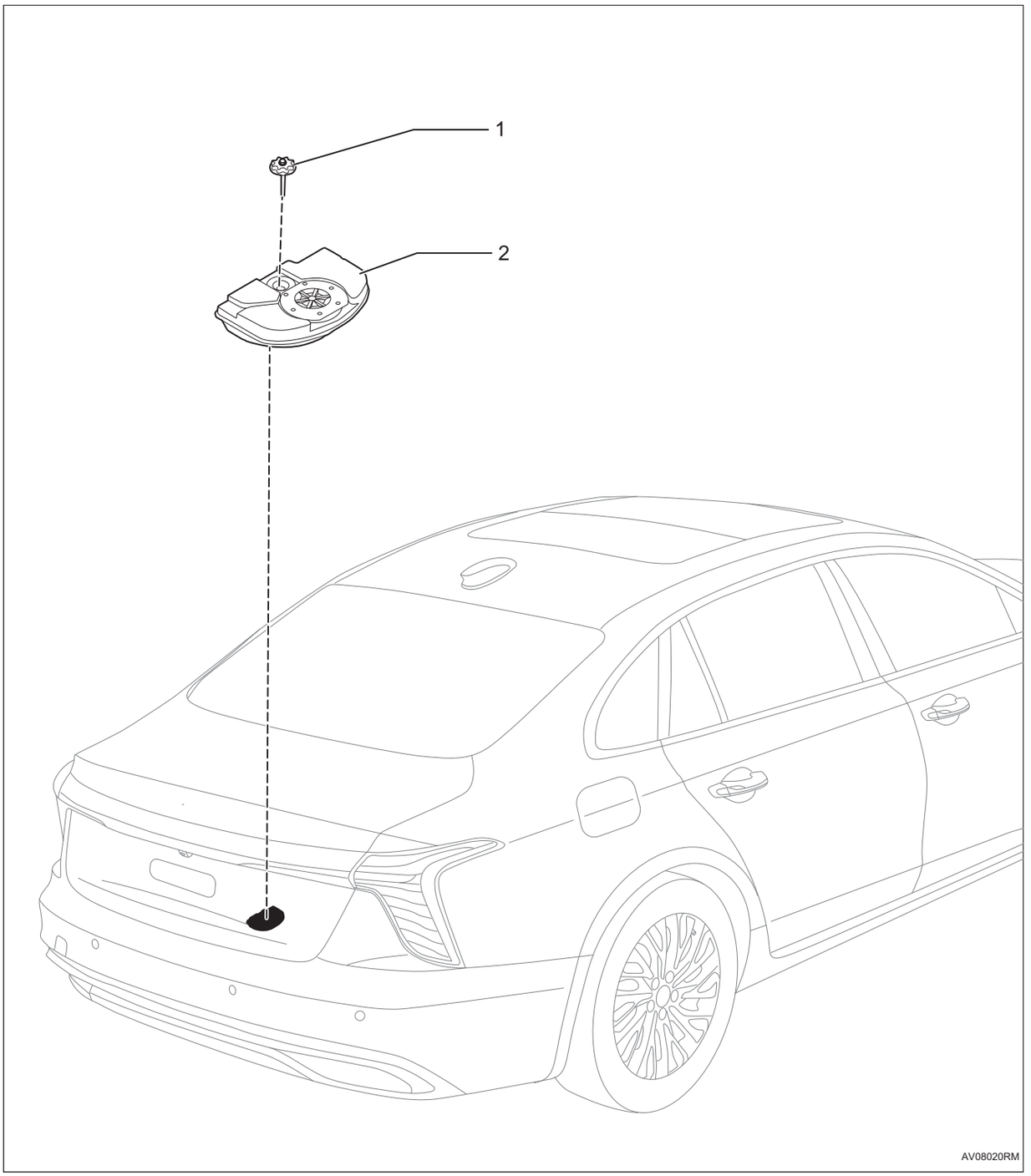
(b) Remove the nuts -1-3-, and remove the power amplifier.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Woofer assembly

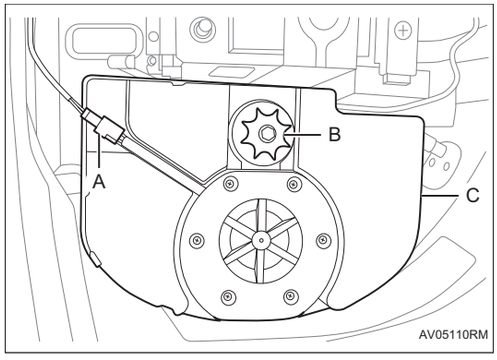
Parts



1. **Handwheel assembly**
2. **Woofer assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the trunk carpet**
3. **Remove the storage box under trunk carpet**
4. **Remove woofer assembly**



(a) Disconnect the harness connector-A-.

(b) Remove the handwheel assembly -B-, and remove the woofer assembly -C-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

HUD system

HUD HD-1
Precautions HD-1
Location of parts HD-2
System diagram HD-5
System description HD-5
Symptom chart HD-7
ECU terminal HD-8
DTC chart HD-8
B14C017 .....HD-9
B14C116 .....HD-9
B14C201 .....HD-12
U004688 .....HD-15
U014687 .....HD-15
U024587 .....HD-15
U015587 .....HD-15
U110187 .....HD-15
U129387 .....HD-15
U112187 .....HD-15
U114087 .....HD-15
U123587 .....HD-15
U113887 .....HD-15
HUD HD-17
Parts HD-17
Removal HD-18
Installation HD-18

HUD

Precautions

1. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

2. Some systems require initialization when reconnecting after disconnecting the battery cable.

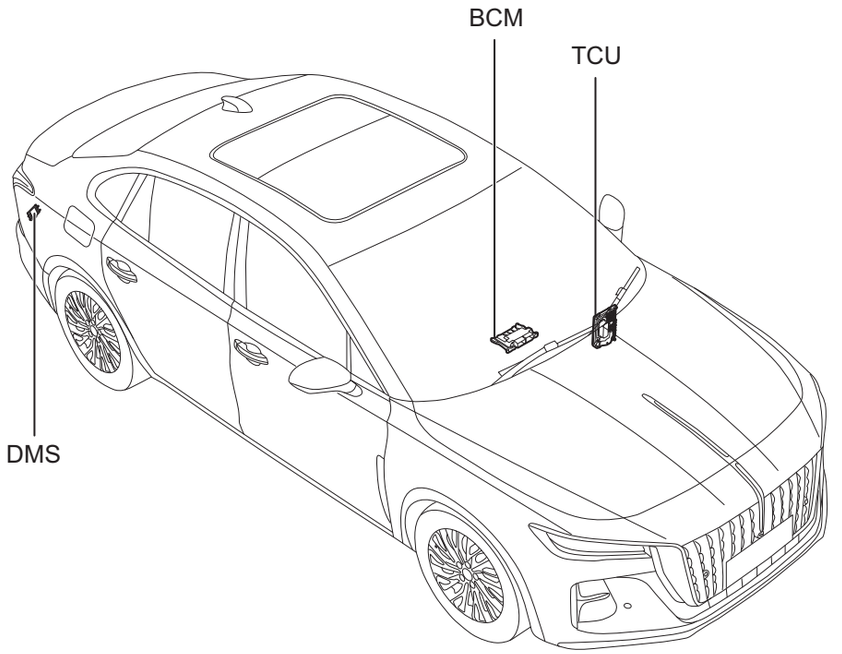
3. General repair instructions

(a) When checking the HUD, it may affect the airbag work. Therefore, before carrying out maintenance work, be sure to carefully read and confirm the precautions for airbag.

(b) When the part needs to be replaced or the connector needs to be disconnected during maintenance of HUD, disconnect the battery negative cable.

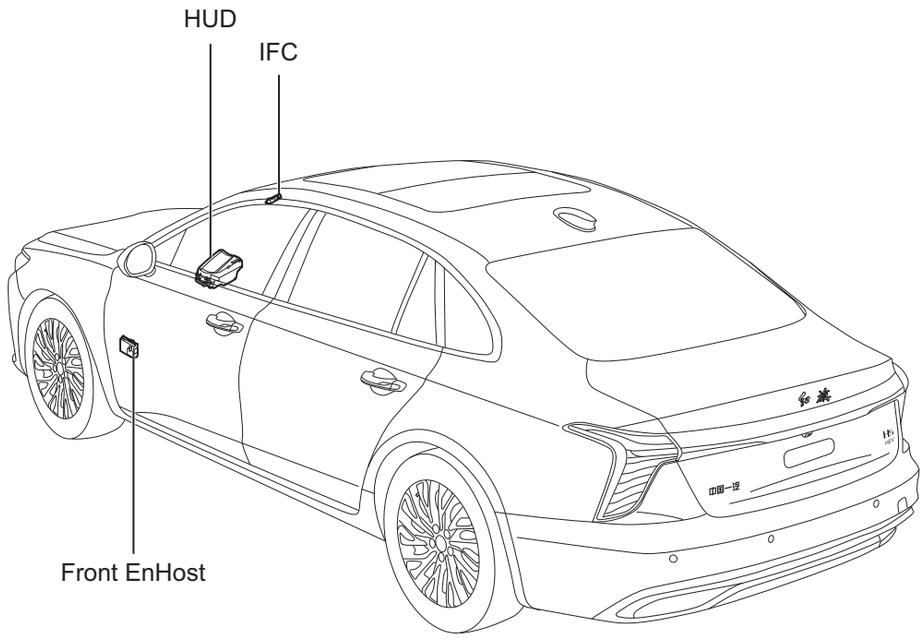
(c) The door control system needs to be initialized after reconnecting the battery. And use the HQ-VDS to "clear the DTC" for all electronic control systems.

Location of parts



HD00030RM

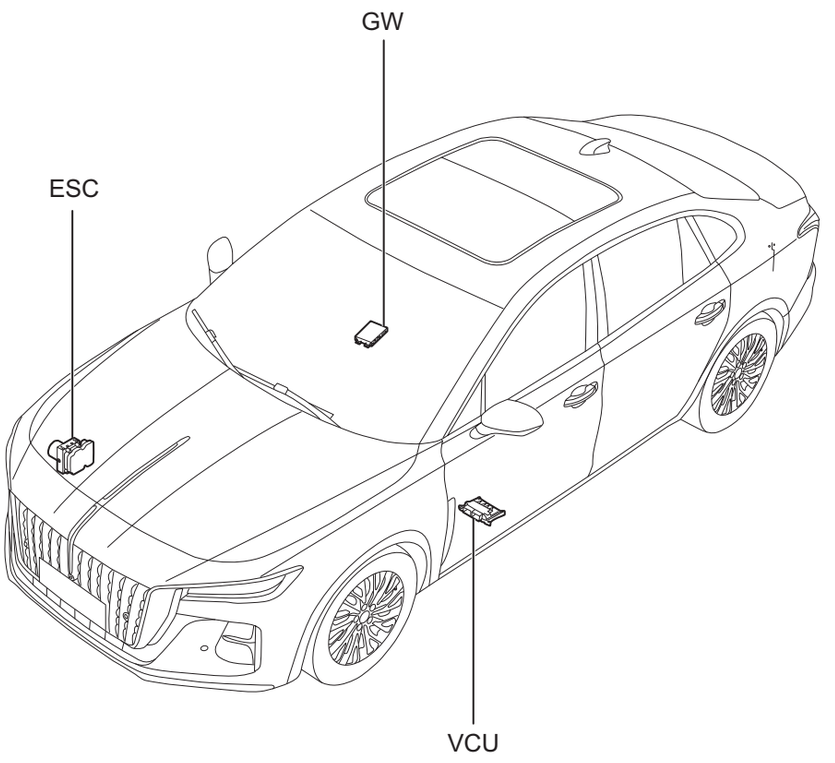
Location of parts



HD00040RM

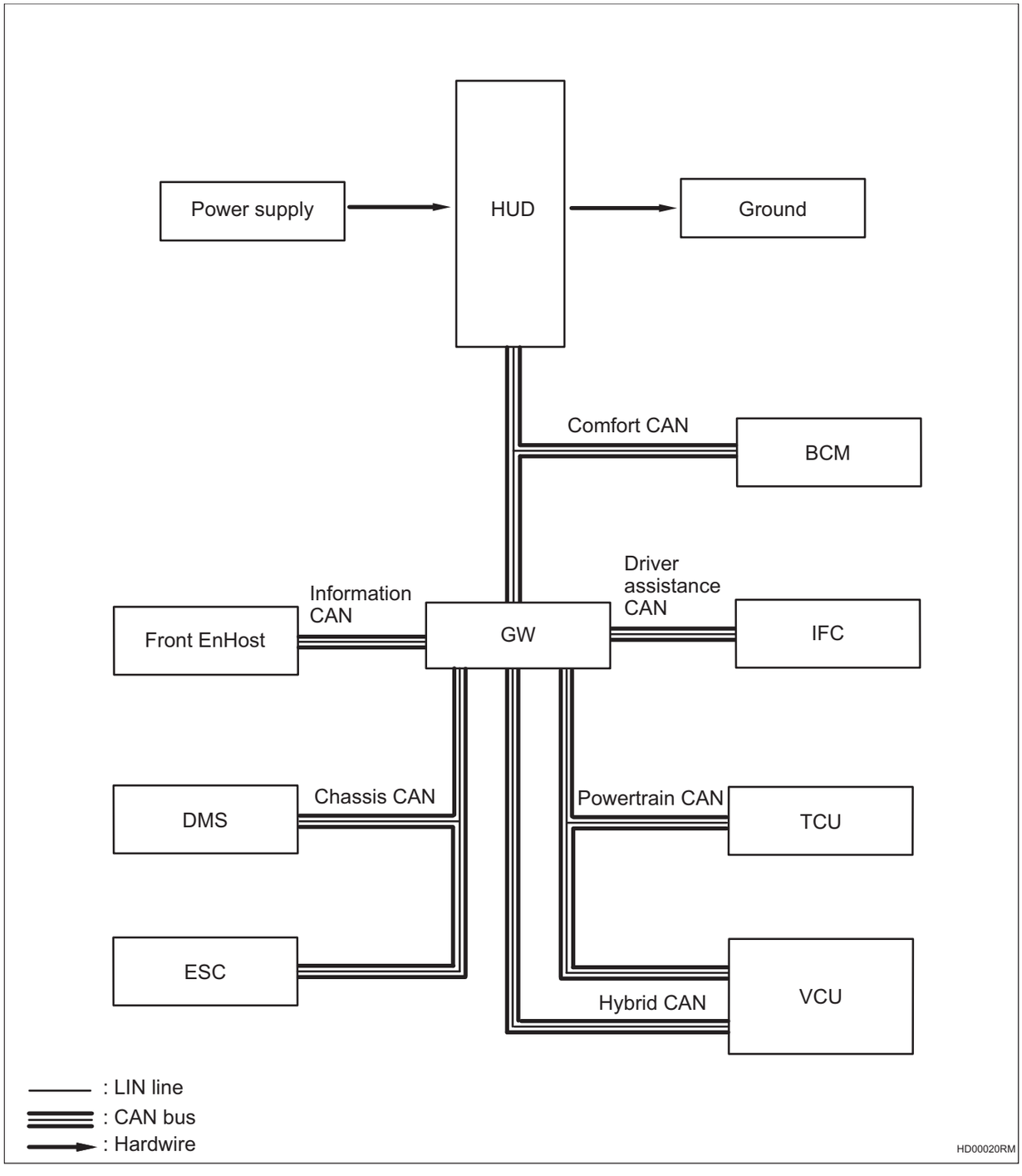
HD

Location of parts



HD00050RM

System diagram



System description

1. Function brief description

(a) The HUD system is linked to the instrument cluster and sound system to project driver assistance and audio entertainment information on the windshield immediately in front of the driver.

(b) The display contents include navigation, entertainment, driver assistance, vehicle speed, speed limit alarm and other information.

2. System settings

(a) Turn on or off the HUD, and set the virtual image height, brightness and angle through the display settings of the instrument cluster.

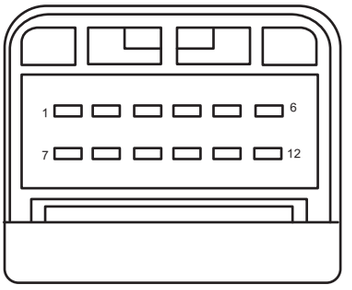
(b) Set the on/off and display content of the HUD through the vehicle settings of the IVI.

Symptom chart

Fault	Possible location
HUD system inoperative	• HUD • Fuse • Battery • Related harness and connector

HD

ECU terminal



HD00010RM

HUD			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	B+	7	-
2	-	8	-
3	-	9	-
4	-	10	-
5	CAN-H	11	-
6	CAN-L	12	Ground

DTC chart

DTC	Description	Reference page
B14C017	Battery overvoltage	(See page HD-9)
B14C116	Battery undervoltage	(See page HD-9)
B14C201	Motor fault	(See page HD-12)
U004688	Information CAN bus off	(See page HD-15)
U014687	GW node lost	(See page HD-15)
U024587	IVI node lost	(See page HD-15)
U015587	IVI node lost	(See page HD-15)
U110187	TCU message lost	(See page HD-15)
U129387	HCU message lost	(See page HD-15)
U112187	ESP message lost	(See page HD-15)
U114087	BCM 1 message lost	(See page HD-15)
U123587	IFC message lost	(See page HD-15)
U113887	Driving mode selection control unit message lost	(See page HD-15)

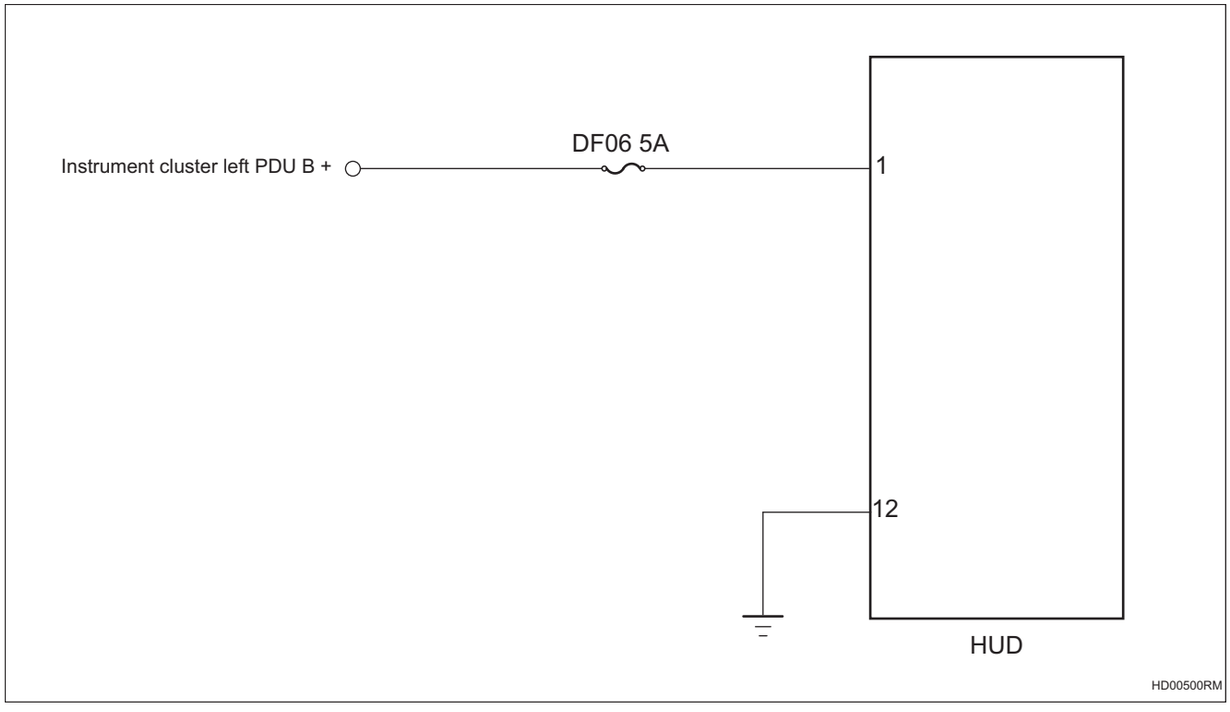
DTC	B14C017	Battery overvoltage
DTC	B14C116	Battery undervoltage

Description

When the HUD input voltage is too high or too low, HUD records the DTC.

DTC	DTC detection conditions	Faulty location
B14C017	(a) System overvoltage.	• HUD • Harness and connector • Battery/charging system
B14C116	(a) System undervoltage.	• HUD • Fuse • Harness and connector • Battery/charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery + - battery -	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2	Check HUD fuse

HD

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the HUD fuse.

(d) Measure the resistance according to the values in the table below.

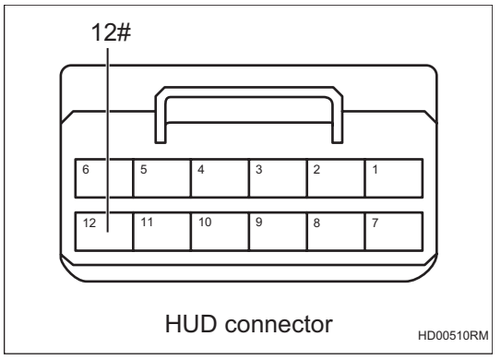
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3	Check HUD ground



(a) Disconnect the HUD connector.

(b) Measure the resistance according to the values in the table below.

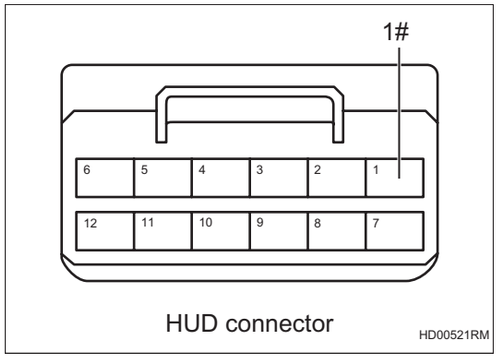
Standard value

Detector connection	Detection conditions	Specified state
HUD connector 12# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	Check HUD power supply



HUD connector

(a) Install the fuse.

(b) Connect the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
HUD connector 1# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace the HUD (See page HD-17)**

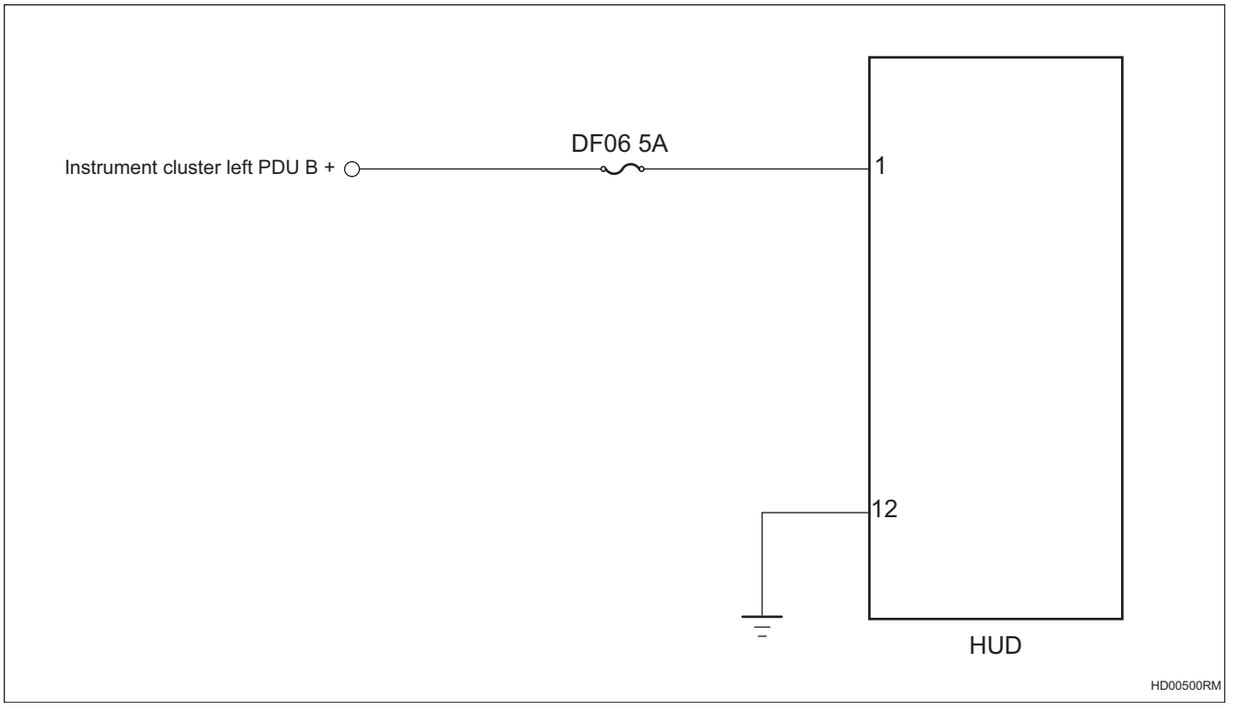
DTC	B14C201	Motor fault

Description

When the HUD motor function is abnormal, the HUD records the DTC.

DTC	DTC detection conditions	Faulty location
B14C201	(a) Motor fault.	• HUD • Fuse • Harness and connector

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery + - battery -	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2	Check HUD fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the HUD fuse.

(d) Measure the resistance according to the values in the table below.

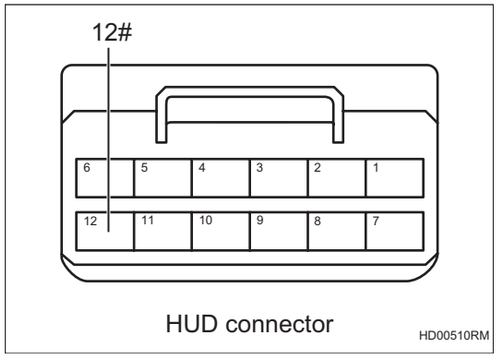
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3 Check HUD ground



(a) Disconnect the HUD connector.

(b) Measure the resistance according to the values in the table below.

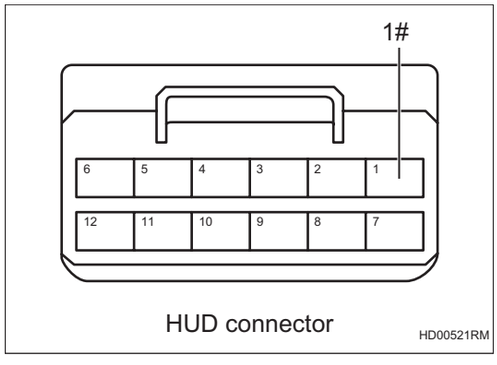
Standard value

Detector connection	Detection conditions	Specified state
HUD connector 12# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4 Check HUD power supply



(a) Install the fuse.

(b) Connect the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
HUD connector 1# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace the HUD (See page HD-17)**

DTC	U004688	Information CAN bus off
DTC	U014687	GW node lost
DTC	U024587	IVI node lost
DTC	U015587	IVI node lost
DTC	U110187	TCU message lost
DTC	U129387	HCU message lost
DTC	U112187	ESP message lost
DTC	U114087	BCM 1 message lost
DTC	U123587	IFC message lost
DTC	U113887	Driving mode selection control unit message lost

Description

When the communication between the HUD and other control units is abnormal or interrupted, the HUD will record the DTC.

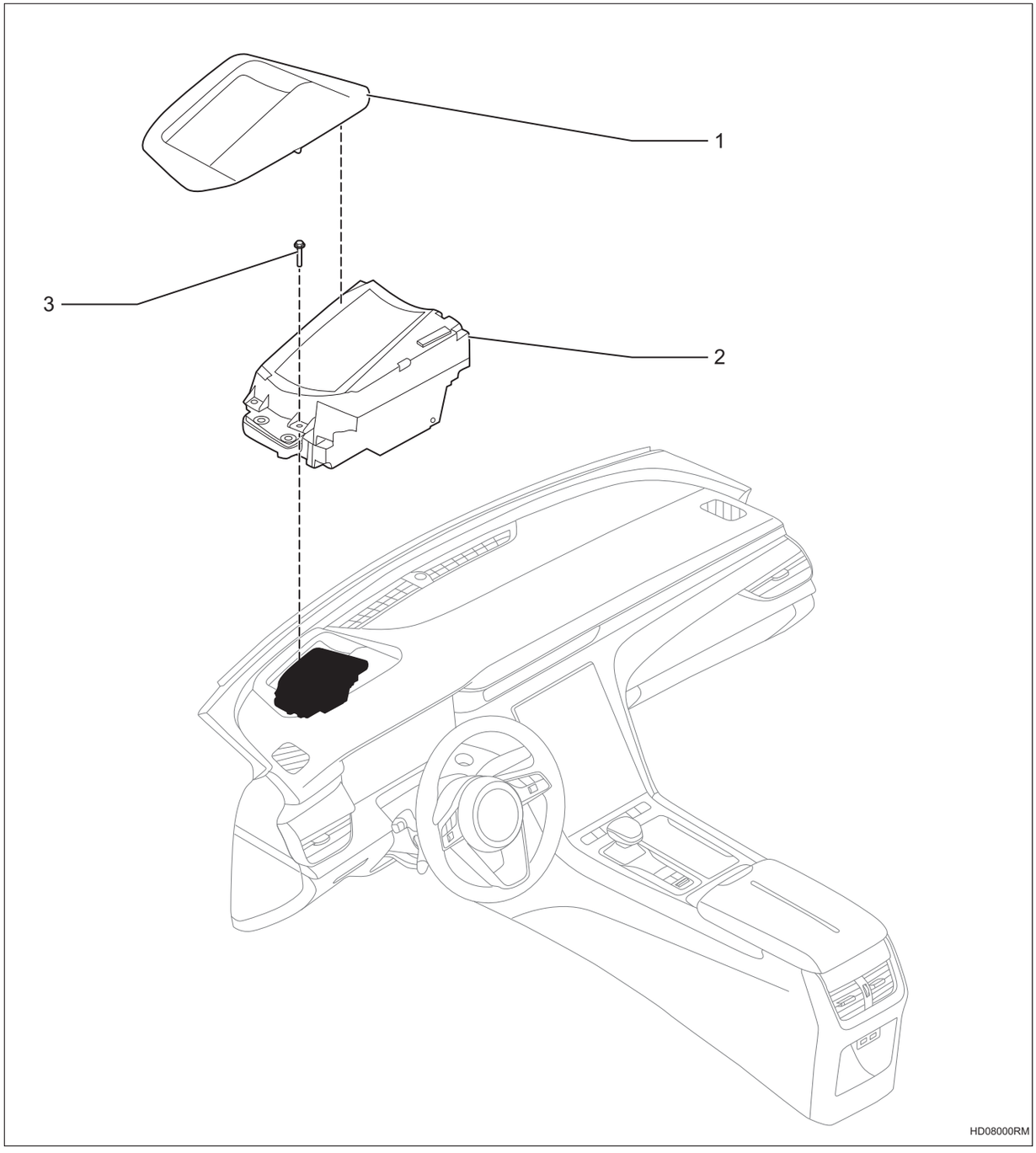
DTC	DTC detection conditions	Faulty location
U004688	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U014687	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U024587	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U015587	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U110187	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U129387	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U112187	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U114087	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U123587	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit
U113887	(a) Abnormal or interrupted communication.	• Harness and connector • Relevant control unit

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

HUD

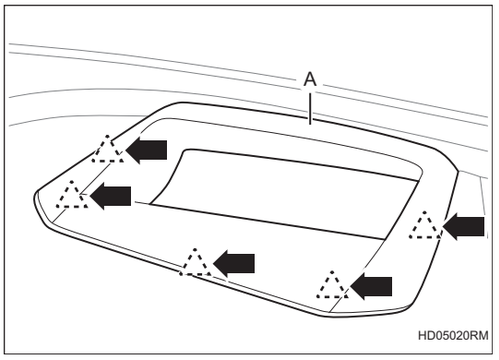
Parts



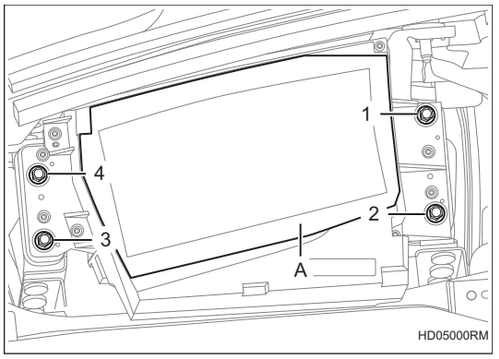
1. **HUD trim cover**
2. **HUD**
3. **Hexagon flange bolt**
   - X4
   - Torque: 3 ~ 5 N·m

Removal

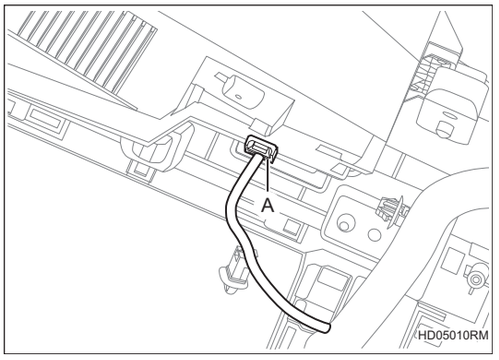
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove HUD trim cover**
   (a) Detach the claw-arrow- and remove the HUD trim cover.



3. **Remove instrument panel body assembly (See page IP-5)**
4. **Remove HUD**
   (a) Remove the fixing bolt -1-4- of HUD -A-.



   (b) Disconnect the harness connector-A-.



Installation

1. **The installation procedure is the reverse of removal procedure.**

IPC

Instrument cluster ME-1
Precautions ME-1
Location of parts ME-2
System diagram ME-5
System description ME-5
ECU terminal ME-7
DTC chart ME-8
B144011 ..... ME-11
B144015 ..... ME-11
B14401E ME-11
B144211 ..... ME-16
B144311 ..... ME-16
B144403 ..... ME-18
B144703 ..... ME-18
B144804 ..... ME-18
B144971 ..... ME-18
B144A01 ..... ME-18
B144971 ..... ME-19
U004688 ..... ME-20
U014687 ..... ME-20
U024587 ..... ME-20
U015887 ..... ME-20
U024887 ..... ME-20
U12E187 ..... ME-20
U112187 ..... ME-20
U115187 ..... ME-20
U116487 ..... ME-20
U114087 ..... ME-20
U119987 ..... ME-20
U120087 ..... ME-20
U120187 ..... ME-20
U120287 ..... ME-20
U113887 ..... ME-20
U110087 ..... ME-20
U110187 ..... ME-20
U129387 ..... ME-20
U129A87 ..... ME-20
U113187 ..... ME-20
U123587 ..... ME-20

U12D587 ..... ME-20
U123287 ..... ME-20
U114687 ..... ME-20
U145E8A ME-20
U14A28E ME-20
U12E387 ..... ME-20
U300316 ..... ME-22
U300317 ..... ME-22
B144017 ..... ME-26
B144016 ..... ME-26
B144111 ..... ME-30
B144113 ..... ME-30
B14411C ME-30
B144200 ..... ME-35
B144300 ..... ME-35
U004688 ..... ME-37
U014687 ..... ME-37
U024587 ..... ME-37
U015887 ..... ME-37
U024887 ..... ME-37
U114087 ..... ME-37
U119987 ..... ME-37
U120087 ..... ME-37
U120187 ..... ME-37
U120287 ..... ME-37
U113887 ..... ME-37
U129387 ..... ME-37
U129A87 ..... ME-37
U129887 ..... ME-37
U123587 ..... ME-37
U123287 ..... ME-37
U114687 ..... ME-37
U110087 ..... ME-37
U110187 ..... ME-37
U115187 ..... ME-37
U112187 ..... ME-37
U113187 ..... ME-37
U116487 ..... ME-37
U12D587 ..... ME-37
U12E187 ..... ME-37
Instrument cluster ME-39
Parts ME-39

Removal ME-40
Installation ME-40

Instrument cluster

Precautions

1. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

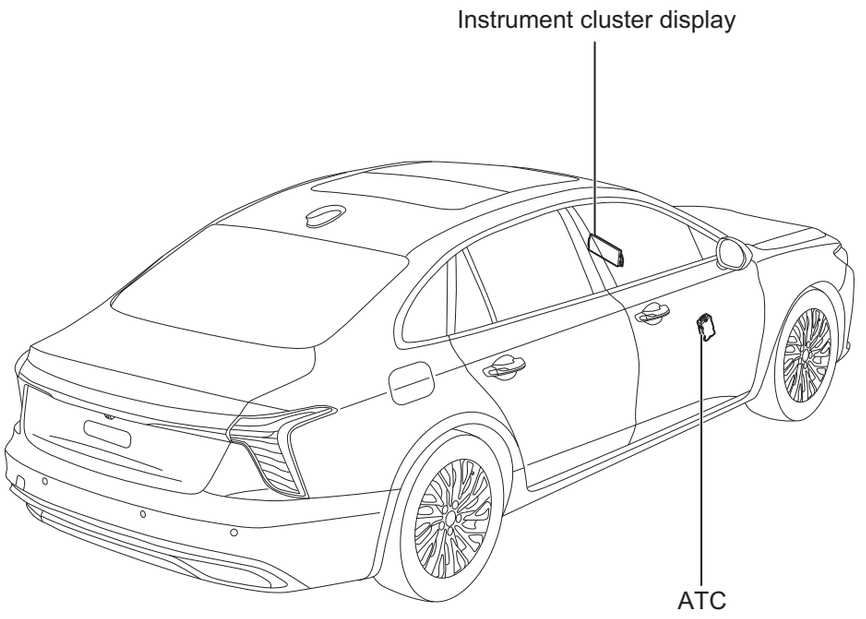
HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

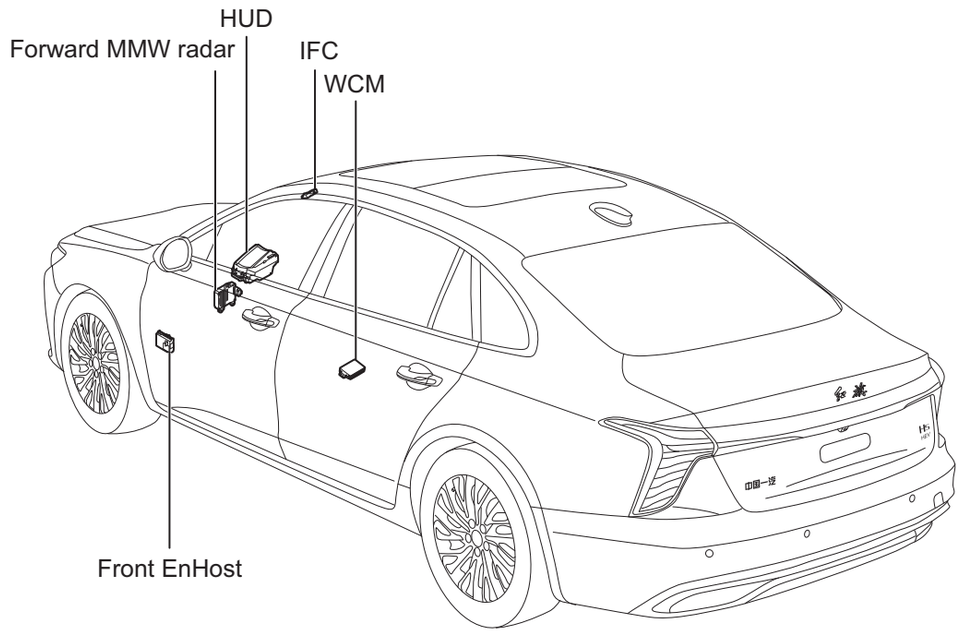
2. When checking and replacing the electronic component, ensure that the battery - is disconnected before the system can be repaired.

3. when the battery cable is disconnected and reconnected, some systems require initialization.

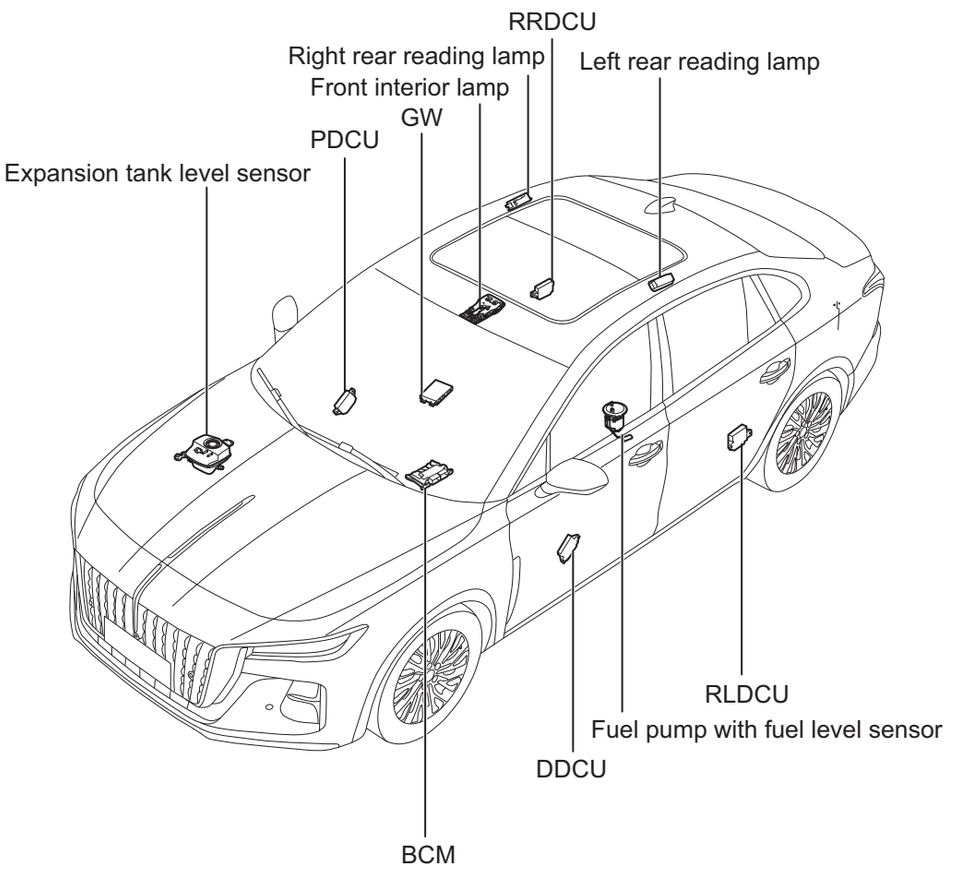
Location of parts



ME00040RM

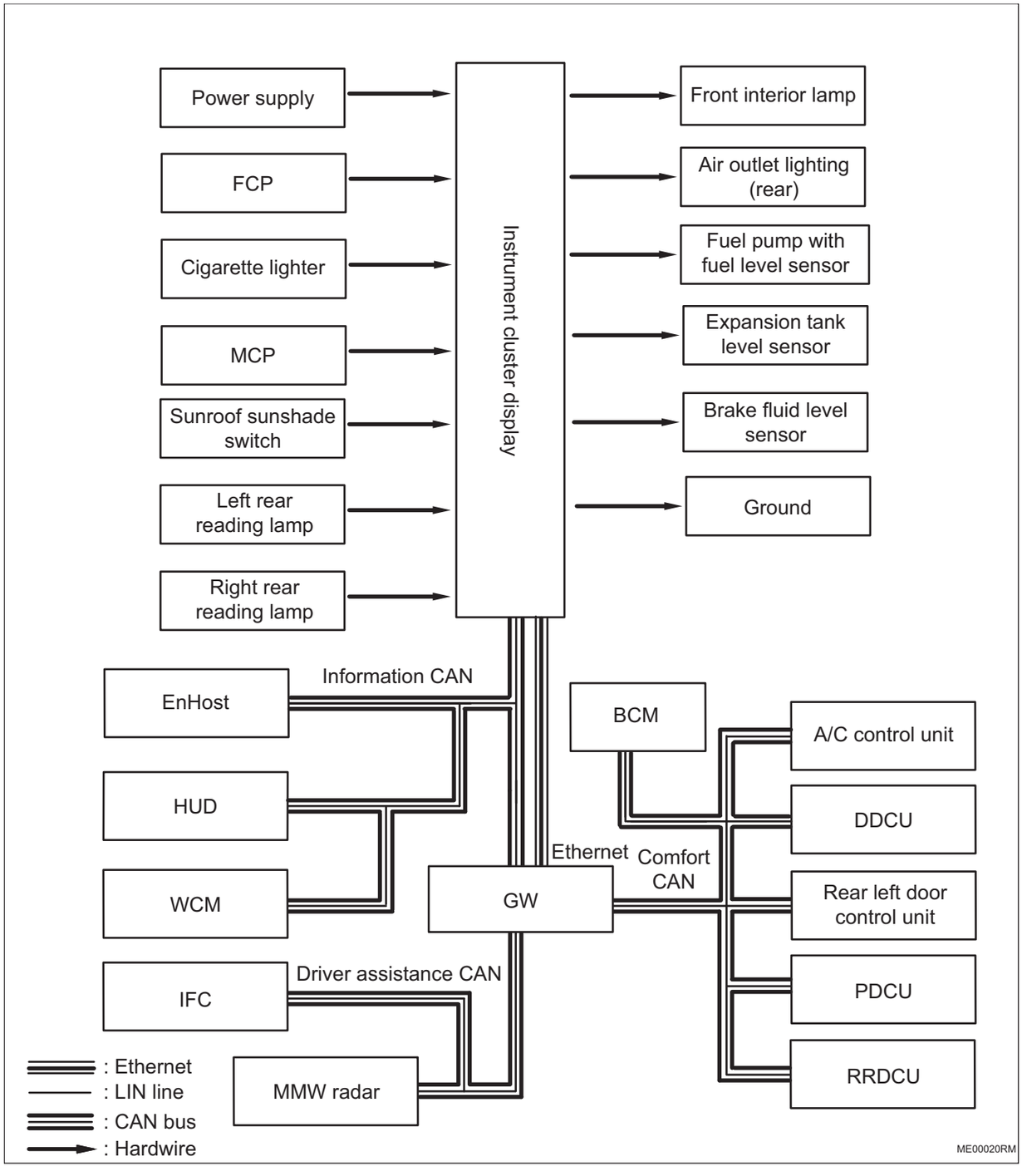


ME00050RM


RRDCU
Right rear reading lamp
Left rear reading lamp
Front interior lamp
GW
PDCU
Expansion tank level sensor
RLDCU
Fuel pump with fuel level sensor
DDCU
BCM

ME00060RM

System diagram



System description

1. Function overview

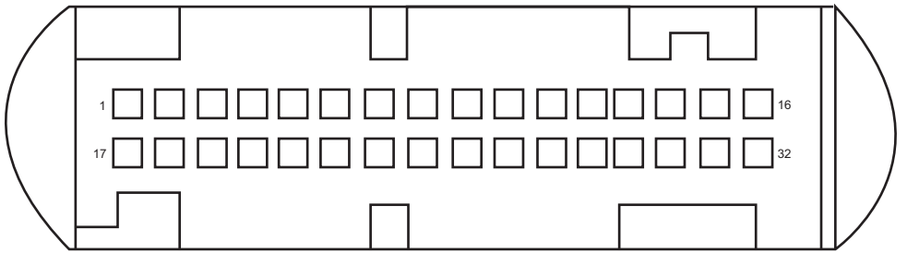
(a) The information display system/instrument cluster is mainly used to provide vehicle state and driving information to the driver in a visual and/or audible manner.

(b) The display includes power, vehicle speed, gear position information, alarm/indicator lamp, average vehicle speed, tire pressure information, time, various alarms and prompt information, etc.

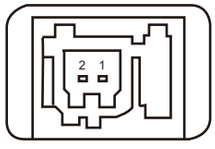
2. **Chinese display is supported in the instrument cluster display.**

3. **Built-in speaker for audible prompt and alarm prompt.**

ECU terminal



Instrument cluster display A



Instrument cluster display C

ME00010RM

Instrument cluster display A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Ground	17	B+
2	Ground	18	B+
3	—	19	IG1
4	CAN_L	20	—
5	CAN_H	21	—
6	Fuel GND	22	—
7	Fuel signal (resistance)	23	—
8	Brake fluid level	24	—
9	—	25	—
10	Backlight drive PWM1 (hazard warning lamp switch SOS switch)	26	—
11	Backlight drive PWM2 (switch other than for A10 drive)	27	—
12	Coolant level inspection channel 2 (motor) "+"	28	Coolant level inspection channel 2 (motor) "-"
13	Coolant level inspection channel 1 (engine) "+"	29	Coolant level inspection channel 1 (engine) "-"
14	—	30	—
15	—	31	—
16	—	32	—

Instrument cluster display C			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Ethernet-	2	Ethernet +

ME

DTC chart

Premium model

DTC	Description	Reference page
U300316	Power supply voltage low	(See page ME-22)
U300317	Power supply voltage high	(See page ME-22)
B144011	Fuel signal circuit shorted to ground	(See page ME-11)
B144015	Fuel signal circuit open/shorted to power supply	(See page ME-11)
B14401E	Fuel sensor resistance out of range	(See page ME-11)
B144211	Vehicle backlight drive PWM1 signal fault-circuit shorted to ground	(See page ME-16)
B144311	Vehicle backlight drive PWM2 signal fault-circuit shorted to ground	(See page ME-16)
B144403	Abnormal communication of daughter board	(See page ME-18)
B144703	TFT fault	(See page ME-18)
B144804	Instrument cluster internal fault	(See page ME-18)
B144971	Button fault	(See page ME-18)
B144A01	Ethernet communication failure	(See page ME-18)
U004688	Information CAN bus off	(See page ME-21)
U014687	GW node lost	(See page ME-21)
U024587	EnHost node lost	(See page ME-21)
U015887	HUD node lost	(See page ME-21)
U024887	WCM node lost Missing WCM	(See page ME-21)
U12E187	IHC message lost	(See page ME-21)
U112187	ESP message lost	(See page ME-21)
U115187	ACU message lost	(See page ME-21)
U116487	A/C control unit message lost	(See page ME-21)
U114087	BCM 1 message lost	(See page ME-21)
U119987	Driver door module message lost	(See page ME-21)
U120087	Passenger door module message lost	(See page ME-21)
U120187	Rear left door module message lost	(See page ME-21)
U120287	Rear right door module message lost	(See page ME-21)
U113887	Driving mode selection control unit message lost	(See page ME-21)
U110087	ECM message lost	(See page ME-21)
U110187	TCU message lost	(See page ME-21)
U129387	HCU message lost	(See page ME-21)
U129A87	BMS message lost	(See page ME-21)
U113187	EPS ECU message lost	(See page ME-21)
U123587	IFC message lost	(See page ME-21)
U12D587	ETC system message lost	(See page ME-21)

DTC	Description	Reference page
U123287	LCDA message lost	(See page ME-21)
U114687	GW message lost	(See page ME-21)
U145E8A	IC ETH1 connection failure	(See page ME-21)
U14A28E	IVI SOMEIP no response	(See page ME-21)
U12E387	Headlamp control unit message lost	(See page ME-21)

Base model

DTC	Description	Reference page
U004688	Information CAN bus off	(See page ME-38)
U014687	GW node lost	(See page ME-38)
U024587	EnHost node lost	(See page ME-38)
U015887	HUD node lost	(See page ME-38)
U024887	WCM node lost	(See page ME-38)
U114087	BCM node lost	(See page ME-38)
U119987	Driver door node lost	(See page ME-38)
U120087	Passenger door node lost	(See page ME-38)
U120187	Rear left door node lost	(See page ME-38)
U120287	Rear right door node lost	(See page ME-38)
U113887	DMS node lost	(See page ME-38)
U129387	HCU node lost	(See page ME-38)
U129A87	BMS node lost	(See page ME-38)
U129887	Battery charging system node lost	(See page ME-38)
U123587	IFC node lost	(See page ME-38)
U123287	LCDA node lost	(See page ME-38)
U114687	GW node lost	(See page ME-38)
U110087	ECM message lost	(See page ME-38)
U110187	TCU message lost	(See page ME-38)
U115187	ACU message lost	(See page ME-38)
U112187	ESC and EPB message lost	(See page ME-38)
U113187	EPS ECU message lost	(See page ME-38)
U116487	A/C control unit message lost	(See page ME-38)
U12D587	ETC system message lost	(See page ME-38)
U12E187	IHC message lost	(See page ME-38)
B144017	Battery power supply voltage high	(See page ME-26)
B144016	Battery supply voltage low	(See page ME-26)
B144111	Fuel sensor output circuit shorted to ground	(See page ME-30)
B144113	Fuel sensor output open-circuited to ground	(See page ME-30)
B14411C	Fuel sensor out of range	(See page ME-30)
B144200	Vehicle backlight drive PWM1 signal fault	(See page ME-35)

DTC	Description	Reference page
B144300	Vehicle backlight drive PWM2 signal fault	(See page ME-35)

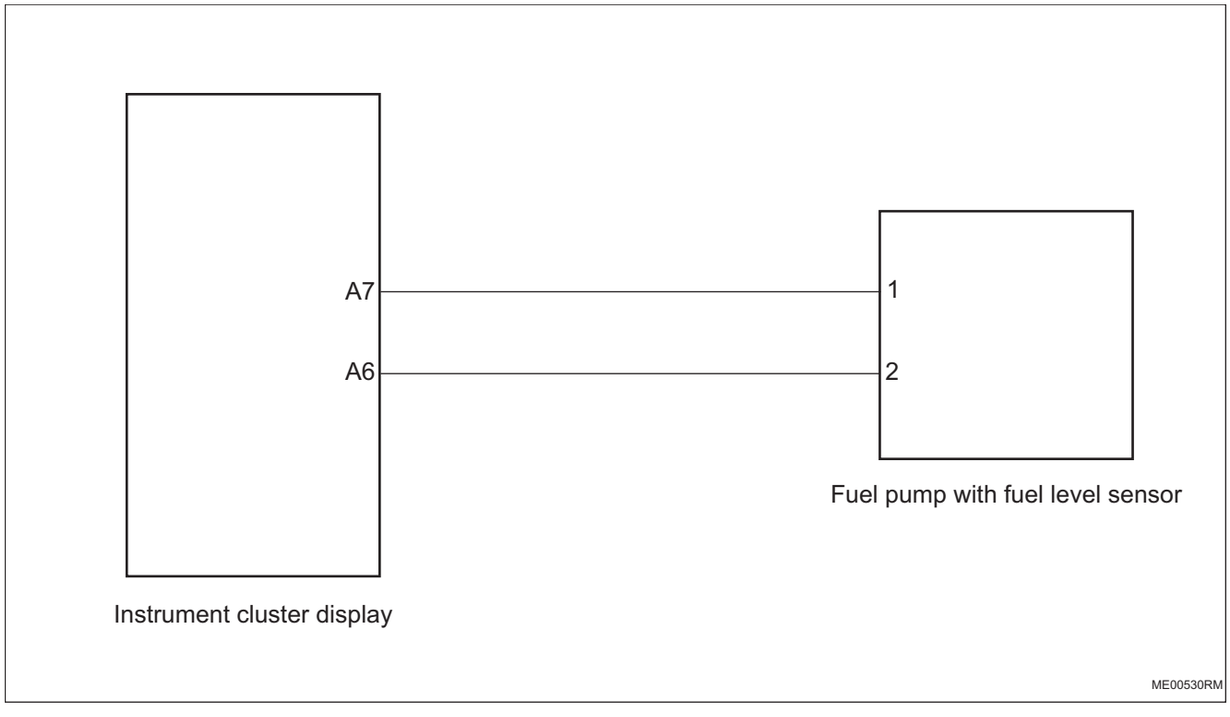
DTC	B144011	Fuel signal circuit shorted to ground
DTC	B144015	Fuel signal circuit open/shorted to power supply
DTC	B14401E	Fuel sensor resistance out of range

Description

When the fuel level sensor fails, the instrument cluster display records the DTC.

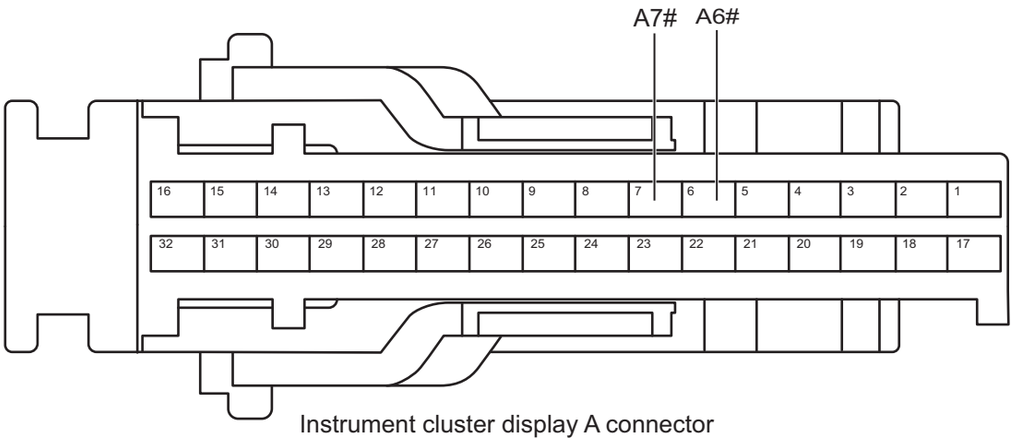
DTC	DTC detection conditions	Faulty location
B144011	(a) Fuel signal circuit shorted to ground.	• Fuel pump with fuel level sensor • Harness and connector • Instrument cluster display
B144015	(a) Fuel signal circuit open/circuit shorted to power supply.	• Fuel pump with fuel level sensor • Harness and connector • Instrument cluster display
B14401E	(a) Fuel sensor resistance is out of range.	• Fuel pump with fuel level sensor • Harness and connector • Instrument cluster display

Circuit diagram



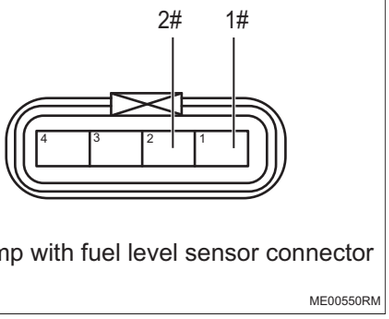
Inspection procedure

1	Check fuel pump with fuel level sensor harness and connector for open circuit



Instrument cluster display A connector

ME00541RM



Fuel pump with fuel level sensor connector

ME00550RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the instrument cluster display connector.

(c) Disconnect the fuel pump with fuel level sensor connector.

(d) Measure the resistance according to the values in the table below.

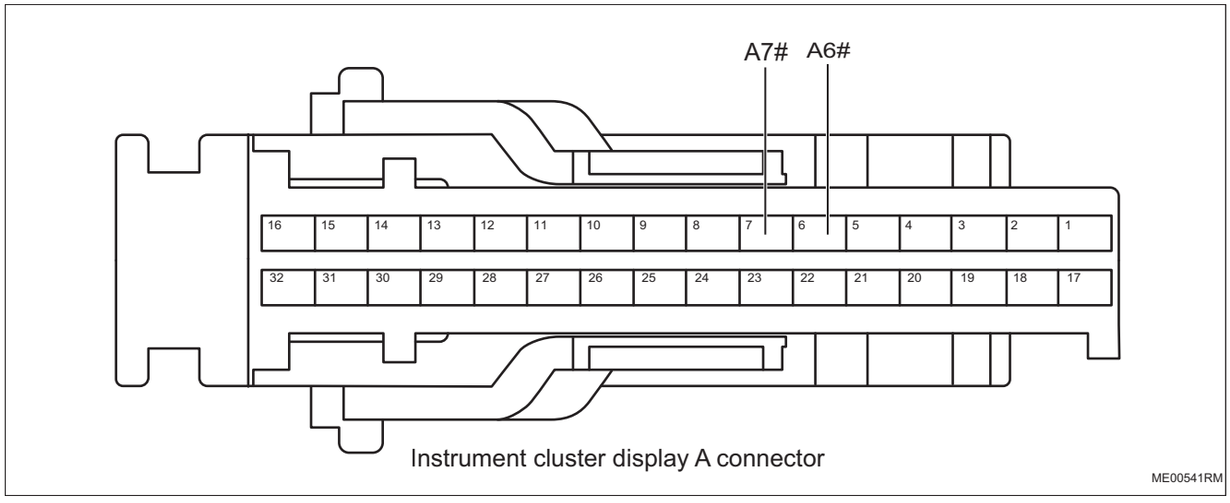
Standard value

Detector connection	Detection conditions	Specified state
Instrument cluster display connector A6# -fuel pump with fuel level sensor connector 2#	Always connected	Less than 1Ω
Instrument cluster display connector A7# -fuel pump with fuel level senso connector 1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check fuel pump with fuel level sensor harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

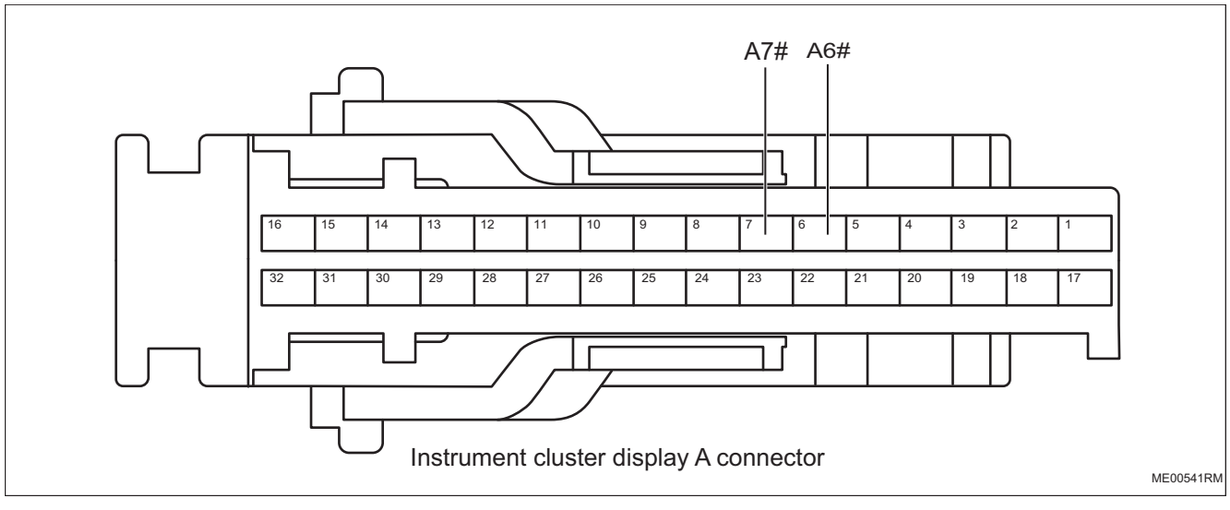
Standard value

Detector connection	Detection conditions	Specified state
Instrument cluster display connector A6# - body GND	Always connected	10 KΩ or greater
Instrument cluster display connector A7# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check fuel pump with fuel level sensor harness and connector for circuit shorted to power supply**



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

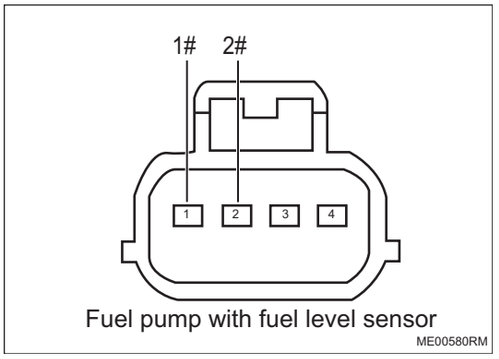
Standard value

Detector connection	Detection conditions	Specified state
Instrument cluster display connector A6# - body GND	Always connected	Less than 1 V
Instrument cluster display connector A7# - body GND	Always connected	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	Check fuel pump with fuel level sensor



Fuel pump with fuel level sensor
ME00580RM

(a) Measure the resistance according to the values in the table below.

Standard value

Applicable to traditional gasoline engine models

Detector connection	Fuel gauge indication	Float center height (mm)	Resistance (Ω)
Fuel pump with fuel level sensor 1# - Fuel pump with fuel level sensor 2#	Empty	25.5±3	256±3
	1/4	74.5±3	205±3
	3/8	83.5±3	181±3
	1/2	96.5±3	154±3
	5/8	111±3	125±3
	3/4	121±3	103±2
	7/8	134.4±3	78±2
	Full	147.5±3	52±2

For HEV models

Detector connection	Fuel gauge indication	Float center height (mm)	Resistance (Ω)
Fuel pump with fuel level sensor 1# - Fuel pump with fuel level sensor 2#	Empty	16.8±3	259±3
	1/4	41±3	207±3
	3/8	52.5±3	180.5±3
	1/2	64.3±3	154.4±3
	5/8	78.9±3	127.1±3
	3/4	93.6±3	102±3
	7/8	112.4±3	76.2±2
	Full	132.9±3	49.8±2

NG → **Replacement of fuel pump with fuel level sensor (See page FU-6)**

OK

5	**Replace instrument cluster display (See page ME-39)**

DTC	B144211	Vehicle backlight drive PWM1 signal fault-circuit shorted to ground
DTC	B144311	Vehicle backlight drive PWM2 signal fault-circuit shorted to ground

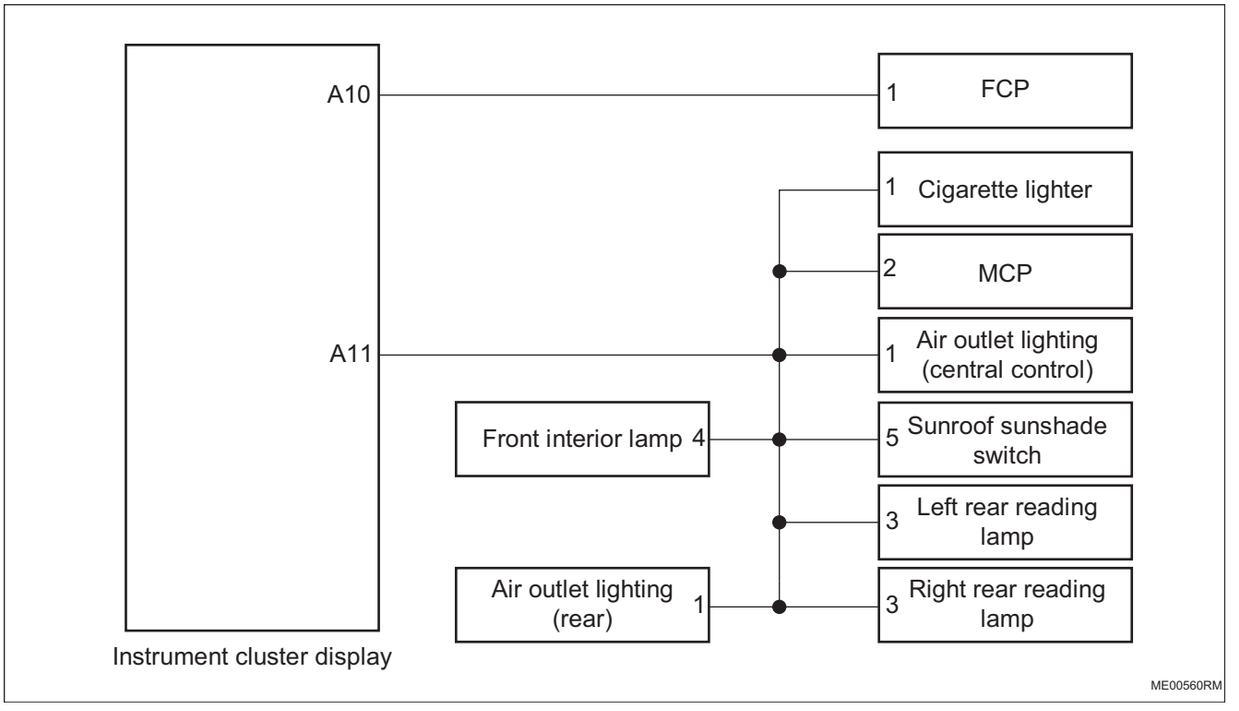
Description

When the backlight drive signal circuit is shorted to ground, instrument cluster display records the DTC.

ME

DTC	DTC detection conditions	Faulty location
B144211	(a) Backlight drive PWM1 signal fault.	• Harness and connector • Instrument cluster display
B144311	(a) Backlight drive PWM2 signal fault.	• Harness and connector • Instrument cluster display

Circuit diagram



Inspection procedure

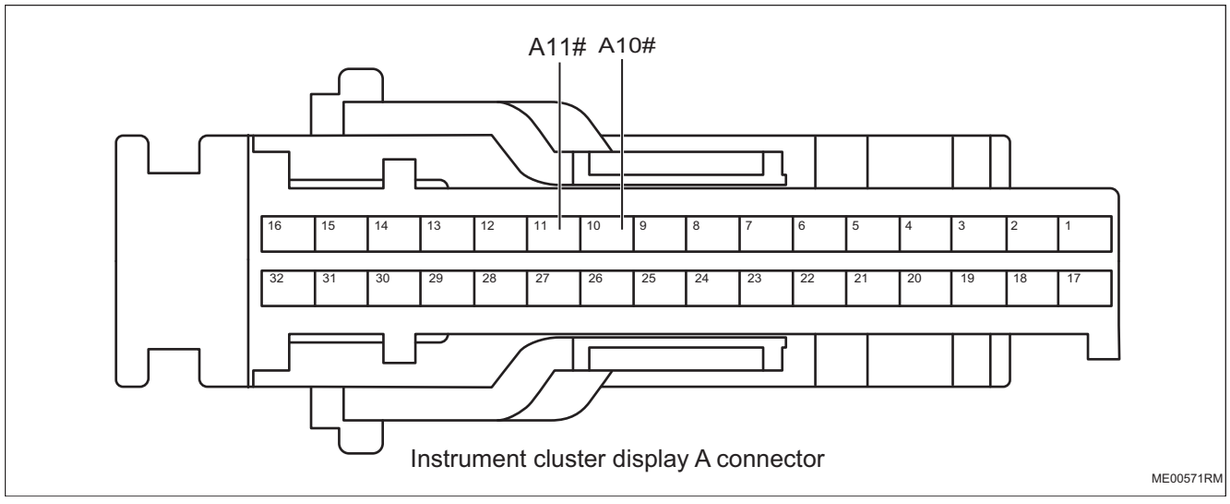
1	Check whether the backlight is damaged

(a) Check whether the backlight is damaged.

NG → Replace backlight

OK

2	Check backlight drive signal harness and connector for circuit shorted to ground



(a) Set the ignition switch to "OFF".

(b) Disconnect the instrument cluster display connector.

(c) Disconnect all the backlight connectors.

(d) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Instrument cluster display connector A10# - body GND	Always connected	10 KΩ or greater
Instrument cluster display connector A11# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	Replace instrument cluster display (See page ME-39)

ME

DTC	B144403	Abnormal communication of daughter board
DTC	B144703	TFT fault
DTC	B144804	Instrument cluster internal fault
DTC	B144971	Button fault
DTC	B144A01	Ethernet communication failure

ME

Description

When a fault exists in the instrument cluster display, the instrument cluster display records the DTC.

DTC	DTC detection conditions	Faulty location
B144403	(a) Abnormal communication of the daughter board.	• Instrument cluster display
B144703	(a) TFT failure.	• Instrument cluster display
B144804	(a) Instrument cluster internal fault.	• Instrument cluster display
B144971	(a) Button fault.	• Instrument cluster display
B144A01	(a) Ethernet communication failure.	• Instrument cluster display

Inspection procedure

1	**Clear DTC**

(a) Connect the HQ-VDS.

(b) Clear the DTC.

(c) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace instrument cluster display (See page ME-39)**

OK

2	**End**

DTC	B144971	Button fault

Description

When the left button of the steering wheel fails, the instrument cluster display records the DTC.

DTC	DTC detection conditions	Faulty location
B144971	(a) Button fault.	• Steering wheel button • Harness and connector • Instrument cluster display

Inspection procedure

1	Check the left button of the steering wheel

(a) Check whether the left button of the steering wheel is stuck.

(b) Check whether the left button of the steering wheel is damaged.

NG → **Repair according to the fault**

OK

2	Steering wheel left button harness and connector

(a) Check whether the harness and connector of the left button of the steering wheel are securely connected.

(b) Check whether the steering wheel left button harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

3	Replace instrument cluster display (See page ME-39)

ME

DTC	U004688	Information CAN bus off
DTC	U014687	GW node lost
DTC	U024587	EnHost node lost
DTC	U015887	HUD node lost
DTC	U024887	WCM node lost Missing WCM
DTC	U12E187	IHC message lost
DTC	U112187	ESP message lost
DTC	U115187	ACU message lost
DTC	U116487	A/C control unit message lost
DTC	U114087	BCM 1 message lost
DTC	U119987	Driver door module message lost
DTC	U120087	Passenger door module message lost
DTC	U120187	Rear left door module message lost
DTC	U120287	Rear right door module message lost
DTC	U113887	Driving mode selection control unit message lost
DTC	U110087	ECM message lost
DTC	U110187	TCU message lost
DTC	U129387	HCU message lost
DTC	U129A87	BMS message lost
DTC	U113187	EPS ECU message lost
DTC	U123587	IFC message lost
DTC	U12D587	ETC system message lost
DTC	U123287	LCDA message lost
DTC	U114687	GW message lost
DTC	U145E8A	IC ETH1 connection failure
DTC	U14A28E	IVI SOMEIP no response
DTC	U12E387	Headlamp control unit message lost

Description

When the communication between the instrument cluster display and other systems is abnormal or interrupted, the instrument cluster display will record the DTC.

DTC	DTC detection conditions	Faulty location
U004688	(a) Abnormal or interrupted communication.	• Relevant system control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	
U024587	(a) Abnormal or interrupted communication.	
U015887	(a) Abnormal or interrupted communication.	
U024887	(a) Abnormal or interrupted communication.	
U12E187	(a) Abnormal or interrupted communication.	
U112187	(a) Abnormal or interrupted communication.	
U115187	(a) Abnormal or interrupted communication.	
U116487	(a) Abnormal or interrupted communication.	
U114087	(a) Abnormal or interrupted communication.	
U119987	(a) Abnormal or interrupted communication.	
U120087	(a) Abnormal or interrupted communication.	
U120187	(a) Abnormal or interrupted communication.	
U120287	(a) Abnormal or interrupted communication.	
U113887	(a) Abnormal or interrupted communication.	
U110087	(a) Abnormal or interrupted communication.	
U110187	(a) Abnormal or interrupted communication.	
U129387	(a) Abnormal or interrupted communication.	
U129A87	(a) Abnormal or interrupted communication.	
U113187	(a) Abnormal or interrupted communication.	
U123587	(a) Abnormal or interrupted communication.	
U12D587	(a) Abnormal or interrupted communication.	
U123287	(a) Abnormal or interrupted communication.	
U114687	(a) Abnormal or interrupted communication.	
U145E8A	(a) Abnormal or interrupted communication.	
U14A28E	(a) Abnormal or interrupted communication.	
U12E387	(a) Abnormal or interrupted communication.	

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

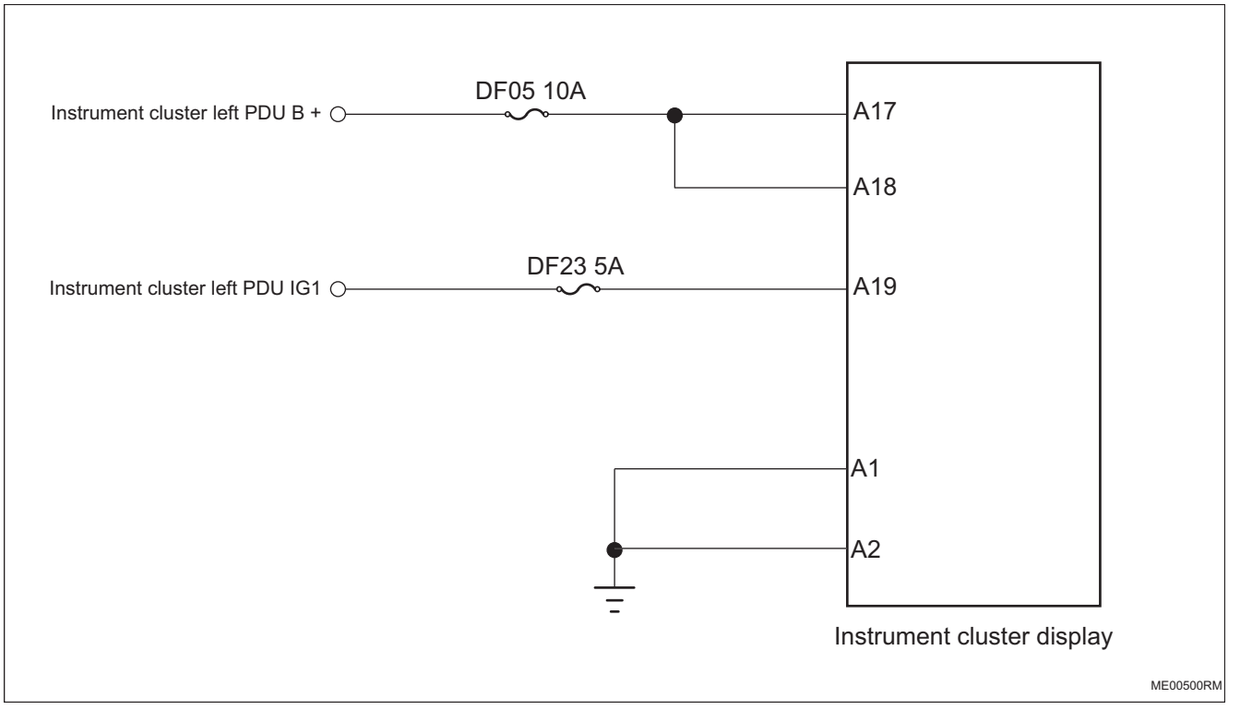
DTC	U300316	Power supply voltage low
DTC	U300317	Power supply voltage high

Description

When the system voltage is out of the normal range, the instrument cluster display records the DTC.

DTC	DTC detection conditions	Faulty location
U300316	(a) Power supply voltage low.	• Charging system • Harness and connector • Instrument cluster display
U300317	(a) Power supply voltage high.	• Charging system • Harness and connector • Instrument cluster display

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) When the vehicle enters Ready mode, measure battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery + - battery -	Always connected	9–16V

NG → **Overhaul the charging system**

OK

2 Check the instrument cluster display fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the instrument cluster display fuse.

(d) Measure the resistance according to the values in the table below.

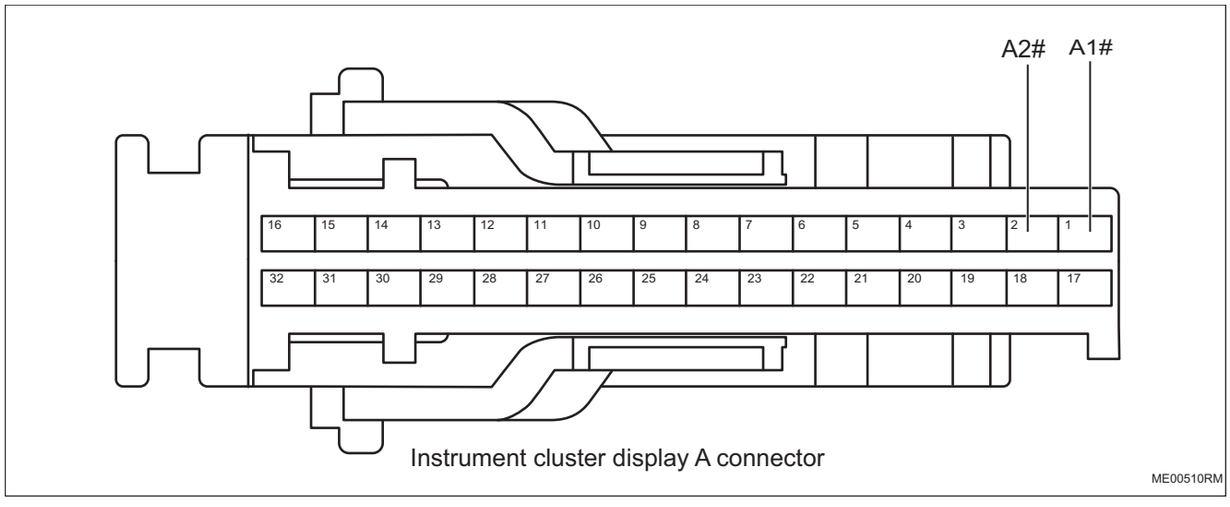
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3 Check the instrument cluster display ground



(a) Disconnect the instrument cluster display connector.

(b) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Instrument cluster display connector A1# - body GND	Always connected	Less than 1Ω

ME

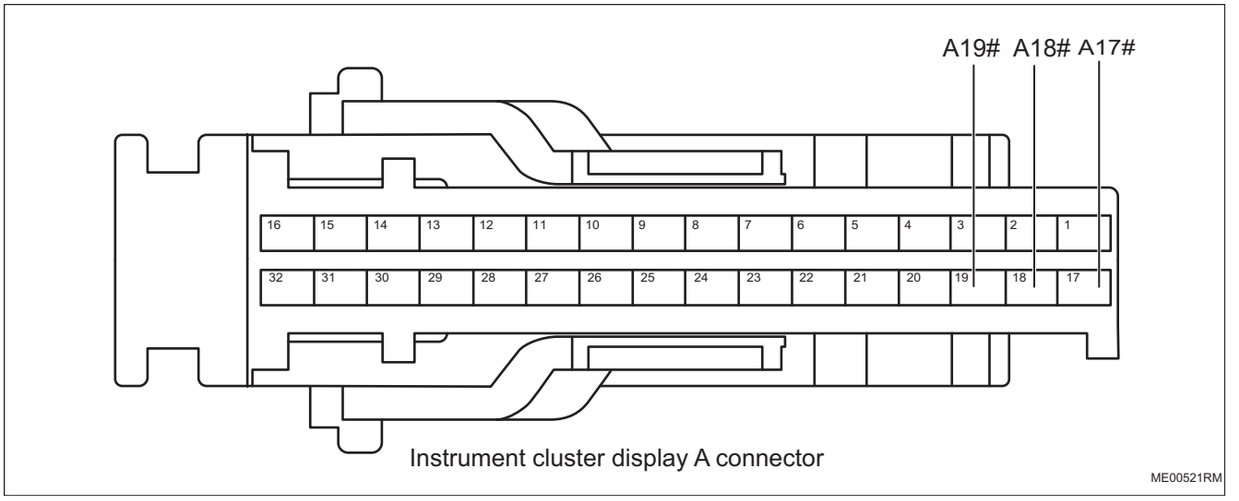
Detector connection	Detection conditions	Specified state
Instrument cluster display connector A2# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

ME

OK

4 Check the instrument cluster display power supply



(a) Install the fuse.

(b) Connect the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Instrument cluster display connector A17# - body GND	Set the ignition switch to "ON"	Battery voltage
Instrument cluster display connector A18# - body GND	Set the ignition switch to "ON"	Battery voltage
Instrument cluster display connector A19# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace instrument cluster display (See page ME-39)**

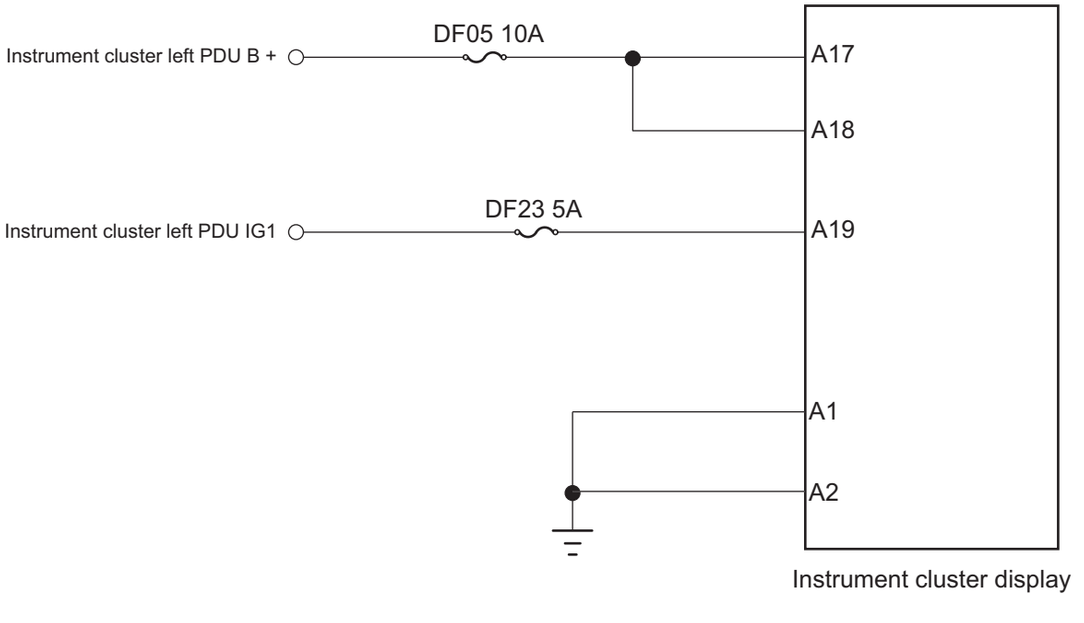
DTC	B144017	Battery power supply voltage high
DTC	B144016	Battery supply voltage low

Description

When the system voltage is out of the normal range, the instrument cluster display records the DTC.

DTC	DTC detection conditions	Faulty location
B144017	(a) Power supply voltage high.	• Charging system • Harness and connector • Instrument cluster display
B144016	(a) Power supply voltage low.	• Charging system • Harness and connector • Instrument cluster display

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) When the vehicle enters Ready mode, measure battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery + - battery -	Always connected	9–16V

NG → **Overhaul the charging system**

OK

2 Check the instrument cluster display fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the instrument cluster display fuse.

(d) Measure the resistance according to the values in the table below.

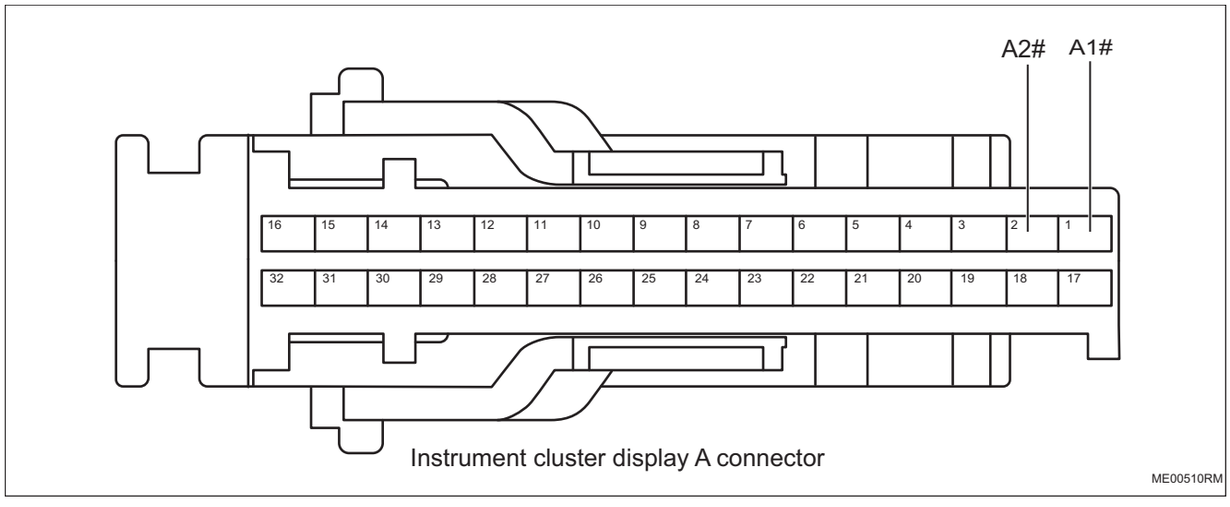
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3 Check the instrument cluster display ground



Instrument cluster display A connector

(a) Disconnect the instrument cluster display connector.

(b) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Instrument cluster display connector A1# - body GND	Always connected	Less than 1Ω

ME

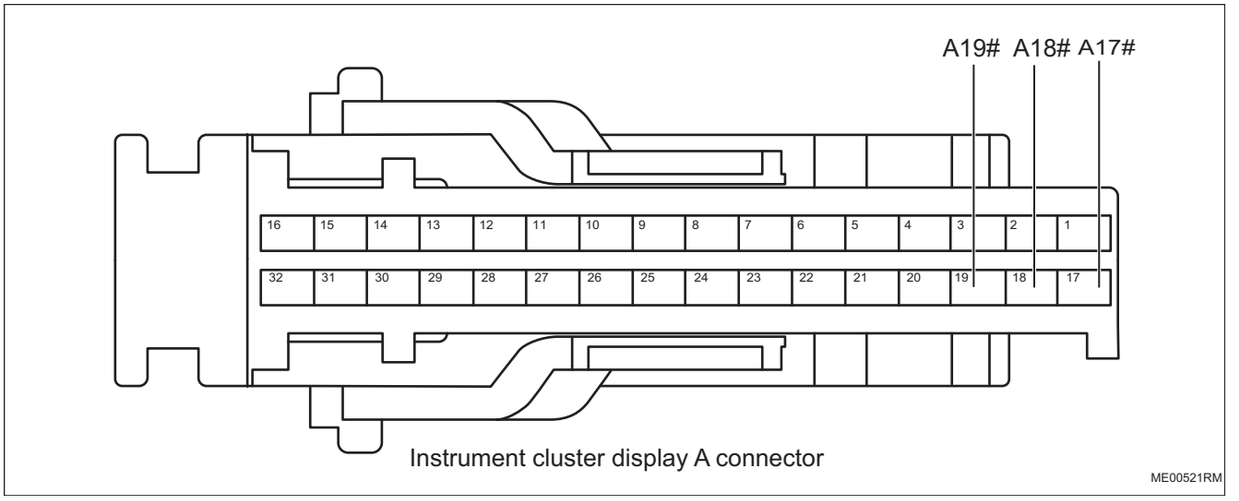
Detector connection	Detection conditions	Specified state
Instrume t cluster display connector A2# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

ME

OK

4	Check the instrument cluster display power supply



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Instrument cluster display connector A17# - body GND	Set the ignition switch to "ON"	Battery voltage
Instrument cluster display connector A18# - body GND	Set the ignition switch to "ON"	Battery voltage
Instrument cluster display connector A19# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace instrument cluster display (See page ME-39)**

DTC	B144111	Fuel sensor output circuit shorted to ground
DTC	B144113	Fuel sensor output open-circuited to ground
DTC	B14411C	Fuel sensor out of range

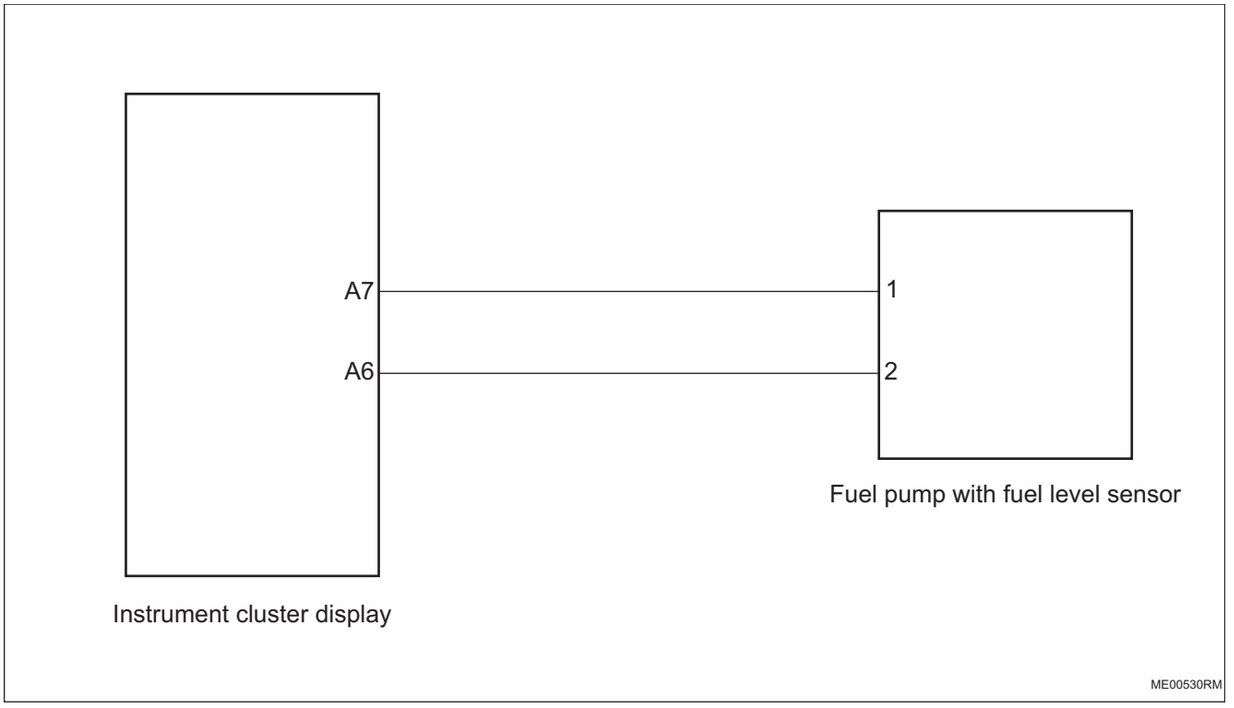
Description

When the fuel level sensor fails, the instrument cluster display records the DTC.

ME

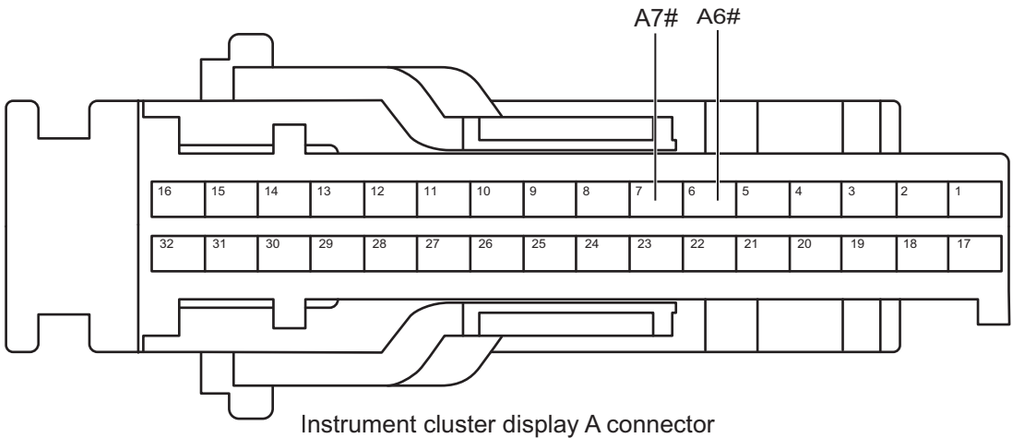
DTC	DTC detection conditions	Faulty location
B144111	(a) Fuel sensor output circuit shorted to ground.	• Fuel pump with fuel level sensor • Harness and connector • Instrument cluster display
B144113	(a) Fuel sensor output open-circuited to ground.	• Fuel pump with fuel level sensor • Harness and connector • Instrument cluster display
B14411C	(a) Fuel sensor resistance is out of range.	• Fuel pump with fuel level sensor • Harness and connector • Instrument cluster display

Circuit diagram



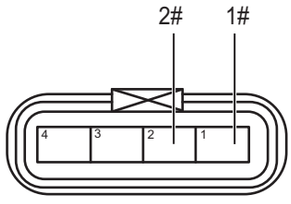
Inspection procedure

1	Check fuel pump with fuel level sensor harness and connector for open circuit



Instrument cluster display A connector

ME00541RM



Fuel pump with fuel level sensor connector

ME00550RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the instrument cluster display connector.

(c) Disconnect the fuel pump with fuel level sensor connector.

(d) Measure the resistance according to the values in the table below.

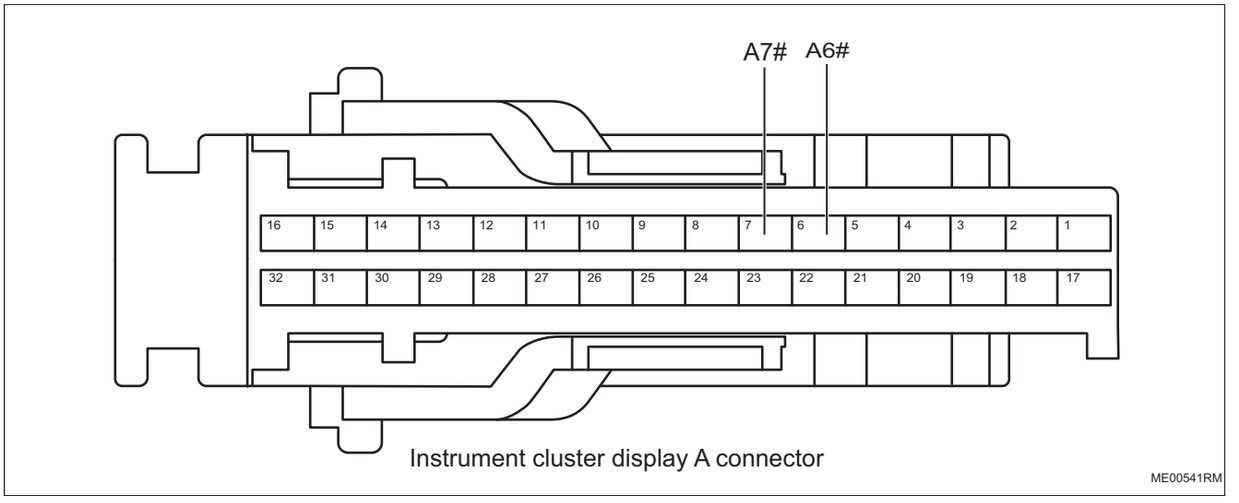
Standard value

Detector connection	Detection conditions	Specified state
Instrument cluster display connector A6# -fuel pump with fuel level sensor connector 2#	Always connected	Less than 1Ω
Instrument cluster display connector A7# -fuel pump with fuel level senso connector 1#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check fuel pump with fuel level sensor harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

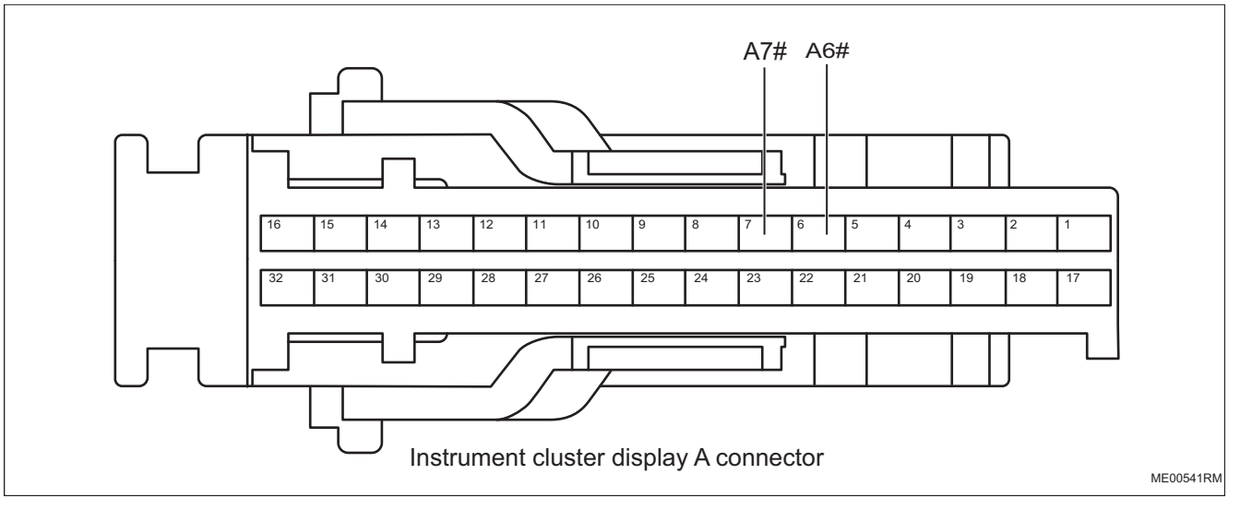
Standard value

Detector connection	Detection conditions	Specified state
Instrument cluster display connector A6# - body GND	Always connected	10 KΩ or greater
Instrument cluster display connector A7# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check fuel pump with fuel level sensor harness and connector for circuit shorted to power supply**



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

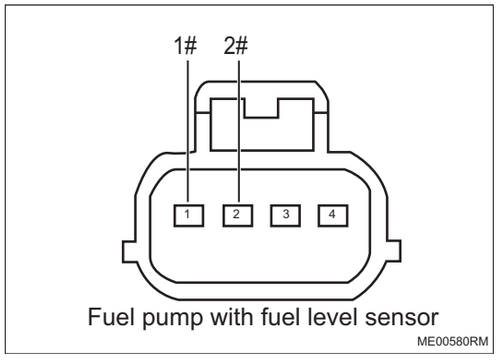
Standard value

Detector connection	Detection conditions	Specified state
Instrument cluster display connector A6# - body GND	Always connected	Less than 1 V
Instrument cluster display connector A7# - body GND	Always connected	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4 Check fuel pump with fuel level sensor



Fuel pump with fuel level sensor
ME00580RM

(a) Measure the resistance according to the values in the table below.

Standard value

Applicable to traditional gasoline engine models

Detector connection	Fuel gauge indication	Float center height (mm)	Resistance (Ω)
Fuel pump with fuel level sensor 1# - Fuel pump with fuel level sensor 2#	Empty	25.5±3	256±3
	1/4	74.5±3	205±3
	3/8	83.5±3	181±3
	1/2	96.5±3	154±3
	5/8	111±3	125±3
	3/4	121±3	103±2
	7/8	134.4±3	78±2
	Full	147.5±3	52±2

For HEV models

Detector connection	Fuel gauge indication	Float center height (mm)	Resistance (Ω)
Fuel pump with fuel level sensor 1# - Fuel pump with fuel level sensor 2#	Empty	16.8±3	259±3
	1/4	41±3	207±3
	3/8	52.5±3	180.5±3
	1/2	64.3±3	154.4±3
	5/8	78.9±3	127.1±3
	3/4	93.6±3	102±3
	7/8	112.4±3	76.2±2
	Full	132.9±3	49.8±2

NG → **Replacement of fuel pump with fuel level sensor (See page FU-6)**

OK

5	**Replace instrument cluster display (See page ME-39)**

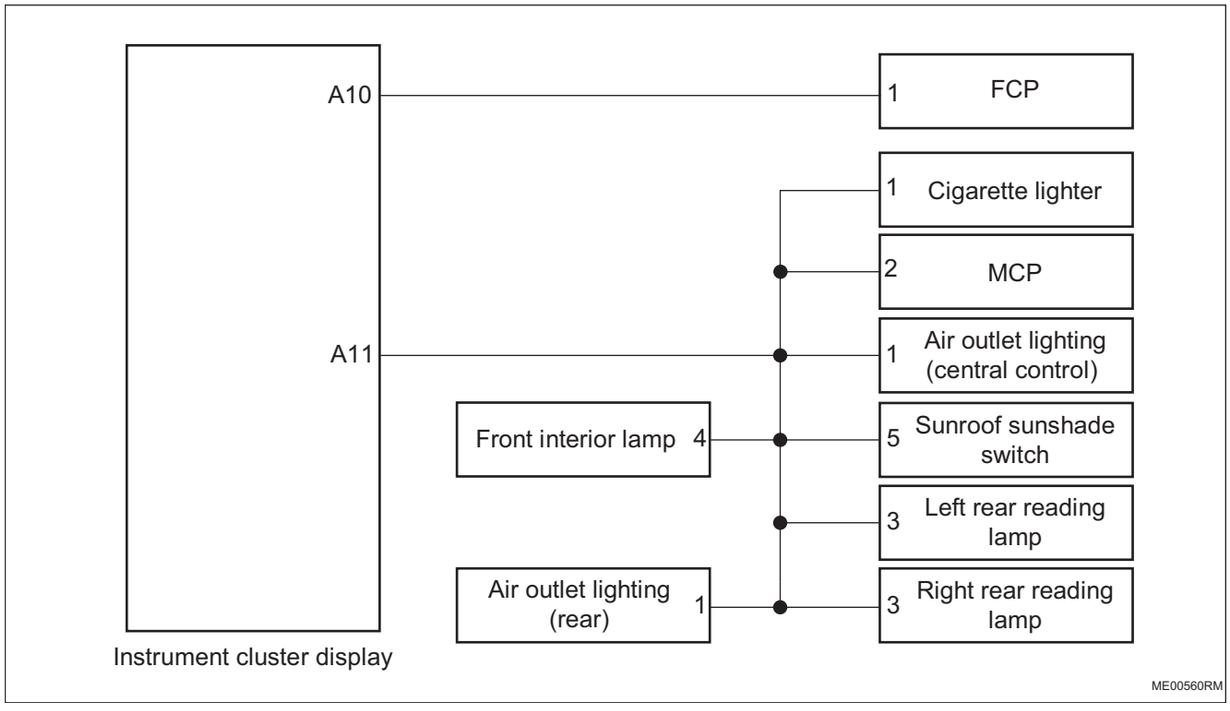
DTC	B144200	Vehicle backlight drive PWM1 signal fault
DTC	B144300	Vehicle backlight drive PWM2 signal fault

Description

When the backlight drive signal circuit is shorted to ground, instrument cluster display records the DTC.

DTC	DTC detection conditions	Faulty location
B144200	(a) Backlight drive PWM1 signal fault.	• Harness and connector • Instrument cluster display
B144300	(a) Backlight drive PWM2 signal fault.	• Harness and connector • Instrument cluster display

Circuit diagram



Inspection procedure

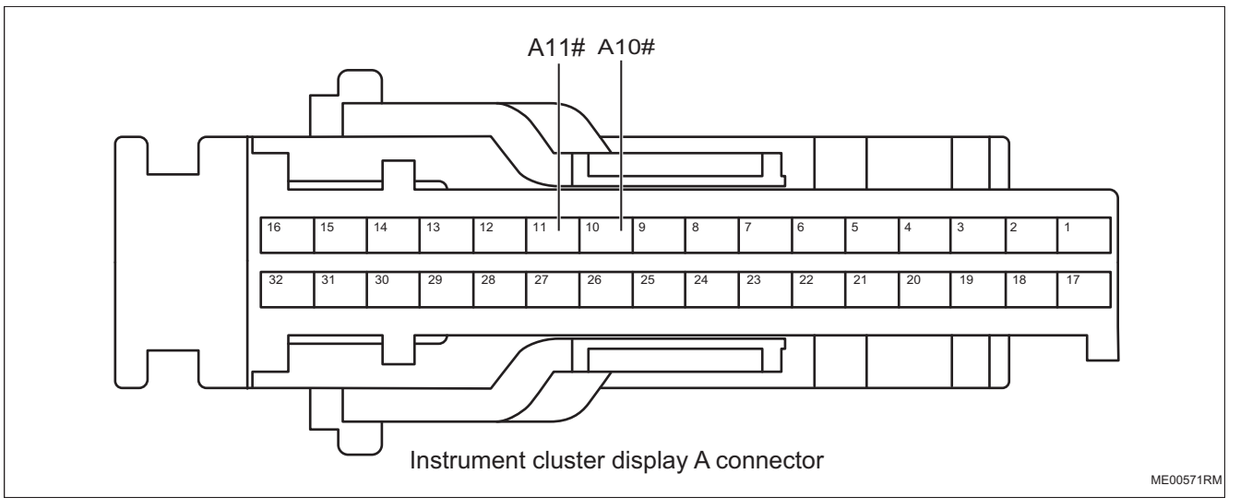
1	Check whether the backlight is damaged

(a) Check whether the backlight is damaged.

NG → Replace backlight

OK

2	Check backlight drive signal harness and connector for circuit shorted to ground



(a) Set the ignition switch to "OFF".

(b) Disconnect the instrument cluster display connector.

(c) Disconnect all the backlight connectors.

(d) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Instrument cluster display connector A10# - body GND	Always connected	10 KΩ or greater
Instrument cluster display connector A11# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Replace instrument cluster display (See page ME-39)**

DTC	U004688	Information CAN bus off
DTC	U014687	GW node lost
DTC	U024587	EnHost node lost
DTC	U015887	HUD node lost
DTC	U024887	WCM node lost
DTC	U114087	BCM node lost
DTC	U119987	Driver door node lost
DTC	U120087	Passenger door node lost
DTC	U120187	Rear left door node lost
DTC	U120287	Rear right door node lost
DTC	U113887	DMS node lost
DTC	U129387	HCU node lost
DTC	U129A87	BMS node lost
DTC	U129887	Battery charging system node lost
DTC	U123587	IFC node lost
DTC	U123287	LCDA node lost
DTC	U114687	GW node lost
DTC	U110087	ECM message lost
DTC	U110187	TCU message lost
DTC	U115187	ACU message lost
DTC	U112187	ESC and EPB message lost
DTC	U113187	EPS ECU message lost
DTC	U116487	A/C control unit message lost
DTC	U12D587	ETC system message lost
DTC	U12E187	IHC message lost

Description

When the communication between the instrument cluster display and other systems is abnormal or interrupted, the instrument cluster display will record the DTC.

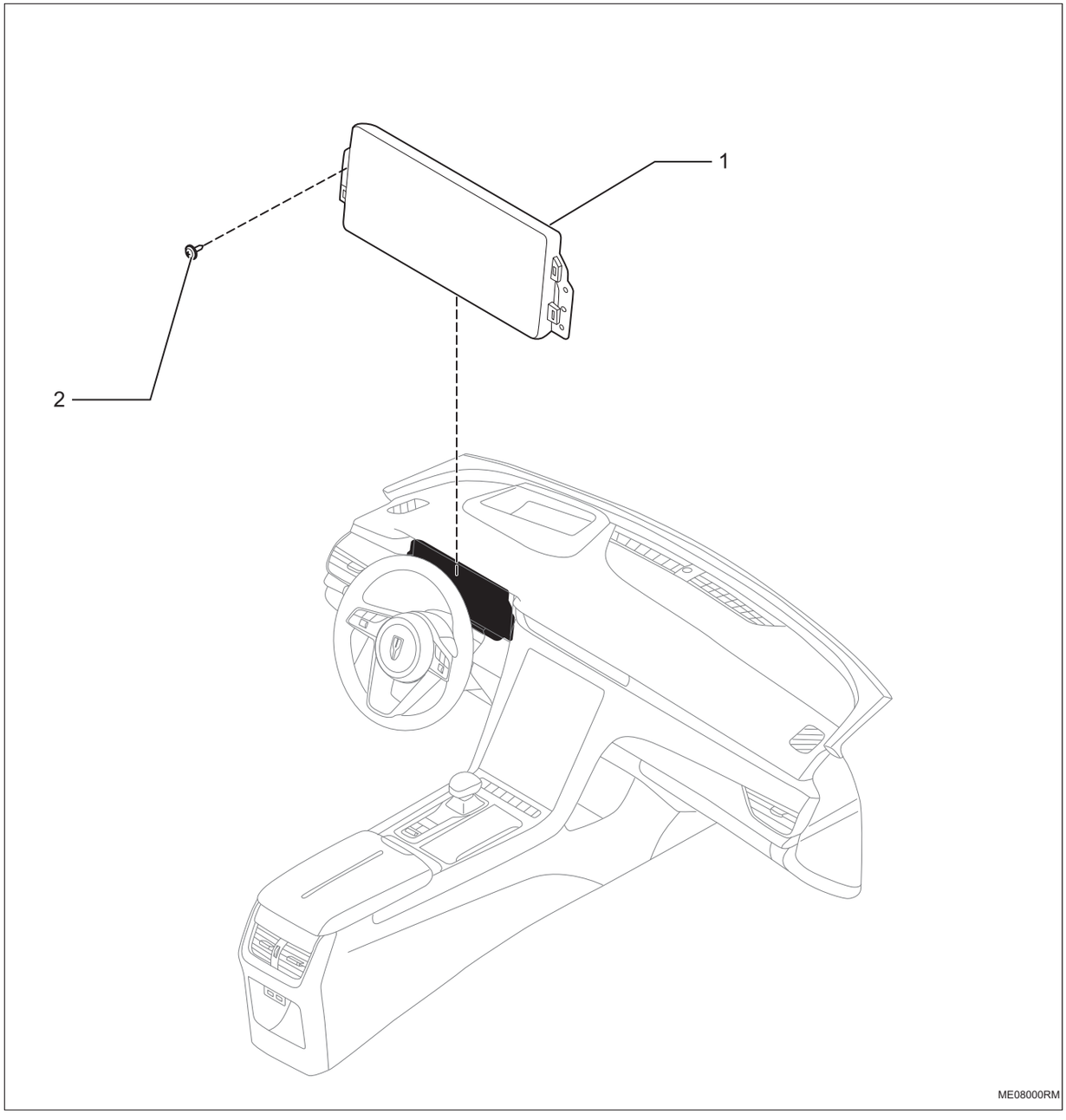
DTC	DTC detection conditions	Faulty location
U004688	(a) Abnormal or interrupted communication.	• Relevant system control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	
U024587	(a) Abnormal or interrupted communication.	
U015887	(a) Abnormal or interrupted communication.	
U024887	(a) Abnormal or interrupted communication.	
U114087	(a) Abnormal or interrupted communication.	
U119987	(a) Abnormal or interrupted communication.	
U120087	(a) Abnormal or interrupted communication.	
U120187	(a) Abnormal or interrupted communication.	
U120287	(a) Abnormal or interrupted communication.	
U113887	(a) Abnormal or interrupted communication.	
U129387	(a) Abnormal or interrupted communication.	
U129A87	(a) Abnormal or interrupted communication.	
U129887	(a) Abnormal or interrupted communication.	
U123587	(a) Abnormal or interrupted communication.	
U123287	(a) Abnormal or interrupted communication.	
U114687	(a) Abnormal or interrupted communication.	
U110087	(a) Abnormal or interrupted communication.	
U110187	(a) Abnormal or interrupted communication.	
U115187	(a) Abnormal or interrupted communication.	
U112187	(a) Abnormal or interrupted communication.	
U113187	(a) Abnormal or interrupted communication.	
U116487	(a) Abnormal or interrupted communication.	
U12D587	(a) Abnormal or interrupted communication.	
U12E187	(a) Abnormal or interrupted communication.	

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

Instrument cluster

Parts



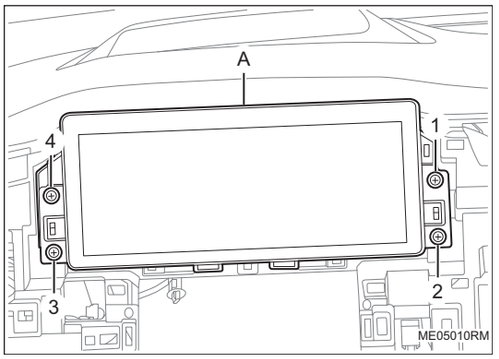
1. **Instrument cluster assembly**
2. **Screw**
   - X4
   - Torque: 3.3 ~ 4.3N·m

ME

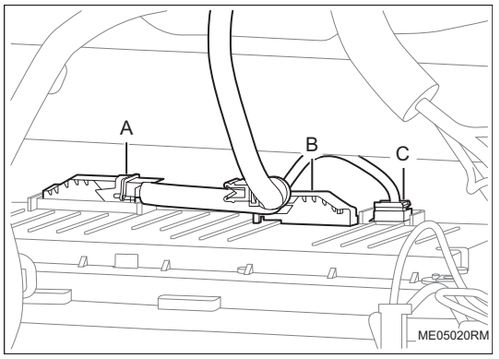
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove instrument panel left air outlet assembly (See page AC-138)**
3. **Remove instrument panel left trim strip (See page IP-5)**
4. **Remove the instrument panel left upper trim strip (See page IP-5)**
5. **Remove instrument panel middle trim strip assembly (See page IP-5)**
6. **Remove instrument panel right middle trim panel (See page IP-5)**
7. **Remove the instrument panel right upper trim strip (See page IP-5)**
8. **Remove instrument cluster assembly**

   (a) Remove the screws -1-4- and take out the instrument cluster assembly.



   (b) Disconnect the harness connectors-A-C-.



Installation

1. **The installation procedure is the reverse of removal procedure.**

PDC

PDC PM-1
Precautions PM-1
Location of parts PM-2
System diagram PM-5
System description PM-7
Symptom chart PM-7
ECU terminal PM-8
DTC chart PM-9
B1A6A17 ..... PM-12
B1A6A16 ..... PM-12
B1A6012 ..... PM-15
B1A6014 ..... PM-15
B1A6034 ..... PM-15
B1A6013 ..... PM-15
B1A6112 ..... PM-19
B1A6114 ..... PM-19
B1A6134 ..... PM-19
B1A6113 ..... PM-19
B1A6212 ..... PM-24
B1A6214 ..... PM-24
B1A6234 ..... PM-24
B1A6213 ..... PM-24
B1A6312 ..... PM-29
B1A6314 ..... PM-29
B1A6334 ..... PM-29
B1A6313 ..... PM-29
B1A6412 ..... PM-33
B1A6414 ..... PM-33
B1A6434 ..... PM-33
B1A6413 ..... PM-33
B1A6512 ..... PM-37
B1A6514 ..... PM-37
B1A6534 ..... PM-37
B1A6513 ..... PM-37
B1A6612 ..... PM-42
B1A6614 ..... PM-42
B1A6634 ..... PM-42
B1A6613 ..... PM-42
B1A6712 ..... PM-47

B1A6714 ..... PM-47
B1A6734 ..... PM-47
B1A6713 ..... PM-47
B1A6814 ..... PM-51
U003788 ..... PM-54
U014687 ..... PM-54
U023A87 ..... PM-54
U024387 ..... PM-54
U112187 ..... PM-54
U116487 ..... PM-54
U114087 ..... PM-54
U113887 ..... PM-54
U124587 ..... PM-54
U115587 ..... PM-54
U113187 ..... PM-54
U110187 ..... PM-54
U129387 ..... PM-54
U114687 ..... PM-54
U041582 ..... PM-54
U041583 ..... PM-54
U054682 ..... PM-54
U054683 ..... PM-54
U040282 ..... PM-54
U040283 ..... PM-54
U042082 ..... PM-54
U042083 ..... PM-54
U059482 ..... PM-54
U059483 ..... PM-54

PDC assembly PM-57

Parts PM-57
Removal PM-58
Installation PM-58

Ultrasonic sensor assembly PM-59

Parts PM-59
Removal PM-61
Installation PM-61

PDC

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Warning:

Before repairing high voltage system or adjacent high voltage system components, be sure to read the Instructions and Precautions for Maintenance Work in the introduction carefully!

2. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

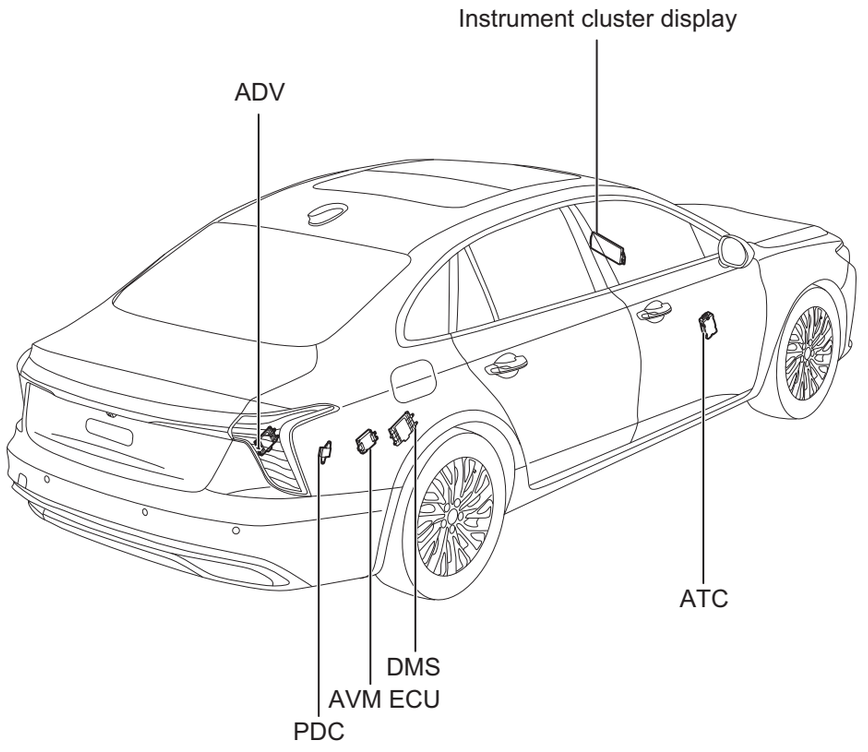
Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

3. Removal and installation of battery terminal

(a) Before electrical operation, disconnect the battery negative (-) terminal to prevent the system from short circuit.

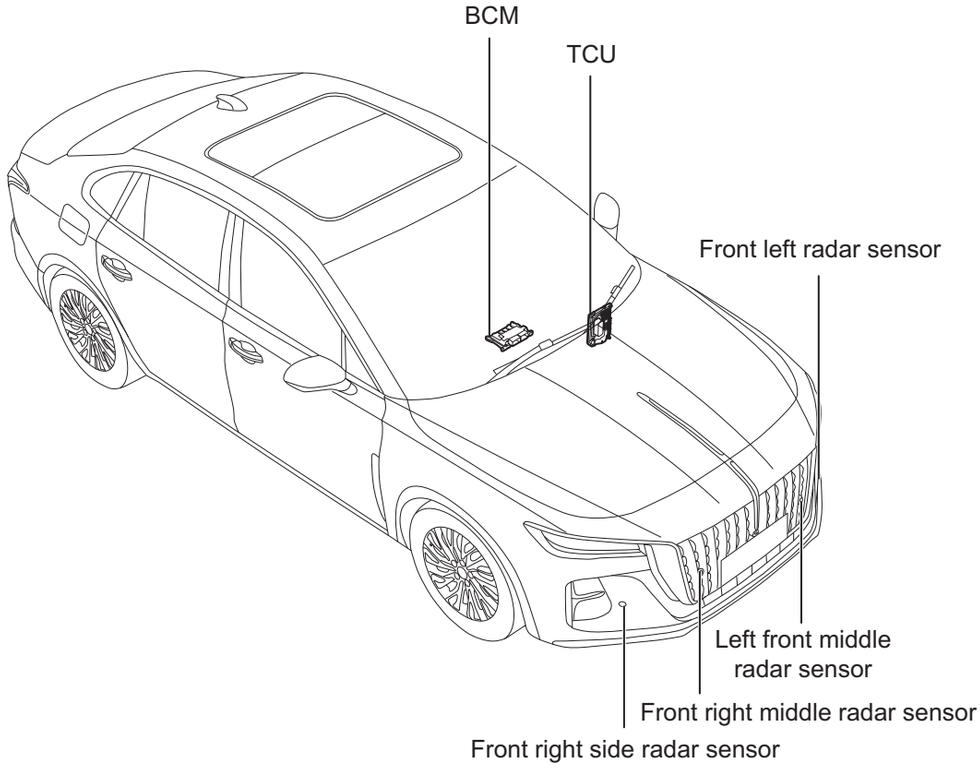
(b) When disconnecting and reconnecting the battery cable, turn off the ignition switch and lighting switch and completely release the terminal nut.

Location of parts



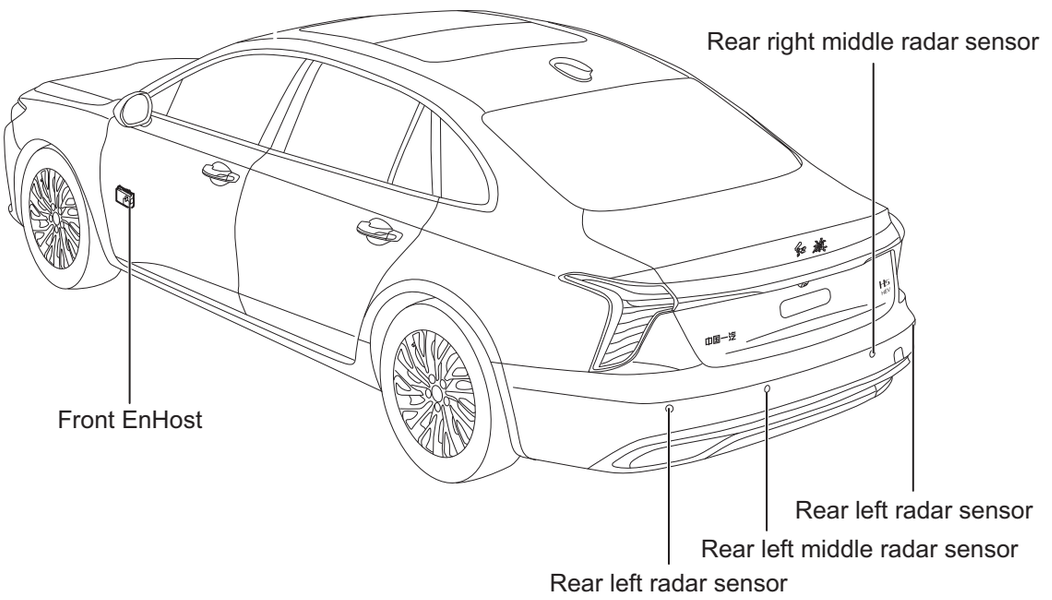
PM00030RM

Location of parts



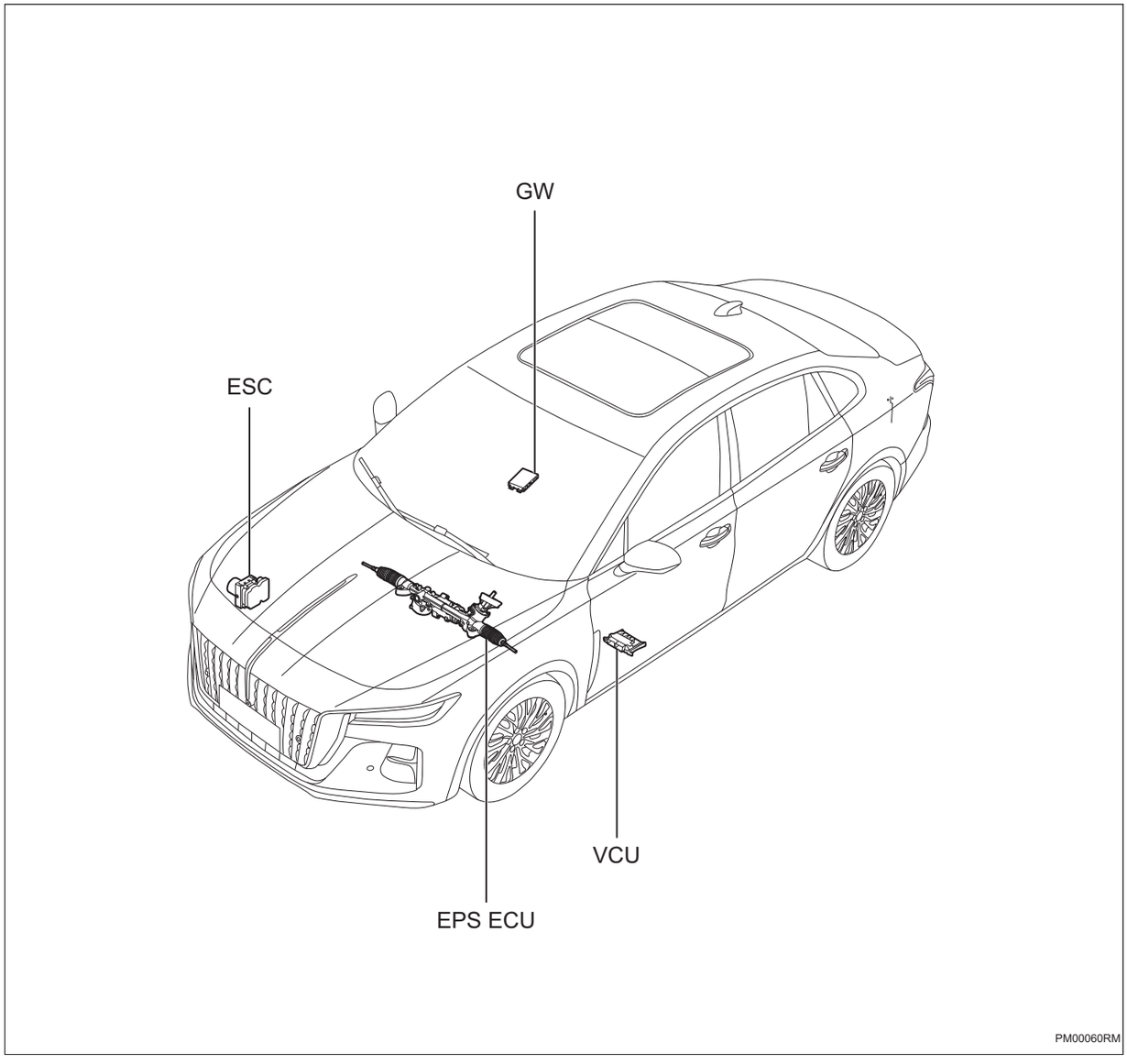
PM00040RM

Location of parts



PM00050RM

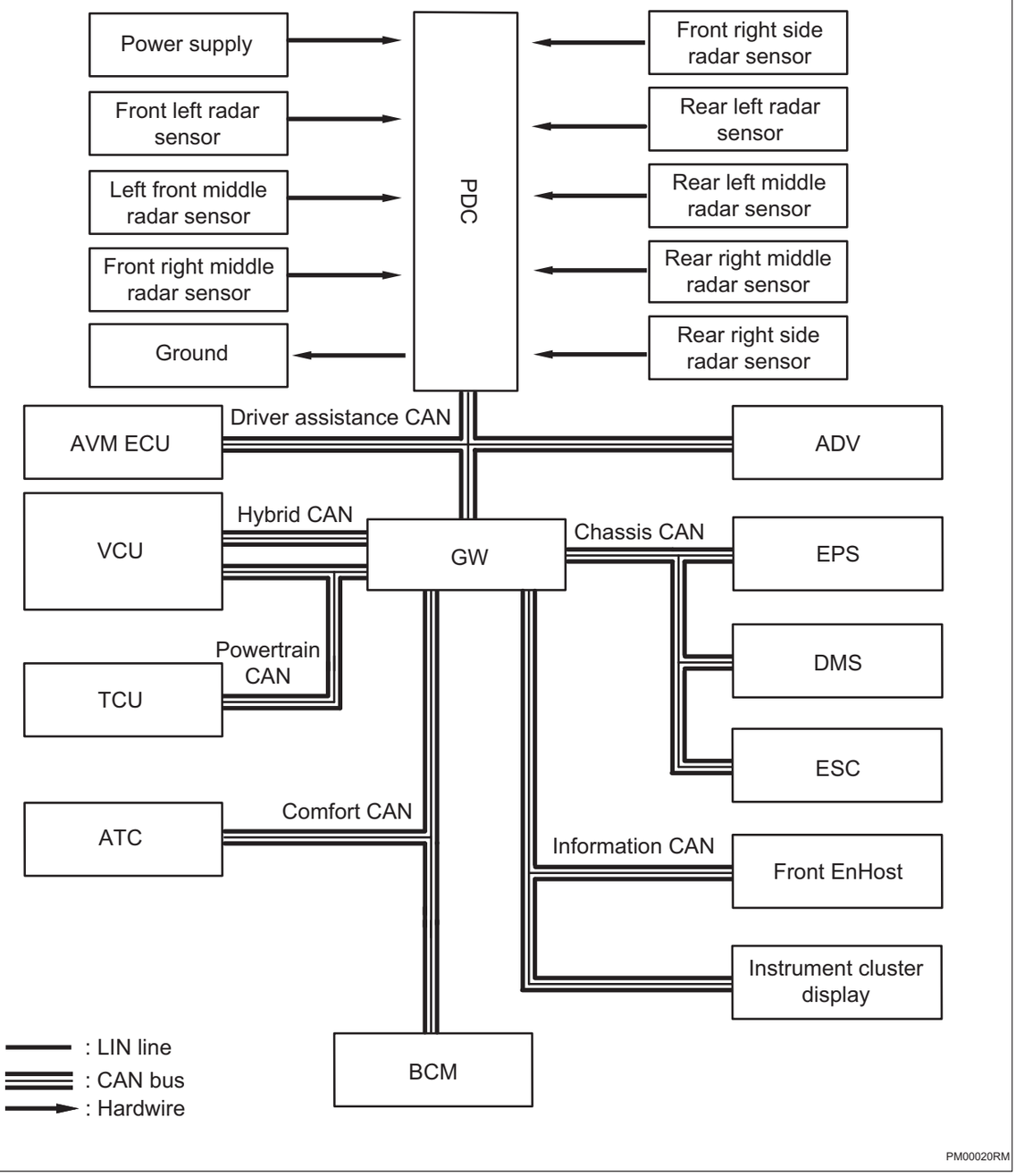
Location of parts



System diagram

PDC

PM


Power supply
Front left radar sensor
Left front middle radar sensor
Front right middle radar sensor
Ground
PDC
Front right side radar sensor
Rear left radar sensor
Rear left middle radar sensor
Rear right middle radar sensor
Rear right side radar sensor
AVM ECU
Driver assistance CAN
ADV
VCU
Hybrid CAN
GW
Chassis CAN
EPS
DMS
ESC
Powertrain CAN
TCU
ATC
Comfort CAN
Information CAN
Front EnHost
Instrument cluster display
BCM
: LIN line
: CAN bus
: Hardwire
PM00020RM

System description

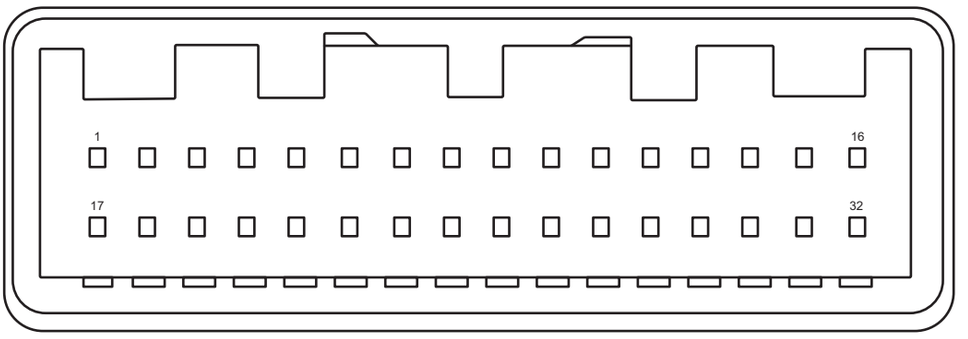
1. PA

(a) The PA consists of control unit and ultrasonic sensor. The ultrasonic sensor can measure the distance between the vehicle and the obstacle. According to the distance of the obstacle entering the detection area, the speaker will sound at different frequencies. At the same time, the multimedia display will display the distance and orientation information of the obstacle. When using the system, be sure to pay attention to the surrounding area.

Symptom chart

Fault	Possible location
The radar system does not work when the gearshift lever is in R position	• Shift switch • Radar system circuit • PDC

ECU terminal



PDC

PM00010RM

PDC

PDC	
Pin No.	**DEFINITIONS**
1	-
2	-
3	-
4	-
5	-
6	IG
7	-
8	GND
9	FR-SR
10	FRC-SR
11	FLC-SR
12	FL-SR
13	RR-SR
14	RL-SR
15	RRC-SR
16	RLC-SR
17	-
18	-
19	-
20	-
21	CAN L
22	CAN H
23	-
24	-

PDC	
Pin No.	**DEFINITIONS**
25	-
26	F-GND
27	F-PWR
28	-
29	R-GND
30	R-PWR
31	-
32	-

DTC chart

DTC	Description	Reference page
B1A6012	Rear right sensor signal wire shorted to power supply	(See page PM-15)
B1A6014	Rear right sensor signal wire shorted to ground	(See page PM-15)
B1A6034	Rear right sensor aftershock time fault	(See page PM-15)
B1A6013	Rear right sensor signal wire open	(See page PM-15)
B1A6112	Rear right middle sensor signal wire shorted to power supply	(See page PM-19)
B1A6114	Rear right middle sensor signal wire shorted to ground	(See page PM-19)
B1A6134	Rear right middle sensor aftershock timeout	(See page PM-19)
B1A6113	Rear right middle sensor signal wire open	(See page PM-19)
B1A6212	Rear left middle sensor signal wire shorted to power supply	(See page PM-24)
B1A6214	Rear left middle sensor signal wire shorted to ground	(See page PM-24)
B1A6234	Rear left middle sensor aftershock timeout	(See page PM-24)
B1A6213	Rear left middle sensor signal wire open	(See page PM-24)
B1A6312	Rear left sensor signal wire shorted to power supply	(See page PM-29)
B1A6314	Rear left sensor signal wire shorted to ground	(See page PM-29)
B1A6334	Rear left sensor aftershock timeout	(See page PM-29)
B1A6313	Rear left sensor signal wire open	(See page PM-29)
B1A6412	Front right sensor signal wire shorted to power supply	(See page PM-33)
B1A6414	Front right sensor signal wire shorted to ground	(See page PM-33)
B1A6434	Front right sensor aftershock timeout	(See page PM-33)
B1A6413	Front right sensor signal wire open circuit	(See page PM-33)
B1A6512	Front right middle sensor signal wire shorted to power supply	(See page PM-37)

DTC	Description	Reference page
B1A6514	Front right middle sensor signal wire shorted to ground	(See page PM-37)
B1A6534	Front right middle sensor aftershock timeout	(See page PM-37)
B1A6513	Front right middle sensor signal wire open	(See page PM-37)
B1A6612	Front left middle sensor signal wire shorted to power supply	(See page PM-42)
B1A6614	Front left middle sensor signal wire shorted to ground	(See page PM-42)
B1A6634	Front left middle sensor aftershock timeout	(See page PM-42)
B1A6613	Front left middle sensor signal wire open	(See page PM-42)
B1A6712	Front left sensor signal wire shorted to power supply	(See page PM-47)
B1A6714	Front left sensor signal wire shorted to ground	(See page PM-47)
B1A6734	Front left sensor aftershock timeout	(See page PM-47)
B1A6713	Front left sensor signal wire open	(See page PM-47)
B1A6814	Sensor power supply short circuit to ground	(See page PM-51)
B1A6A17	Control unit power supply overvoltage	(See page PM-12)
B1A6A16	Control unit power supply undervoltage	(See page PM-12)
U003788	Driver assistance/extension CAN bus off	(See page PM-54)
U014687	GW node lost	(See page PM-54)
U023A87	AVM ECU/AVM ECU node lost	(See page PM-54)
U024387	ADV node lost	(See page PM-54)
U112187	ESP message lost	(See page PM-54)
U116487	A/C control unit message lost	(See page PM-54)
U114087	BCM 1 message lost	(See page PM-54)
U113887	Driving mode selection control unit message lost	(See page PM-54)
U124587	IVI message lost	(See page PM-54)
U115587	Instrument cluster control unit message lost	(See page PM-54)
U113187	EPS ECU message lost	(See page PM-54)
U110187	TCU message lost	(See page PM-54)
U129387	HCU message lost	(See page PM-54)
U114687	GW message lost	(See page PM-54)
U041582	ESP message content error	(See page PM-54)
U041583	ESP message content error	(See page PM-54)
U054682	EnHost/IVI message content error	(See page PM-54)
U054683	EnHost/IVI message content error	(See page PM-54)
U040282	TCU message content error	(See page PM-54)
U040283	TCU message content error	(See page PM-54)
U042082	EPS ECU message content error	(See page PM-54)
U042083	EPS ECU message content error	(See page PM-54)

DTC	Description	Reference page
U059482	HCU message content error	(See page PM-54)
U059483	HCU message content error	(See page PM-54)

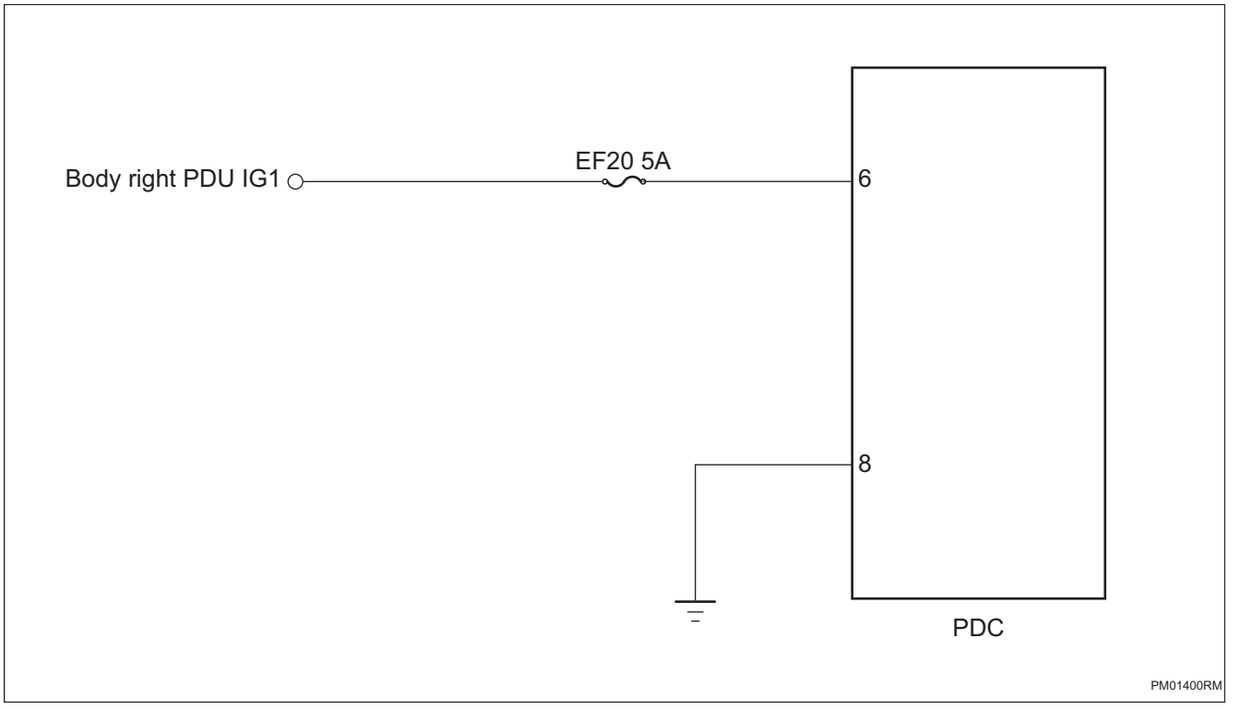
DTC	B1A6A17	Control unit power supply overvoltage
DTC	B1A6A16	Control unit power supply undervoltage

Description

When the PDC power supply is out of the normal operating range, the PDC records the DTC.

DTC	DTC detection conditions	Faulty location
B1A6A17	(a) Control unit power supply overvoltage.	• PDC • Harness and connector • Charging system
B1A6A16	(a) Control unit power supply undervoltage.	• PDC • Harness and connector • Charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery + - battery	Always connected	About 11~14 V

NG	Overhaul the charging system

OK

2	**Check PDC fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the PDC fuse.

(d) Measure the resistance according to the values in the table below.

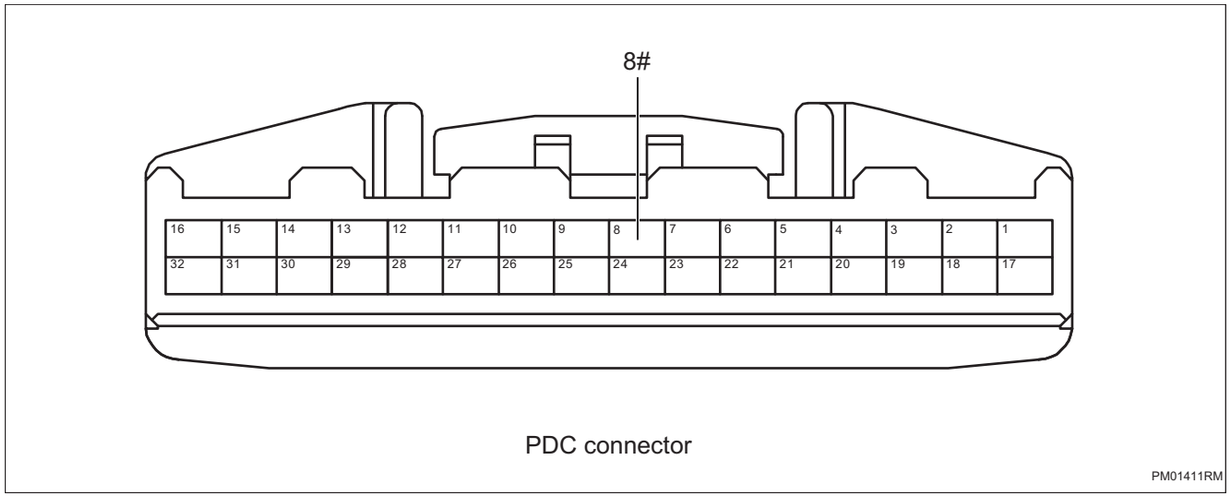
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG **Replace fuse**

OK

3	**Check PDC ground**



PDC connector

PM01411RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDC connector.

(d) Measure the resistance according to the values in the table below.

Standard value

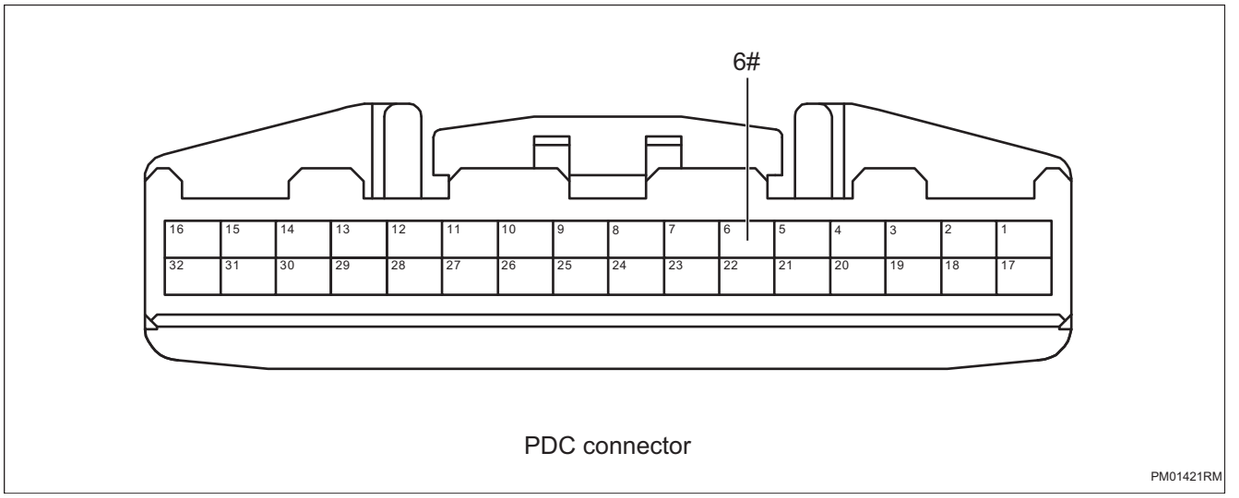
Detector connection	Detection conditions	Specified state
PDC connector 8# - body GND	Always connected	Less than 1Ω

PM

NG → **Repair or replace the harness and connector**

OK

4	Check PDC power supply



PDC connector

(a) Install the fuse.

(b) Connect the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PDC connector 6# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	Replace PDC (See page PM-57)

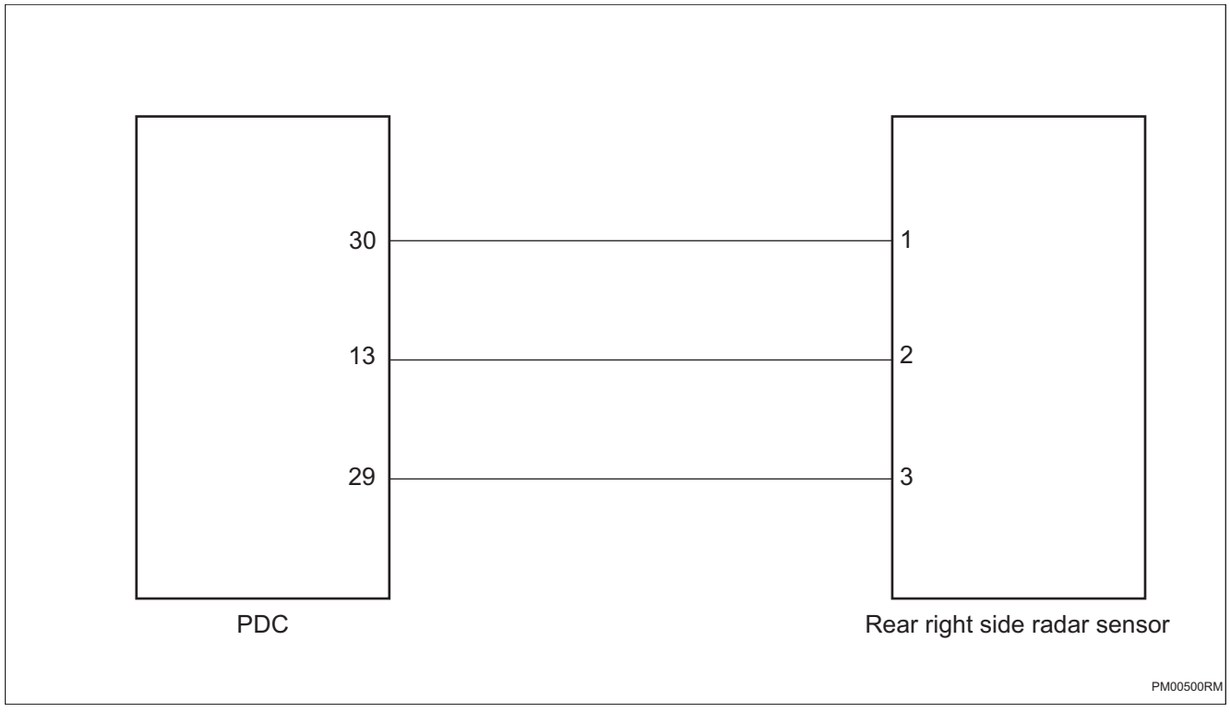
DTC	**B1A6012**	**Rear right sensor signal wire shorted to power supply**
DTC	**B1A6014**	**Rear right sensor signal wire shorted to ground**
DTC	**B1A6034**	**Rear right sensor aftershock time fault**
DTC	**B1A6013**	**Rear right sensor signal wire open**

Description

When the PDC detects the rear right side radar sensor type error or short circuit or open circuit, the PDC records a DTC.

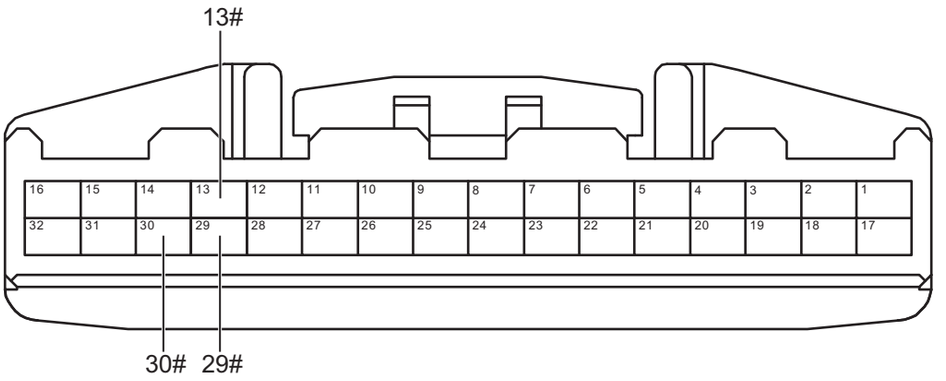
DTC	DTC detection conditions	Faulty location
B1A6012	(a) Rear right sensor signal wire shorted to power supply.	• PDC • Relevant harnesses • Rear right side radar sensor
B1A6014	(a) Rear right sensor signal wire shorted to ground.	• PDC • Relevant harnesses • Rear right side radar sensor
B1A6034	(a) Rear right sensor aftershock time fault.	• Rear right side radar sensor
B1A6013	(a) Rear right sensor signal wire open.	• PDC • Relevant harnesses • Rear right side radar sensor

Circuit diagram



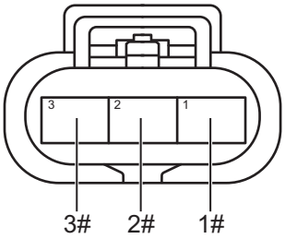
Inspection procedure

1	Check rear right side radar sensor harness and connector for open circuit



PDC connector

PM00510RM



Rear right side radar sensor connector

PM00520RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDC connector.

(d) Disconnect all the rear sensor connectors.

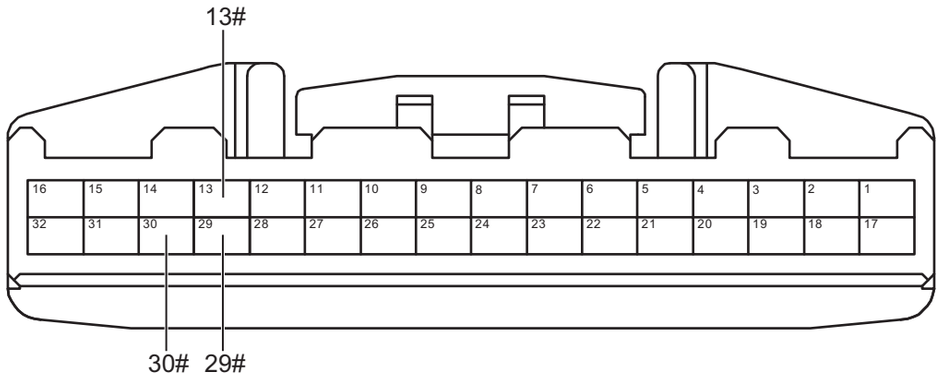
(e) Measure the resistance according to the values in the table below.

Detector connection	Detection conditions	Specified state
Rear right side radar sensor connector 1# - PDC 30#	Always connected	Less than 1Ω
Rear right side radar sensor connector 2# - PDC connector 13#	Always connected	Less than 1Ω
Rear right side radar sensor connector 3# - PDC connector 29#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check rear right side radar sensor harness and connector for circuit shorted to ground



PDC connector

PM00510RM

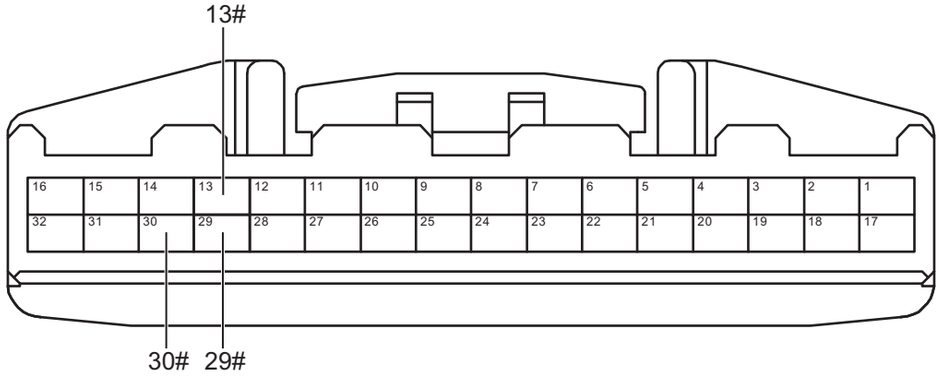
(a) Measure the resistance according to the values in the table below.

Detector connection	Detection conditions	Specified state
PDC connector 30# - body GND	Always connected	10 KΩ or greater
PDC connector 13# - body GND	Always connected	10 KΩ or greater
PDC connector 29# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

3	**Check rear right side radar sensor harness and connector for circuit shorted to power supply**



PDC connector

PM00510RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Detector connection	Detection conditions	Specified state
PDC connector 30# - body GND	Always connected	Less than 1 V
PDC connector 13# - body GND	Always connected	Less than 1 V
PDC connector 29# - body GND	Always connected	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the rear right side radar sensor (See page PM-59)**

(a) Replace the rear right side radar sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace PDC (See page PM-57)**

OK

5	**End**

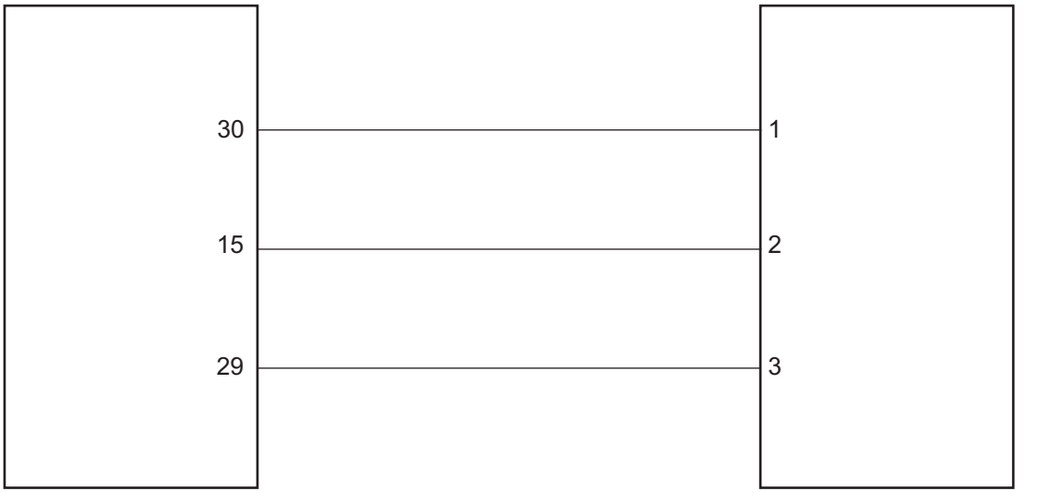
DTC	**B1A6112**	**Rear right middle sensor signal wire shorted to power supply**
DTC	**B1A6114**	**Rear right middle sensor signal wire shorted to ground**
DTC	**B1A6134**	**Rear right middle sensor aftershock timeout**
DTC	**B1A6113**	**Rear right middle sensor signal wire open**

Description

When the PDC detects the rear right middle radar sensor type error or short circuit or open circuit, the PDC records a DTC.

DTC	DTC detection conditions	Faulty location
B1A6112	(a) Rear right middle sensor signal wire shorted to power supply.	• PDC • Relevant harnesses • Rear right middle radar sensor
B1A6114	(a) Rear right middle sensor signal wire shorted to ground.	• PDC • Relevant harnesses • Rear right middle radar sensor
B1A6134	(a) Rear right middle sensor aftershock time-out.	• Rear right middle radar sensor
B1A6113	(a) Rear right middle sensor signal wire open.	• PDC • Relevant harnesses • Rear right middle radar sensor

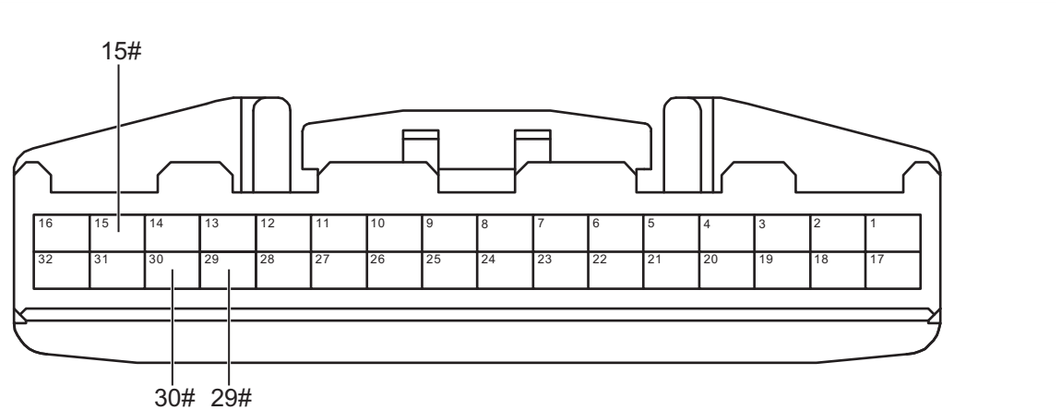
Circuit diagram

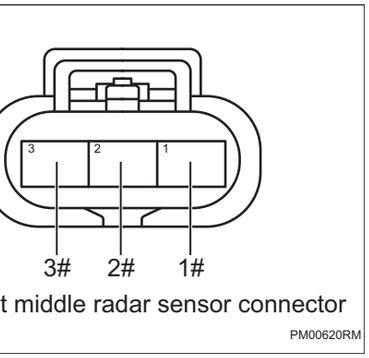


PM

Inspection procedure

1	**Check rear right middle radar sensor harness and connector for open circuit**





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDC connector.

(d) Disconnect all the rear sensor connectors.

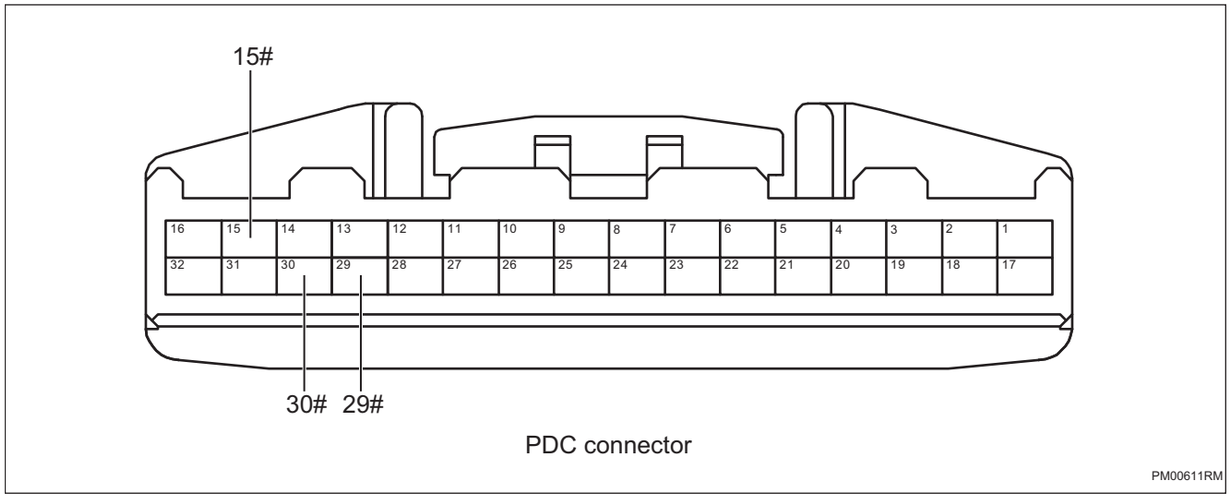
(e) Measure the resistance according to the values in the table below.

Detector connection	Detection conditions	Specified state
Rear right middle radar sensor connector 1# - PDC connector 30#	Always connected	Less than 1Ω
Rear right middle radar sensor connector 2# - PDC connector 15#	Always connected	Less than 1Ω
Rear right middle radar sensor connector 3# - PDC connector 29#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check rear right middle radar sensor harness and connector for circuit shorted to ground**



PDC connector

PM00611RM

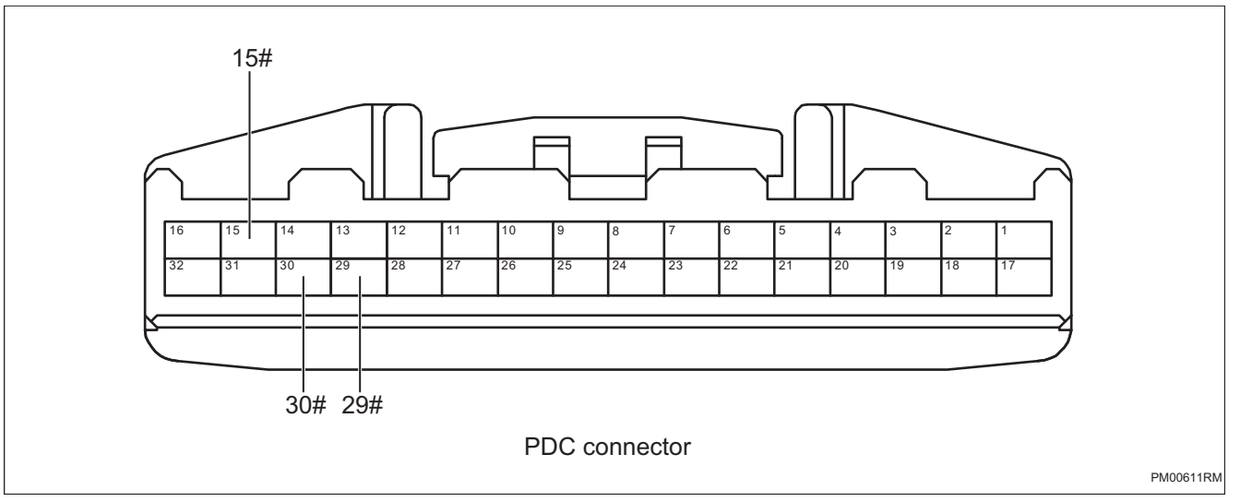
(a) Measure the resistance according to the values in the table below.

Detector connection	Detection conditions	Specified state
PDC connector 30# - body GND	Always connected	10 KΩ or greater
PDC connector 15# - body GND	Always connected	10 KΩ or greater
PDC connector 29# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	Check rear right middle radar sensor harness and connector for circuit shorted to power supply



PDC connector

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Detector connection	Detection conditions	Specified state
PDC connector 30# - body GND	Always connected	Less than 1 V
PDC connector 15# - body GND	Always connected	Less than 1 V
PDC connector 29# - body GND	Always connected	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	Replace the rear right middle radar sensor (See page PM-59)

(a) Replace the rear right middle radar sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG	**Replace PDC (See page PM-57)**

OK

5	**End**

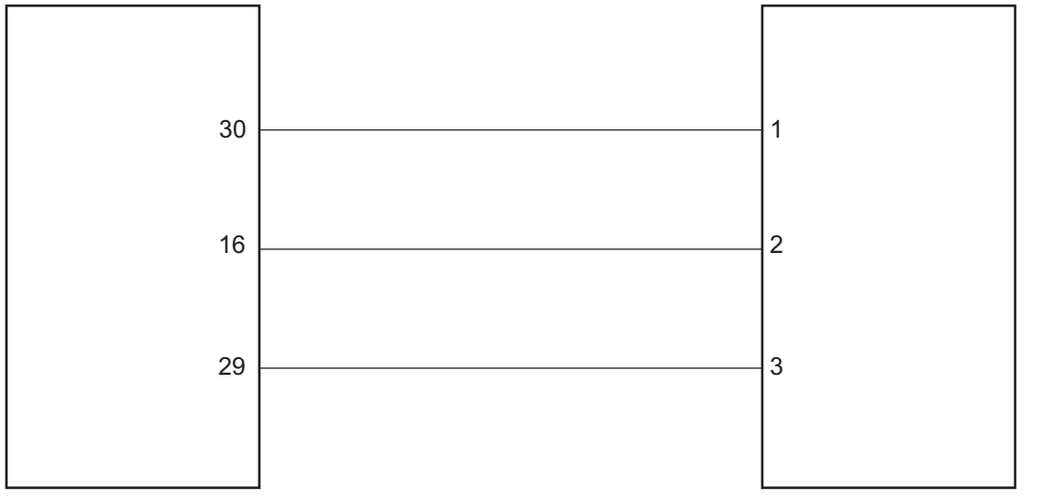
DTC	B1A6212	Rear left middle sensor signal wire shorted to power supply
DTC	B1A6214	Rear left middle sensor signal wire shorted to ground
DTC	B1A6234	Rear left middle sensor aftershock timeout
DTC	B1A6213	Rear left middle sensor signal wire open

Description

When the PDC detects the rear left middle radar sensor type error or short circuit or open circuit, the PDC records a DTC.

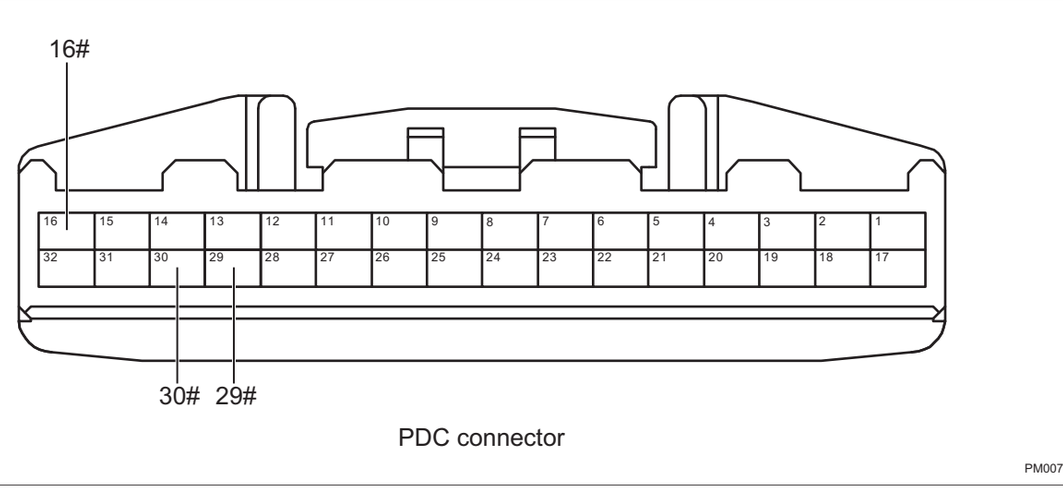
DTC	DTC detection conditions	Faulty location
B1A6212	(a) Rear left middle sensor signal wire shorted to power supply.	• PDC • Relevant harnesses • Rear left middle radar sensor
B1A6214	(a) Rear left middle sensor signal wire shorted to ground.	• PDC • Relevant harnesses • Rear left middle radar sensor
B1A6234	(a) Rear left middle sensor aftershock time-out.	• Rear left middle radar sensor
B1A6213	(a) Rear left middle sensor signal wire open.	• PDC • Relevant harnesses • Rear left middle radar sensor

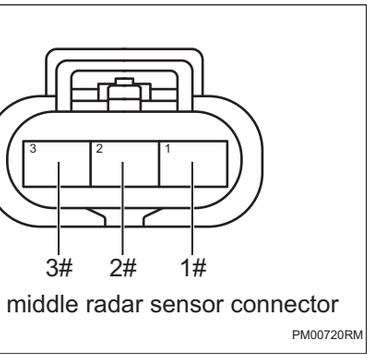
Circuit diagram



Inspection procedure

1	Check rear left middle radar sensor harness and connector for open circuit





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDC connector.

(d) Disconnect all the rear sensor connectors.

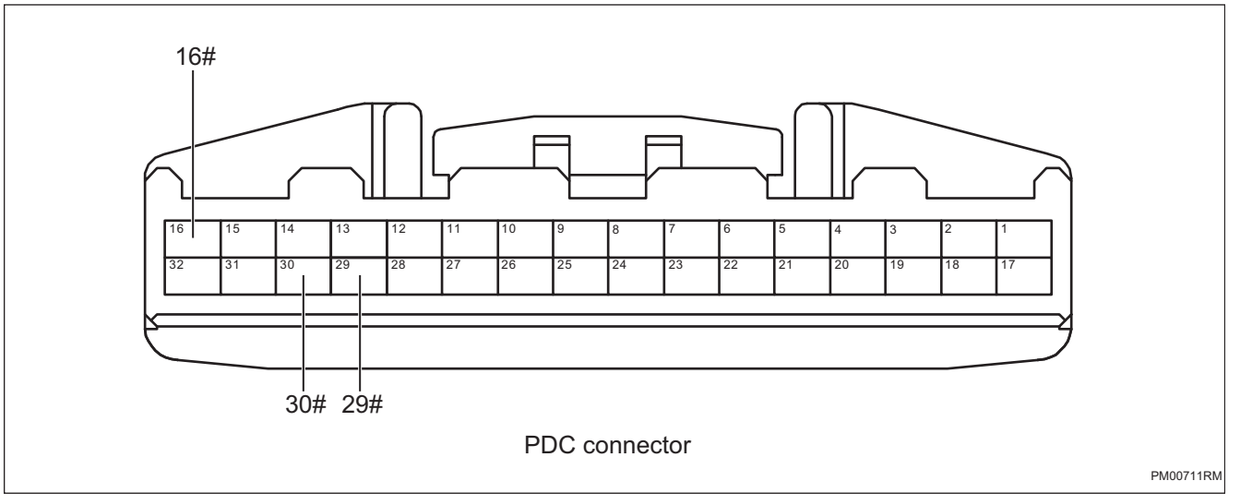
(e) Measure the resistance according to the values in the table below.

Detector connection	Detection conditions	Specified state
Rear left middle radar sensor connector 1# - PDC connector 30#	Always connected	Less than 1Ω
Rear left middle radar sensor connector 2# - PDC connector 16#	Always connected	Less than 1Ω
Rear left middle radar sensor connector 3# - PDC connector 29#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check rear left middle radar sensor harness and connector for circuit shorted to ground**



PDC connector

PM00711RM

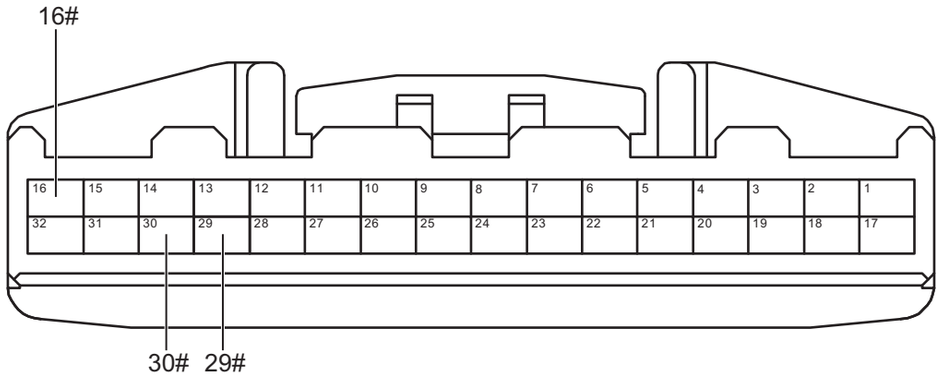
(a) Measure the resistance according to the values in the table below.

Detector connection	Detection conditions	Specified state
PDC connector 30# - body GND	Always connected	10 KΩ or greater
PDC connector 16# - body GND	Always connected	10 KΩ or greater
PDC connector 29# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check rear left middle radar sensor harness and connector for circuit shorted to power supply**



PDC connector

PM00711RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Detector connection	Detection conditions	Specified state
PDC connector 30# - body GND	Always connected	Less than 1 V
PDC connector 16# - body GND	Always connected	Less than 1 V
PDC connector 29# - body GND	Always connected	Less than 1 V

NG **Repair or replace the harness and connector**

OK

4	**Replace the rear left middle radar sensor (See page PM-59)**

(a) Replace the rear left middle radar sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

PM

NG → Replace PDC (See page PM-57)

OK

5	End

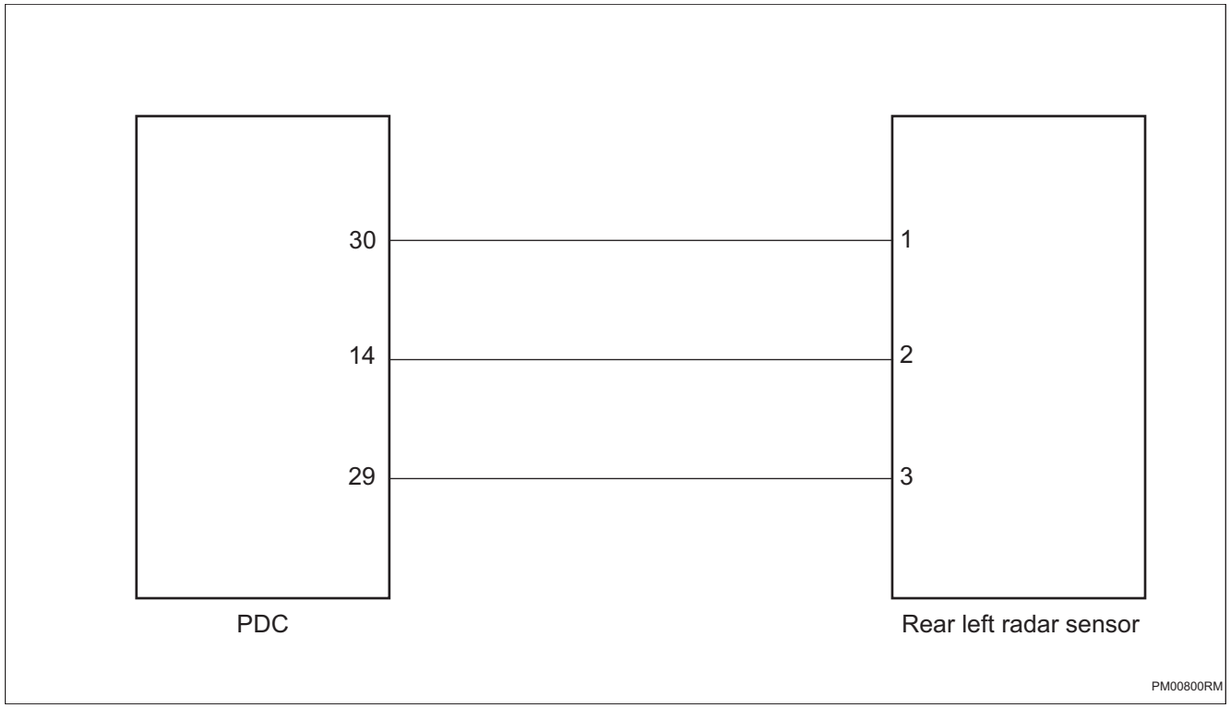
DTC	**B1A6312**	**Rear left sensor signal wire shorted to power supply**
DTC	**B1A6314**	**Rear left sensor signal wire shorted to ground**
DTC	**B1A6334**	**Rear left sensor aftershock timeout**
DTC	**B1A6313**	**Rear left sensor signal wire open**

Description

When the PDC detects the rear left radar sensor type error or short circuit or open circuit, the PDC records the DTC.

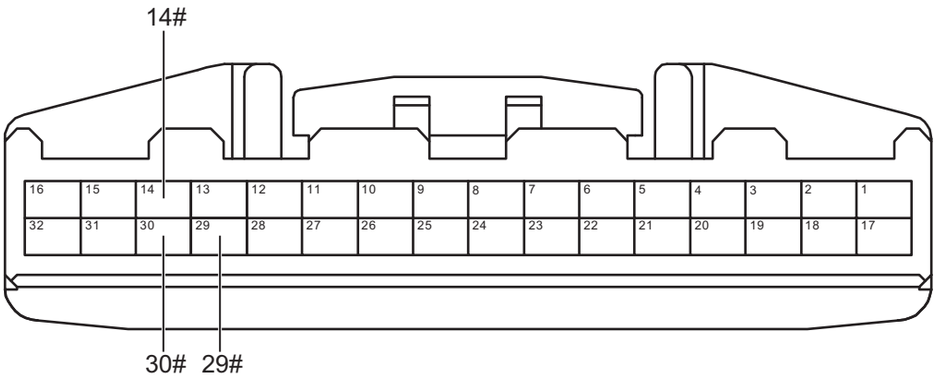
DTC	DTC detection conditions	Faulty location
B1A6312	(a) Rear left sensor signal wire shorted to power supply.	• PDC • Relevant harnesses • Rear left radar sensor
B1A6314	(a) Rear left sensor signal wire shorted to ground.	• PDC • Relevant harnesses • Rear left radar sensor
B1A6334	(a) Rear left sensor aftershock timeout.	• Rear left radar sensor
B1A6313	(a) Rear left sensor signal wire open.	• PDC • Relevant harnesses • Rear left radar sensor

Circuit diagram



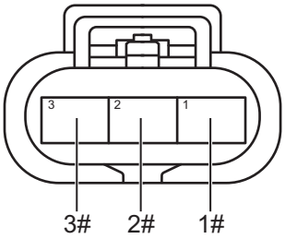
Inspection procedure

1	Check rear left radar sensor harness and connector for open circuit



PDC connector

PM00811RM



Rear left side radar sensor connector

PM00820RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDC connector.

(d) Disconnect all the rear sensor connectors.

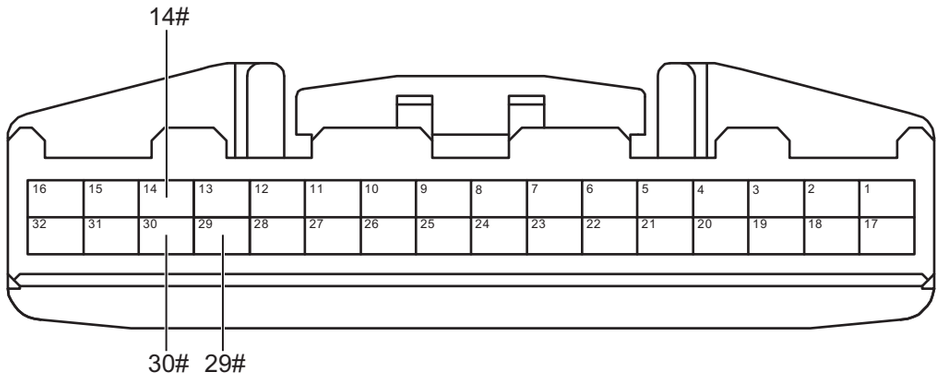
(e) Measure the resistance according to the values in the table below.

Detector connection	Detection conditions	Specified state
Rear left side radar sensor connector 1# - PDC connector 30#	Always connected	Less than 1Ω
Rear left side radar sensor connector 2# - PDC connector 14#	Always connected	Less than 1Ω
Rear left side radar sensor connector 3# - PDC connector 29#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check rear left radar sensor harness and connector for circuit shorted to ground



PDC connector

PM00811RM

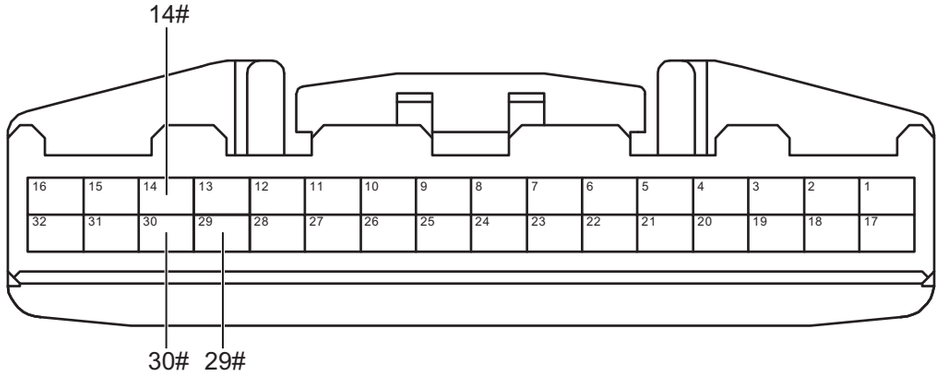
(a) Measure the resistance according to the values in the table below.

Detector connection	Detection conditions	Specified state
PDC connector 30# - body GND	Always connected	10 KΩ or greater
PDC connector 14# - body GND	Always connected	10 KΩ or greater
PDC connector 29# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

3	**Check rear left radar sensor harness and connector for circuit shorted to power supply**



PDC connector

PM00811RM

(a) Connect battery negative terminal.

PM

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Detector connection	Detection conditions	Specified state
PDC connector 30# - body GND	Always connected	Less than 1 V
PDC connector 14# - body GND	Always connected	Less than 1 V
PDC connector 29# - body GND	Always connected	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the rear left radar sensor (See page PM-59)**

(a) Replace the rear left radar sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace PDC (See page PM-57)**

OK

5	**End**

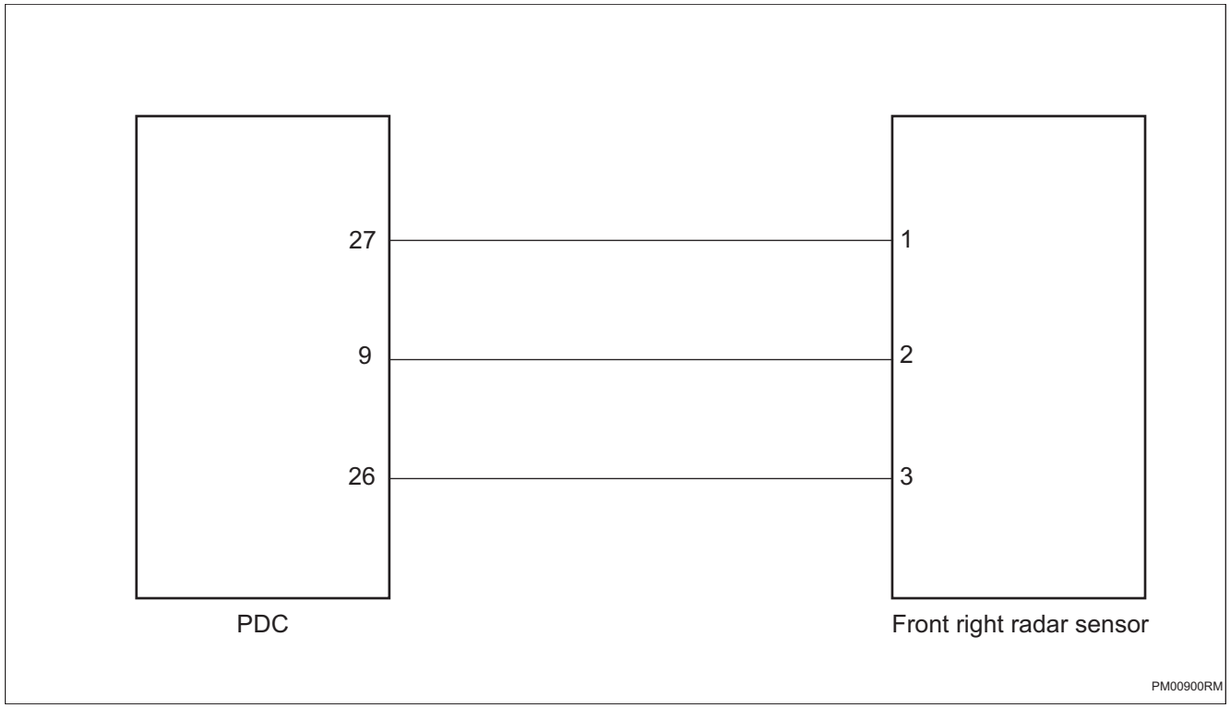
DTC	**B1A6412**	**Front right sensor signal wire shorted to power supply**
DTC	**B1A6414**	**Front right sensor signal wire shorted to ground**
DTC	**B1A6434**	**Front right sensor aftershock timeout**
DTC	**B1A6413**	**Front right sensor signal wire open circuit**

Description

When the PDC detects the front right side radar sensor type error or short circuit or open circuit, the PDC records the DTC.

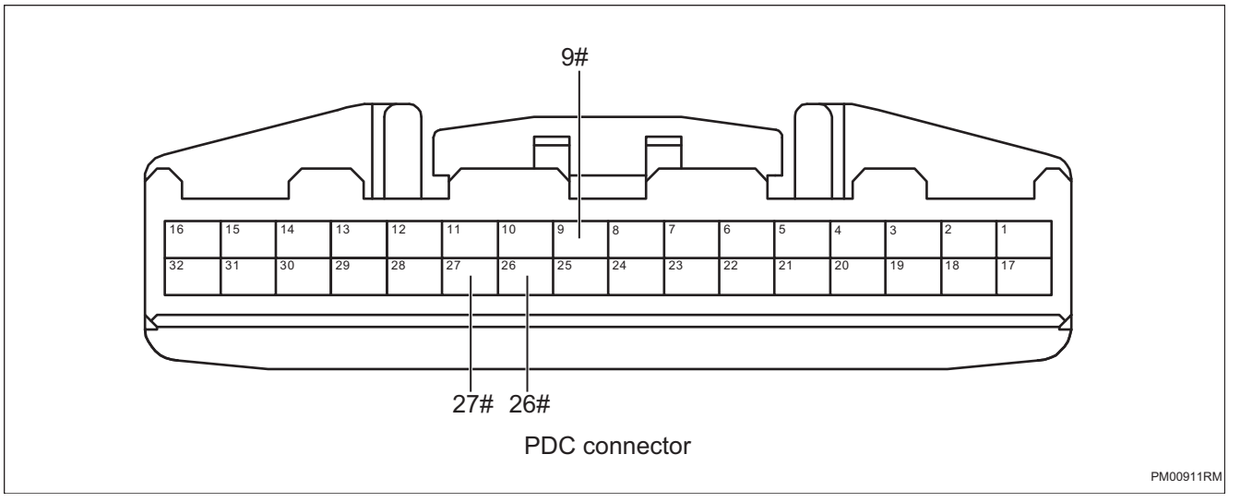
DTC	DTC detection conditions	Faulty location
B1A6412	(a) Front right sensor signal wire shorted to power supply.	• PDC • Relevant harnesses • Front right side radar sensor
B1A6414	(a) Front right sensor signal wire shorted to ground.	• PDC • Relevant harnesses • Front right side radar sensor
B1A6434	(a) Front right sensor aftershock timeout.	• Front right side radar sensor
B1A6413	(a) Front right sensor signal wire open.	• PDC • Relevant harnesses • Front right side radar sensor

Circuit diagram



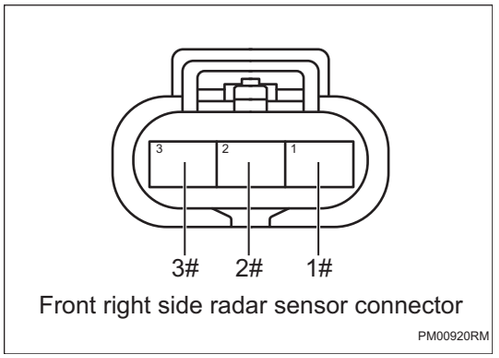
Inspection procedure

1	Check front right side radar sensor harness and connector for open circuit



PDC connector

PM00911RM



Front right side radar sensor connector

PM00920RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDC connector.

(d) Disconnect all the front sensor connectors.

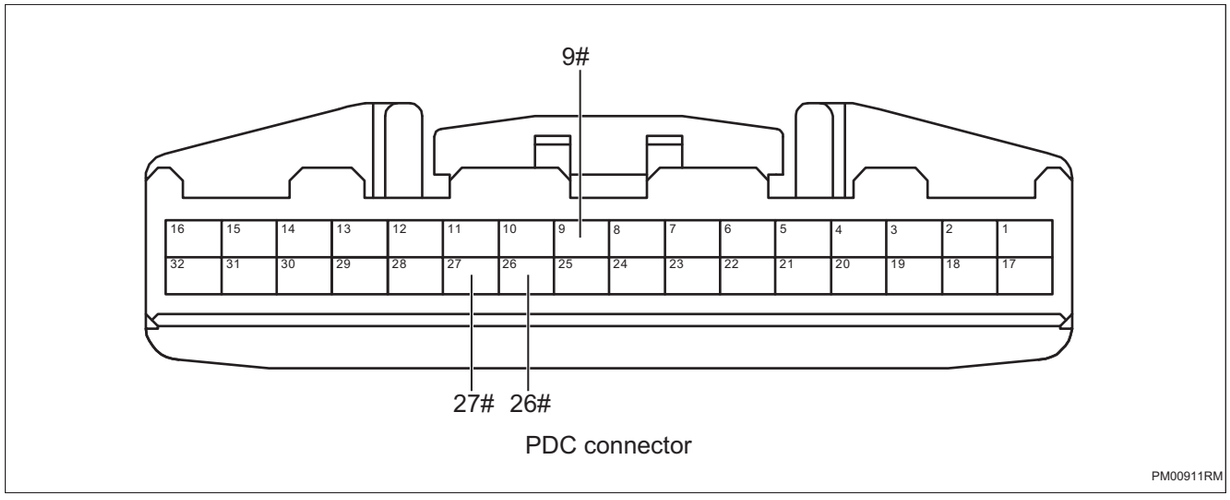
(e) Measure the resistance according to the values in the table below.

Detector connection	Detection conditions	Specified state
Front right side radar sensor connector 1# - PDC connector 27#	Always connected	Less than 1Ω
Front right side radar sensor connector 2# - PDC connector 9#	Always connected	Less than 1Ω
Front right side radar sensor connector 3# - PDC connector 26#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check front right side radar sensor harness and connector for circuit shorted to ground



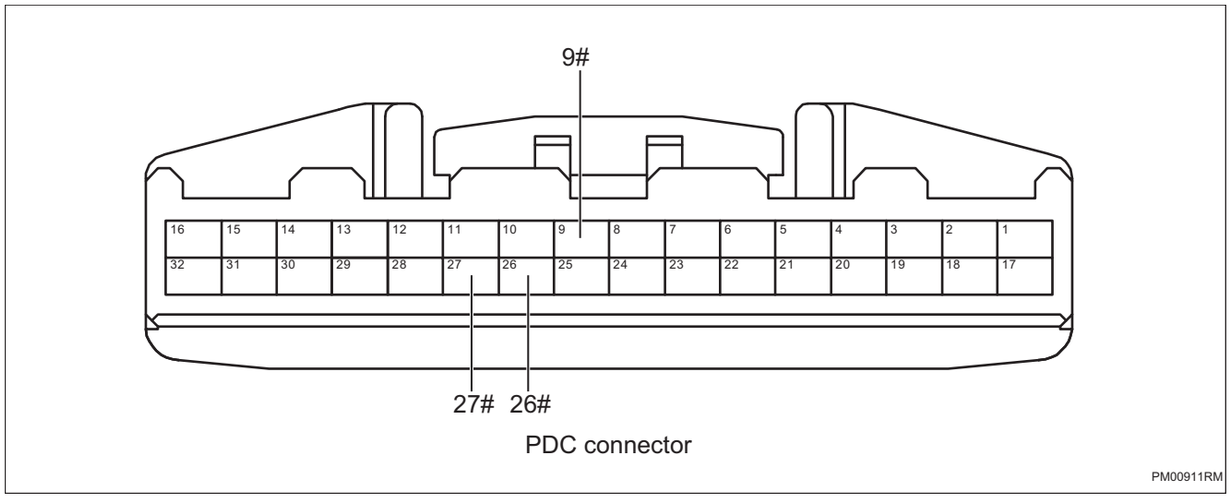
(a) Measure the resistance according to the values in the table below.

Detector connection	Detection conditions	Specified state
PDC connector 27# - body GND	Always connected	10 KΩ or greater
PDC connector 9# - body GND	Always connected	10 KΩ or greater
PDC connector 26# - body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

3	**Check front right side radar sensor harness and connector for circuit shorted to power supply**



(a) Connect battery negative terminal.

PM

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Detector connection	Detection conditions	Specified state
PDC connector 27# - body GND	Always connected	Less than 1 V
PDC connector 9# - body GND	Always connected	Less than 1 V
PDC connector 26# - body GND	Always connected	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the front right side radar sensor (See page PM-59)**

(a) Replace the front right side radar sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace PDC (See page PM-57)**

OK

5	**End**

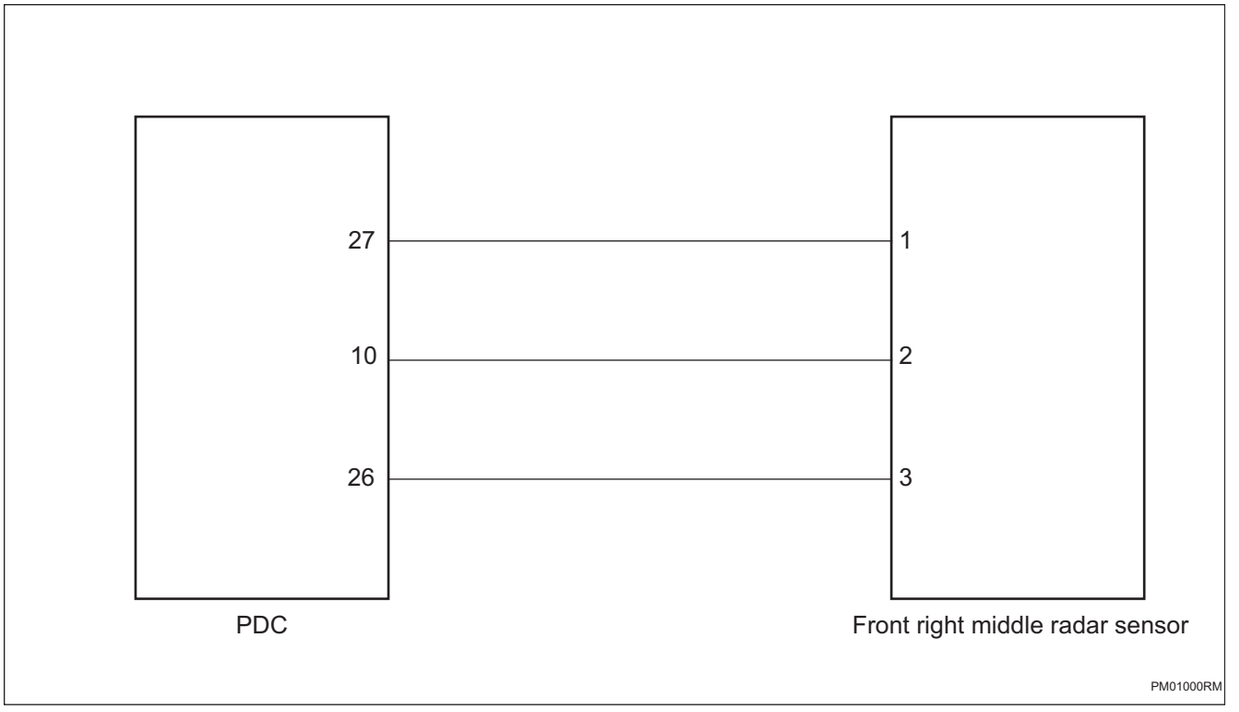
DTC	**B1A6512**	**Front right middle sensor signal wire shorted to power supply**
DTC	**B1A6514**	**Front right middle sensor signal wire shorted to ground**
DTC	**B1A6534**	**Front right middle sensor aftershock timeout**
DTC	**B1A6513**	**Front right middle sensor signal wire open**

Description

When the PDC detects the front right middle radar sensor type error or short circuit or open circuit, the PDC records the DTC.

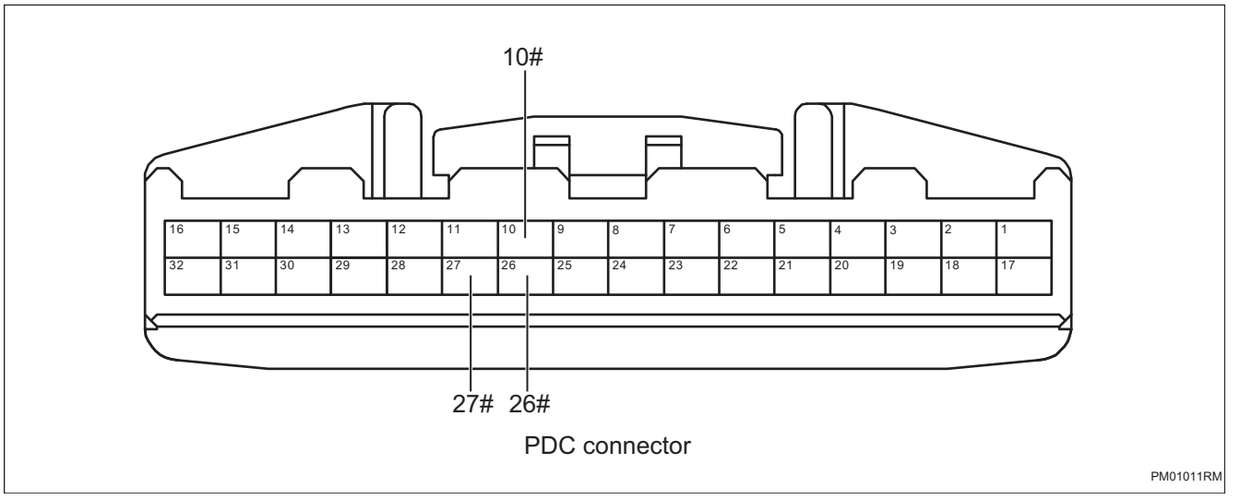
DTC	DTC detection conditions	Faulty location
B1A6512	(a) Front right middle sensor signal wire shorted to power supply.	• PDC • Relevant harnesses • Front right middle radar sensor
B1A6514	(a) Front right middle sensor signal wire shorted to ground.	• PDC • Relevant harnesses • Front right middle radar sensor
B1A6534	(a) Front right middle sensor aftershock timeout.	• Front right middle radar sensor
B1A6513	(a) Front right middle sensor signal wire open.	• PDC • Relevant harnesses • Front right middle radar sensor

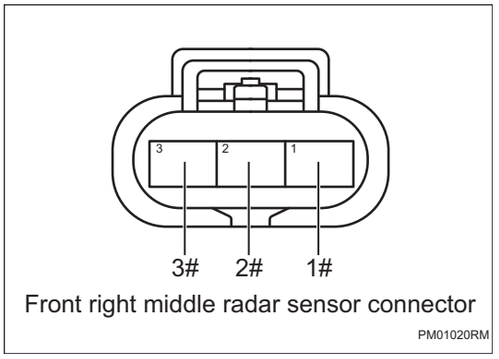
Circuit diagram



Inspection procedure

1	**Check front right middle radar sensor harness and connector for open circuit**





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDC connector.

(d) Disconnect all the front sensor connectors.

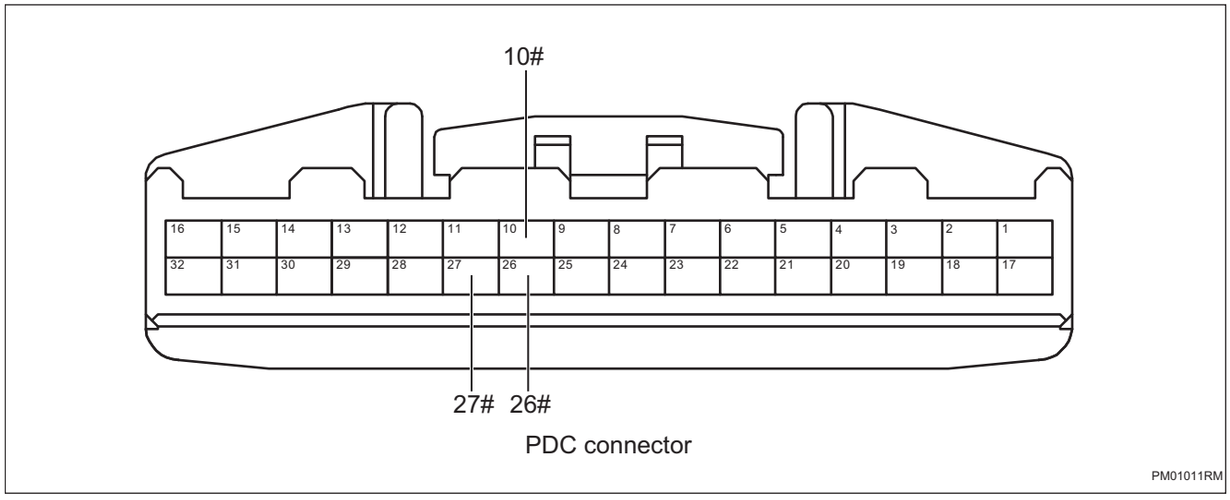
(e) Measure the resistance according to the values in the table below.

Detector connection	Detection conditions	Specified state
Front right middle radar sensor connector 1# - PDC connector 27#	Always connected	Less than 1Ω
Front right middle radar sensor connector 2# - PDC connector 10#	Always connected	Less than 1Ω
Front right middle radar sensor connector 3# - PDC connector 26#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check front right middle radar sensor harness and connector for circuit shorted to ground**



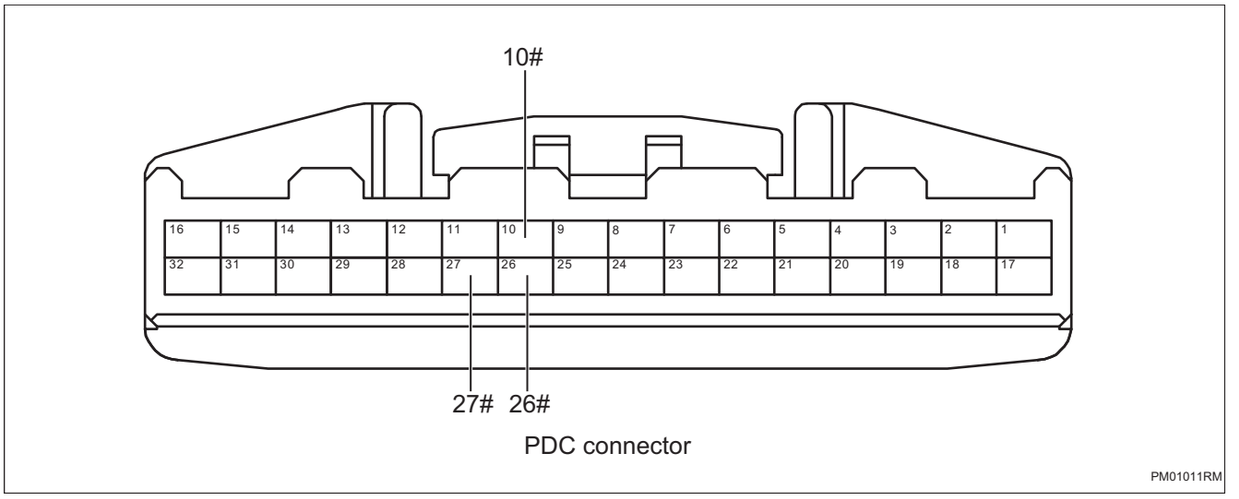
(a) Measure the resistance according to the values in the table below.

Detector connection	Detection conditions	Specified state
PDC connector 27# - body GND	Always connected	10 KΩ or greater
PDC connector 10# - body GND	Always connected	10 KΩ or greater
PDC connector 26# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	Check front right middle radar sensor harness and connector for circuit shorted to power supply



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Detector connection	Detection conditions	Specified state
PDC connector 27# - body GND	Always connected	Less than 1 V
PDC connector 10# - body GND	Always connected	Less than 1 V
PDC connector 26# - body GND	Always connected	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	Replace the front right middle radar sensor (See page PM-59)

(a) Replace the front right middle radar sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace PDC (See page PM-57)**

OK

5	**End**

DTC	B1A6612	Front left middle sensor signal wire shorted to power supply
DTC	B1A6614	Front left middle sensor signal wire shorted to ground
DTC	B1A6634	Front left middle sensor aftershock timeout
DTC	B1A6613	Front left middle sensor signal wire open

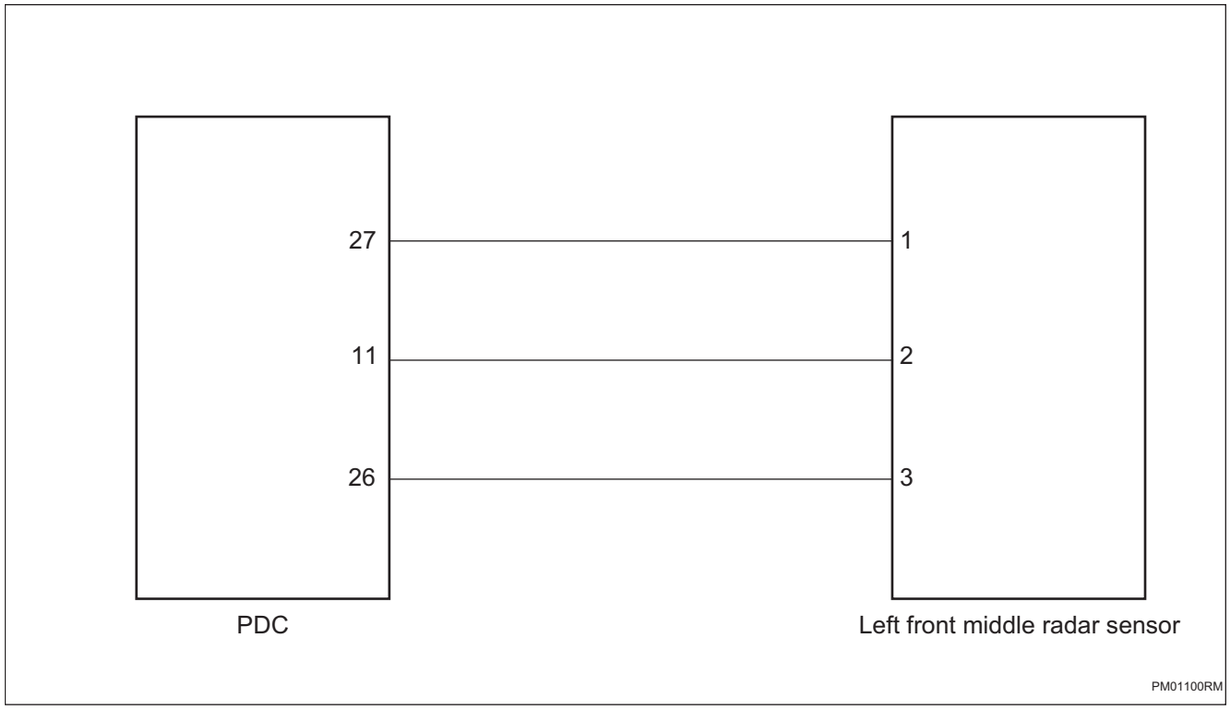
PM

Description

When the PDC detects the left front middle radar sensor type error or short circuit or open circuit, the PDC records the DTC.

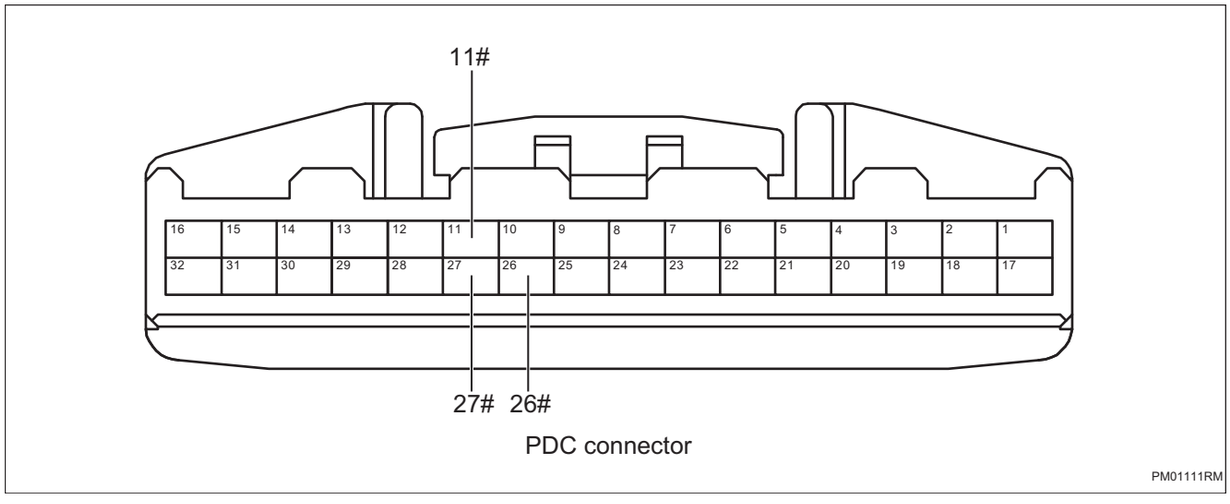
DTC	DTC detection conditions	Faulty location
B1A6612	(a) Front left middle sensor signal wire shorted to power supply.	• PDC • Relevant harnesses • Left front middle radar sensor
B1A6614	(a) Front left middle sensor signal wire shorted to ground.	• PDC • Relevant harnesses • Left front middle radar sensor
B1A6634	(a) Front left middle sensor aftershock time-out.	• Left front middle radar sensor
B1A6613	(a) Front left middle sensor signal wire open.	• PDC • Relevant harnesses • Left front middle radar sensor

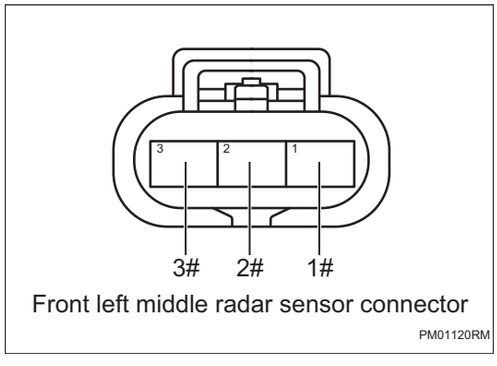
Circuit diagram



Inspection procedure

1	**Check front left middle radar sensor harness and connector for open circuit**





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDC connector.

(d) Disconnect all the front sensor connectors.

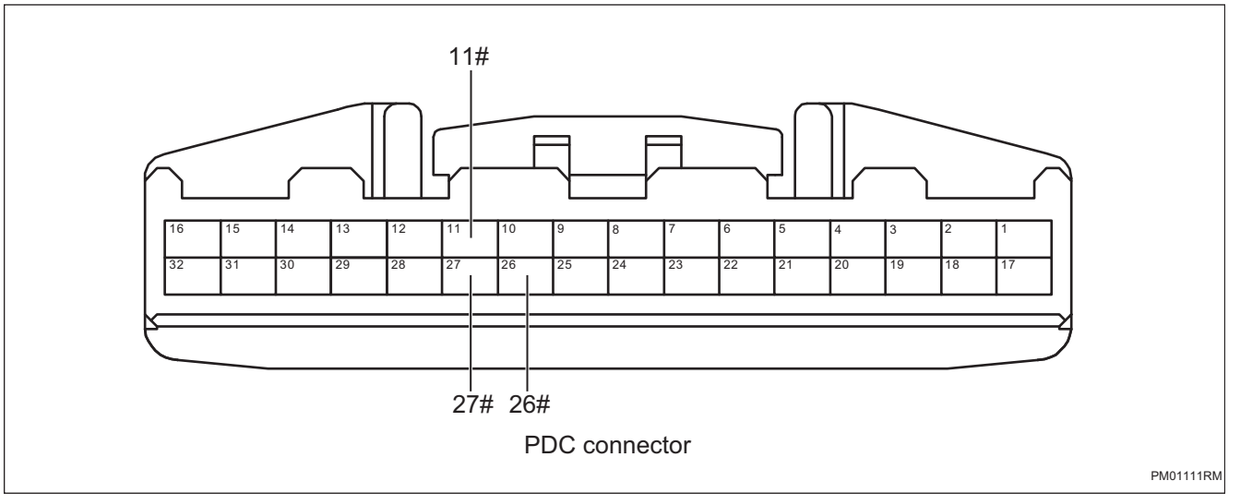
(e) Measure the resistance according to the values in the table below.

Detector connection	Detection conditions	Specified state
Front left middle radar sensor connector 1#-PDC connector 27#	Always connected	Less than 1Ω
Front left middle radar sensor connector 2#-PDC connector 11#	Always connected	Less than 1Ω
Front left middle radar sensor connector 3#-PDC connector 26#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check front left middle radar sensor harness and connector for circuit shorted to ground**



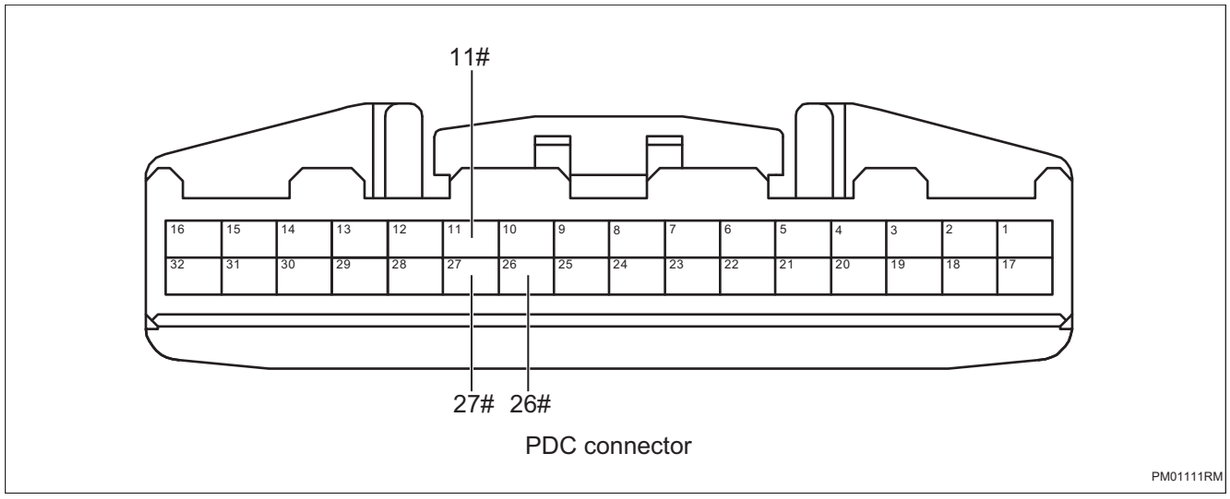
(a) Measure the resistance according to the values in the table below.

Detector connection	Detection conditions	Specified state
PDC connector 27# - body GND	Always connected	11 KΩ or greater
PDC connector 11# - body GND	Always connected	11 KΩ or greater
PDC connector 26# - body GND	Always connected	11 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check front left middle radar sensor harness and connector for circuit shorted to power supply**



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Detector connection	Detection conditions	Specified state
PDC connector 27# - body GND	Always connected	Less than 1 V
PDC connector 11# - body GND	Always connected	Less than 1 V
PDC connector 26# - body GND	Always connected	Less than 1 V

NG **Repair or replace the harness and connector**

OK

4	**Replace the left front middle radar sensor (See page PM-59)**

(a) Replace the left front middle radar sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

PM

NG → Replace PDC (See page PM-57)

OK

5	End

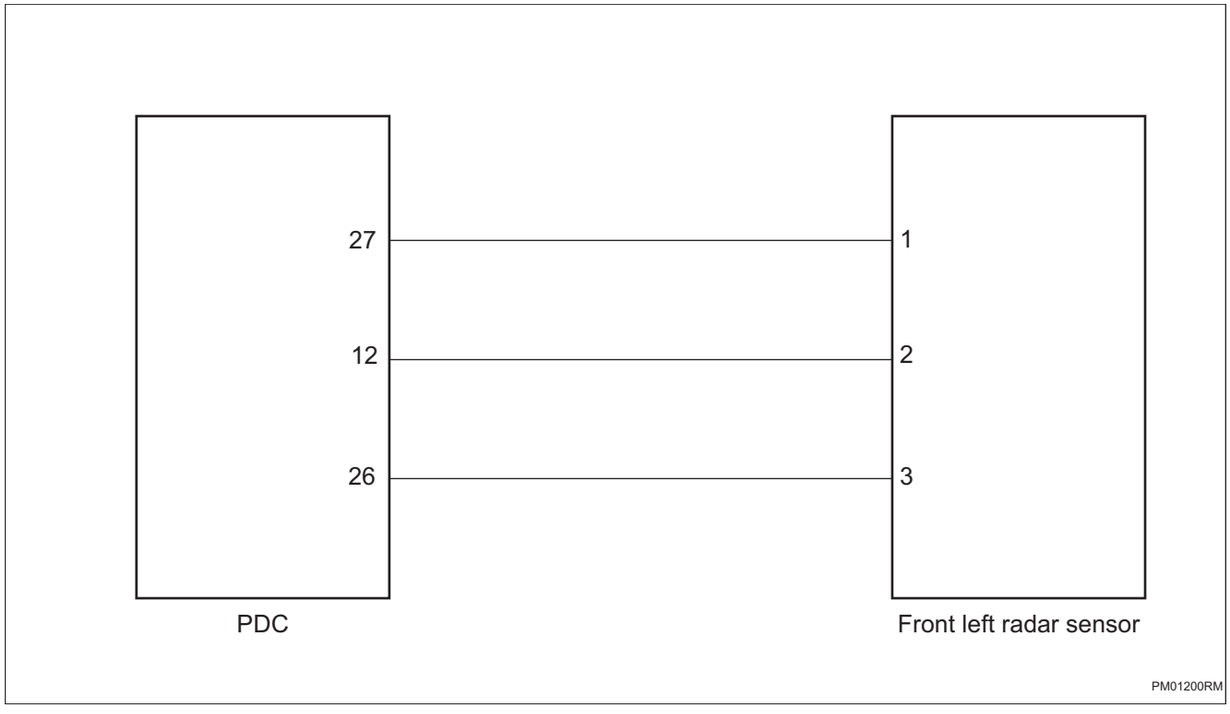
DTC	**B1A6712**	**Front left sensor signal wire shorted to power supply**
DTC	**B1A6714**	**Front left sensor signal wire shorted to ground**
DTC	**B1A6734**	**Front left sensor aftershock timeout**
DTC	**B1A6713**	**Front left sensor signal wire open**

Description

When the PDC detects the front left radar sensor type error or short circuit or open circuit, the PDC records the DTC.

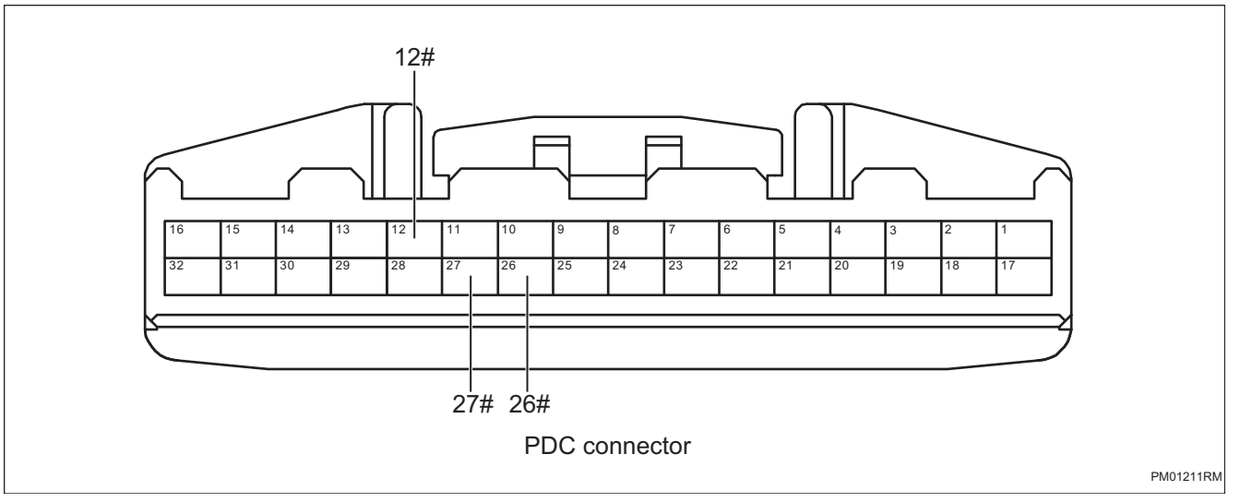
DTC	DTC detection conditions	Faulty location
B1A6712	(a) Front left sensor signal wire shorted to power supply.	• PDC • Relevant harnesses • Front left radar sensor
B1A6714	(a) Front left sensor signal wire circuit shorted to ground.	• PDC • Relevant harnesses • Front left radar sensor
B1A6734	(a) Front left sensor aftershock timeout.	• Front left radar sensor
B1A6713	(a) Front left sensor signal wire circuit open.	• PDC • Relevant harnesses • Front left radar sensor

Circuit diagram



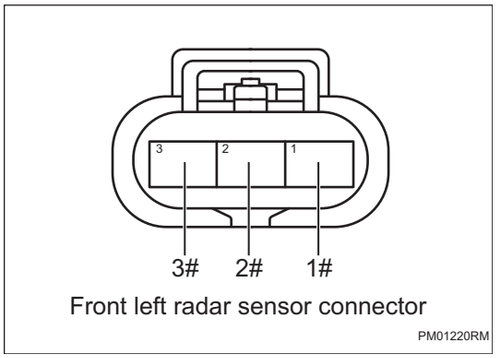
Inspection procedure

1	Check front left side radar sensor harness and connector for open circuit



PDC connector

PM01211RM



Front left radar sensor connector

PM01220RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDC connector.

(d) Disconnect all the front sensor connectors.

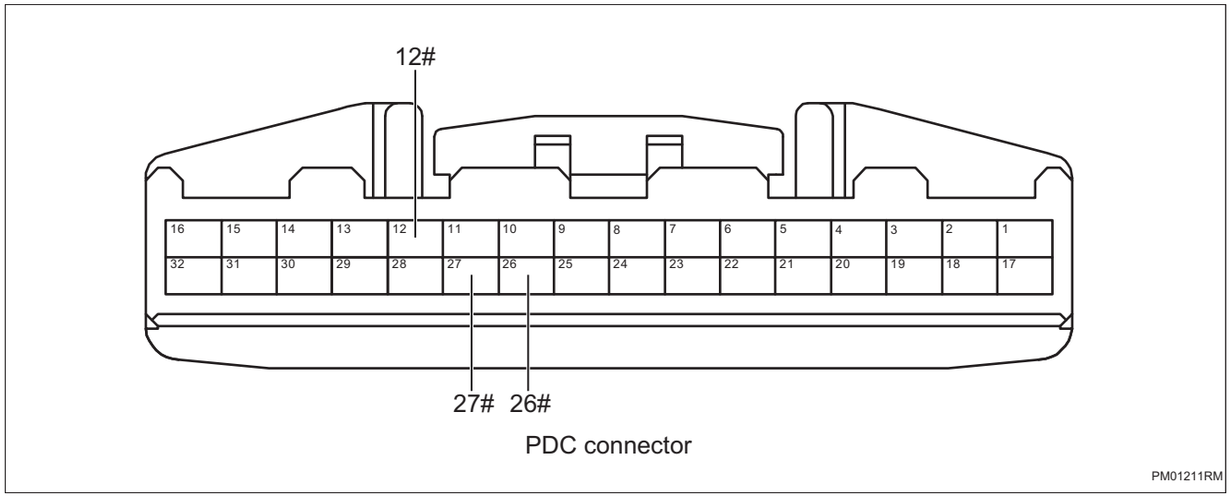
(e) Measure the resistance according to the values in the table below.

Detector connection	Detection conditions	Specified state
Front left radar sensor connector 1#-PDC connector 27#	Always connected	Less than 1Ω
Front left radar sensor connector 2#-PDC connector 12#	Always connected	Less than 1Ω
Front left radar sensor connector 3#-PDC connector 26#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check front left side radar sensor harness and connector for circuit shorted to ground



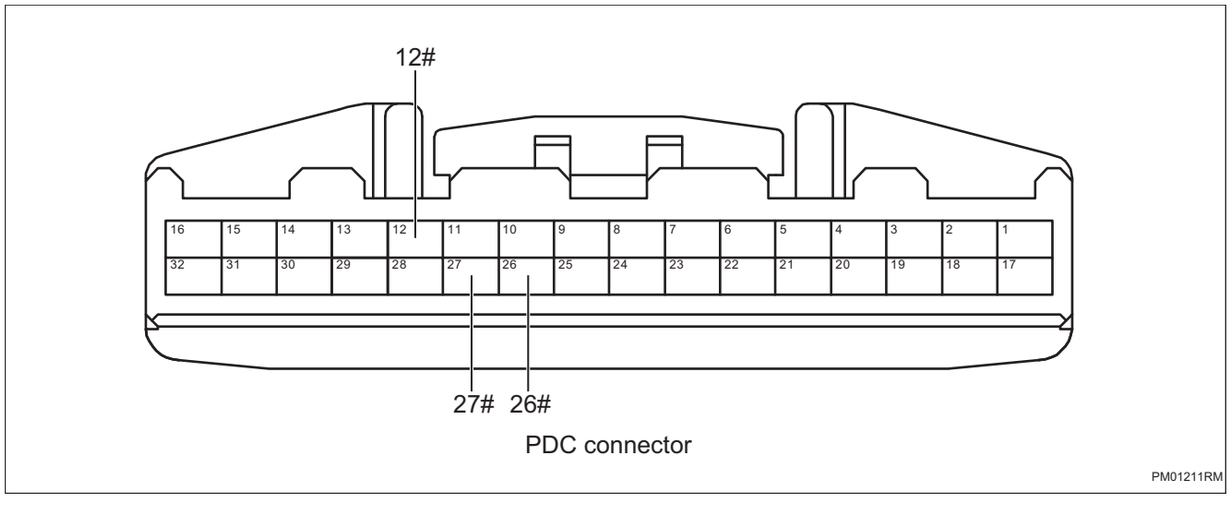
(a) Measure the resistance according to the values in the table below.

Detector connection	Detection conditions	Specified state
PDC connector 27# - body GND	Always connected	10 KΩ or greater
PDC connector 12# - body GND	Always connected	10 KΩ or greater
PDC connector 26# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Check front left side radar sensor harness and connector for circuit shorted to power supply**



(a) Connect battery negative terminal.

PM

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Detector connection	Detection conditions	Specified state
PDC connector 27# - body GND	Always connected	Less than 1 V
PDC connector 12# - body GND	Always connected	Less than 1 V
PDC connector 26# - body GND	Always connected	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	**Replace the front left radar sensor (See page PM-59)**

(a) Replace the front left radar sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace PDC (See page PM-57)**

OK

5	**End**

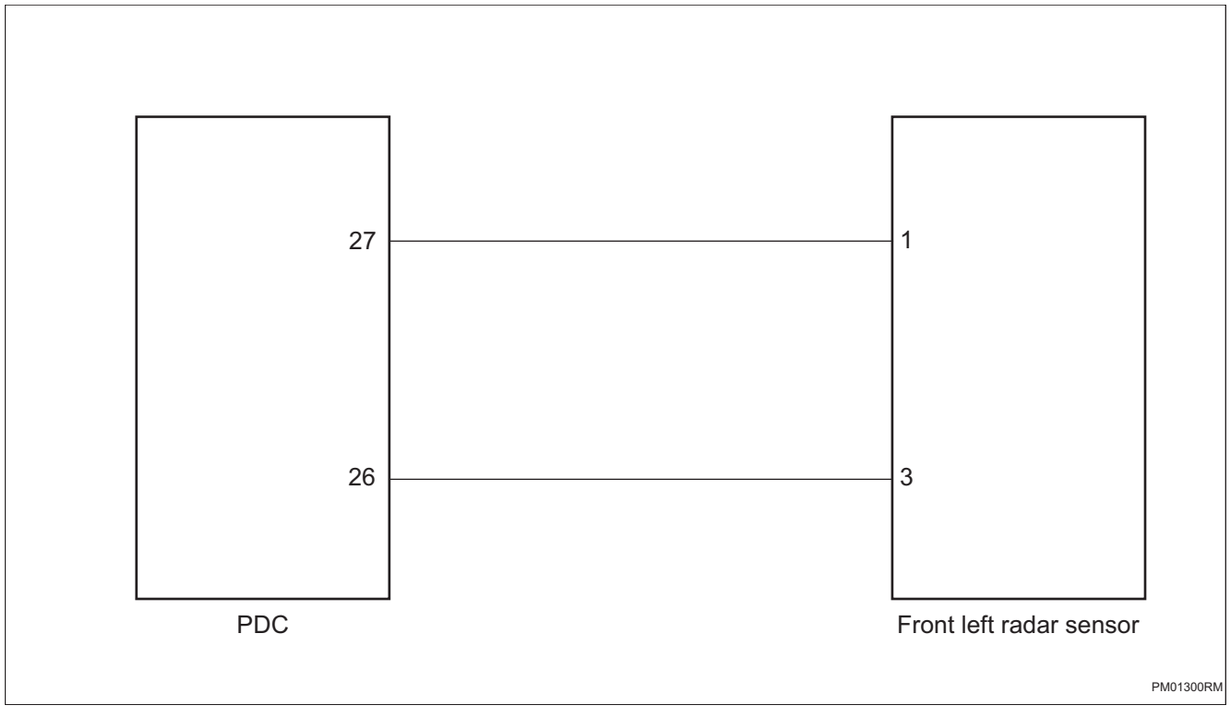
DTC	B1A6814	Sensor power supply short circuit to ground

Description

When there is a circuit shorted to ground in the radar sensor power supply line, the PDC records a DTC.

DTC	DTC detection conditions	Faulty location
B1A6814	(a) Sensor power supply short circuit to ground.	• PDC • Relevant harnesses • Front left radar sensor • Left front middle radar sensor • Front right middle radar sensor • Front right side radar sensor • Rear left radar sensor • Rear left middle radar sensor • Rear right middle radar sensor • Rear right side radar sensor

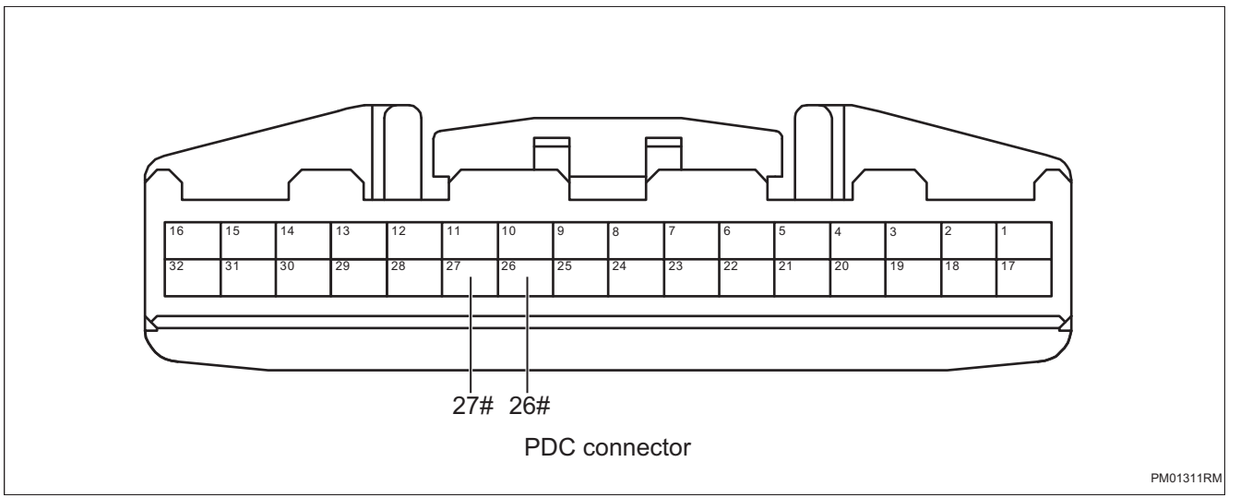
Circuit diagram



Inspection procedure

Note: Take the inspection procedure of front left radar sensor fault as an example, and the inspection procedures of other radar sensors are similar.

1	**Check front left side radar sensor harness and connector for circuit shorted to each other**



PDC connector

PM01311RM

PM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PDC connector.

(d) Disconnect all front radar sensor connectors.

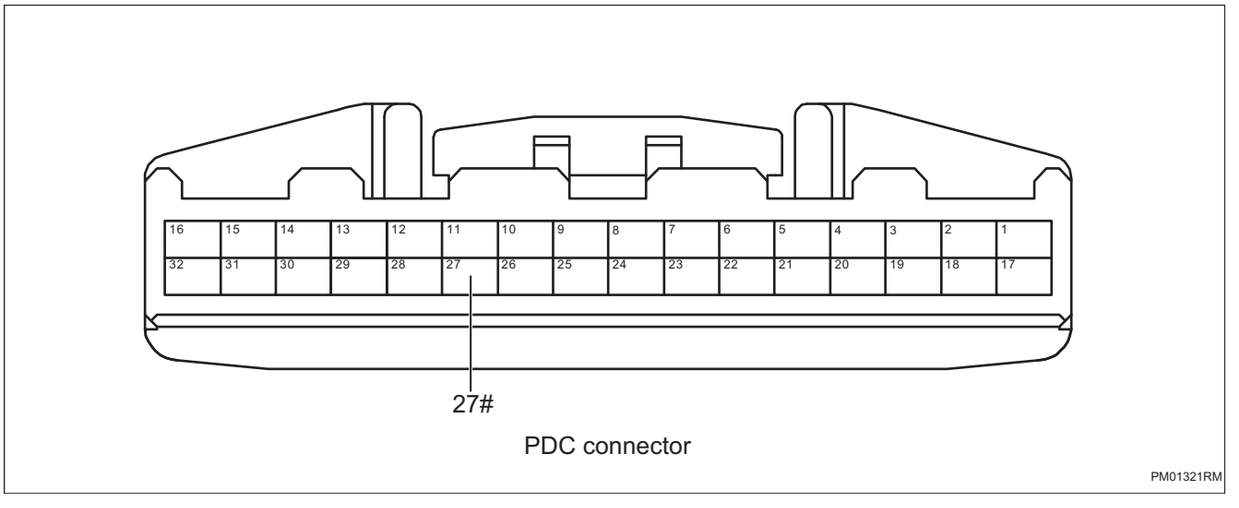
(e) Measure the resistance according to the values in the table below.

Detector connection	Detection conditions	Specified state
PDC connector 27# - PDC connector 26#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

2	**Check front left side radar sensor harness and connector for circuit shorted to ground**



PDC connector

PM01321RM

(a) Measure the resistance according to the values in the table below.

Detector connection	Detection conditions	Specified state
PDC connector 27# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	**Replace the front left radar sensor (See page PM-59)**

(a) Replace the front left radar sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace PDC (See page PM-57)**

OK

4	**End**

DTC	U003788	Driver assistance/extension CAN bus off
DTC	U014687	GW node lost
DTC	U023A87	AVM ECU/AVM ECU node lost
DTC	U024387	ADV node lost
DTC	U112187	ESP message lost
DTC	U116487	A/C control unit message lost
DTC	U114087	BCM 1 message lost
DTC	U113887	Driving mode selection control unit message lost
DTC	U124587	IVI message lost
DTC	U115587	Instrument cluster control unit message lost
DTC	U113187	EPS ECU message lost
DTC	U110187	TCU message lost
DTC	U129387	HCU message lost
DTC	U114687	GW message lost
DTC	U041582	ESP message content error
DTC	U041583	ESP message content error
DTC	U054682	EnHost/IVI message content error
DTC	U054683	EnHost/IVI message content error
DTC	U040282	TCU message content error
DTC	U040283	TCU message content error
DTC	U042082	EPS ECU message content error
DTC	U042083	EPS ECU message content error
DTC	U059482	HCU message content error
DTC	U059483	HCU message content error

PM

Description

When the communication between the PDC and other systems is abnormal or interrupted, the PDC records a DTC.

DTC	DTC detection conditions	Faulty location
U003788	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U023A87	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U024387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U112187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U116487	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U113887	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U124587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U113187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U129387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041582	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041583	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U054682	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U054683	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U040282	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U040283	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042082	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

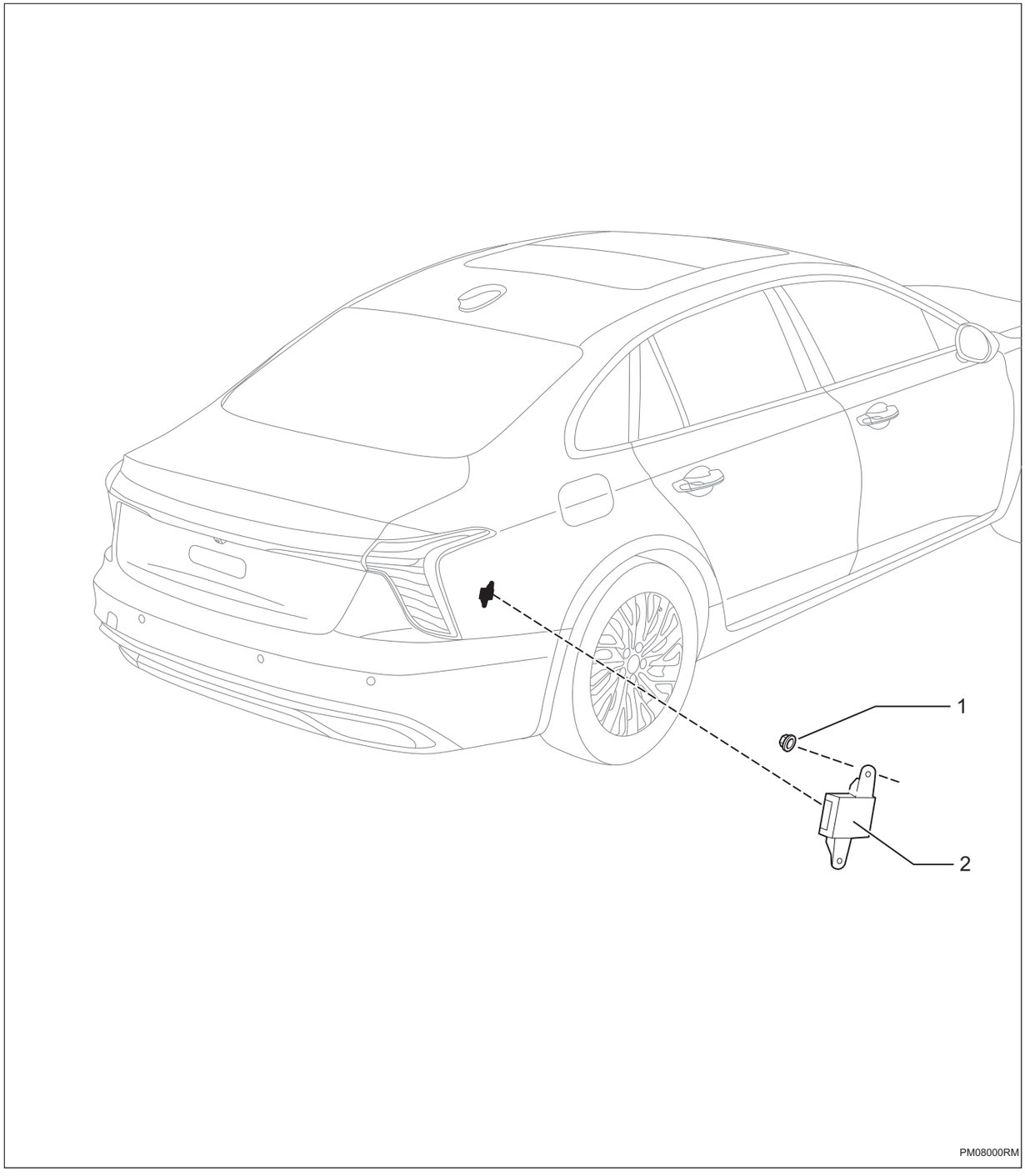
DTC	DTC detection conditions	Faulty location
U042083	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059482	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059483	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

PDC assembly

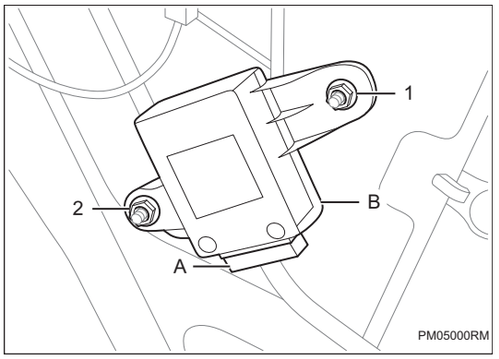
Parts



1. **Hexagon flange nut**
   - X2
   - Torque: 12 ~ 17N·m
2. **PDC assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove trunk right covering (See page IR-33)**
3. **Removal PDC assembly**



(a) Disconnect the harness connector-A-.

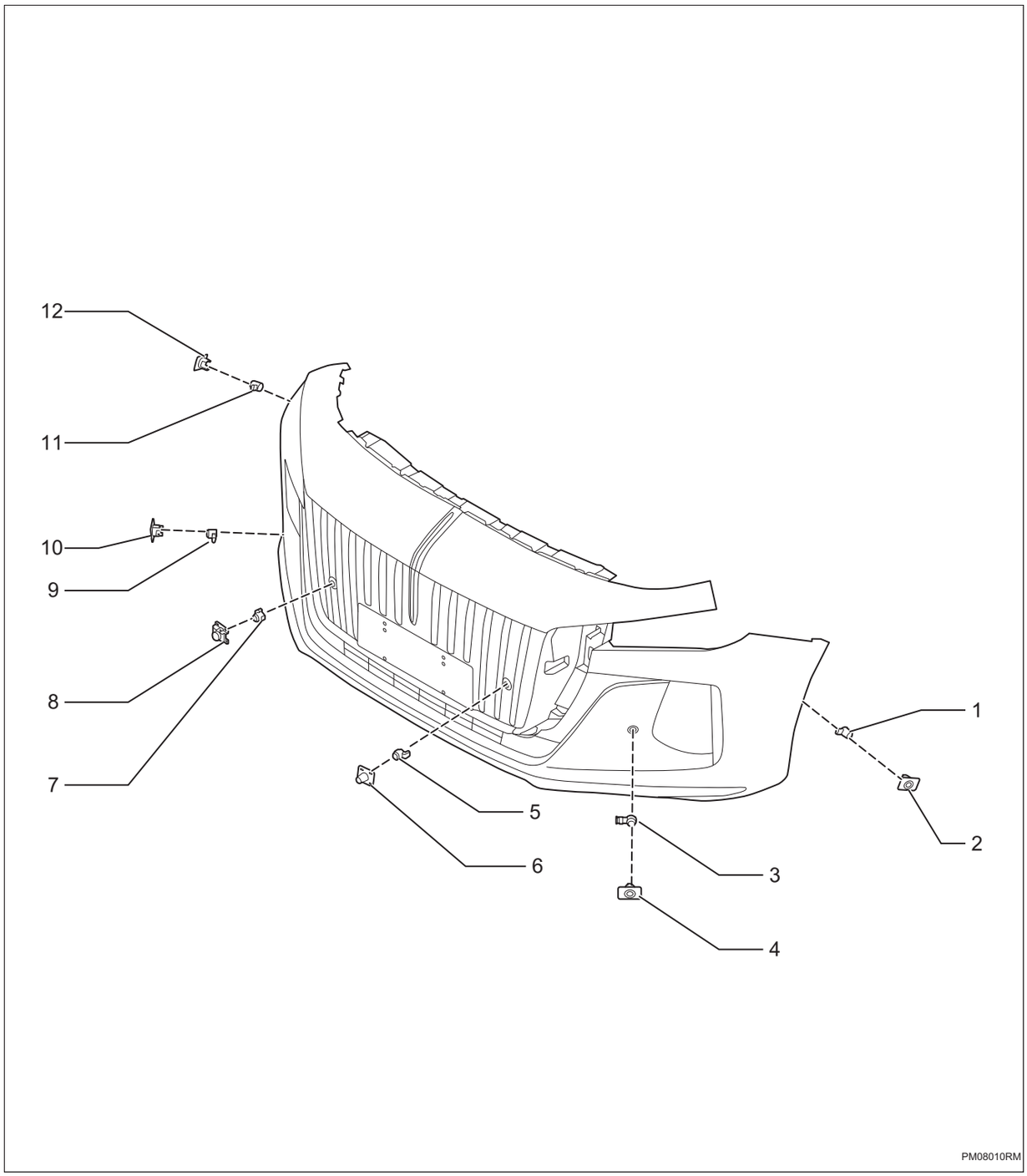
(b) Remove nuts -1-2-, and remove PDC assembly-B-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Ultrasonic sensor assembly

Parts



1. **Long-range ultrasonic sensor assembly**
2. **Long-range ultrasonic sensor bracket**
3. **Ultrasonic sensor assembly**
4. **Ultrasonic sensor bracket**
5. **Ultrasonic sensor assembly**

6. **Ultrasonic sensor bracket**
7. **Ultrasonic sensor assembly**
8. **Ultrasonic sensor bracket**
9. **Ultrasonic sensor assembly**
10. **Ultrasonic sensor bracket**
11. **Long-range ultrasonic sensor assembly**
12. **Long-range ultrasonic sensor bracket**

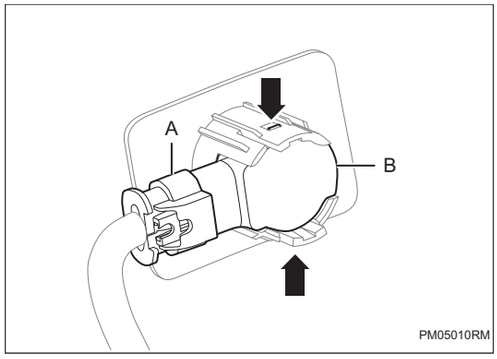
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove front bumper (See page ET-7)**
3. **Remove the rear bumper (See page ET-21)**
4. **Remove ultrasonic sensor assembly**

   Hint:

   The removal sequence of all front and rear long-range ultrasonic sensor assembly and ultrasonic sensor assembly is the same.

   (a) Disconnect the harness connector-A-.



   (b) Detach the claw-arrow- and remove the ultrasonic sensor assembly-B-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

PA

PA ECU PA-1
Precautions PA-1
Location of parts PA-3
System diagram PA-7
System description PA-9
Symptom chart PA-10
ECU terminal PA-11
DTC chart PA-12
B1A8016 ..... PA-15
B1A8017 ..... PA-15
B1A8A1C PA-18
B1A8948 ..... PA-19
B1A4C02 ..... PA-20
B1A4C53 ..... PA-20
B1A4D02 ..... PA-24
B1A4D53 ..... PA-24
B1A4E02 ..... PA-28
B1A4E53 ..... PA-28
B1A4F02 ..... PA-32
B1A4F53 ..... PA-32
B1A5002 ..... PA-36
B1A5053 ..... PA-36
B1A5102 ..... PA-40
B1A5153 ..... PA-40
B1A5202 ..... PA-44
B1A5253 ..... PA-44
B1A5302 ..... PA-48
B1A5353 ..... PA-48
B1A5402 ..... PA-52
B1A5453 ..... PA-52
B1A5502 ..... PA-56
B1A5553 ..... PA-56
B1A5602 ..... PA-60
B1A5653 ..... PA-60
B1A5702 ..... PA-64
B1A5753 ..... PA-64
B1A8113 ..... PA-68
B1A8511 ..... PA-68
B1A8512 ..... PA-68

B1A8213 ..... PA-70
B1A8711 ..... PA-70
B1A8712 ..... PA-70
B1A8313 ..... PA-72
B1A8811 ..... PA-72
B1A8812 ..... PA-72
B1A8413 ..... PA-74
B1A8611 ..... PA-74
B1A8612 ..... PA-74
U003788 ..... PA-76
U007788 ..... PA-76
U014687 ..... PA-76
U024387 ..... PA-76
U112187 ..... PA-76
U116487 ..... PA-76
U114087 ..... PA-76
U119987 ..... PA-76
U120087 ..... PA-76
U120187 ..... PA-76
U120287 ..... PA-76
U113187 ..... PA-76
U113887 ..... PA-76
U110087 ..... PA-76
U124587 ..... PA-76
U115587 ..... PA-76
U110187 ..... PA-76
U041582 ..... PA-76
U041583 ..... PA-76
U041586 ..... PA-76
U042082 ..... PA-76
U042083 ..... PA-76
U042086 ..... PA-76
U144C8A PA-76

PA ECU assembly PA-79
Parts PA-79
Removal PA-81
Installation PA-81

Rear camera and bracket assembly PA-82
Parts PA-82
Removal PA-83
Installation PA-83

PA ECU

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Warning:

Before repairing the high voltage system or adjacent high voltage system components, be sure to carefully read the "Instructions and precautions for maintenance work" in the introduction carefully!

2. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

3. When checking and replacing electronic components, make sure to disconnect the battery - to repair the system.

4. The initialization is required for some systems when the battery cable is disconnected and reconnected.

5. General repair instructions

(a) When the part needs to be replaced or the connector needs to be disconnected during maintenance of PA, disconnect the battery negative cable.

(b) After reconnecting the battery, perform a "clear DTC" operation on the all electronic control systems using the HQ-VDS.

6. Precautions for PA

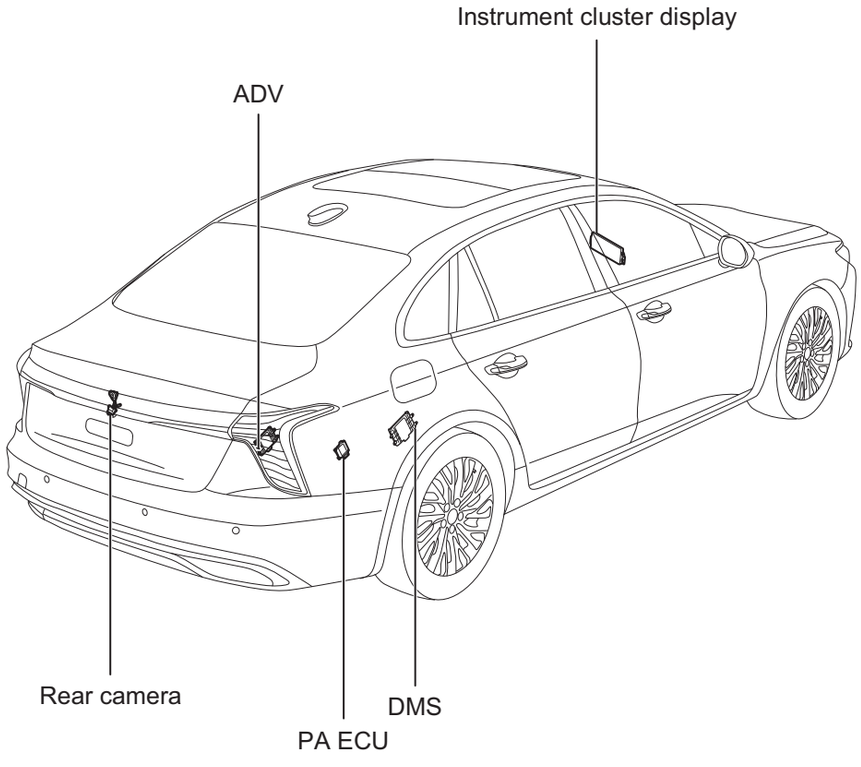
(a) The system cannot achieve absolute interference immunity due to the influence of various external sound fields and electromagnetic fields determined by physical characteristics (for example: other vehicle using ultrasonic distance measurement, air pressure, engine noise, electronically controlled gears, induction coil, etc.)

(b) If the camera becomes dirty, a clear image cannot be transmitted. Rinse with water and wipe clean with a soft cloth. If the camera is very dirty, clean it with neutral detergent and wipe it off.

(c) When the system temperature is low, the displayed image may become dark, and the moving image may be slightly distorted.

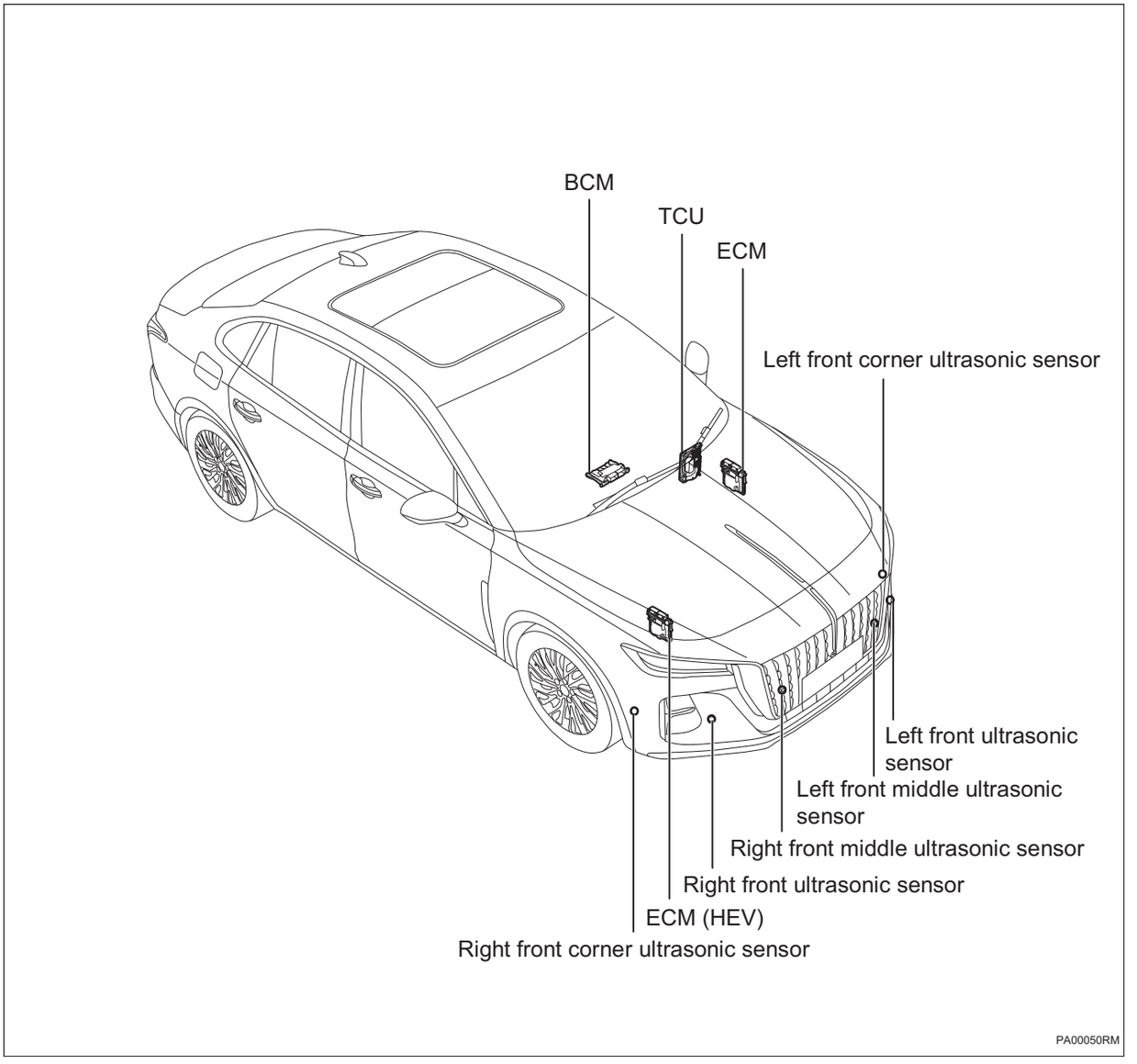
7. Calibration with HQ-VDS is required after replacing the PA ECU.

Location of parts



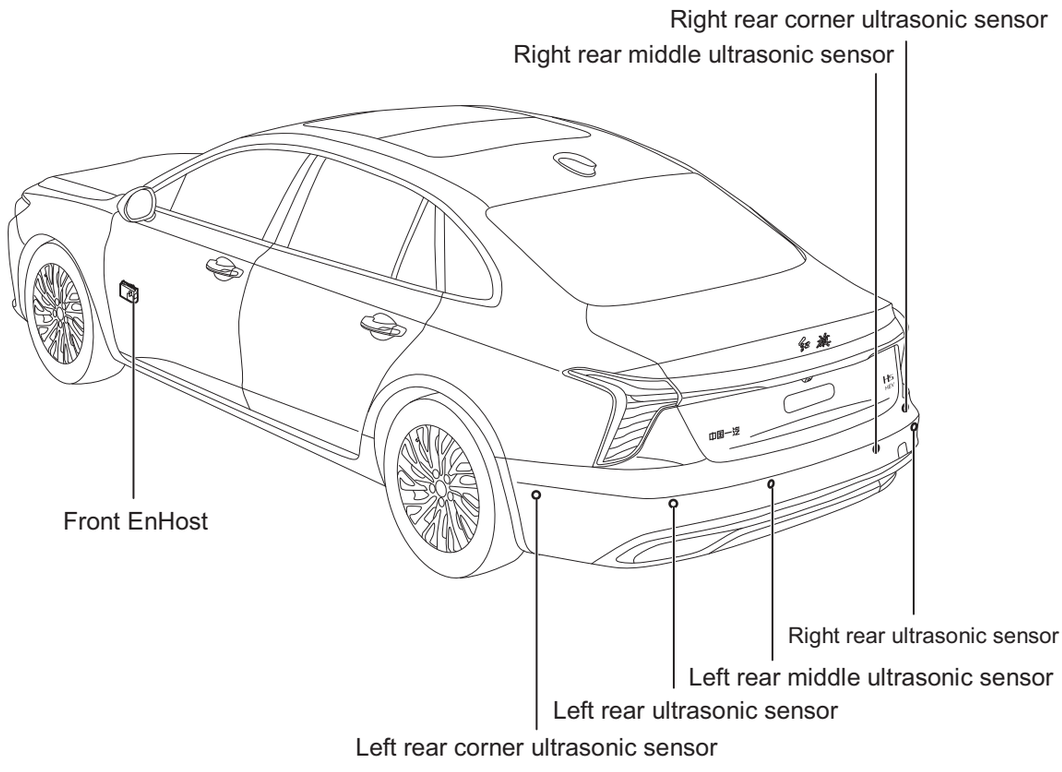
PA00040RM

Location of parts

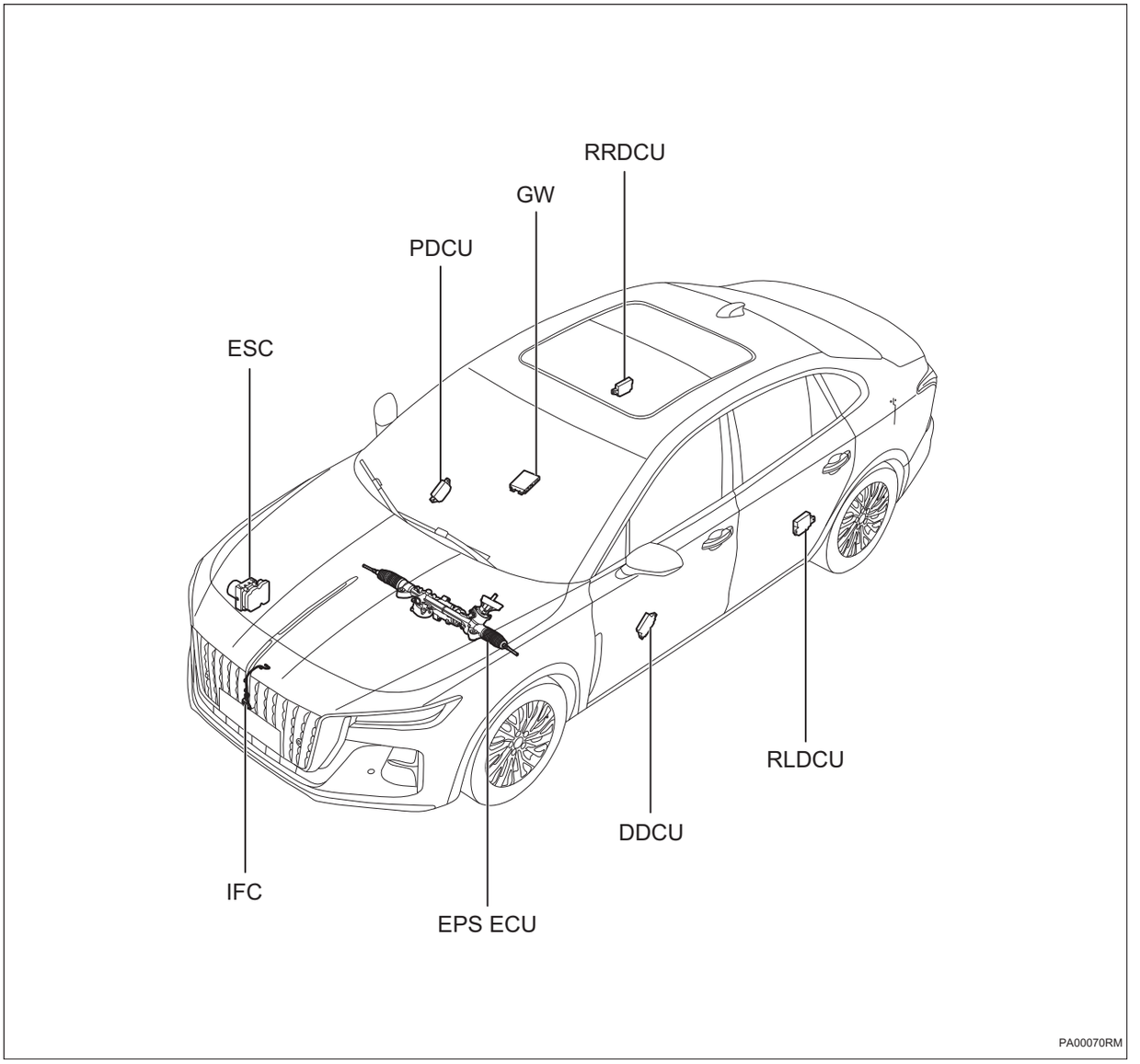


PA

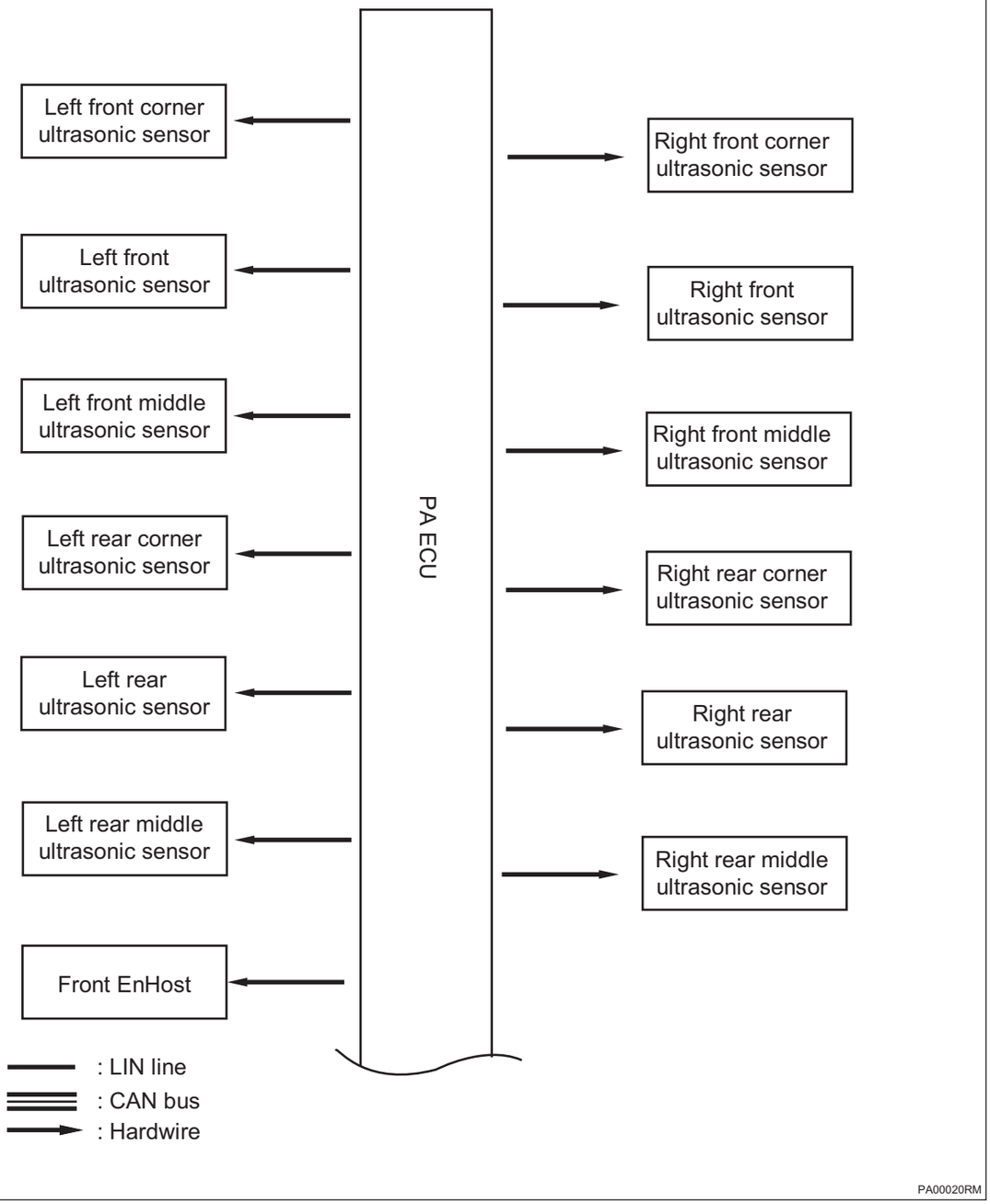
Location of parts



Location of parts

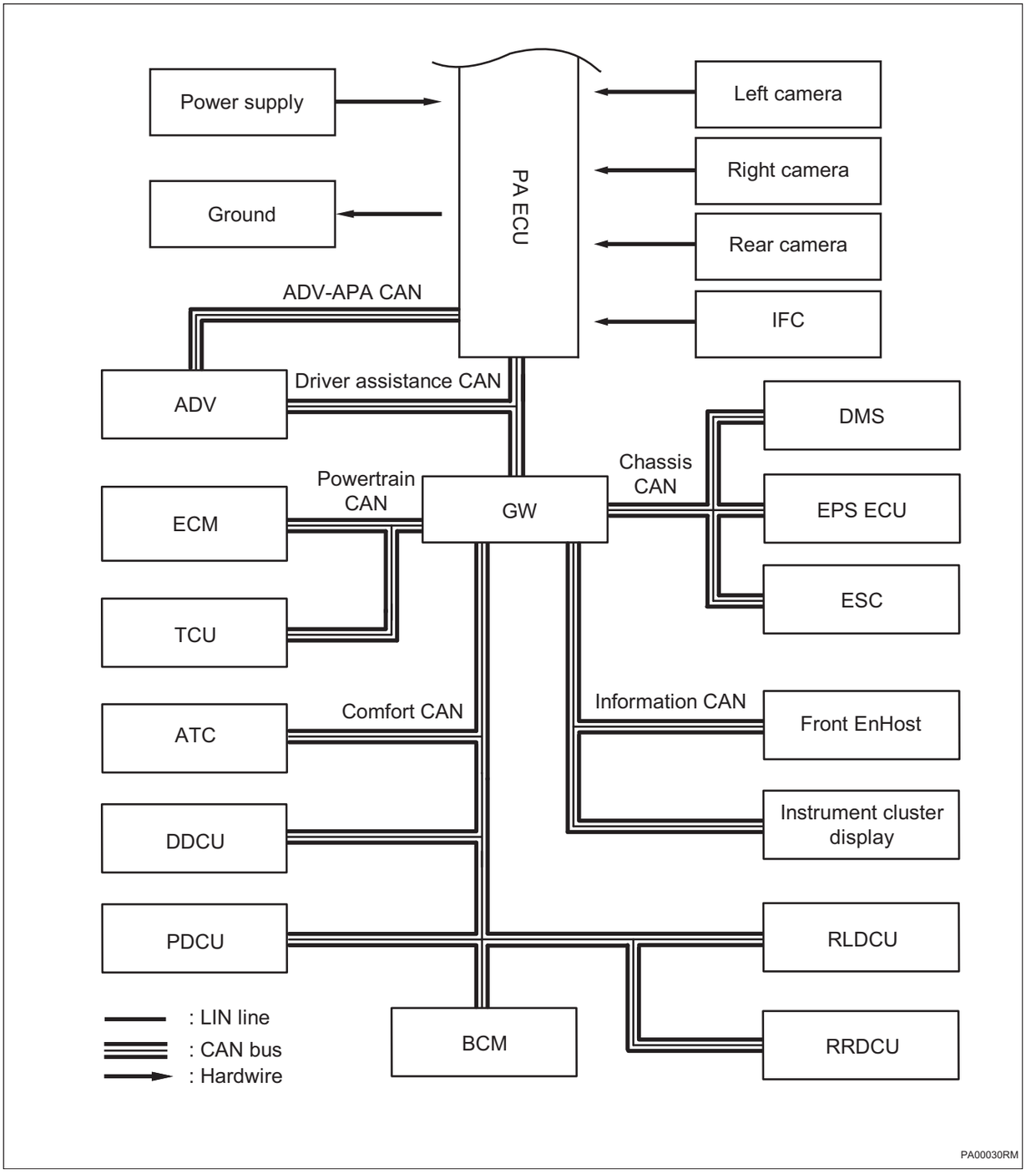


System diagram



PA

System diagram



System description

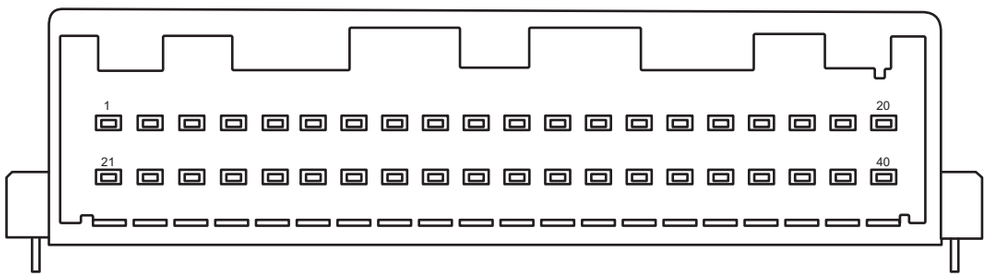
1. PA

(a) The PA measures the length of parking spaces on both sides of the road by ultrasonic and camera, and automatically controls the vehicle to park in the selected parking space after selecting the suitable parking space. The PA includes automatic parking in and automatic parking out. Select on the multimedia display.

Symptom chart

Fault	Possible location
System inoperative or abnormal	• Battery • Related harness and connector • Front EnHost • Ultrasonic sensor • Camera • PA ECU

ECU terminal



PA ECU

PA00010RM

PA ECU A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	GND	21	B+
2	Hardwire ACC	22	-
3	CAN2_L(ADV)	23	CAN2_H(ADV)
4	CAN1_L(ADAS)	24	CAN1_H(ADAS)
5	-	25	-
6	-	26	-
7	-	27	-
8	-	28	-
9	Front_SENSOR4	29	Front_SENSOR5
10	Front_SENSOR2	30	Front_SENSOR3
11	Front_SENSOR6	31	Front_SENSOR1
12	Front ultrasonic sensor ground	32	Front ultrasonic sensor power supply
13	Rear_SENSOR4	33	Rear_SENSOR5
14	Rear_SENSOR2	34	Rear_SENSOR3
15	Rear_SENSOR6	35	Rear_SENSOR1
16	Rear ultrasonic sensor ground	36	Rear ultrasonic sensor power supply
17	-	37	-
18	-	38	-
19	-	39	-
20	-	40	-

DTC chart

DTC	Description	Reference page
B1A8016	Control unit input voltage undervoltage.	(See page PA-15)
B1A8017	Control unit input overvoltage.	(See page PA-15)
B1A8113	AVS front camera harness open-circuited	(See page PA-68)
B1A8213	AVS left camera harness open-circuited	(See page PA-70)
B1A8313	AVS right camera harness open-circuited	(See page PA-72)
B1A8413	AVS rear camera harness open-circuited	(See page PA-74)
B1A8511	AVS IFC power supply circuit shorted to ground	(See page PA-68)
B1A8512	AVS IFC power supply to shorted to power positive	(See page PA-68)
B1A8611	AVS rear camera power supply circuit shorted to ground	(See page PA-74)
B1A8612	AVS rear camera power supply shorted to power positive	(See page PA-74)
B1A8711	AVS left camera power supply circuit shorted to ground	(See page PA-70)
B1A8712	AVS left camera power supply shorted to power positive	(See page PA-70)
B1A8811	AVS right camera power supply circuit shorted to ground	(See page PA-72)
B1A8812	AVS right camera power supply shorted to power positive	(See page PA-72)
B1A8948	AVS not calibrated	(See page PA-19)
B1A8A1C	AVS system failure	(See page PA-18)
B1A4C02	Right rear side long distance ultrasonic sensor probe failure	(See page PA-20)
B1A4D02	Right rear outermost ultrasonic sensor probe failure	(See page PA-24)
B1A4E02	Right rear ultrasonic sensor probe failure	(See page PA-28)
B1A4F02	Left rear ultrasonic sensor probe failure	(See page PA-32)
B1A5002	Left rear outermost ultrasonic sensor probe failure	(See page PA-36)
B1A5102	Left rear side long-range ultrasonic sensor probe failure	(See page PA-40)
B1A5202	Right front side long-range ultrasonic sensor probe failure	(See page PA-44)
B1A5302	Right front outermost ultrasonic sensor probe failure	(See page PA-48)
B1A5402	Right front ultrasonic sensor probe failure	(See page PA-52)
B1A5502	Left front ultrasonic sensor probe failure	(See page PA-56)
B1A5602	Left front outermost ultrasonic sensor probe failure	(See page PA-60)
B1A5702	Left front side long-range ultrasonic sensor probe failure	(See page PA-64)

DTC	Description	Reference page
B1A4C53	Right rear side long distance ultrasonic sensor probe failure	(See page PA-20)
B1A4D53	Right rear outermost ultrasonic sensor probe failure	(See page PA-24)
B1A4E53	Right rear ultrasonic sensor probe failure	(See page PA-28)
B1A4F53	Left rear ultrasonic sensor probe failure	(See page PA-32)
B1A5053	Left rear outermost ultrasonic sensor probe failure	(See page PA-36)
B1A5153	Left rear side long-range ultrasonic sensor probe failure	(See page PA-40)
B1A5253	Right front side long-range ultrasonic sensor probe failure	(See page PA-44)
B1A5353	Right front outermost ultrasonic sensor probe failure	(See page PA-48)
B1A5453	Right front ultrasonic sensor probe failure	(See page PA-52)
B1A5553	Left front ultrasonic sensor probe failure	(See page PA-56)
B1A5653	Left front outermost ultrasonic sensor probe failure	(See page PA-60)
B1A5753	Left front side long-range ultrasonic sensor probe failure	(See page PA-64)
U003788	Extension CAN bus off	(See page PA-76)
U007788	ADV-APA CAN bus off	(See page PA-76)
U014687	GW node lost	(See page PA-76)
U024387	ADV node lost	(See page PA-76)
U112187	ESP message lost	(See page PA-76)
U116487	A/C control unit message lost	(See page PA-76)
U114087	BCM 1 message lost	(See page PA-76)
U119987	Driver door module message lost	(See page PA-76)
U120087	Passenger door module message lost	(See page PA-76)
U120187	Rear left door module message lost	(See page PA-76)
U120287	Rear right door module message lost	(See page PA-76)
U113187	EPS ECU message lost	(See page PA-76)
U113887	Driving mode selection control unit message lost	(See page PA-76)
U110087	ECM message lost	(See page PA-76)
U124587	IVI message lost	(See page PA-76)
U115587	Instrument cluster control unit message lost	(See page PA-76)
U110187	TCU message lost	(See page PA-76)
U041582	ESP message content error	(See page PA-76)
U041583	ESP message content error	(See page PA-76)
U041586	ESP message content error	(See page PA-76)
U042082	EPS ECU message content error	(See page PA-76)
U042083	EPS ECU message content error	(See page PA-76)

DTC	Description	Reference page
U042086	EPS ECU message content error	(See page PA-76)
U144C8A	APA ETH1 connection failure	(See page PA-76)

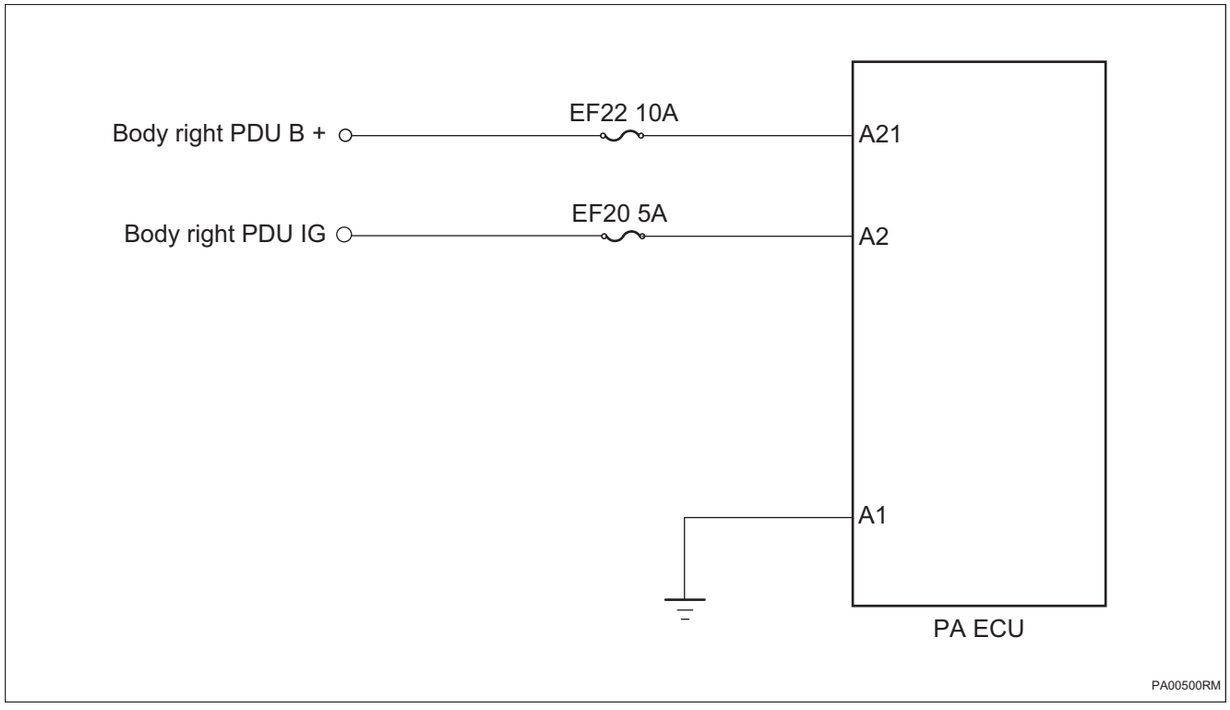
DTC	B1A8016	Control unit input voltage undervoltage.
DTC	B1A8017	Control unit input overvoltage.

Description

When the PA ECU input voltage is too high or too low, PA ECU records the DTC.

DTC	DTC detection conditions	Faulty location
B1A8016	(a) Control unit input voltage undervoltage.	• PA ECU • Fuse • Harness and connector • Battery/charging system
B1A8017	(a) Control unit input overvoltage.	• PA ECU • Harness and connector • Battery/charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery + - battery -	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2	Check PA ECU fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the PA ECU fuse.

(d) Measure the resistance according to the values in the table below.

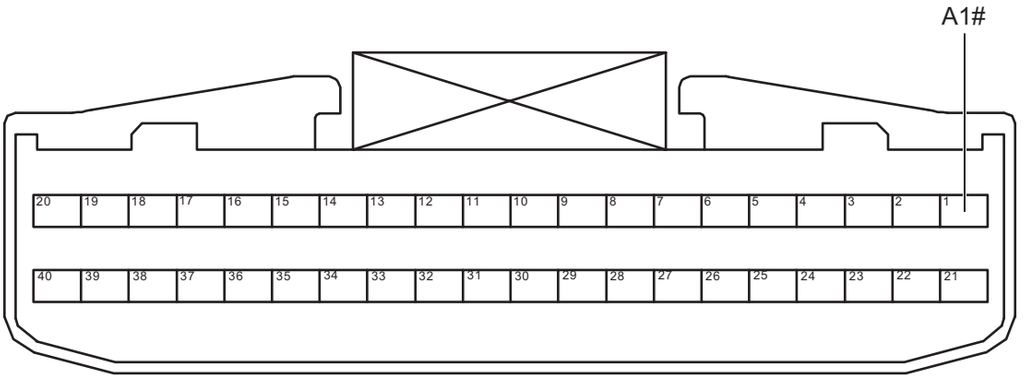
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3	Check PA ECU ground



PA ECU A connector

CA02421RM

(a) Measure the resistance according to the values in the table below.

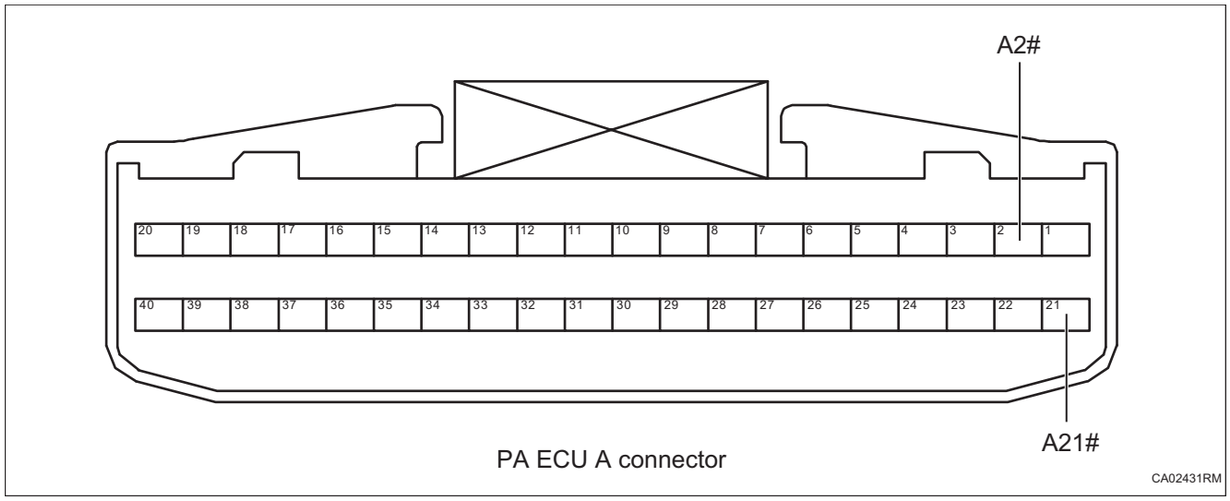
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A1# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check PA ECU power supply**



PA ECU A connector

(a) Install the fuse.

(b) Connect the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A21# -body GND	The ignition switch is set to "ON"	Battery voltage
PA ECU connector A2# -body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace PA ECU (See page PA-79)**

PA

DTC	B1A8A1C	AVS system failure

Description

When an error occurs in the PA, the PA ECU records the DTC.

DTC	DTC detection conditions	Faulty location
B1A8A1C	(a) System failure.	• PA ECU

Inspection procedure

1	Clear DTC

PA

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC.

(d) Re-read the DTC

Criteria:

No DTC is output.

NG → **Replace PA ECU (See page PA-79)**

OK

2	End

DTC	B1A8948	AVS not calibrated

Description

When the PA ECU is not calibrated, PA ECU records the DTC.

DTC	DTC detection conditions	Faulty location
B1A8948	(a) AVS is not calibrated.	• PA ECU

Inspection procedure

1	Re-calibrate the PA ECU

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Re-calibrate the PA ECU.

(d) Clear the DTC.

(e) Re-read the DTC

Criteria:

No DTC is output.

NG → **Replace PA ECU (See page PA-79)**

OK

2	End

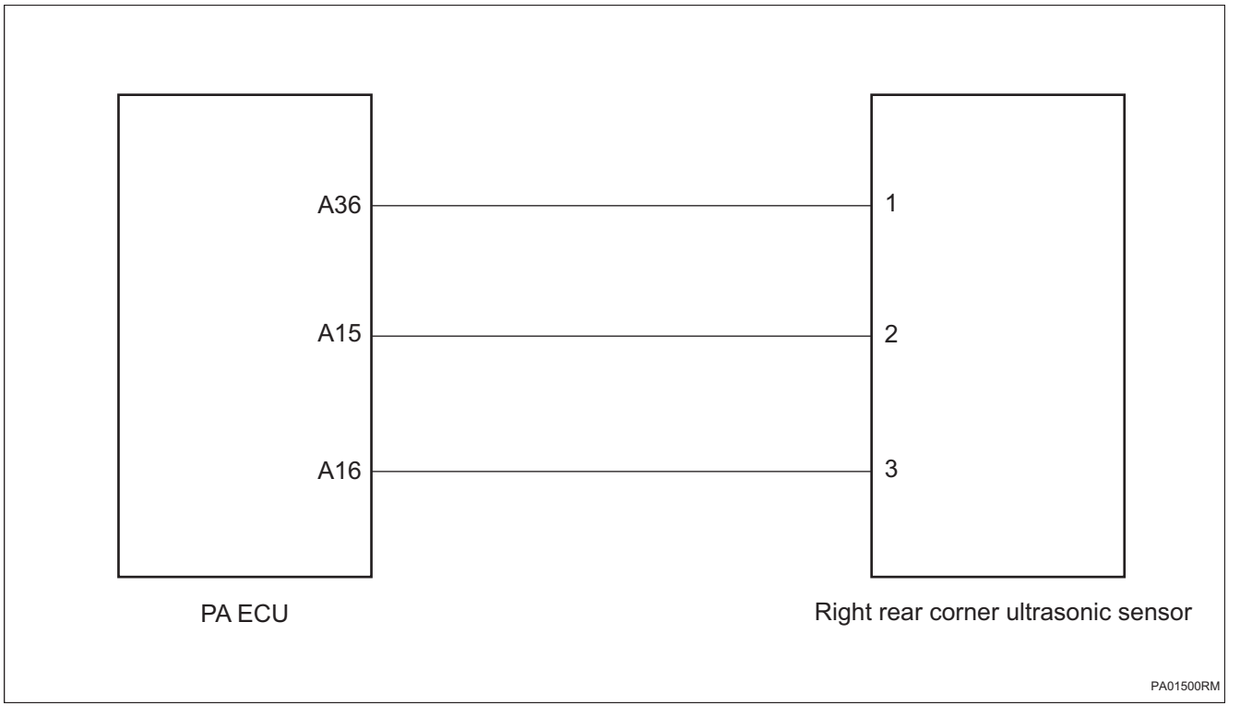
DTC	B1A4C02	Right rear side long distance ultrasonic sensor probe failure
DTC	B1A4C53	Right rear side long distance ultrasonic sensor probe failure

Description

When the right rear corner ultrasonic sensor works abnormally, PA ECU records the DTC.

DTC	DTC detection conditions	Faulty location
B1A4C02	(a) Right rear long distance ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Right rear corner ultrasonic sensor
B1A4C53	(a) Right rear side long-range ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Right rear corner ultrasonic sensor

Circuit diagram



Inspection procedure

1	Check right rear corner ultrasonic sensor

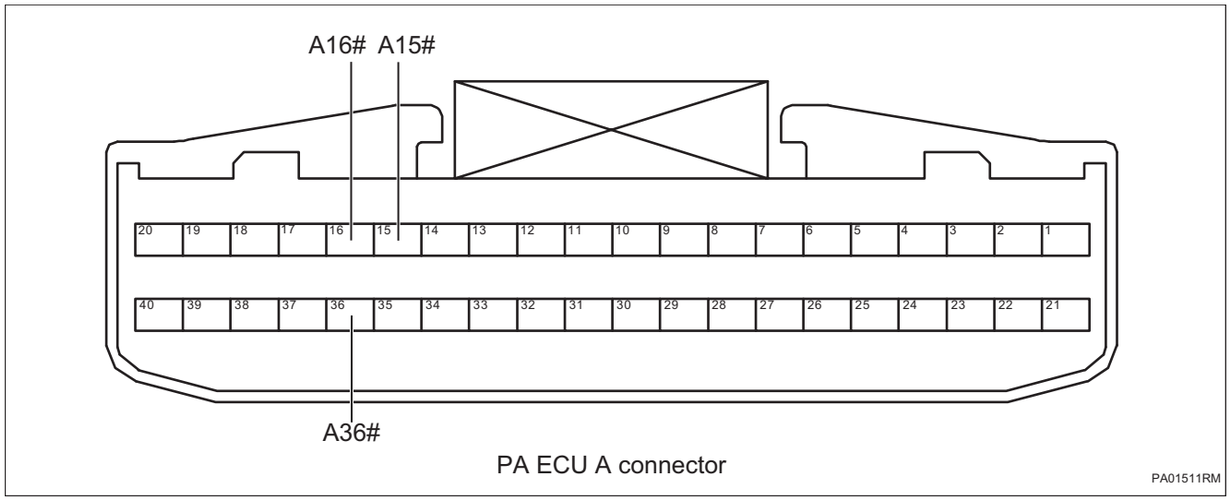
(a) Check whether the right rear corner ultrasonic sensor is dirty.

(b) Check whether the right rear corner ultrasonic sensor is deformed or damaged.

NG → **Repair or replace the right rear corner ultrasonic sensor**

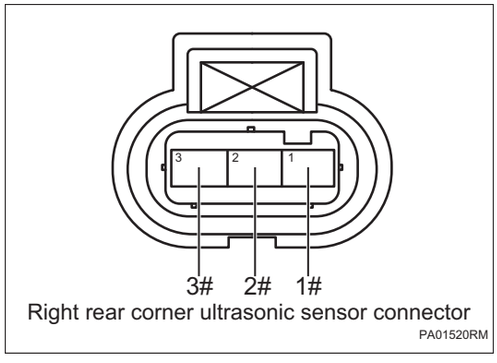
OK

2	**Check right rear corner ultrasonic sensor harness and connector for open circuit**



PA ECU A connector

PA01511RM



Right rear corner ultrasonic sensor connector

PA01520RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PA ECU connector.

(d) Disconnect the right rear corner ultrasonic sensor connector.

(e) Measure the resistance according to the values in the table below.

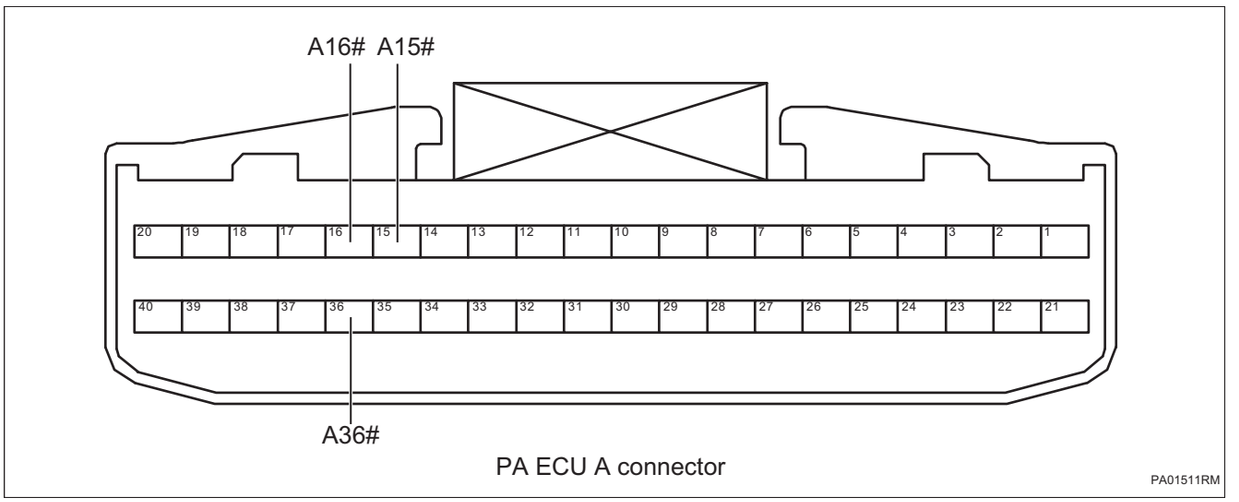
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A36# -right rear corner ultrasonic sensor connector 1#	Always connected	Less than 1Ω
PA ECU connector A15# -right rear corner ultrasonic sensor connector 2#	Always connected	Less than 1Ω
PA ECU connector A16# -right rear corner ultrasonic sensor connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check right rear corner ultrasonic sensor harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

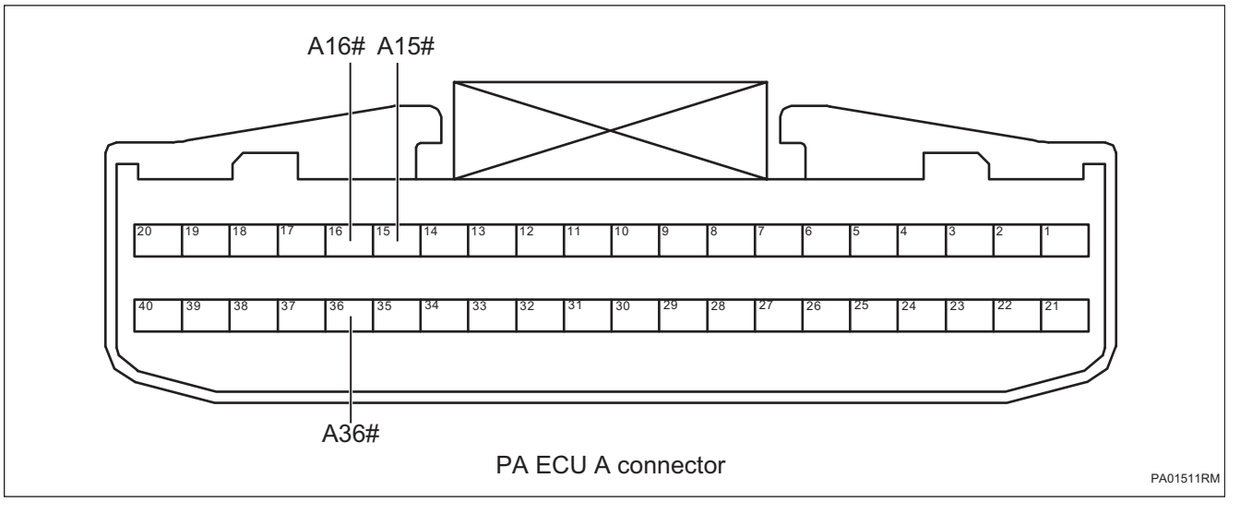
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A36# -body GND	Always connected	10 KΩ or greater
PA ECU connector A15# -body GND	Always connected	10 KΩ or greater
PA ECU connector A16# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check right rear corner ultrasonic sensor harness and connector for circuit shorted to power supply**



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A36# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A15# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A16# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace right rear corner ultrasonic sensor (See page PM-59)**

(a) Replace the right rear corner ultrasonic sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace PA ECU (See page PA-79)**

OK

6	**End**

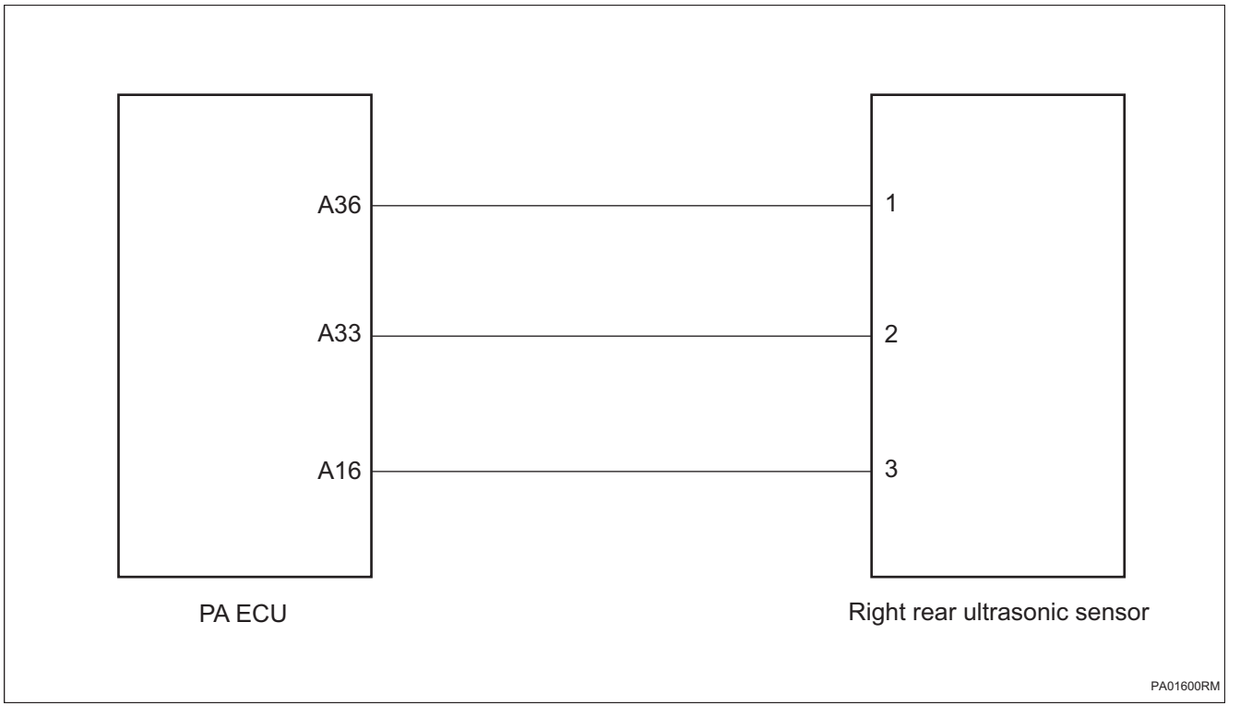
DTC	B1A4D02	Right rear outermost ultrasonic sensor probe failure
DTC	B1A4D53	Right rear outermost ultrasonic sensor probe failure

Description

When the right rear ultrasonic sensor works abnormally, PA ECU records the DTC.

DTC	DTC detection conditions	Faulty location
B1A4D02	(a) Right rear outermost ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Right rear ultrasonic sensor
B1A4D53	(a) Right rear outermost ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Right rear ultrasonic sensor

Circuit diagram



Inspection procedure

1	Check right rear ultrasonic sensor

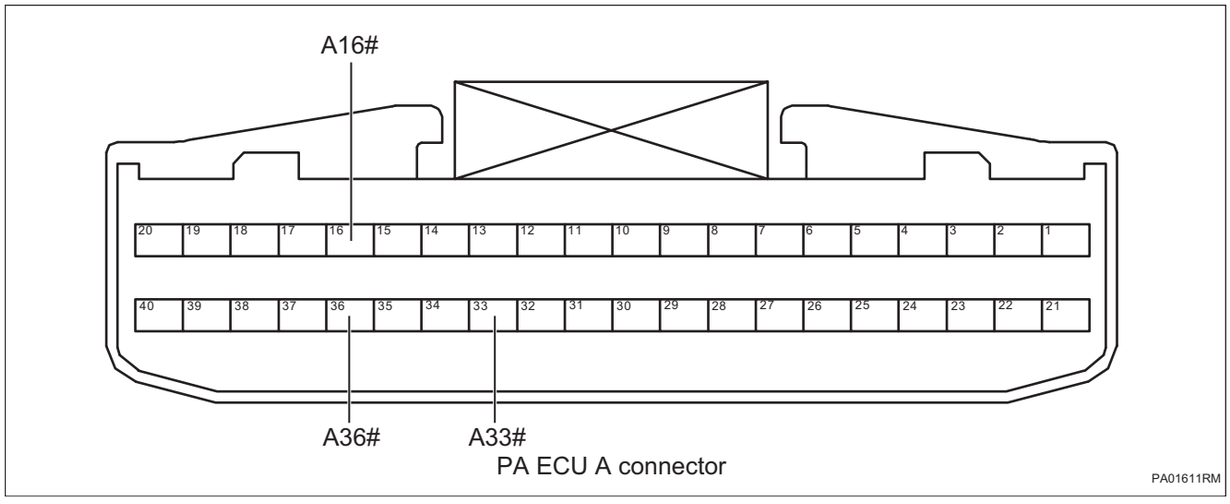
(a) Check whether the right rear ultrasonic sensor is dirty.

(b) Check whether the right rear ultrasonic sensor is deformed or damaged.

NG	Repair or replace the right rear ultrasonic sensor

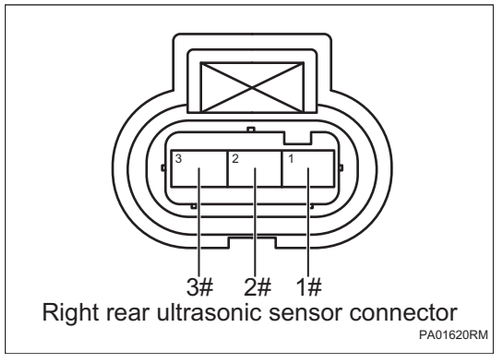
OK

2	**Check right rear ultrasonic sensor harness and connector for open circuit**



PA ECU A connector

PA01611RM



Right rear ultrasonic sensor connector

PA01620RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PA ECU connector.

(d) Disconnect the right rear ultrasonic sensor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

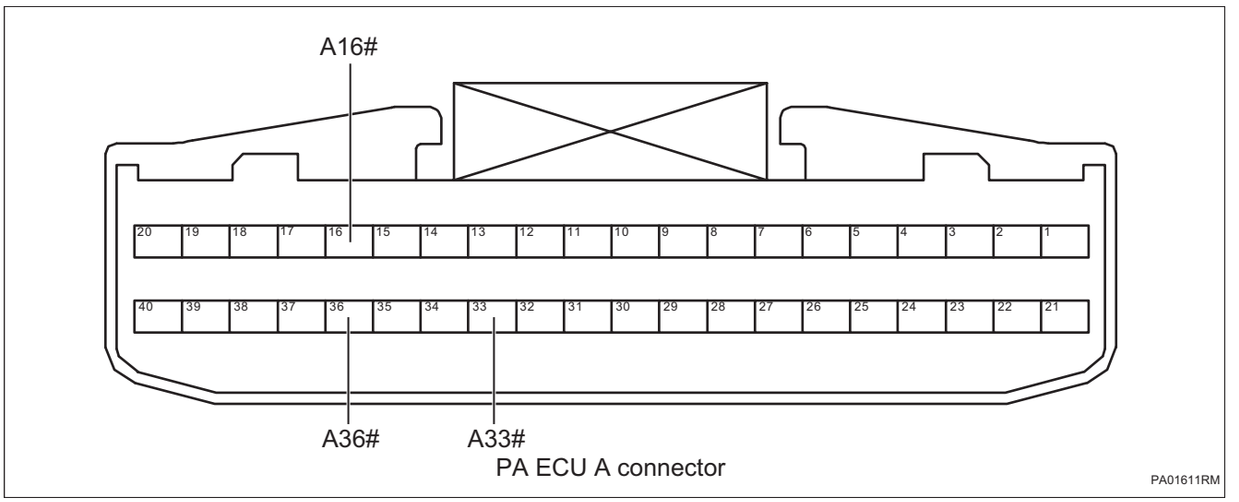
Detector connection	Detection conditions	Specified state
PA ECU connector A36# -right rear ultrasonic sensor connector 1#	Always connected	Less than 1Ω
PA ECU connector A33# -right rear ultrasonic sensor connector 2#	Always connected	Less than 1Ω
PA ECU connector A16# -right rear ultrasonic sensor connector 3#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	**Check right rear ultrasonic sensor harness and connector for circuit shorted to ground**

PA



(a) Measure the resistance according to the values in the table below.

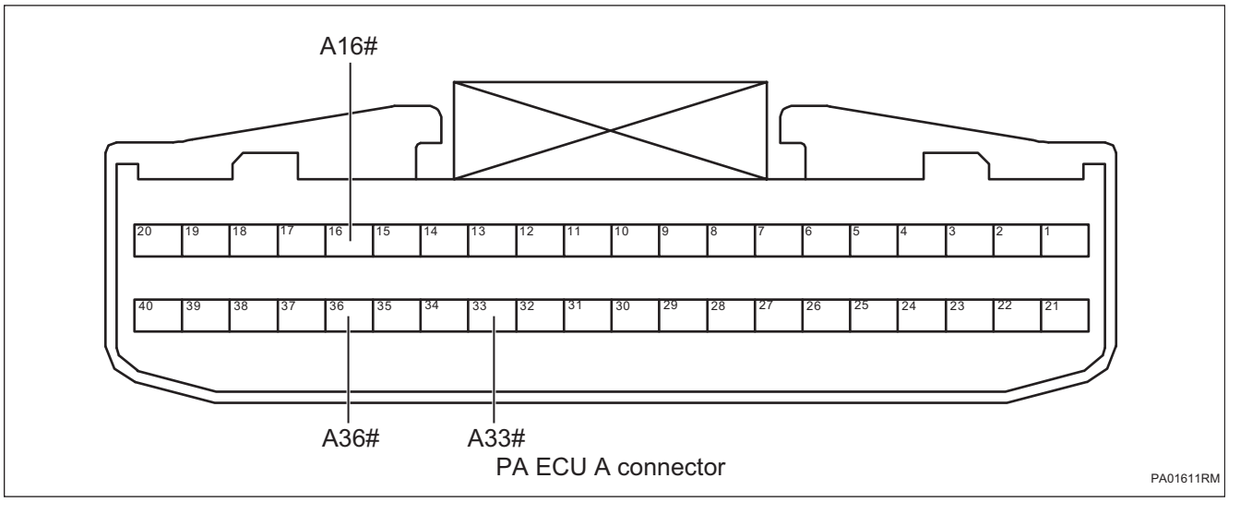
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A36# -body GND	Always connected	33 KΩ or greater
PA ECU connector A33# -body GND	Always connected	33 KΩ or greater
PA ECU connector A16# -body GND	Always connected	33 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check right rear ultrasonic sensor harness and connector for circuit shorted to power supply**



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A36# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A33# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A16# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace right rear ultrasonic sensor (See page PM-59)**

(a) Replace the right rear ultrasonic sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace PA ECU (See page PA-79)**

OK

6	**End**

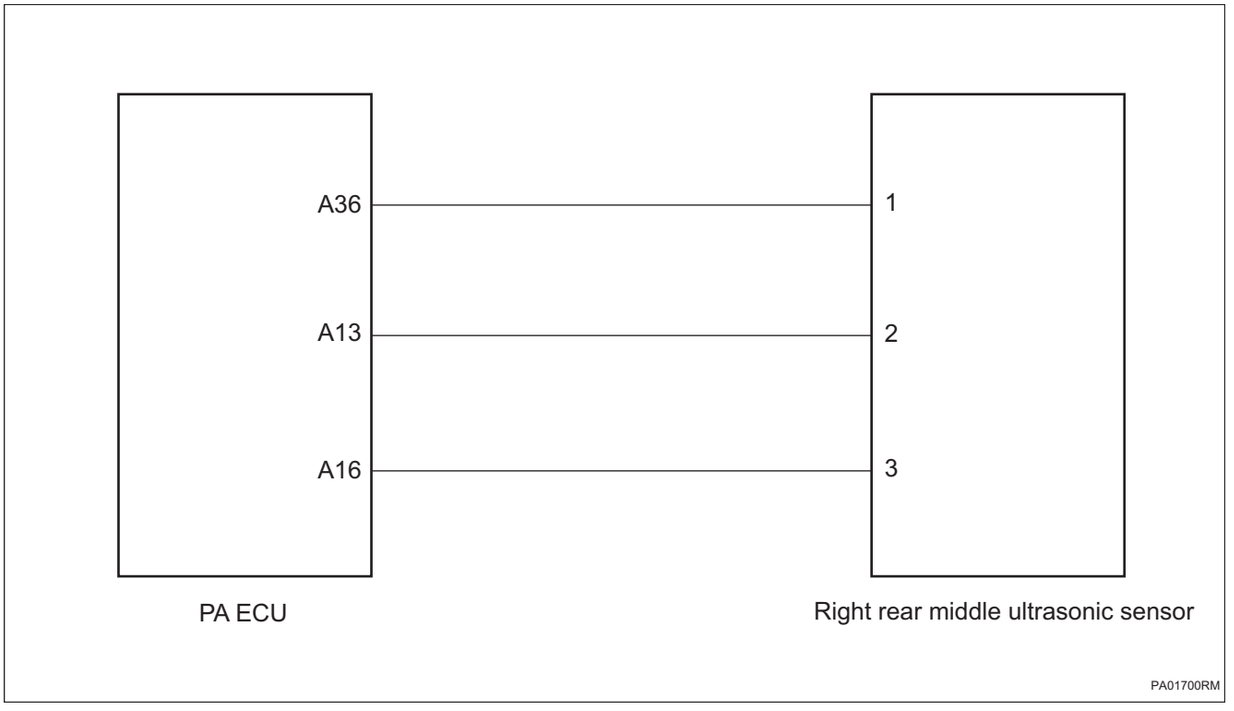
DTC	B1A4E02	Right rear ultrasonic sensor probe failure
DTC	B1A4E53	Right rear ultrasonic sensor probe failure

Description

When the right rear middle ultrasonic sensor works abnormally, PA ECU records the DTC.

DTC	DTC detection conditions	Faulty location
B1A4E02	(a) Right rear ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Right rear middle ultrasonic sensor
B1A4E53	(a) Right rear ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Right rear middle ultrasonic sensor

Circuit diagram



Inspection procedure

1	Check the right rear middle ultrasonic sensor

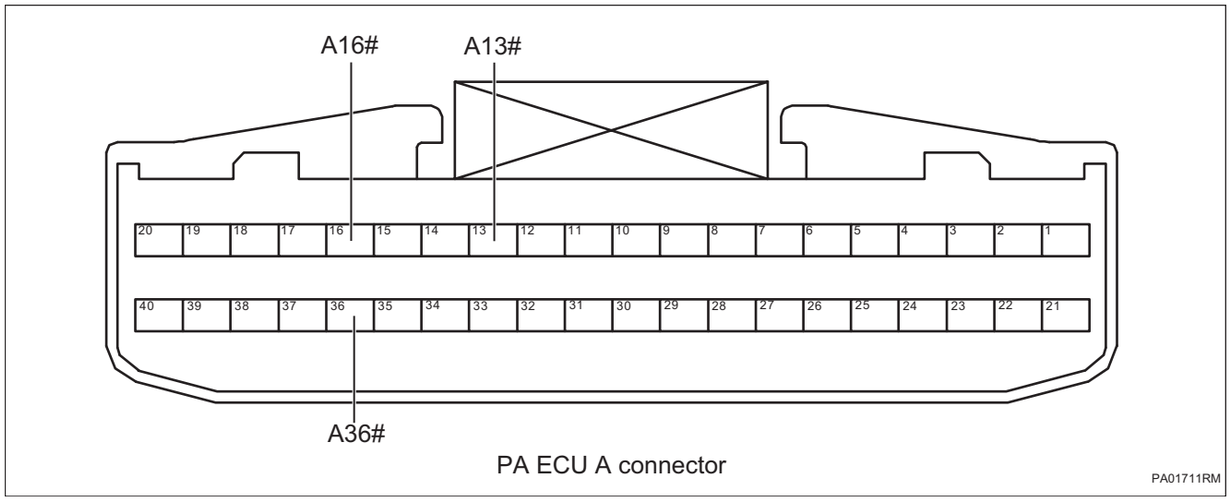
(a) Check whether the right rear middle ultrasonic sensor is dirty.

(b) Check whether the right rear middle ultrasonic sensor is deformed or damaged.

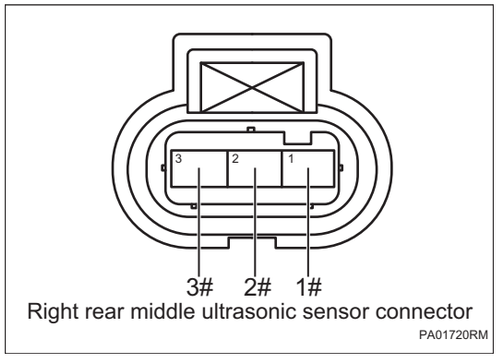
NG	Repair or replace the right rear middle ultrasonic sensor

OK

2	**Check right rear middle ultrasonic sensor harness and connector for open circuit**



PA ECU A connector
PA01711RM



Right rear middle ultrasonic sensor connector
PA01720RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PA ECU connector.

(d) Disconnect the right rear middle ultrasonic sensor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

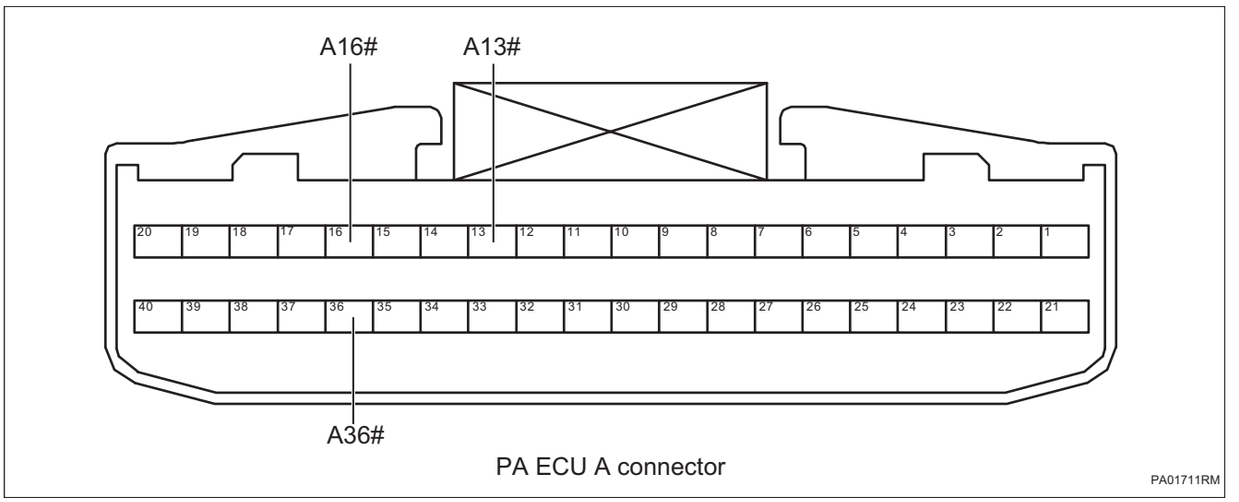
Detector connection	Detection conditions	Specified state
PA ECU connector A36# -right rear middle ultrasonic sensor connector 1#	Always connected	Less than 1Ω
PA ECU connector A13# -right rear middle ultrasonic sensor connector 2#	Always connected	Less than 1Ω
PA ECU connector A16# -right rear middle ultrasonic sensor connector 3#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	**Check right rear middle ultrasonic sensor harness and connector for circuit shorted to ground**

PA



(a) Measure the resistance according to the values in the table below.

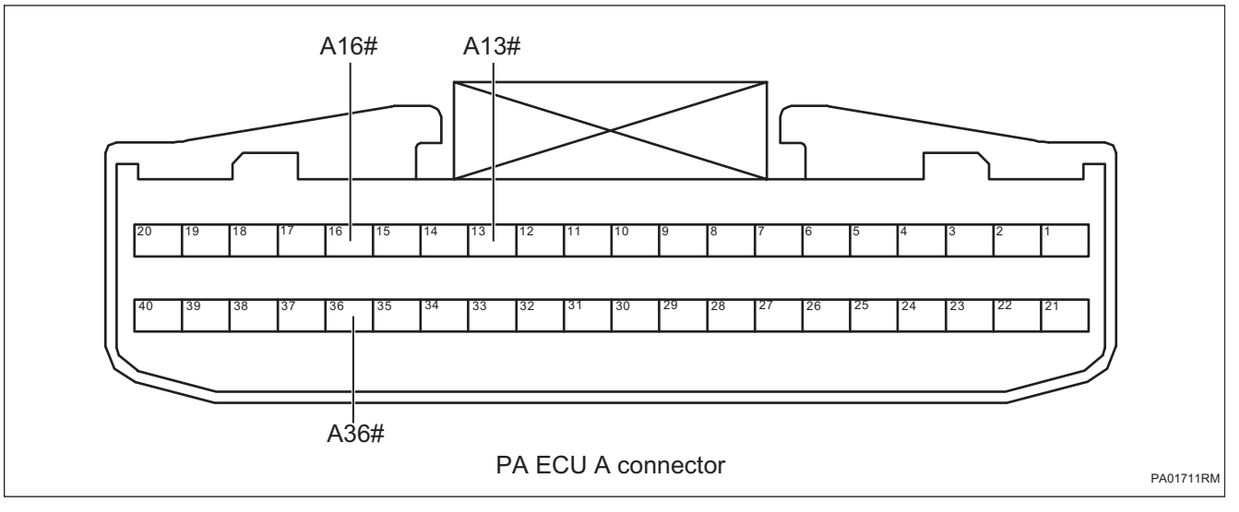
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A36# -body GND	Always connected	10 KΩ or greater
PA ECU connector A13# -body GND	Always connected	10 KΩ or greater
PA ECU connector A16# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check right rear middle ultrasonic sensor harness and connector for circuit shorted to power supply**



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A36# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A13# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A16# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the right rear middle ultrasonic sensor (See page PM-59)**

(a) Replace the right rear middle ultrasonic sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace PA ECU (See page PA-79)**

OK

6	**End**

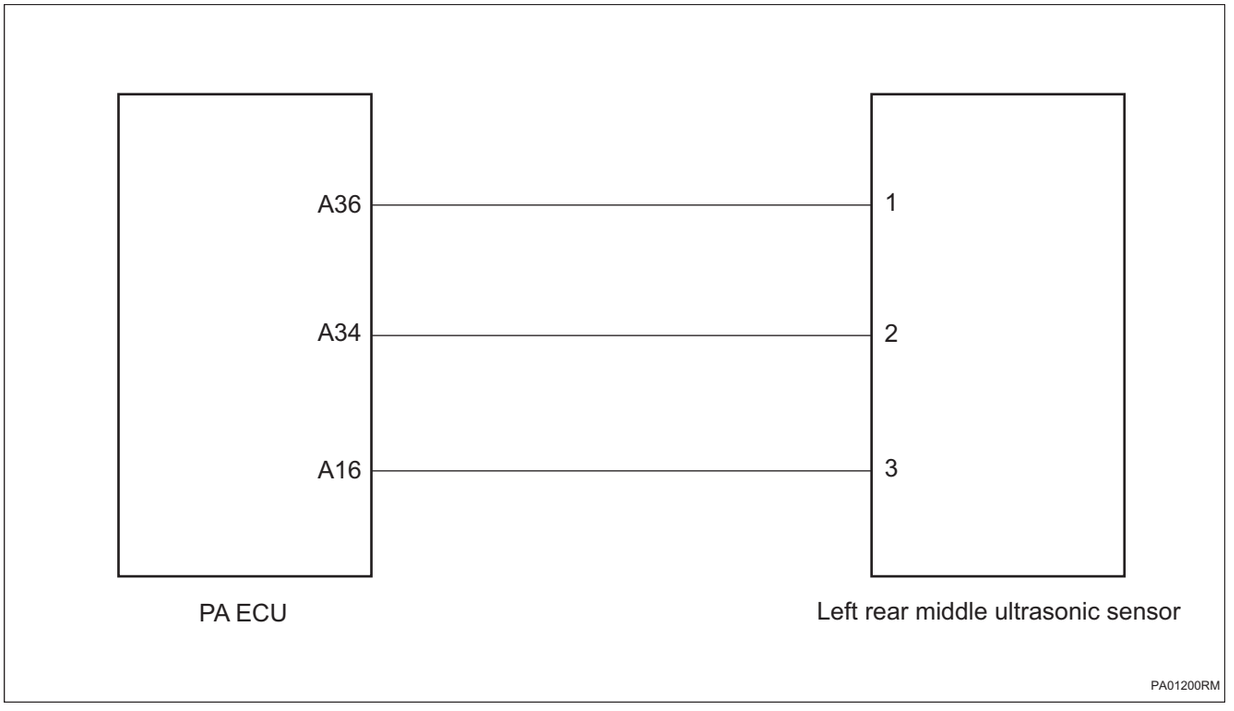
DTC	B1A4F02	Left rear ultrasonic sensor probe failure
DTC	B1A4F53	Left rear ultrasonic sensor probe failure

Description

When the left rear middle ultrasonic sensor works abnormally, PA ECU records the DTC.

DTC	DTC detection conditions	Faulty location
B1A4F02	(a) Left rear ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Left rear middle ultrasonic sensor
B1A4F53	(a) Left rear ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Left rear middle ultrasonic sensor

Circuit diagram



Inspection procedure

1	Check the left rear middle ultrasonic sensor

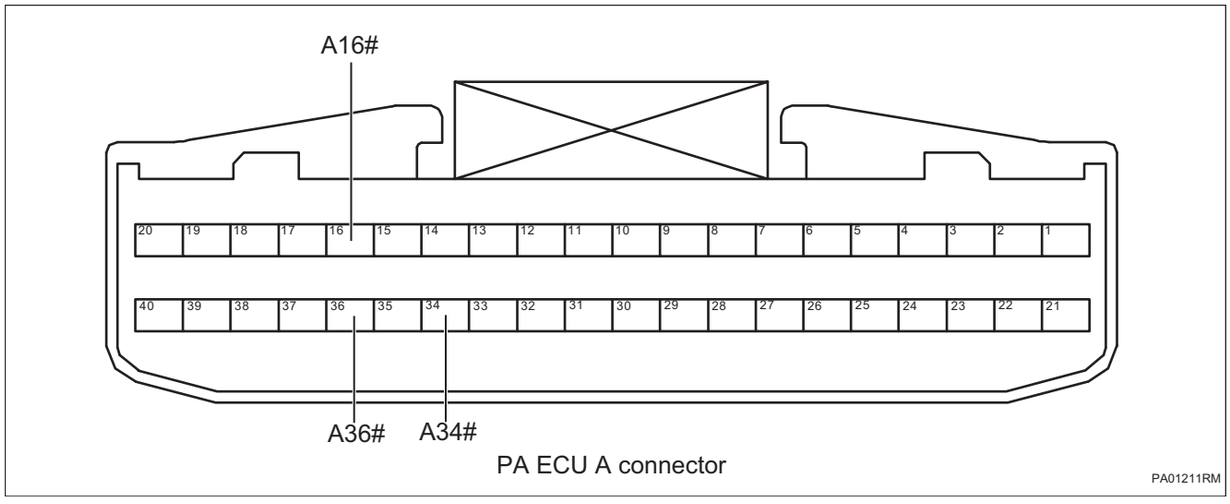
(a) Check whether the left rear middle ultrasonic sensor is dirty.

(b) Check whether the left rear middle ultrasonic sensor is deformed or damaged.

NG	Repair or replace the left rear middle ultrasonic sensor

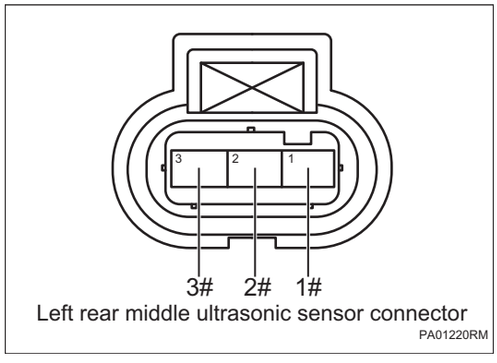
OK

2	**Check left rear middle ultrasonic sensor harness and connector for open circuit**



PA ECU A connector

PA01211RM



Left rear middle ultrasonic sensor connector

PA01220RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PA ECU connector.

(d) Disconnect the left rear middle ultrasonic sensor connector.

(e) Measure the resistance according to the values in the table below.

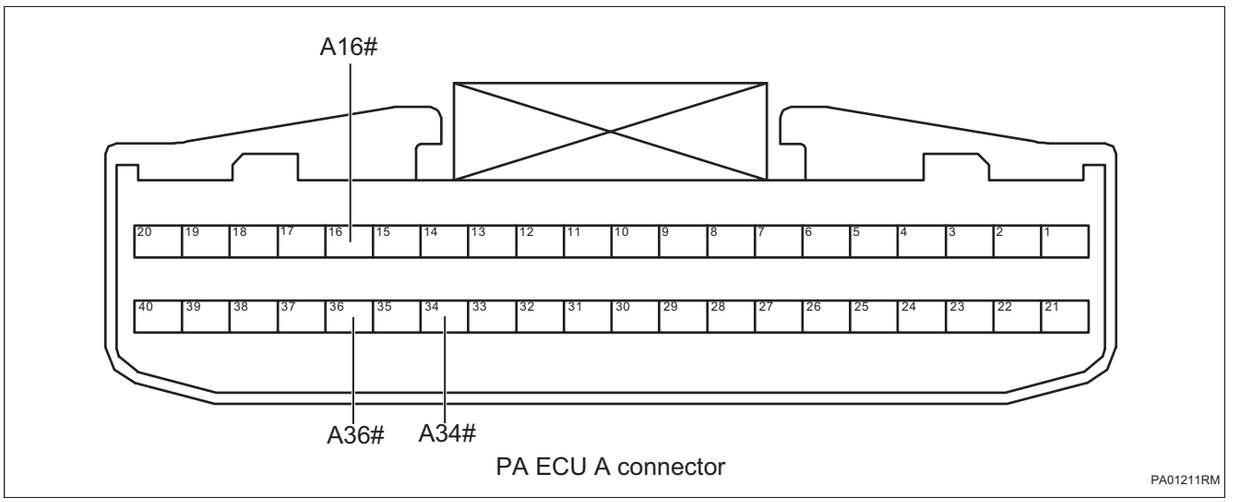
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A36# -left rear middle ultrasonic sensor connector 1#	Always connected	Less than 1Ω
PA ECU connector A34# -left rear middle ultrasonic sensor connector 2#	Always connected	Less than 1Ω
PA ECU connector A16# -left rear middle ultrasonic sensor connector 3#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	**Check left rear middle ultrasonic sensor harness and connector for circuit shorted to ground**



PA ECU A connector
PA01211RM

PA

(a) Measure the resistance according to the values in the table below.

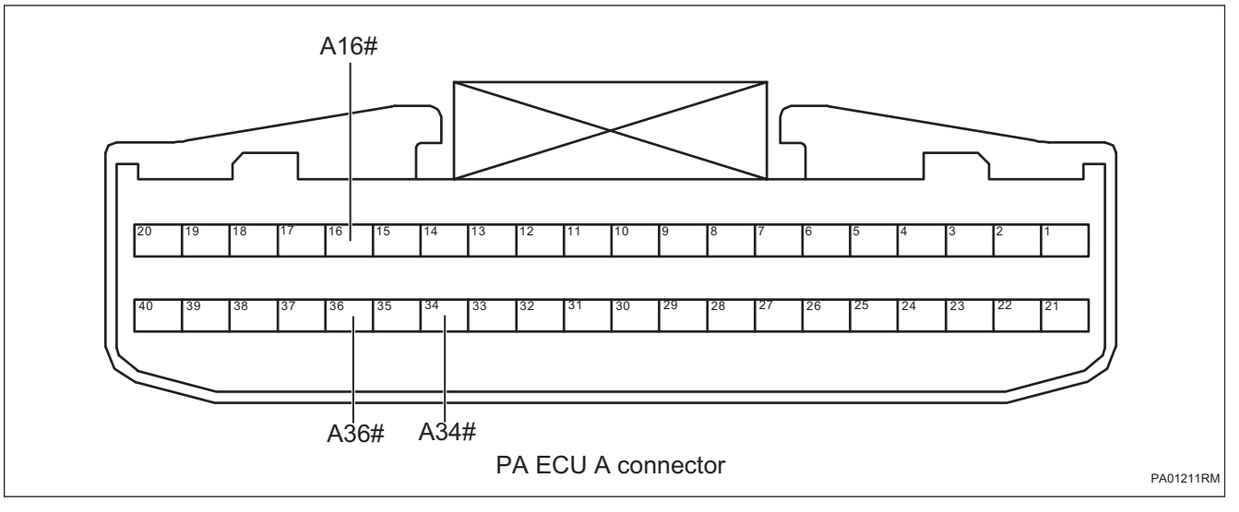
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A36# -body GND	Always connected	10 KΩ or greater
PA ECU connector A34# -body GND	Always connected	10 KΩ or greater
PA ECU connector A16# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check left rear middle ultrasonic sensor harness and connector for circuit shorted to power supply**



PA ECU A connector
PA01211RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A36# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A34# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A16# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the left rear middle ultrasonic sensor (See page PM-59)**

(a) Replace the left rear middle ultrasonic sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace PA ECU (See page PA-79)**

OK

6	**End**

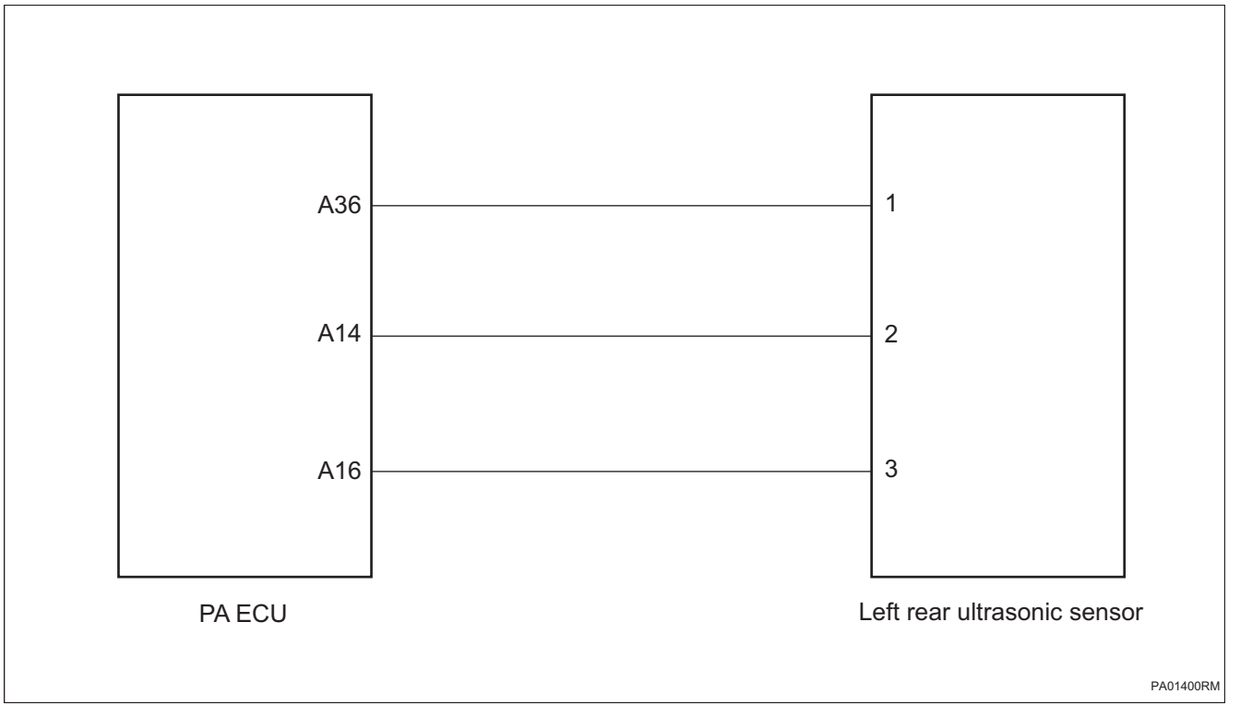
DTC	B1A5002	Left rear outermost ultrasonic sensor probe failure
DTC	B1A5053	Left rear outermost ultrasonic sensor probe failure

Description

When the left rear ultrasonic sensor works abnormally, PA ECU records the DTC.

DTC	DTC detection conditions	Faulty location
B1A5002	(a) Left rear outermost ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Left rear ultrasonic sensor
B1A5053	(a) Left rear outermost ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Left rear ultrasonic sensor

Circuit diagram



Inspection procedure

1	**Check left rear ultrasonic sensor**

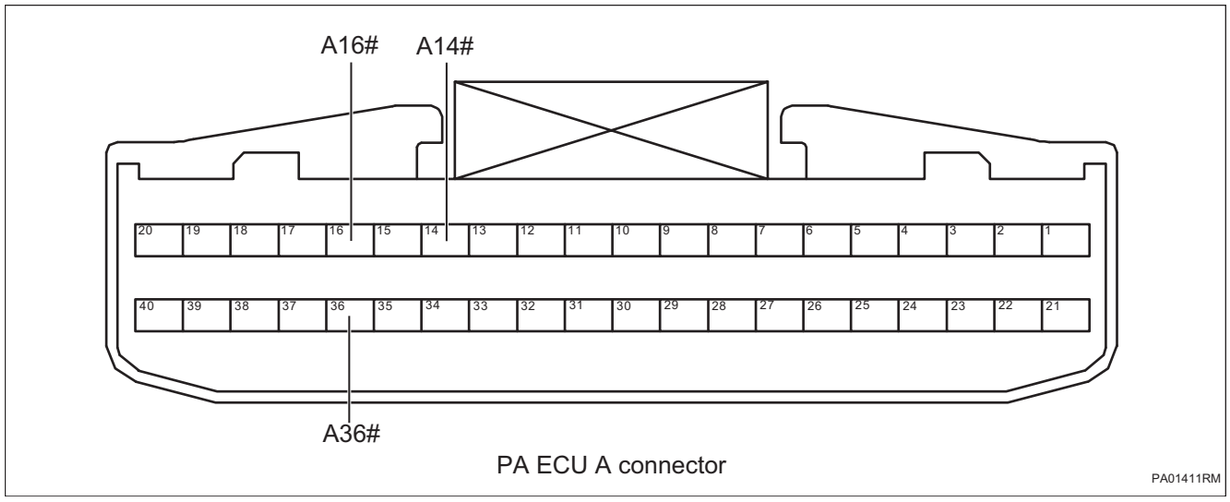
(a) Check whether the left rear ultrasonic sensor is dirty.

(b) Check whether the left rear ultrasonic sensor is deformed or damaged.

NG	**Repair or replace the left rear ultrasonic sensor**

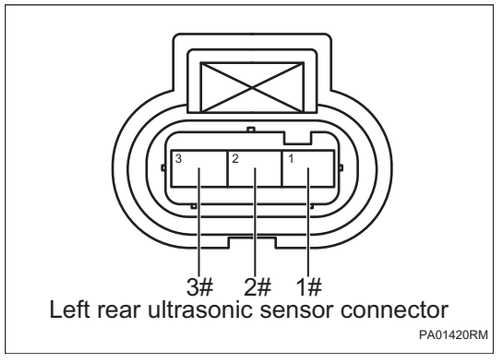
OK

2	**Check left rear ultrasonic sensor harness and connector for open circuit**



PA ECU A connector

PA01411RM



Left rear ultrasonic sensor connector

PA01420RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PA ECU connector.

(d) Disconnect the left rear ultrasonic sensor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

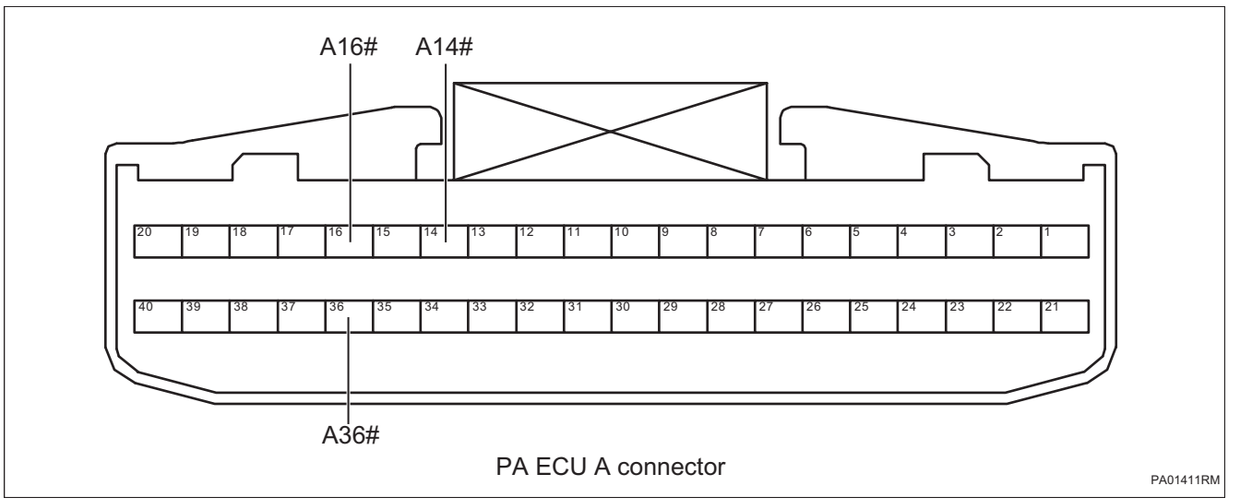
Detector connection	Detection conditions	Specified state
PA ECU connector A36# -left rear ultrasonic sensor connector 1#	Always connected	Less than 1Ω
PA ECU connector A14# -left rear ultrasonic sensor connector 2#	Always connected	Less than 1Ω
PA ECU connector A16# -left rear ultrasonic sensor connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check left rear ultrasonic sensor harness and connector for circuit shorted to ground**

PA



PA

(a) Measure the resistance according to the values in the table below.

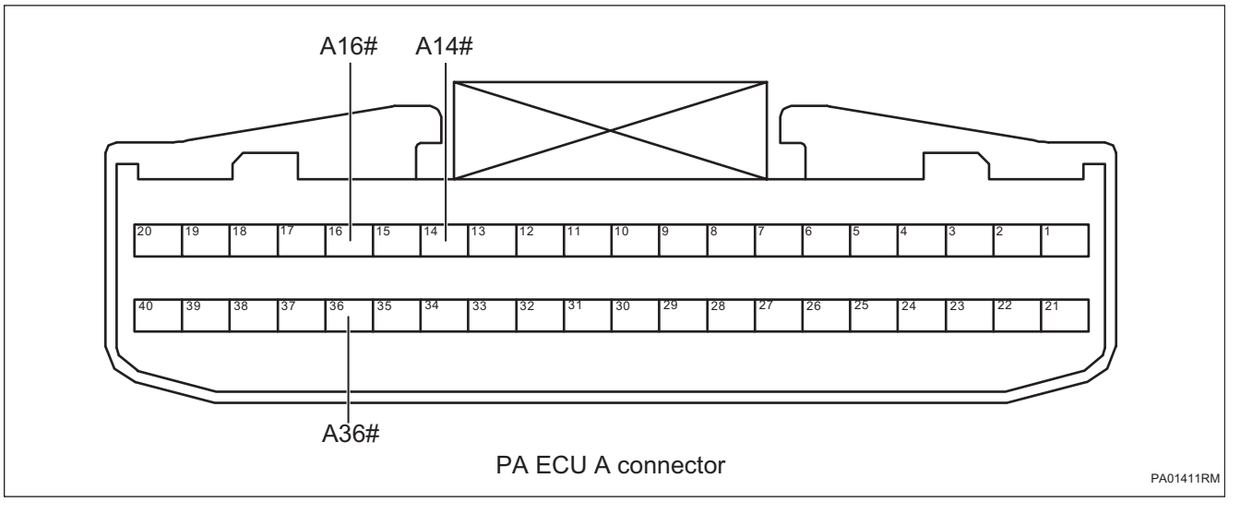
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A36# -body GND	Always connected	14 KΩ or greater
PA ECU connector A14# -body GND	Always connected	14 KΩ or greater
PA ECU connector A16# -body GND	Always connected	14 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check left rear ultrasonic sensor harness and connector for circuit shorted to power supply**



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A36# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A14# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A16# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the left rear ultrasonic sensor (See page PA-79)**

(a) Replace the left rear ultrasonic sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace PA ECU (See page PA-79)**

OK

6	**End**

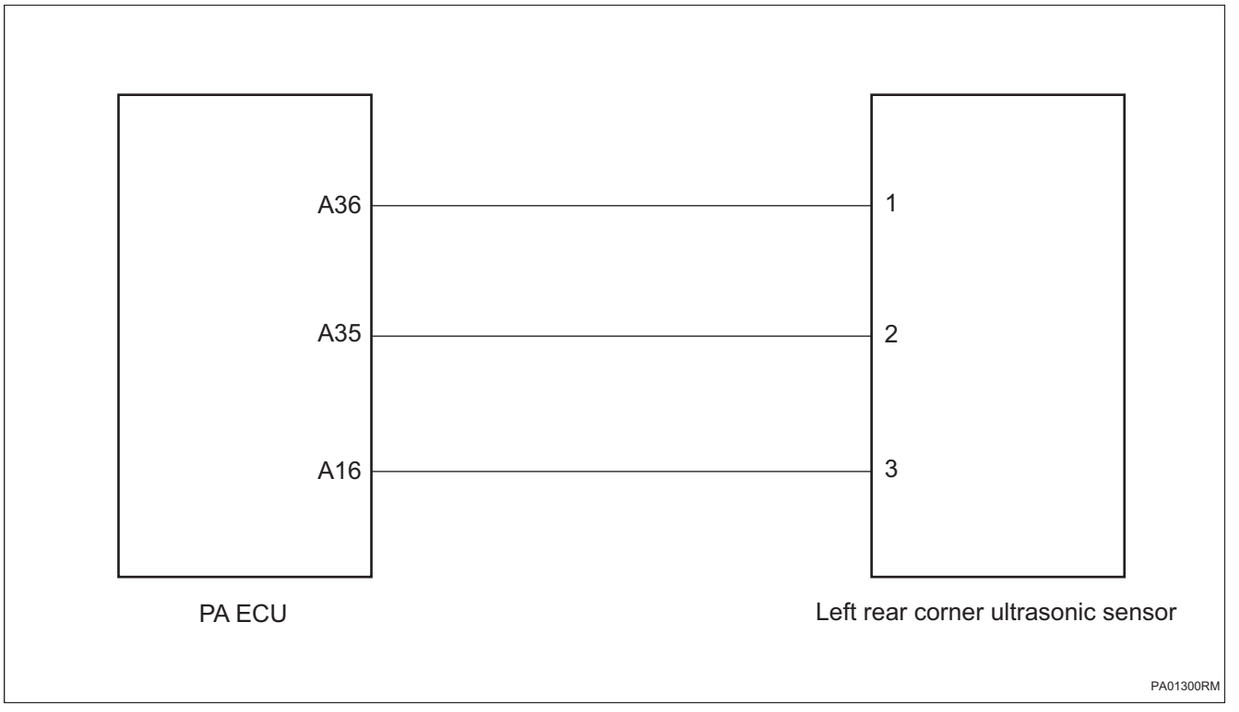
DTC	B1A5102	Left rear side long-range ultrasonic sensor probe failure
DTC	B1A5153	Left rear side long-range ultrasonic sensor probe failure

Description

When the left rear corner ultrasonic sensor works abnormally, PA ECU records the DTC.

DTC	DTC detection conditions	Faulty location
B1A5102	(a) Left rear side long-range ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Left rear corner ultrasonic sensor
B1A5153	(a) Left rear side long-range ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Left rear corner ultrasonic sensor

Circuit diagram



Inspection procedure

1	Check the left rear corner ultrasonic sensor

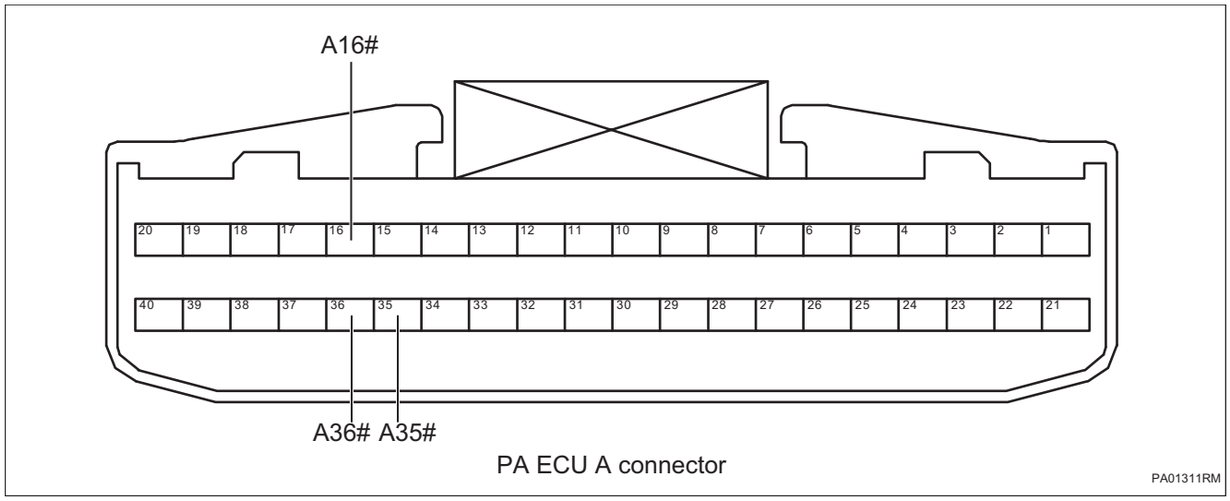
(a) Check whether the left rear corner ultrasonic sensor is dirty.

(b) Check whether the left rear corner ultrasonic sensor is deformed or damaged.

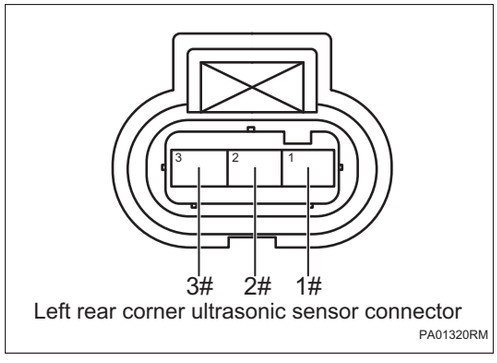
NG → **Repair or replace the left rear corner ultrasonic sensor**

OK

2	**Check left rear corner ultrasonic sensor harness and connector for open circuit**



PA ECU A connector
PA01311RM



Left rear corner ultrasonic sensor connector
PA01320RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PA ECU connector.

(d) Disconnect the left rear corner ultrasonic sensor connector.

(e) Measure the resistance according to the values in the table below.

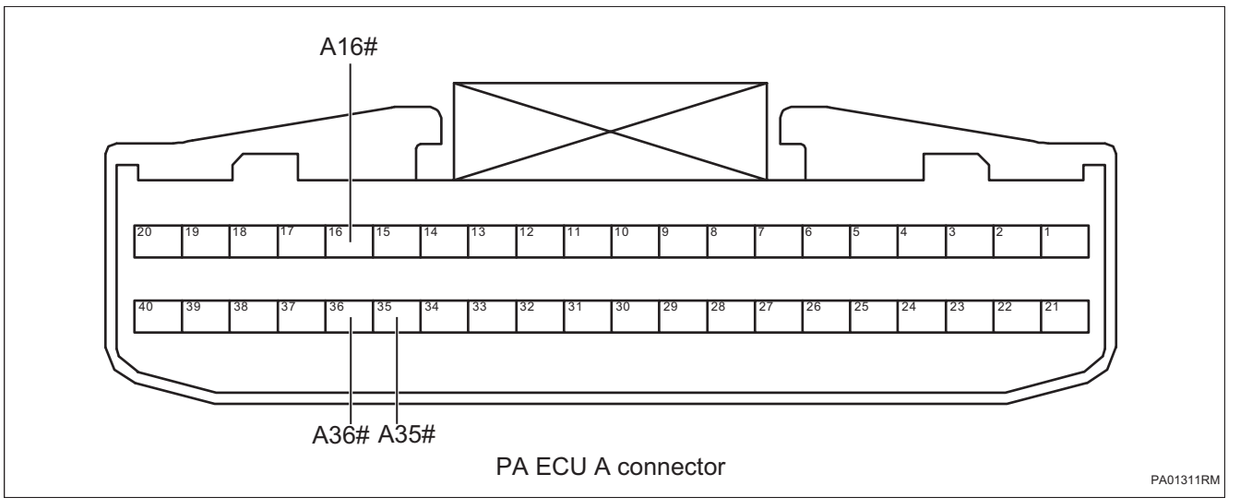
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A36# -left rear corner ultrasonic sensor connector 1#	Always connected	Less than 1Ω
PA ECU connector A35# -left rear corner ultrasonic sensor connector 2#	Always connected	Less than 1Ω
PA ECU connector A16# -left rear corner ultrasonic sensor connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check left rear corner ultrasonic sensor harness and connector for circuit shorted to ground**



PA ECU A connector
PA01311RM

PA

(a) Measure the resistance according to the values in the table below.

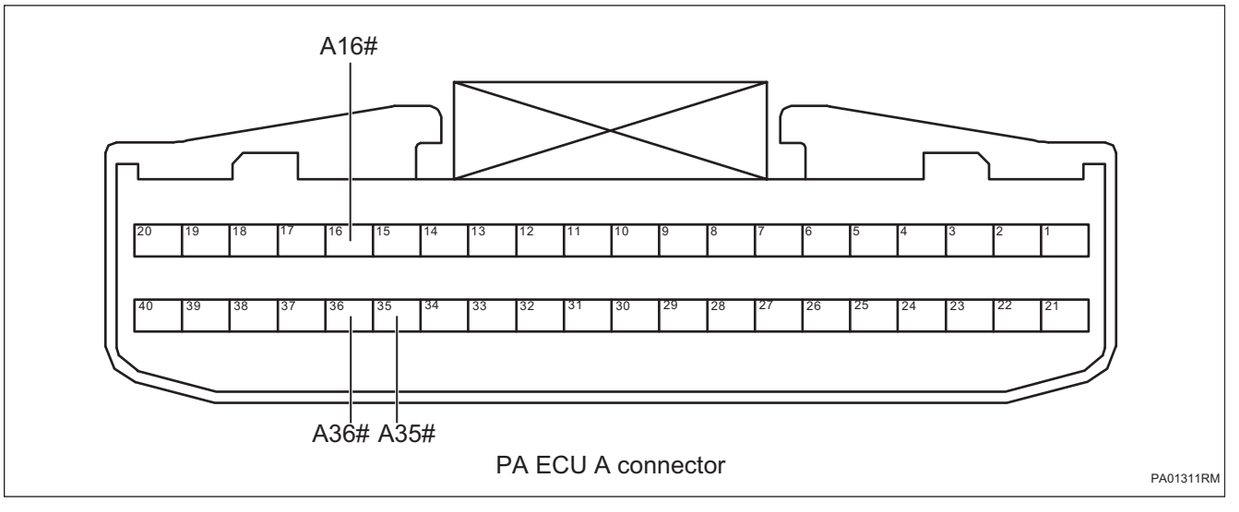
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A36# -body GND	Always connected	10 KΩ or greater
PA ECU connector A35# -body GND	Always connected	10 KΩ or greater
PA ECU connector A16# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check left rear corner ultrasonic sensor harness and connector for circuit shorted to power supply**



PA ECU A connector
PA01311RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A36# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A35# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A16# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the left rear corner ultrasonic sensor (See page PM-59)**

(a) Replace the left rear corner ultrasonic sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace PA ECU (See page PA-79)**

OK

6	**End**

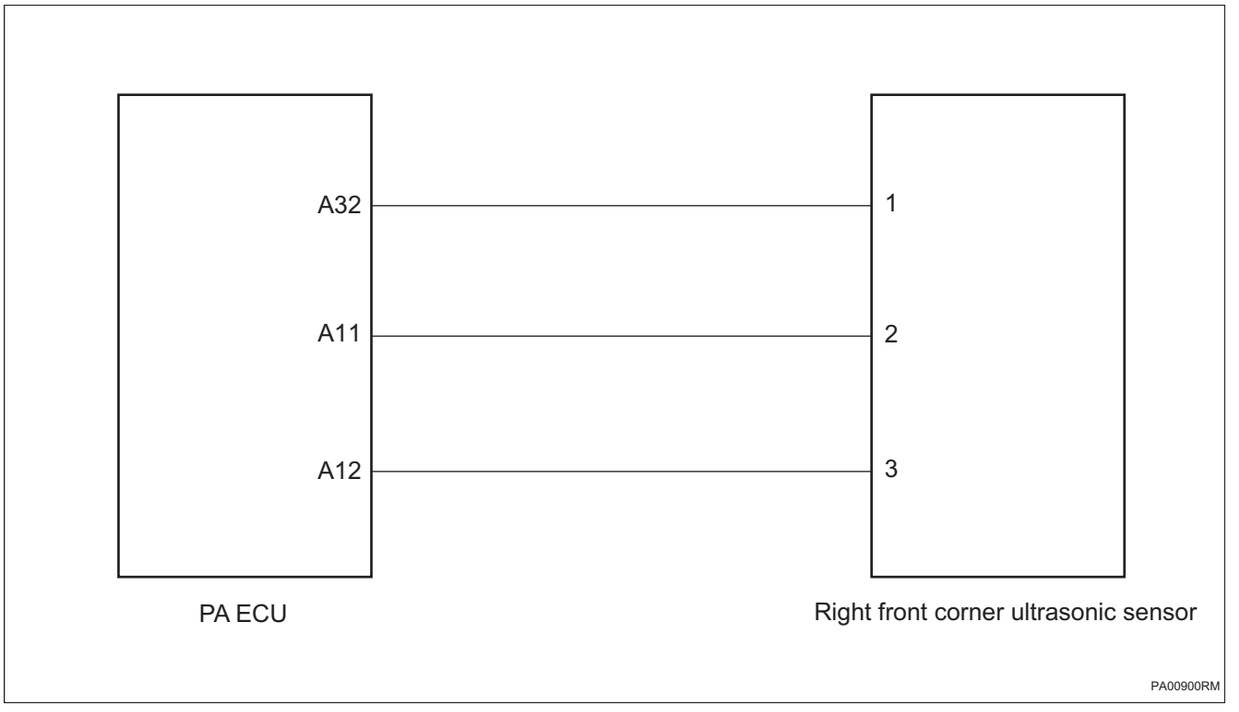
DTC	B1A5202	Right front side long-range ultrasonic sensor probe failure
DTC	B1A5253	Right front side long-range ultrasonic sensor probe failure

Description

When the right front corner ultrasonic sensor works abnormally, PA ECU records the DTC.

DTC	DTC detection conditions	Faulty location
B1A5202	(a) Right front side long-range ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Right front corner ultrasonic sensor
B1A5253	(a) Right front side long-range ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Right front corner ultrasonic sensor

Circuit diagram



Inspection procedure

1	Check the right front corner ultrasonic sensor

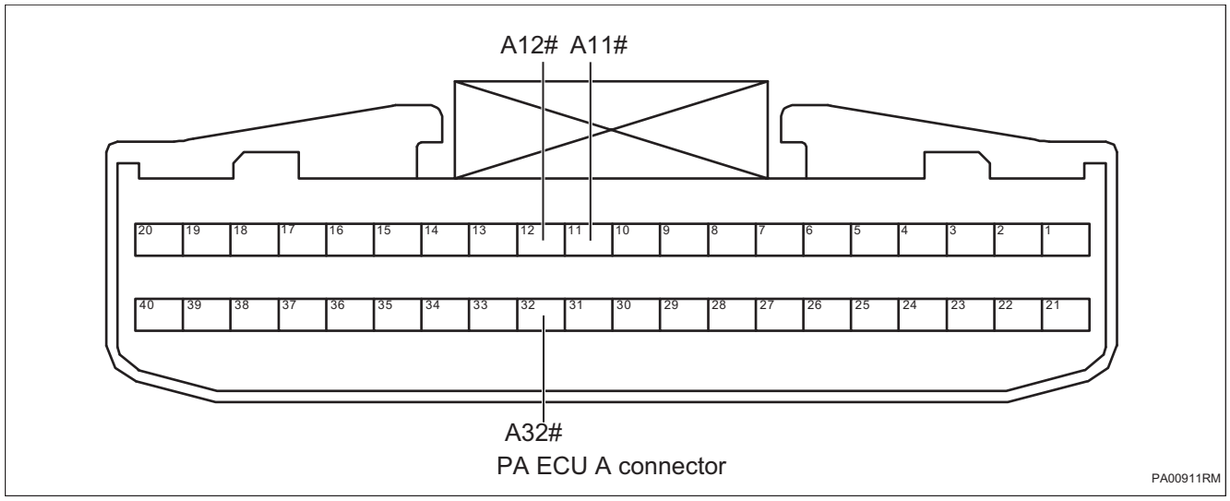
(a) Check whether the right front corner ultrasonic sensor is dirty.

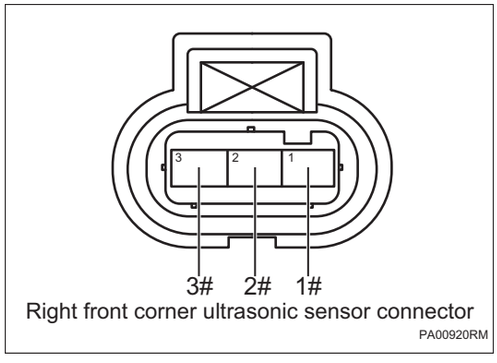
(b) Check whether the right front corner ultrasonic sensor is deformed or damaged.

NG → **Repair or replace the right front corner ultrasonic sensor**

OK

2	**Check right front corner ultrasonic sensor harness and connector for open circuit**





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PA ECU connector.

(d) Disconnect the right front corner ultrasonic sensor connector.

(e) Measure the resistance according to the values in the table below.

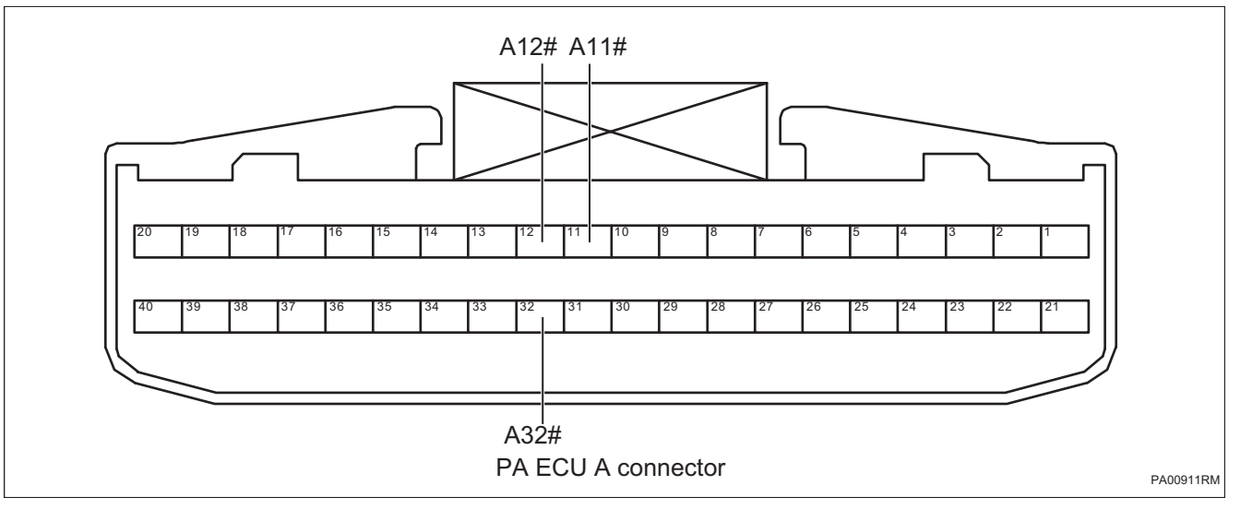
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A32# -right front corner ultrasonic sensor connector 1#	Always connected	Less than 1Ω
PA ECU connector A11# -right front corner ultrasonic sensor connector 2#	Always connected	Less than 1Ω
PA ECU connector A12# -right front corner ultrasonic sensor connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check right front corner ultrasonic sensor harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

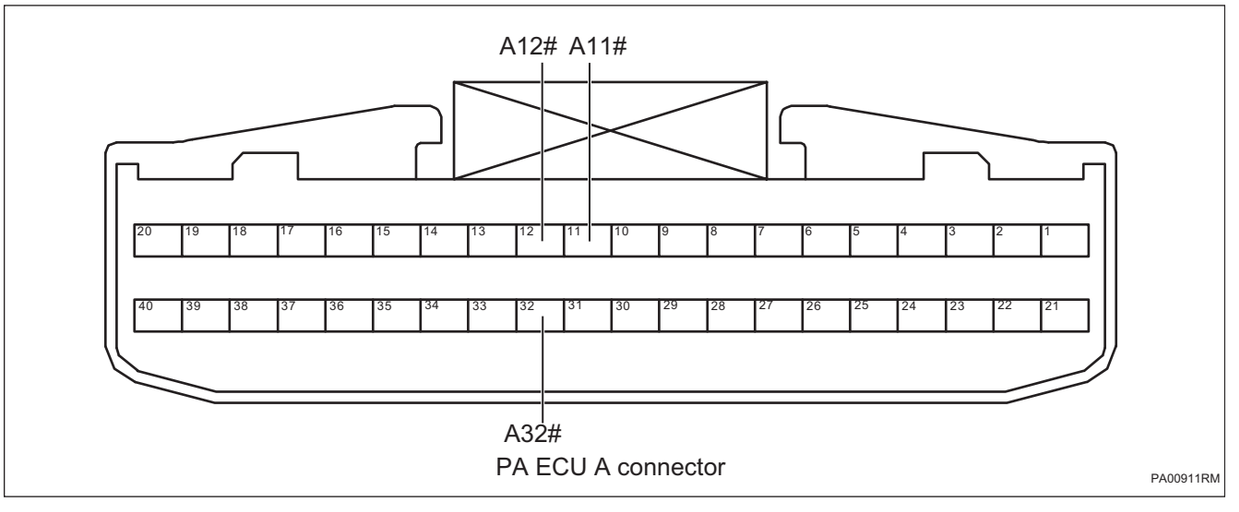
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A32# -body GND	Always connected	10 KΩ or greater
PA ECU connector A11# -body GND	Always connected	10 KΩ or greater
PA ECU connector A12# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check right front corner ultrasonic sensor harness and connector for circuit shorted to power supply**



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A32# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A11# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A12# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the right front corner ultrasonic sensor (See page PM-59)**

(a) Replace the right front corner ultrasonic sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace PA ECU (See page PA-79)**

OK

6	**End**

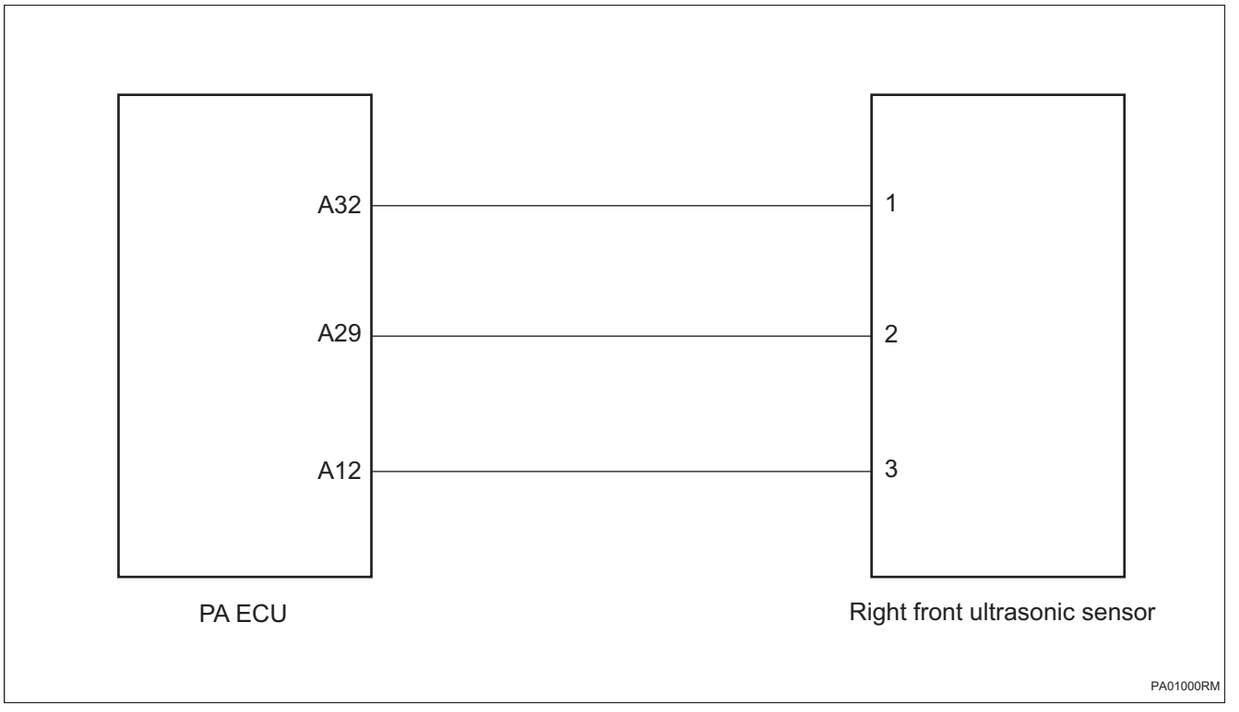
DTC	B1A5302	Right front outermost ultrasonic sensor probe failure
DTC	B1A5353	Right front outermost ultrasonic sensor probe failure

Description

When the right front ultrasonic sensor works abnormally, PA ECU records the DTC.

DTC	DTC detection conditions	Faulty location
B1A5302	(a) Right front outermost ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Right front ultrasonic sensor
B1A5353	(a) Right front outermost ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Right front ultrasonic sensor

Circuit diagram



Inspection procedure

1	Check right front ultrasonic sensor

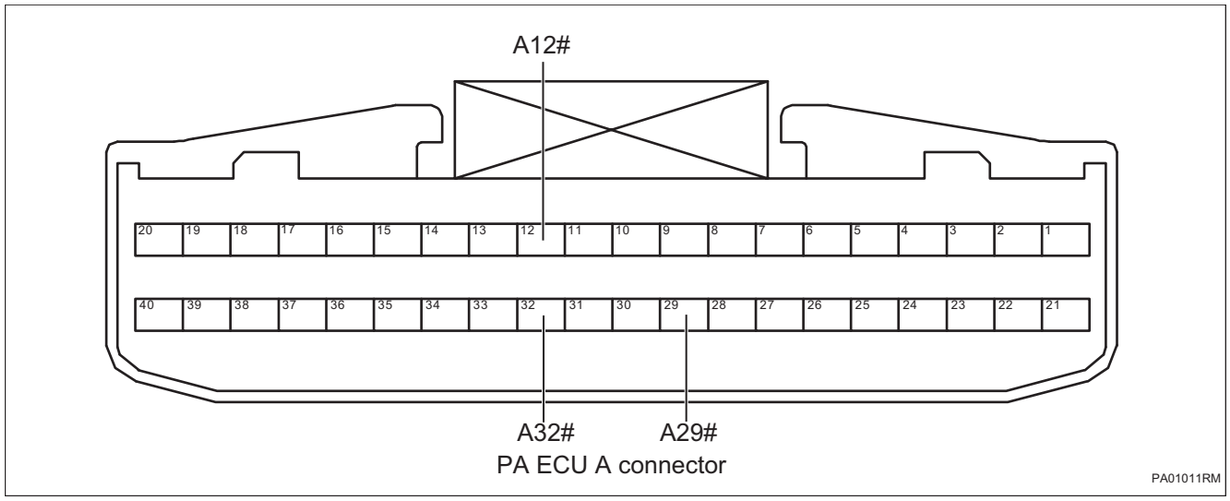
(a) Check whether the right front ultrasonic sensor is dirty.

(b) Check whether the right front ultrasonic sensor is deformed or damaged.

NG → **Repair or replace the right front ultrasonic sensor**

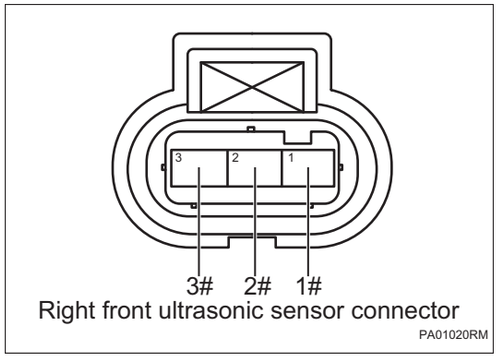
OK

2	**Check right front ultrasonic sensor harness and connector for open circuit**



PA ECU A connector

PA01011RM



Right front ultrasonic sensor connector

PA01020RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PA ECU connector.

(d) Disconnect the right front ultrasonic sensor connector.

(e) Measure the resistance according to the values in the table below.

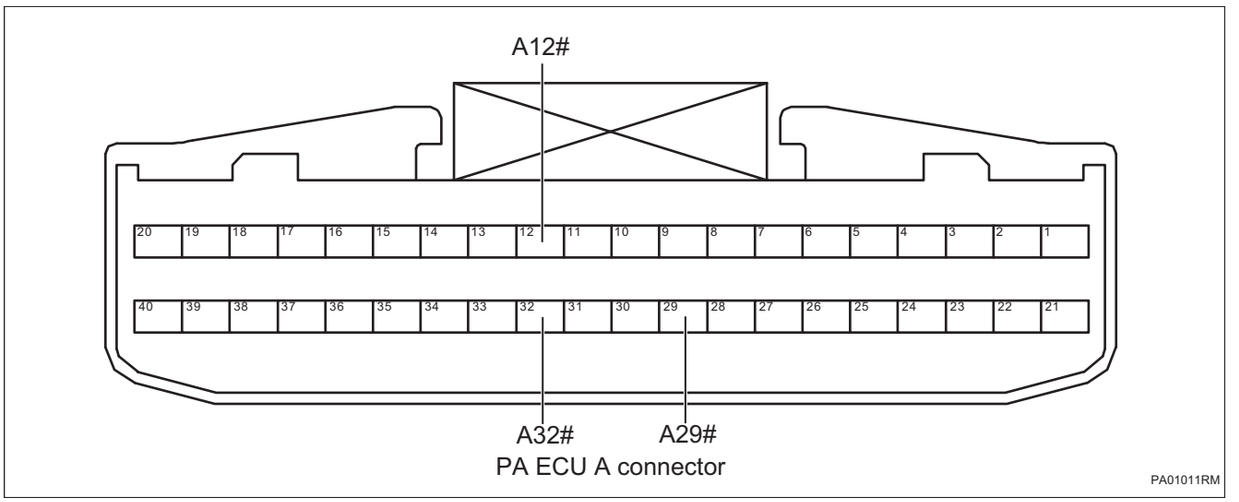
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A32# -right front ultrasonic sensor connector 1#	Always connected	Less than 1Ω
PA ECU connector A29# -right front ultrasonic sensor connector 2#	Always connected	Less than 1Ω
PA ECU connector A12# -right front ultrasonic sensor connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check right front ultrasonic sensor harness and connector for circuit shorted to ground**



(a) Measure the resistance according to the values in the table below.

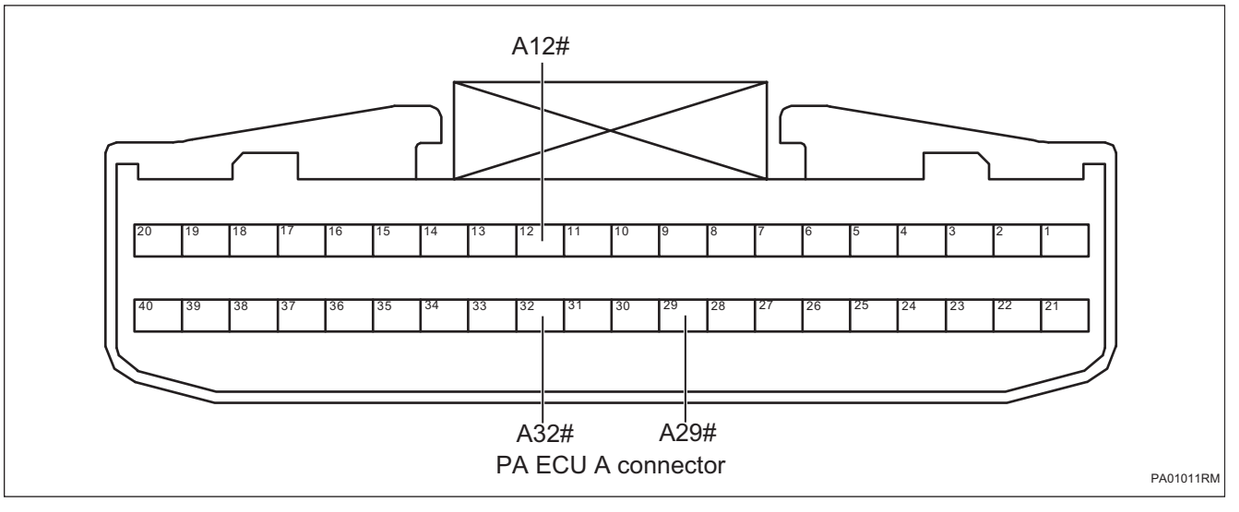
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A32# -body GND	Always connected	10 KΩ or greater
PA ECU connector A29# -body GND	Always connected	10 KΩ or greater
PA ECU connector A12# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check right front ultrasonic sensor harness and connector for circuit shorted to power supply**



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A32# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A29# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A12# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the right front ultrasonic sensor (See page PM-59)**

(a) Replace the right front ultrasonic sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace PA ECU (See page PA-79)**

OK

6	**End**

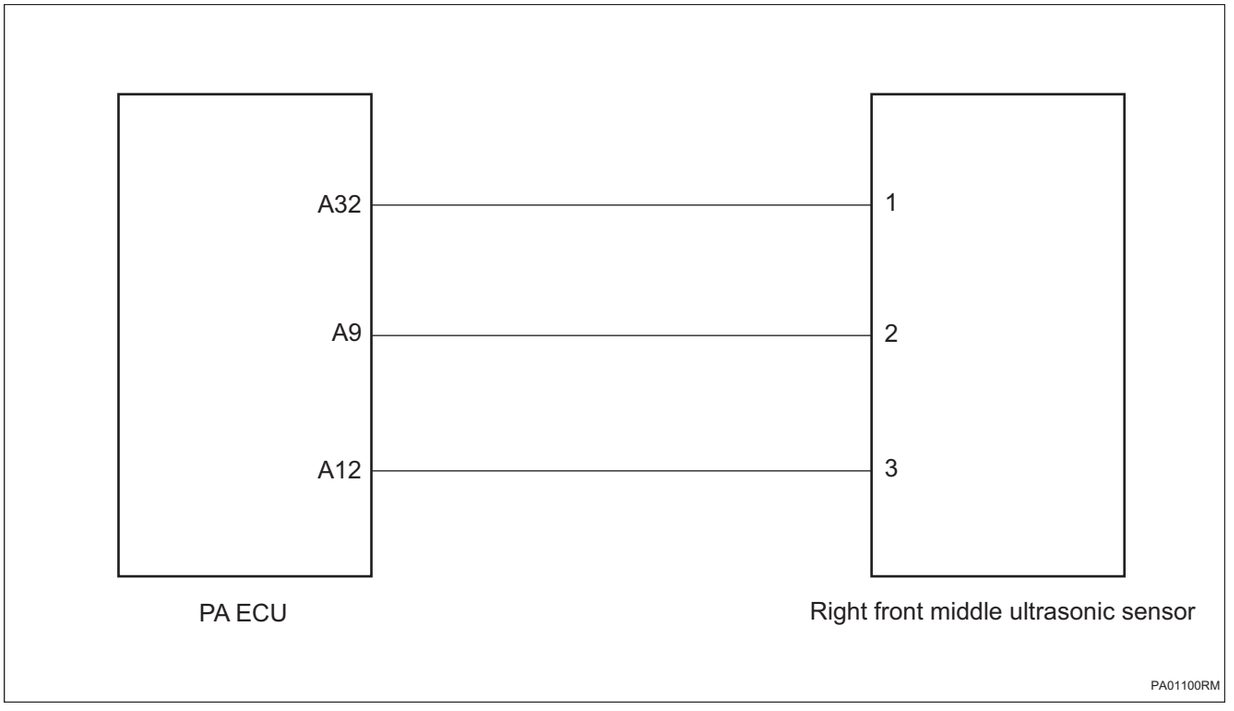
DTC	B1A5402	Right front ultrasonic sensor probe failure
DTC	B1A5453	Right front ultrasonic sensor probe failure

Description

When the right front middle ultrasonic sensor works abnormally, PA ECU records the DTC.

DTC	DTC detection conditions	Faulty location
B1A5402	(a) Right front ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Right front middle ultrasonic sensor
B1A5453	(a) Right front ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Right front middle ultrasonic sensor

Circuit diagram



Inspection procedure

1	Check the right front middle ultrasonic sensor

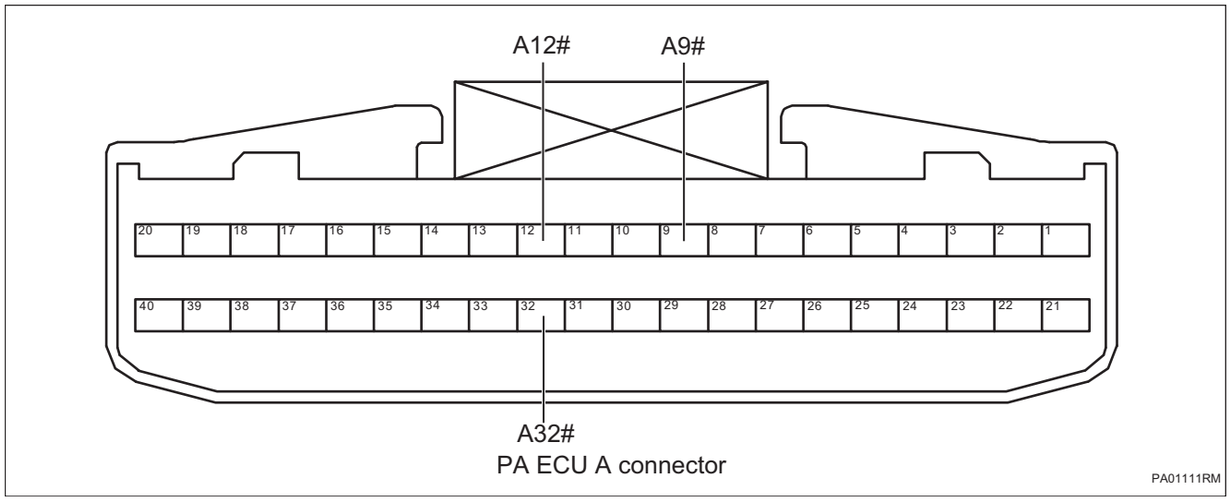
(a) Check whether the right front middle ultrasonic sensor is dirty.

(b) Check whether the right front middle ultrasonic sensor is deformed or damaged.

NG	Repair or replace the right front middle ultrasonic sensor

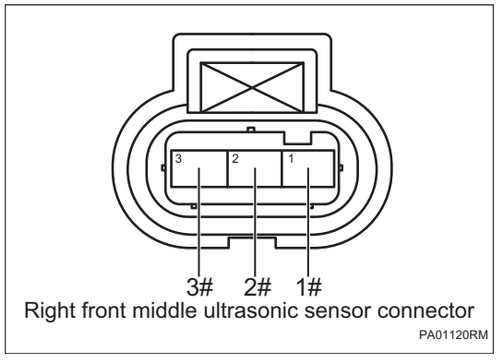
OK

2	**Check right front middle ultrasonic sensor harness and connector for open circuit**



PA ECU A connector

PA01111RM



Right front middle ultrasonic sensor connector

PA01120RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PA ECU connector.

(d) Disconnect the right front middle ultrasonic sensor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

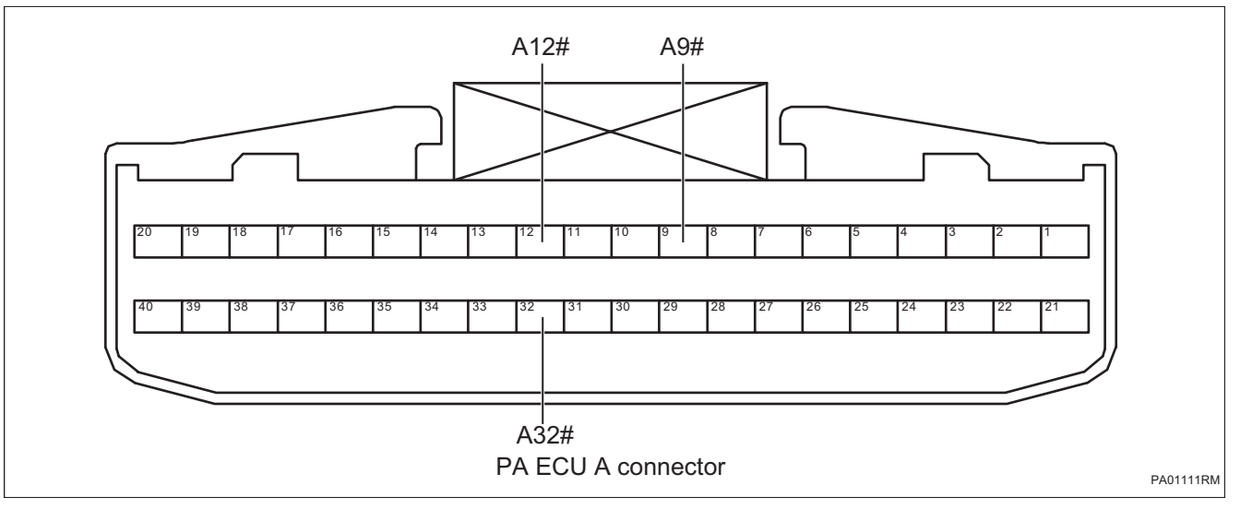
Detector connection	Detection conditions	Specified state
PA ECU connector A32# -right front middle ultrasonic sensor connector 1#	Always connected	Less than 1Ω
PA ECU connector A9# -right front middle ultrasonic sensor connector 2#	Always connected	Less than 1Ω
PA ECU connector A12# -right front middle ultrasonic sensor connector 3#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	**Check right front middle ultrasonic sensor harness and connector for circuit shorted to ground**

PA



(a) Measure the resistance according to the values in the table below.

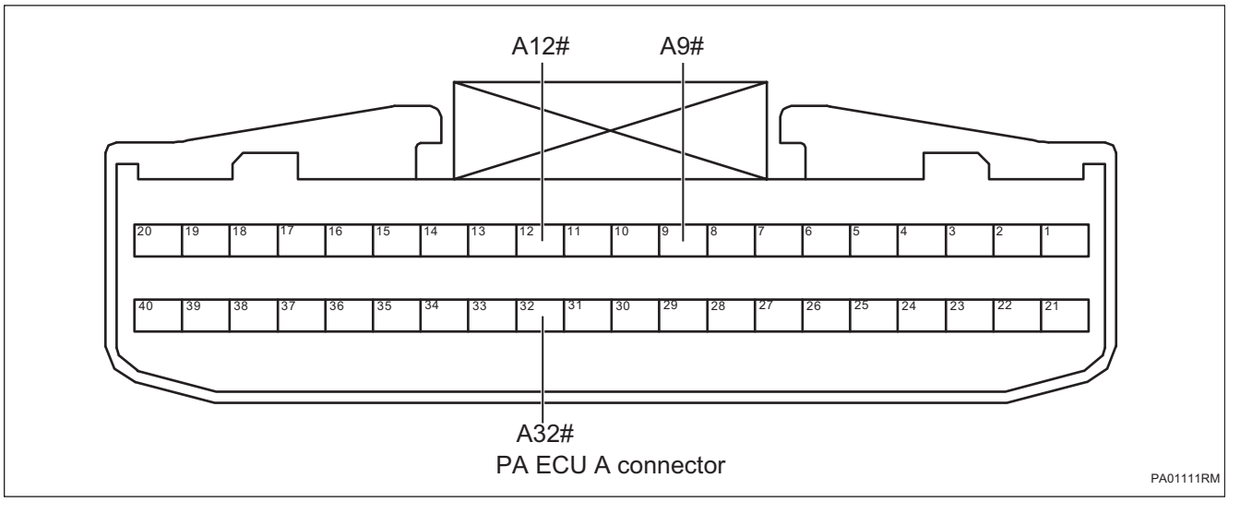
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A32# -body GND	Always connected	10 KΩ or greater
PA ECU connector A9# -body GND	Always connected	10 KΩ or greater
PA ECU connector A12# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check right front middle ultrasonic sensor harness and connector for circuit shorted to power supply**



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A32# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A9# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A12# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the right front middle ultrasonic sensor (See page PM-59)**

(a) Replace the right front middle ultrasonic sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace PA ECU (See page PA-79)**

OK

6	**End**

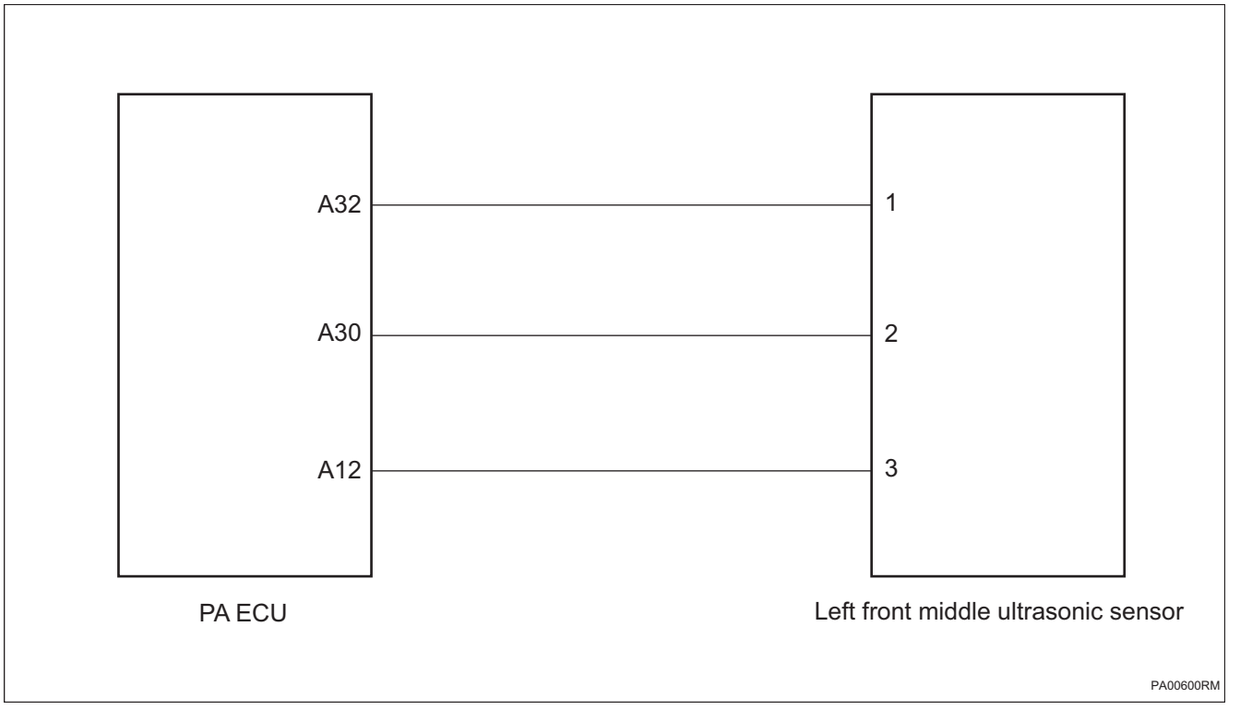
DTC	B1A5502	Left front ultrasonic sensor probe failure
DTC	B1A5553	Left front ultrasonic sensor probe failure

Description

When the left front middle ultrasonic sensor works abnormally, PA ECU records the DTC.

DTC	DTC detection conditions	Faulty location
B1A5502	(a) Left front ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Left front middle ultrasonic sensor
B1A5553	(a) Left front ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Left front middle ultrasonic sensor

Circuit diagram



Inspection procedure

1	Check left front middle ultrasonic sensor

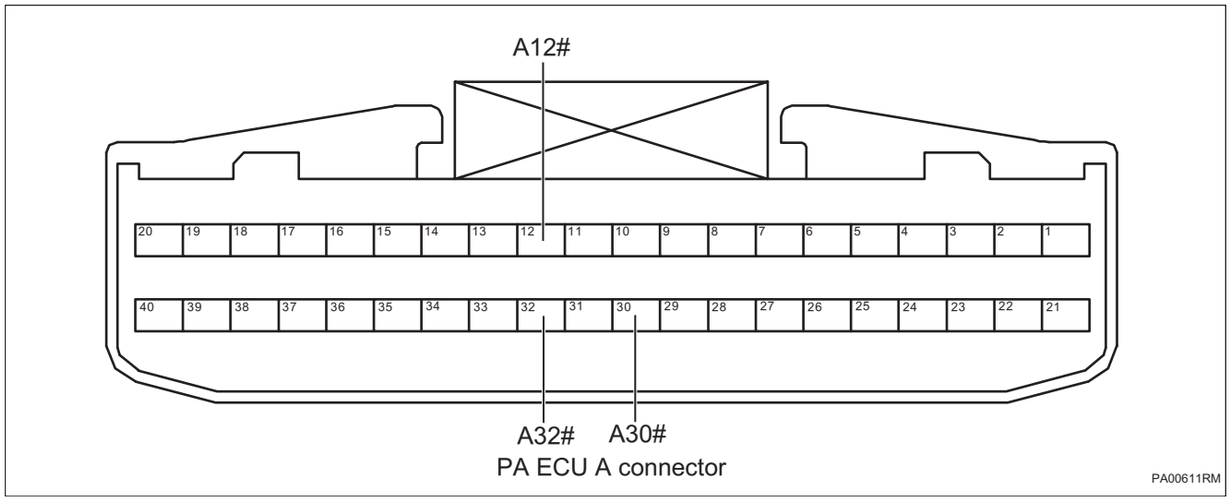
(a) Check whether the left front middle ultrasonic sensor is dirty.

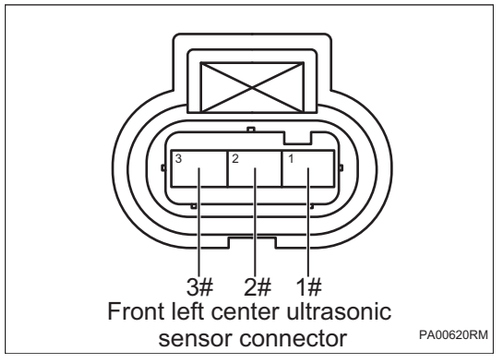
(b) Check whether the left front middle ultrasonic sensor is deformed or damaged.

NG → **Repair or replace the left front middle ultrasonic sensor**

OK

2	**Check left front middle ultrasonic sensor harness and connector for open circuit**





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PA ECU connector.

(d) Disconnect the left front middle ultrasonic sensor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

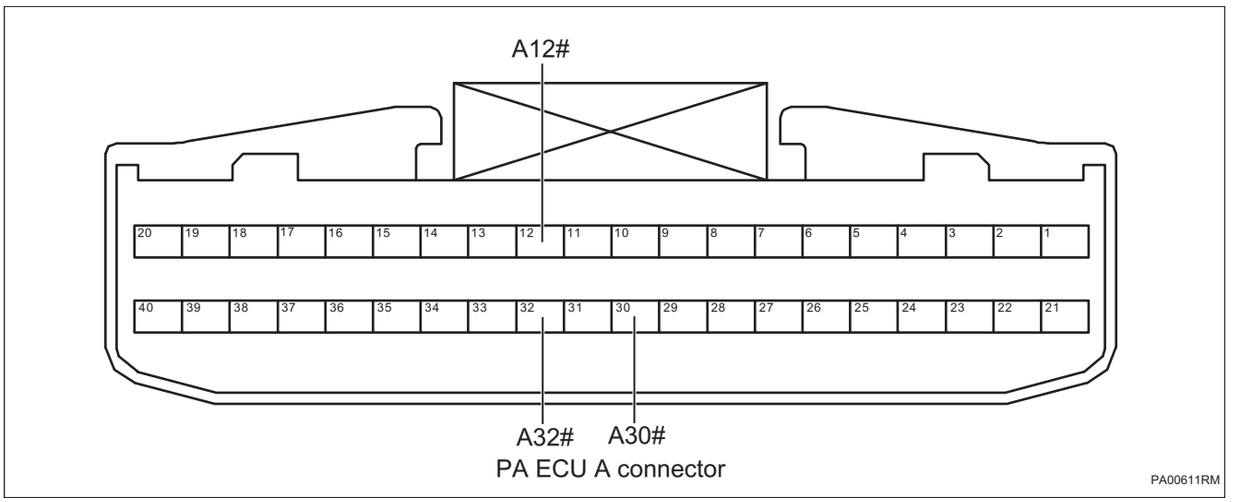
Detector connection	Detection conditions	Specified state
PA ECU connector A32# -left front middle ultrasonic sensor connector 1#	Always connected	Less than 1Ω
PA ECU connector A30# -left front middle ultrasonic sensor connector 2#	Always connected	Less than 1Ω
PA ECU connector A12# -left front middle ultrasonic sensor connector 3#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	**Check left front middle ultrasonic sensor harness and connector for circuit shorted to ground**

PA



(a) Measure the resistance according to the values in the table below.

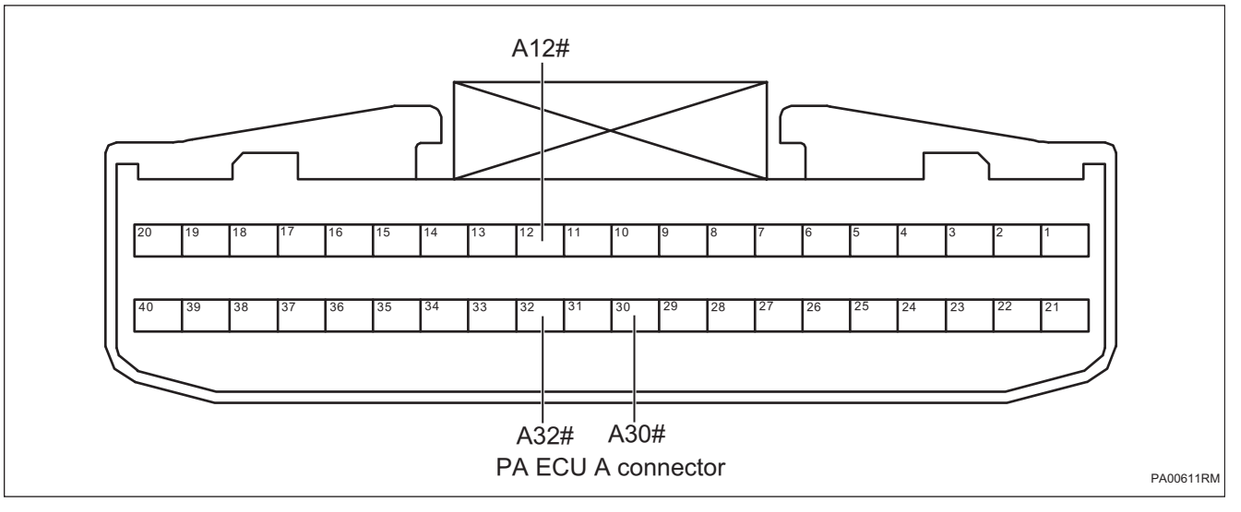
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A32# -body GND	Always connected	10 KΩ or greater
PA ECU connector A30# -body GND	Always connected	10 KΩ or greater
PA ECU connector A12# -body GND	Always connected	10 KΩ or greater

NG **Repair or replace the harness and connector**

OK

4	**Check left front middle ultrasonic sensor harness and connector for circuit shorted to power supply**



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A32# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A30# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A12# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the left front middle ultrasonic sensor (See page PM-59)**

(a) Replace the left front middle ultrasonic sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace PA ECU (See page PA-79)**

OK

6	**End**

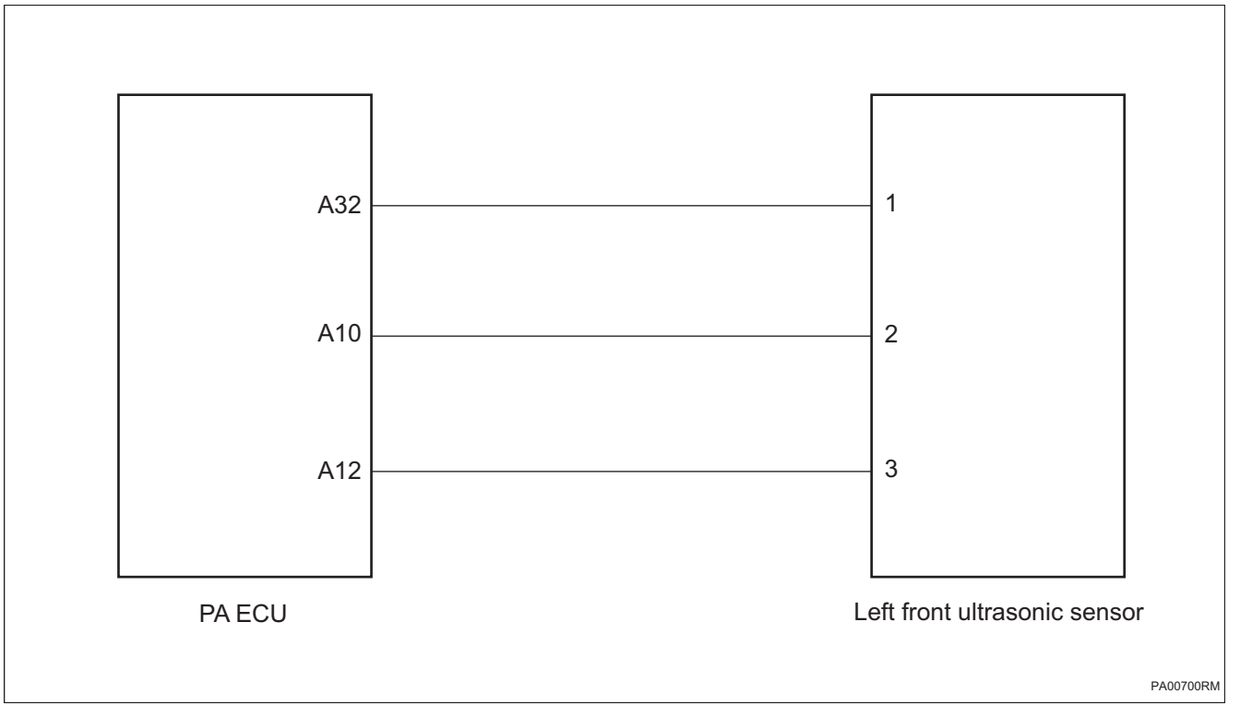
DTC	B1A5602	Left front outermost ultrasonic sensor probe failure
DTC	B1A5653	Left front outermost ultrasonic sensor probe failure

Description

When the left front ultrasonic sensor works abnormally, PA ECU records the DTC.

DTC	DTC detection conditions	Faulty location
B1A5602	(a) Left front outermost ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Left front ultrasonic sensor
B1A5653	(a) Left front outermost ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Left front ultrasonic sensor

Circuit diagram



Inspection procedure

1	Check left front ultrasonic sensor

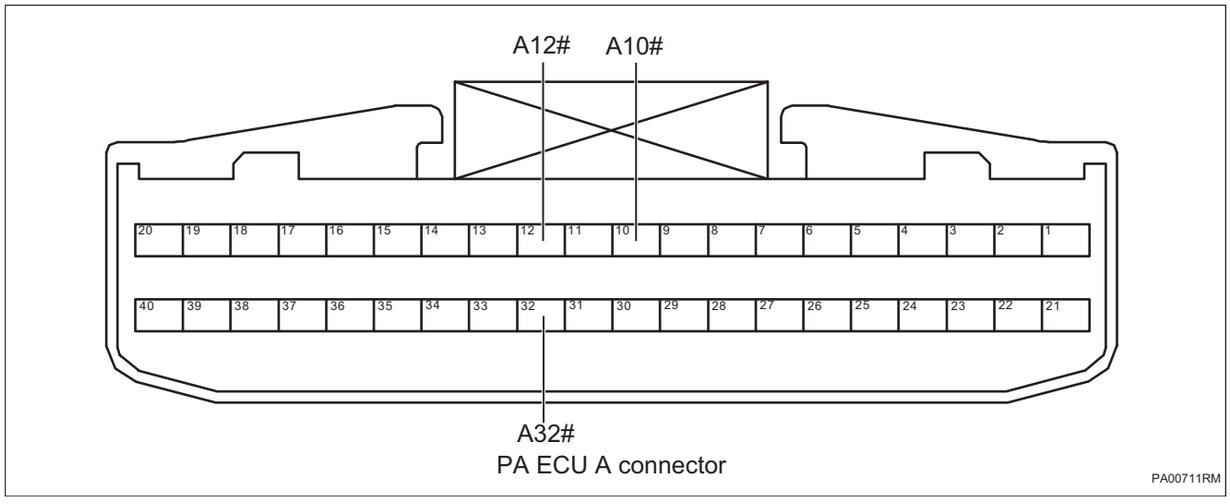
(a) Check whether the left front ultrasonic sensor is dirty.

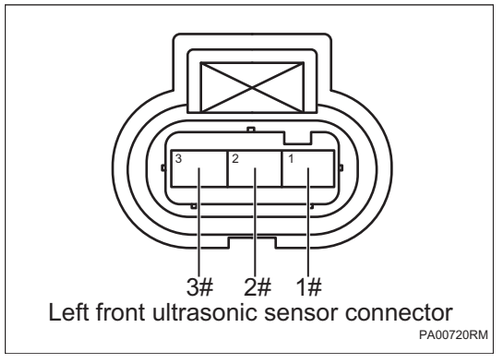
(b) Check whether the left front ultrasonic sensor is deformed or damaged.

NG	Repair or replace the left front ultrasonic sensor

OK

2	**Check the left front ultrasonic sensor harness and connector for open circuit**





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PA ECU connector.

(d) Disconnect the left front ultrasonic sensor connector.

(e) Measure the resistance according to the values in the table below.

Standard value

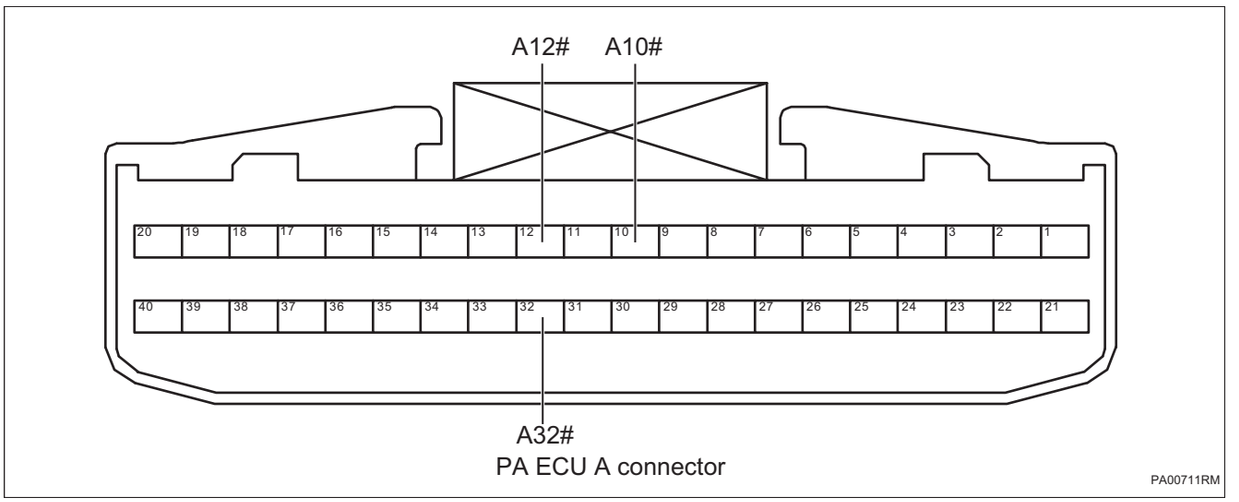
Detector connection	Detection conditions	Specified state
PA ECU connector A32# -left front ultrasonic sensor connector 1#	Always connected	Less than 1Ω
PA ECU connector A10# -left front ultrasonic sensor connector 2#	Always connected	Less than 1Ω
PA ECU connector A12# -left front ultrasonic sensor connector 3#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	**Check left front ultrasonic sensor harness and connector for circuit shorted to ground**

PA



(a) Measure the resistance according to the values in the table below.

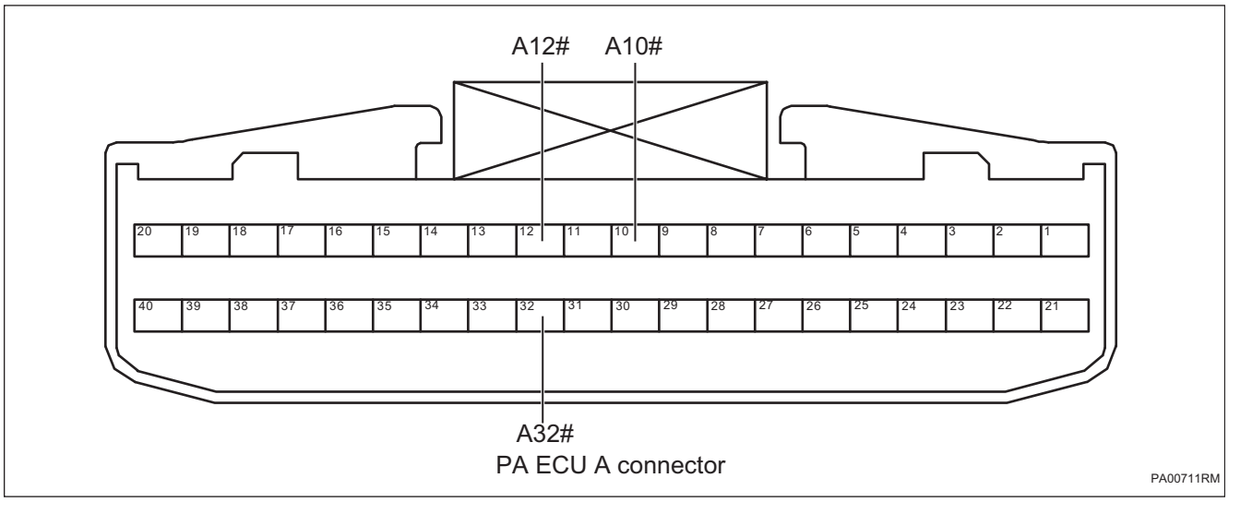
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A32# -body GND	Always connected	10 KΩ or greater
PA ECU connector A10# -body GND	Always connected	10 KΩ or greater
PA ECU connector A12# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check left front ultrasonic sensor harness and connector for circuit shorted to power supply**



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A32# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A10# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A12# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the left front ultrasonic sensor (See page PM-59)**

(a) Replace the left front ultrasonic sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace PA ECU (See page PA-79)**

OK

6	**End**

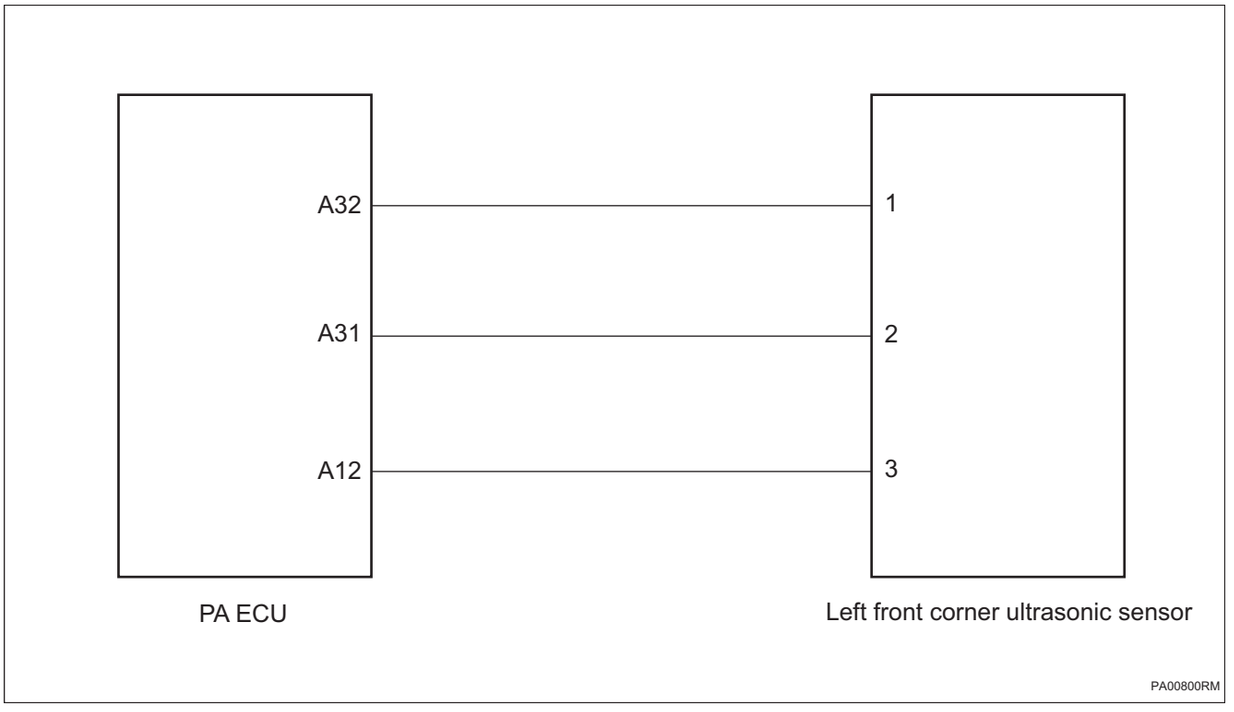
DTC	B1A5702	Left front side long-range ultrasonic sensor probe failure
DTC	B1A5753	Left front side long-range ultrasonic sensor probe failure

Description

When the left front corner ultrasonic sensor works abnormally, PA ECU records the DTC.

DTC	DTC detection conditions	Faulty location
B1A5702	(a) Left front side long-range ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Left front corner ultrasonic sensor
B1A5753	(a) Left front side long-range ultrasonic sensor probe failure.	• PA ECU • Harness and connector • Left front corner ultrasonic sensor

Circuit diagram



Inspection procedure

1	Check the left front corner ultrasonic sensor

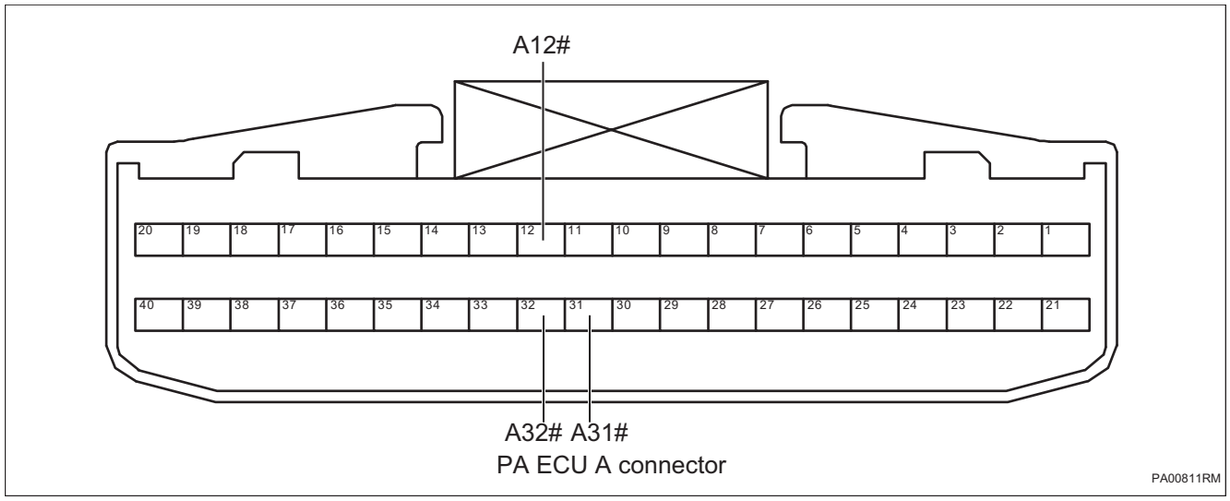
(a) Check whether the left front corner ultrasonic sensor is dirty.

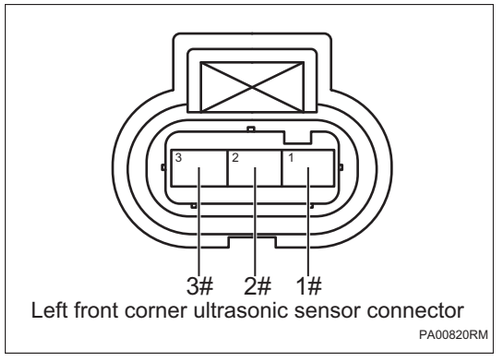
(b) Check whether the left front corner ultrasonic sensor is deformed or damaged.

NG → **Repair or replace the left front corner ultrasonic sensor**

OK

2	**Check the left front corner ultrasonic sensor harness and connector for open circuit**





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the PA ECU connector.

(d) Disconnect the left front corner ultrasonic sensor connector.

(e) Measure the resistance according to the values in the table below.

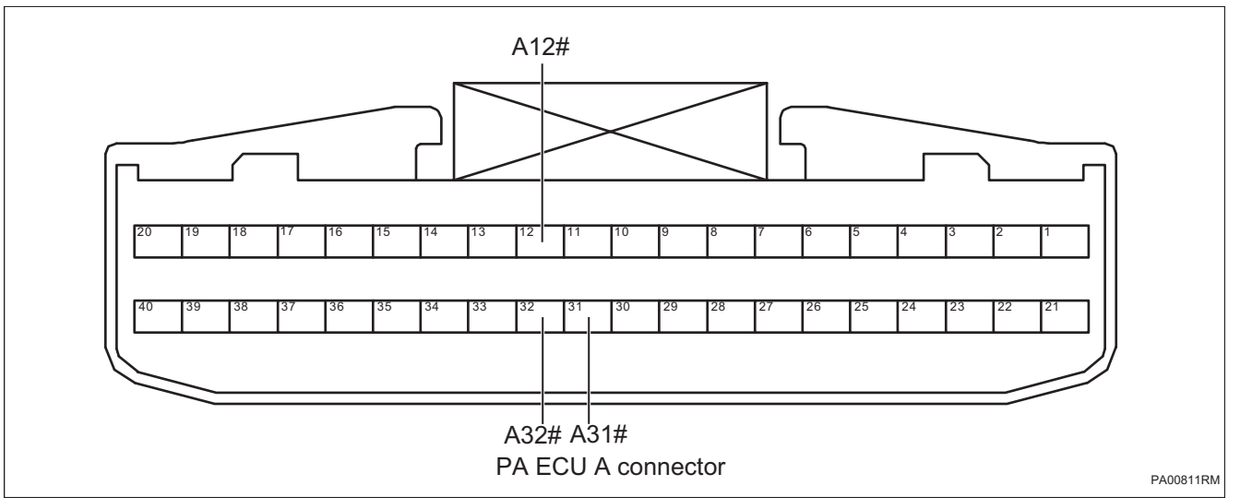
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A32# -left front corner ultrasonic sensor connector 1#	Always connected	Less than 1Ω
PA ECU connector A31# -left front corner ultrasonic sensor connector 2#	Always connected	Less than 1Ω
PA ECU connector A12# -left front corner ultrasonic sensor connector 3#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check left front corner ultrasonic sensor harness and connector for circuit shorted to ground**



PA

(a) Measure the resistance according to the values in the table below.

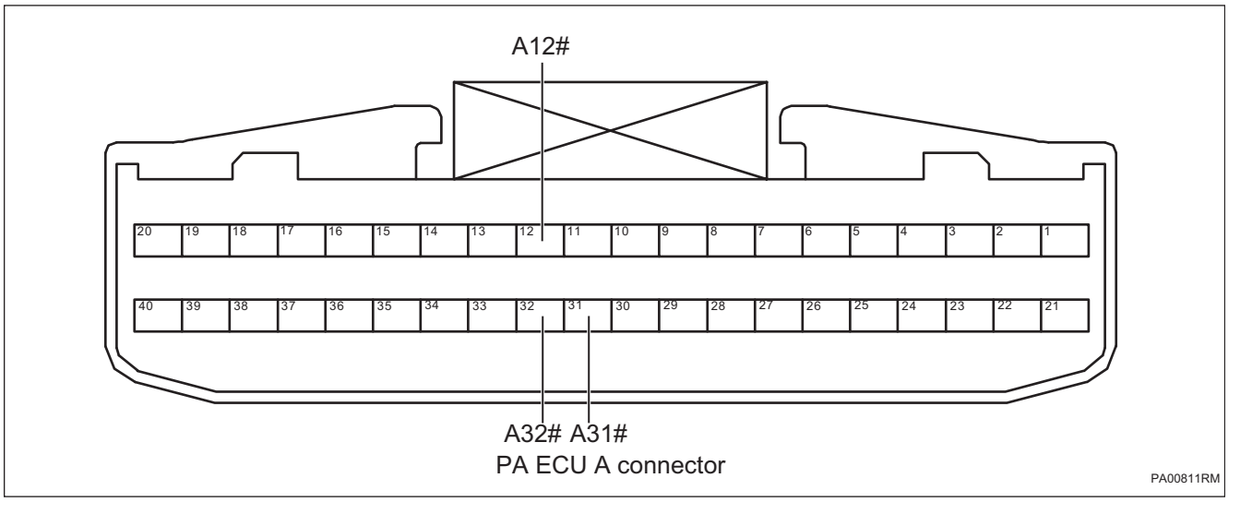
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A32# -body GND	Always connected	10 KΩ or greater
PA ECU connector A31# -body GND	Always connected	10 KΩ or greater
PA ECU connector A12# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	**Check left front corner ultrasonic sensor harness and connector for circuit shorted to power supply**



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A32# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A31# -body GND	The ignition switch is set to "ON"	Less than 1 V
PA ECU connector A12# -body GND	The ignition switch is set to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	**Replace the left front corner ultrasonic sensor (See page PM-59)**

(a) Replace the left front corner ultrasonic sensor.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace PA ECU (See page PA-79)**

OK

6	**End**

DTC	B1A8113	AVS front camera harness open-circuited
DTC	B1A8511	AVS IFC power supply circuit shorted to ground
DTC	B1A8512	AVS IFC power supply to shorted to power positive

Description

When IFC circuit is shorted or open, PA ECU records the DTC.

DTC	DTC detection conditions	Faulty location
B1A8113	(a) AVS front camera harness open-circuited	• PA ECU • Harness and connector • IFC
B1A8511	(a) AVS IFC power supply circuit shorted to ground.	• PA ECU • Harness and connector • IFC
B1A8512	(a) AVS IFC power supply shorted to power positive.	• PA ECU • Harness and connector • IFC

Inspection procedure

1	Check IFC harness and connector

(a) Check whether the IFC connector is connected tightly.

(b) Check whether the IFC harness and connector are broken or damaged.

(c) Check whether the IFC harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

2	Replace the IFC (See page AS-37)

(a) Replace the IFC.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → Replace PA ECU (See page PM-59)

OK

3	End

DTC	B1A8213	AVS left camera harness open-circuited
DTC	B1A8711	AVS left camera power supply circuit shorted to ground
DTC	B1A8712	AVS left camera power supply shorted to power positive

Description

When left camera circuit is shorted or open, PA ECU records the DTC.

DTC	DTC detection conditions	Faulty location
B1A8213	(a) AVS left side camera harness open-circuited.	• PA ECU • Harness and connector • Left camera
B1A8711	(a) AVS left camera power supply circuit shorted to ground.	• PA ECU • Harness and connector • Left camera
B1A8712	(a) AVS left camera power supply shorted to power positive.	• PA ECU • Harness and connector • Left camera

Inspection procedure

1	Check left camera harness and connector

(a) Check whether the left camera connector is connected tightly.

(b) Check whether the left camera harness and connector are broken or damaged.

(c) Check whether the left camera harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

2	Replace the left camera (See page IM-3)

(a) Replace the left camera.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG	Replace PA ECU (See page PA-79)

OK

3	End

DTC	B1A8313	AVS right camera harness open-circuited
DTC	B1A8811	AVS right camera power supply circuit shorted to ground
DTC	B1A8812	AVS right camera power supply shorted to power positive

Description

The PA ECU will record the DTC when the right camera line circuit is shorted or open.

DTC	DTC detection conditions	Faulty location
B1A8313	(a) AVS right camera harness open-circuited.	• PA ECU • Harness and connector • Right camera
B1A8811	(a) AVS right camera power supply circuit shorted to ground.	• PA ECU • Harness and connector • Right camera
B1A8812	(a) AVS right camera power supply shorted to power positive.	• PA ECU • Harness and connector • Right camera

Inspection procedure

1	**Check right camera harness and connector**

(a) Check whether the right camera connector is connected tightly.

(b) Check whether the right camera harness and connector are broken or damaged.

(c) Check whether the right camera harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

2	**Replace the right camera (See page IM-3)**

(a) Replace the right camera.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG	Replace PA ECU (See page PA-79)

OK

3	End

DTC	B1A8413	AVS rear camera harness open-circuited
DTC	B1A8611	AVS rear camera power supply circuit shorted to ground
DTC	B1A8612	AVS rear camera power supply shorted to power positive

Description

The PA ECU will record the DTC when the rear camera line circuit is shorted or open.

DTC	DTC detection conditions	Faulty location
B1A8413	(a) AVS rear camera harness open-circuited.	• PA ECU • Harness and connector • Rear camera
B1A8611	(a) AVS rear camera power supply circuit shorted to ground.	• PA ECU • Harness and connector • Rear camera
B1A8612	(a) AVS rear camera power supply shorted to power positive.	• PA ECU • Harness and connector • Rear camera

Inspection procedure

1	Check rear camera harness and connector

(a) Check whether the rear camera connector is connected tightly.

(b) Check whether the rear camera harness and connector are broken or damaged.

(c) Check whether the rear camera harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

2	Replace the rear camera (See page PA-82)

(a) Replace the rear camera.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → Replace PA ECU (See page PA-79)

OK

3	End

DTC	U003788	Extension CAN bus off
DTC	U007788	ADV-APA CAN bus off
DTC	U014687	GW node lost
DTC	U024387	ADV node lost
DTC	U112187	ESP message lost
DTC	U116487	A/C control unit message lost
DTC	U114087	BCM 1 message lost
DTC	U119987	Driver door module message lost
DTC	U120087	Passenger door module message lost
DTC	U120187	Rear left door module message lost
DTC	U120287	Rear right door module message lost
DTC	U113187	EPS ECU message lost
DTC	U113887	Driving mode selection control unit message lost
DTC	U110087	ECM message lost
DTC	U124587	IVI message lost
DTC	U115587	Instrument cluster control unit message lost
DTC	U110187	TCU message lost
DTC	U041582	ESP message content error
DTC	U041583	ESP message content error
DTC	U041586	ESP message content error
DTC	U042082	EPS ECU message content error
DTC	U042083	EPS ECU message content error
DTC	U042086	EPS ECU message content error
DTC	U144C8A	APA ETH1 connection failure

Description

When the communication between the PA ECU and other systems is abnormal or interrupted, the PA ECU will record the DTC.

DTC	DTC detection conditions	Faulty location
U003788	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U007788	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U024387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U112187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U116487	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U119987	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U120087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U120187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U120287	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U113187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U113887	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U124587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041582	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041583	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041586	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042082	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

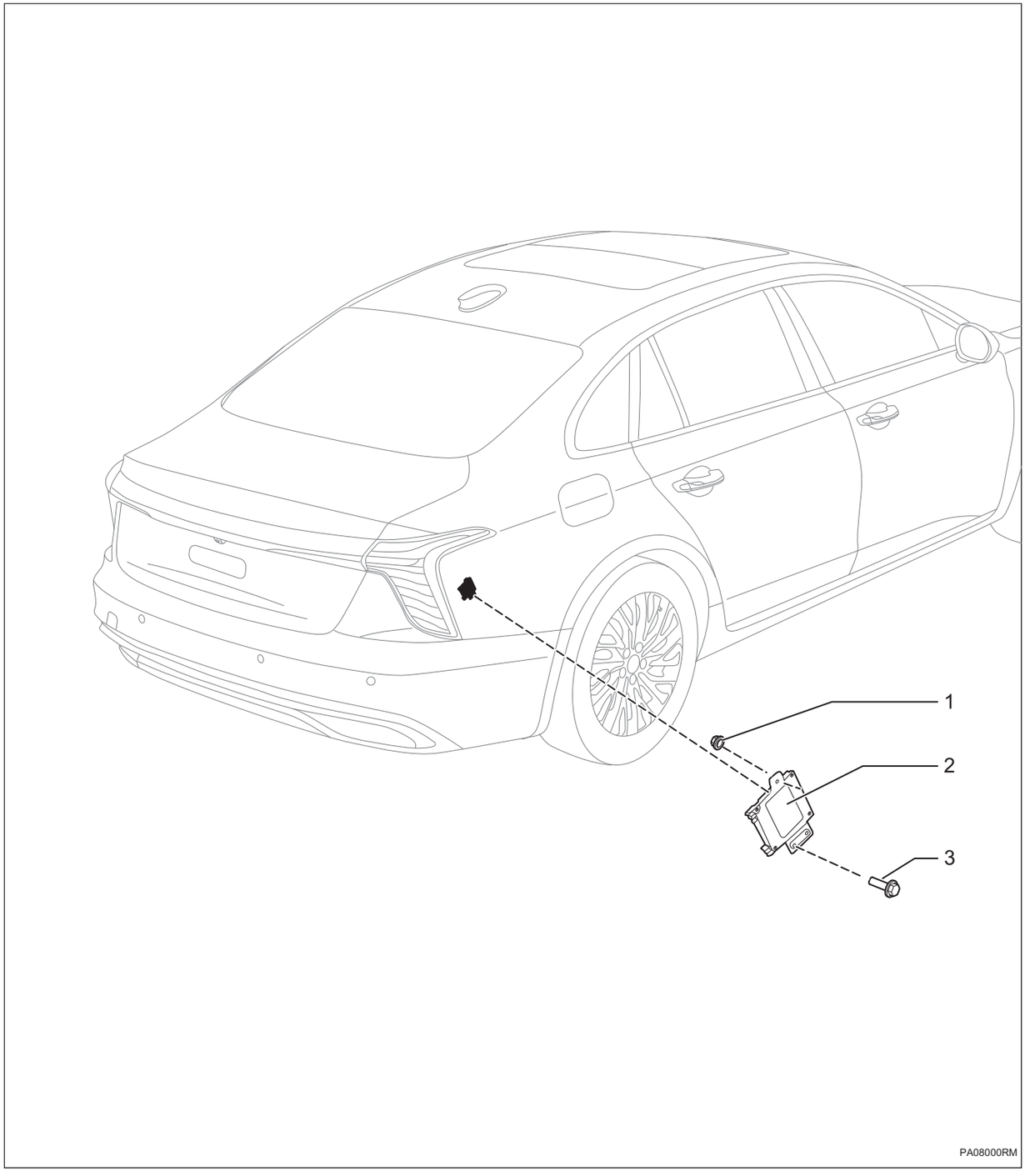
DTC	DTC detection conditions	Faulty location
U042083	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042086	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U144C8A	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

PA ECU assembly

Parts

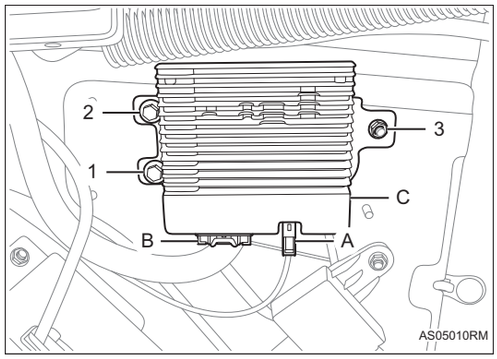


1. **Hexagon flange bolt**
   - Torque: 12 ~ 17 N·m
2. **PA ECU assembly**
3. **Hexagon flange nut**
   - X2

- Torque: 12 ~ 17 N·m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove trunk right covering (See page IR-33)**
3. **Remove PA ECU assembly**



(a) Disconnect the harness connector-A-B-.

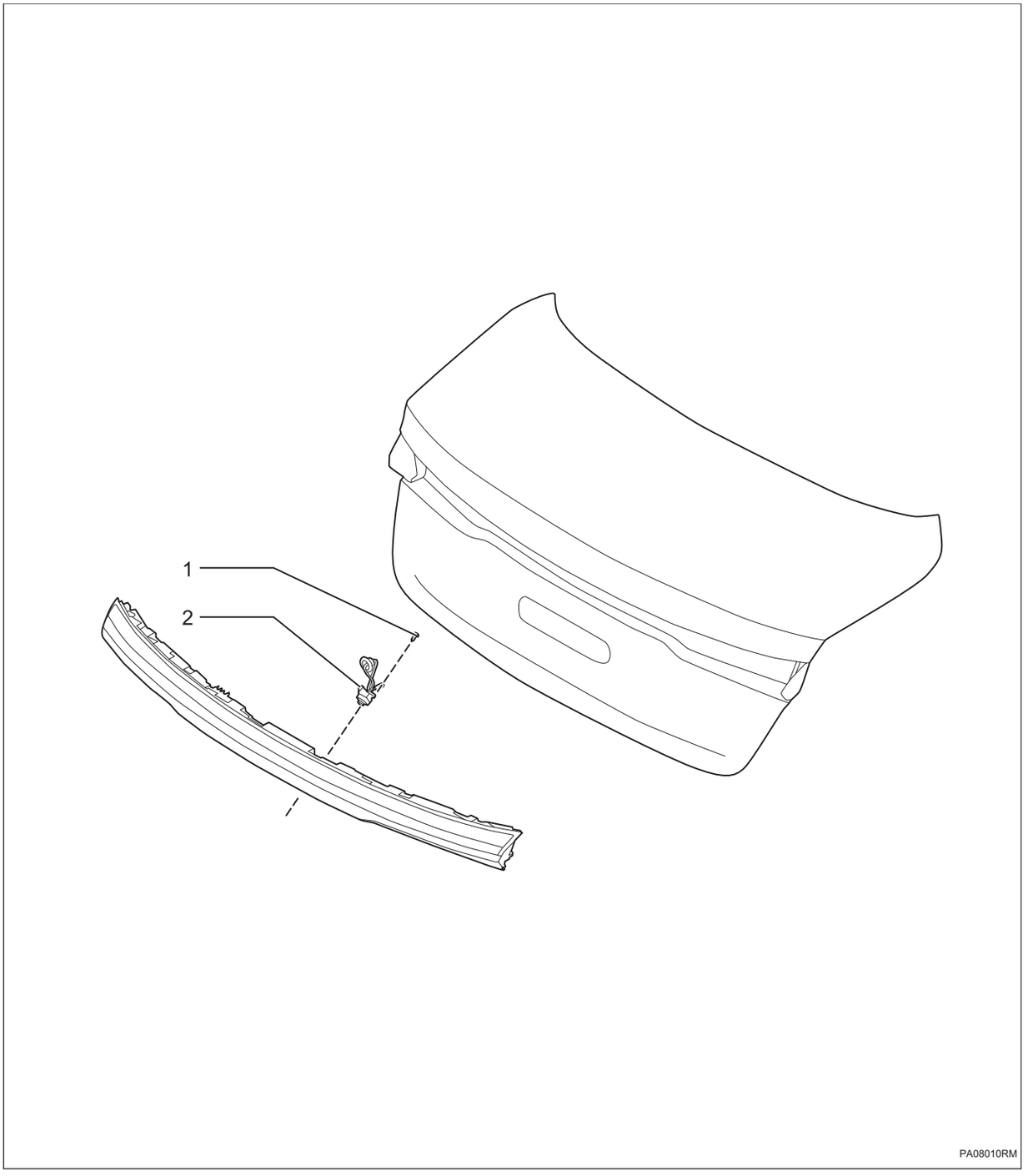
(b) Remove the bolts -1-2- and nut -3-, and remove the PA ECU assembly.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Rear camera and bracket assembly

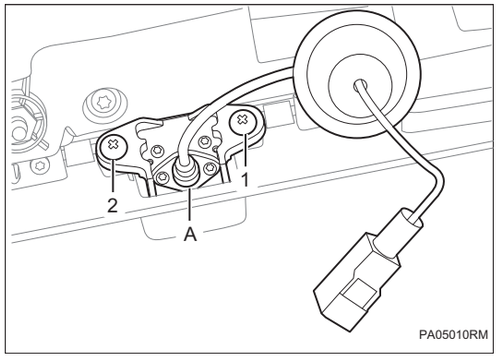
Parts



1. **Screw**
2. **Rear camera and bracket assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove rear combination lamp II assembly (See page LI-127)**
3. **Remove rear camera and bracket assembly**
   (a) Remove the 2 screws, and remove the rear camera and bracket assembly.



Installation

1. **The installation procedure is the reverse of removal procedure.**

AVM

AVM ECU AS-1
Precautions AS-1
Location of parts AS-4
System diagram AS-7
System description AS-7
Symptom chart AS-9
ECU terminal AS-10
DTC chart AS-10
U300317 ..... AS-13
U300316 ..... AS-13
B1A8016 ..... AS-16
B1A8287 ..... AS-16
B1A8142 ..... AS-17
B1A8313 ..... AS-18
B1A8311 ..... AS-18
B1A8413 ..... AS-19
B1A8411 ..... AS-19
B1A8513 ..... AS-20
B1A8511 ..... AS-20
B1A8613 ..... AS-21
B1A8611 ..... AS-21
B1A8F54 ..... AS-22
U003788 ..... AS-23
U014687 ..... AS-23
U015987 ..... AS-23
U112187 ..... AS-23
U112987 ..... AS-23
U116487 ..... AS-23
U114087 ..... AS-23
U119987 ..... AS-23
U113887 ..... AS-23
U110087 ..... AS-23
U120087 ..... AS-23
U120187 ..... AS-23
U120287 ..... AS-23
U113187 ..... AS-23
U124587 ..... AS-23
U115587 ..... AS-23
U110187 ..... AS-23

U129387 ..... AS-23
U114687 ..... AS-23
U041582 ..... AS-23
U041583 ..... AS-23
U041586 ..... AS-23
U041882 ..... AS-23
U041883 ..... AS-23
U041886 ..... AS-23
U040182 ..... AS-23
U040183 ..... AS-23
U054682 ..... AS-23
U054683 ..... AS-24
U040282 ..... AS-24
U040283 ..... AS-24
U059482 ..... AS-24
U059483 ..... AS-24
U042082 ..... AS-24
U042083 ..... AS-24
U042086 ..... AS-24
U023287 ..... AS-24
AVM ECU assembly AS-27
Parts AS-27
Removal AS-29
Installation AS-29
Calibration environmental requirements AS-30
Setting calibration cloth AS-32
Calibration AS-32
IFC & bracket assembly AS-37
Parts AS-37
Removal AS-38
Installation AS-38

AVM ECU

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Warning:

Before repairing the high voltage system or adjacent high voltage system components, be sure to carefully read the "Instructions and precautions for maintenance work" in the introduction carefully!

2. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

3. When checking and replacing electronic components, make sure to disconnect the battery - to repair the system.

4. The initialization is required for some systems when the battery cable is disconnected and reconnected.

5. General repair instructions

(a) When the part needs to be replaced or the connector needs to be disconnected during maintenance of AVM, disconnect the battery negative cable.

(b) The door control system needs to be initialized after reconnecting the battery. And use the HQ-VDS to "clear the DTC" for all electronic control systems.

6. Precautions for AVM

(a) The system cannot achieve absolute interference immunity due to the influence of various external sound fields and electromagnetic fields determined by physical characteristics (for example: other vehicle using ultrasonic distance measurement, air pressure, engine noise, electronically controlled gears, induction coil, etc.)

(b) The immunity from interference and the detection performance of the ultrasonic ranging system may reduce due to environmental conditions and obstacle reflection characteristics, which are determined by the physical properties of ultrasonic propagation.

(c) The installation position of the probe has an important impact on the performance of the system, which is reflected in the reflection of the vehicle bumper surface itself, the reflection of the ground echo, and the detection range.

(d) The propagation of sound waves in air is based on the physical properties of refraction and diffraction. The air temperature difference is one of the most important factors for the generation of non-uniform transmission media, which in turn leads to acoustic wave diffraction.

(e) The detection performance of ultrasonic detection equipment is affected by the following factors:

(1) Hot automobile exhaust.

(2) High temperature asphalt pavement.

(3) Summer breeze.

(4) Temperature stratification.

(f) When there is a difference between the bumper temperature and the ambient air temperature (which usually occurs in winter), temperature stratification will occur, which will lead to acoustic wave diffraction, and there is a risk of false alarm due to reflected echo under certain bumper structures.

(g) Significant factors that may lead to reduced or no detection range:

(1) Snow or sludge is adhered to the bumper surface.

(2) Plaster or ice is adhered to the sensor surface.

(3) High acoustic attenuation (e. g., in a dry, high temperature environment).

(4) In heavy rain or foam.

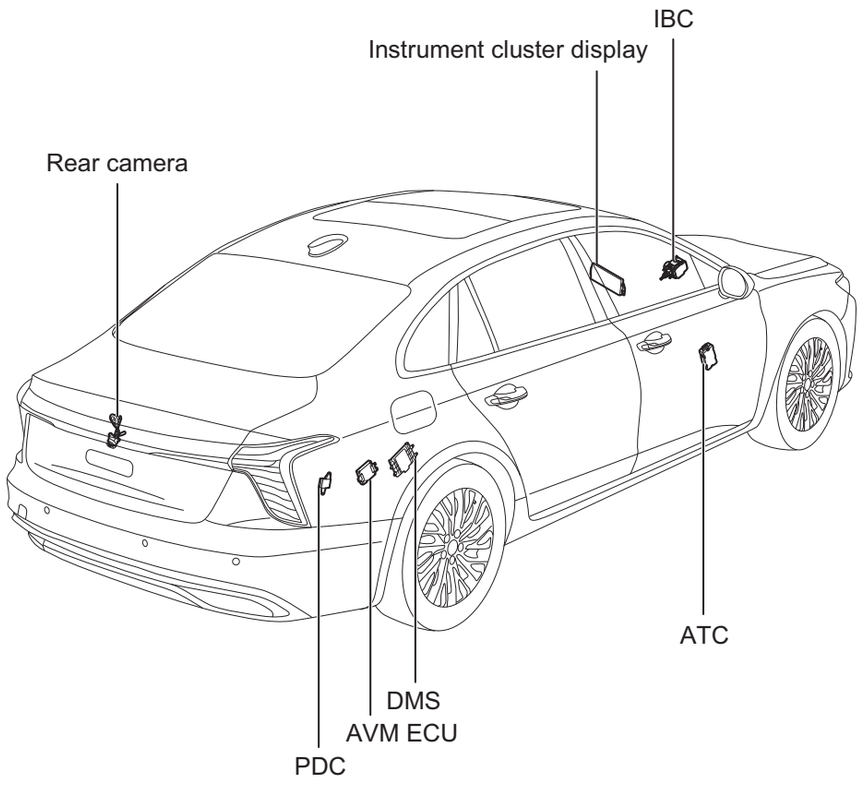
(5) Obstacles with absorbing materials.

(6) The edges and corners of flat obstacles are facing the sensor, and the reflected echo only occurs within a specific angle range.

(h) If the camera becomes dirty, a clear image cannot be transmitted. Rinse with water and wipe clean with a soft cloth. If the camera is very dirty, clean it with neutral detergent and wipe it off.

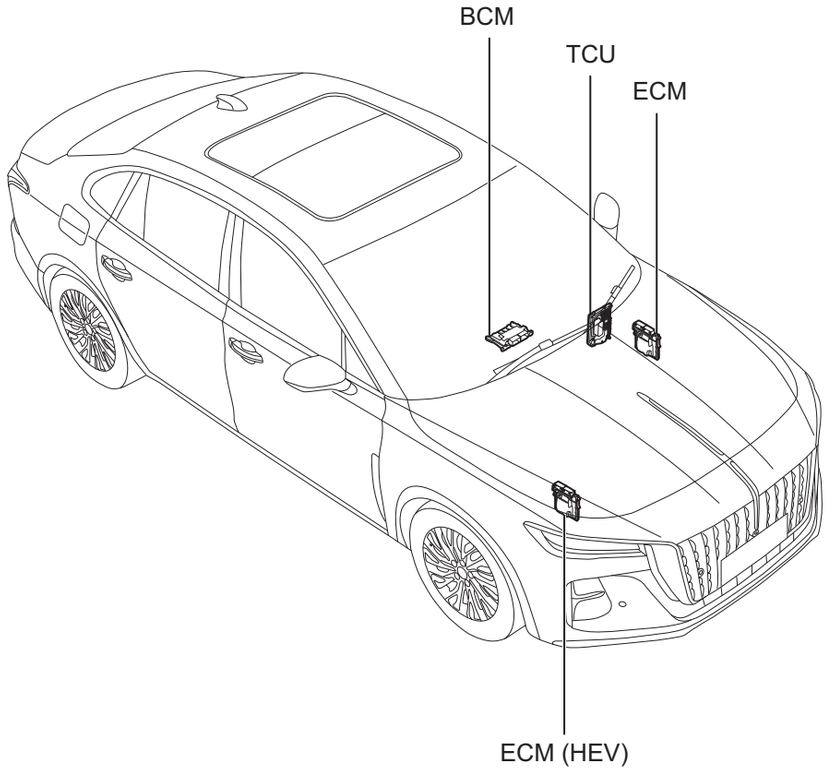
(i) When the system temperature is low, the displayed image may become dark and the moving image may be slightly distorted.

Location of parts



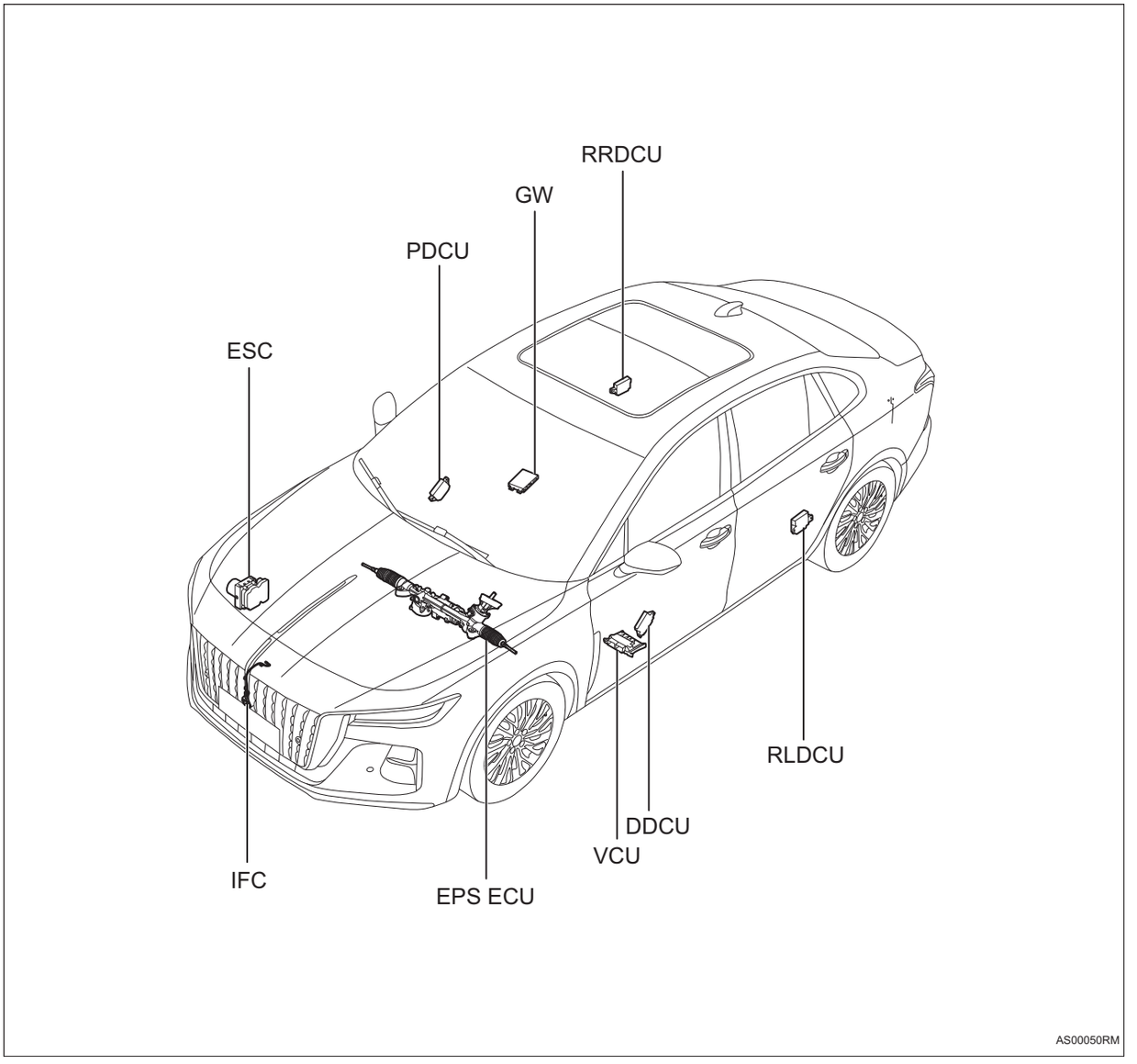
AS00030RM

Location of parts

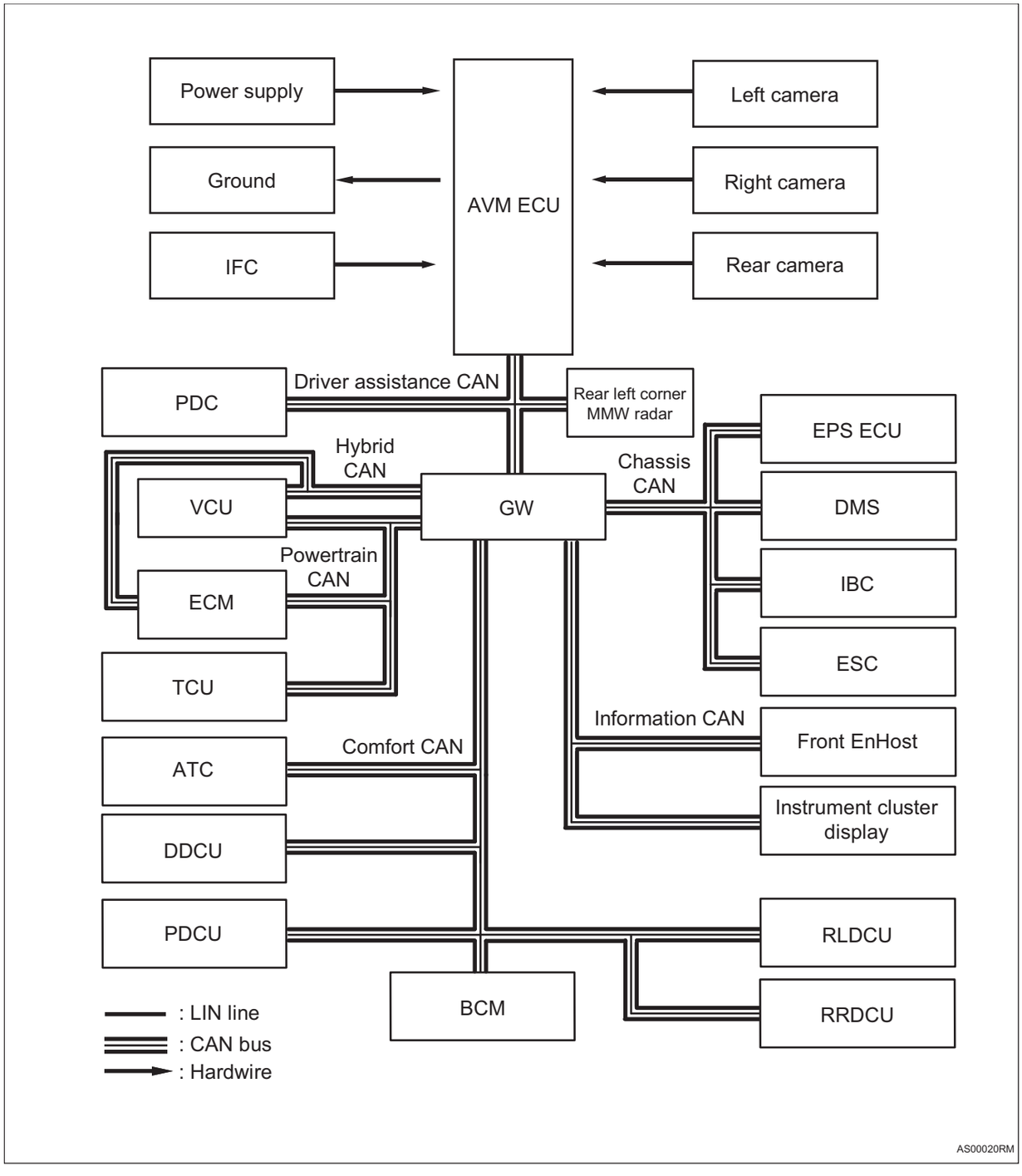


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Location of parts



System diagram



System description

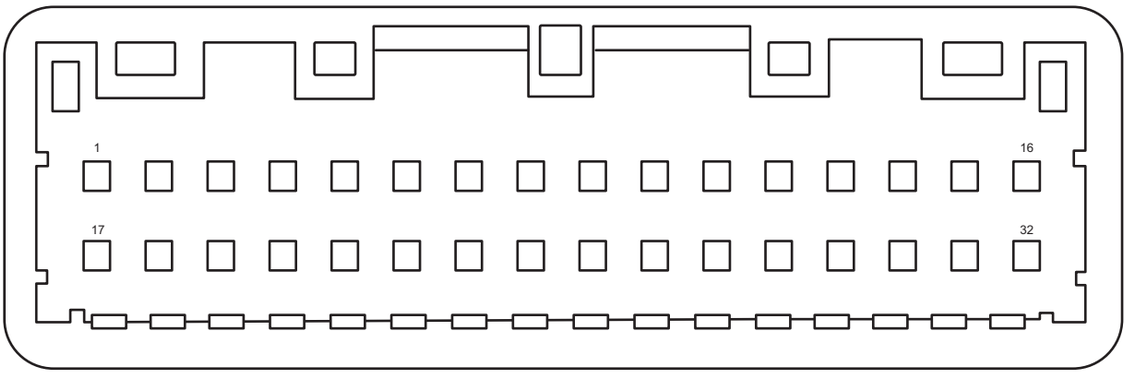
1. AVM

(a) The AVM is displayed through the multimedia display so that the driver can clearly view and understand the surrounding conditions of the vehicle, and at the same time make judgment on the relative orientation and distance of the obstacle to realize safe and easy parking.

Symptom chart

Fault	Possible location
System inoperative or abnormal	• Battery • Related harness and connector • Main display • Front EnHost • Camera • AVM ECU • EGSM • GW

ECU terminal



AVM ECU

AS00010RM

AS

AVM ECU A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	Power supply positive	17	IGN signal input
2	GND	18	AVM-ADAS CANL
3	AVM-ADAS CANH	19	-
4	-	20	-
5	-	21	-
6	-	22	-
7	-	23	-
8	-	24	-
9	-	25	-
10	-	26	-
11	-	27	-
12	-	28	-
13	-	29	-
14	-	30	-
15	-	31	-
16	-	32	-

DTC chart

DTC	Description	Reference page
U300317	ECU overvoltage	(See page AS-13)
U300316	ECU undervoltage	(See page AS-13)
B1A8016	SOC power failure	(See page AS-16)
B1A8142	Internal Flash error	(See page AS-17)

DTC	Description	Reference page
B1A8287	Abnormal communication between MCU and SOC	(See page AS-16)
B1A8313	IFC fault	(See page AS-18)
B1A8413	Rear camera fault	(See page AS-19)
B1A8513	Left camera fault	(See page AS-20)
B1A8613	Right camera fault	(See page AS-21)
B1A8311	IFC overcurrent	(See page AS-18)
B1A8411	Rear camera overcurrent	(See page AS-19)
B1A8511	Left camera overcurrent	(See page AS-20)
B1A8611	Right camera overcurrent	(See page AS-21)
B1A8F54	AVM not calibrated	(See page AS-22)
U003788	Extension CAN bus off	(See page AS-24)
U014687	GW node lost	(See page AS-24)
U015987	PA node lost	(See page AS-24)
U112187	ESP message lost	(See page AS-24)
U112987	IBC message lost	(See page AS-24)
U116487	A/C control unit message lost	(See page AS-24)
U114087	BCM 1 message lost	(See page AS-24)
U119987	Driver door module message lost	(See page AS-24)
U113887	Driving mode selection control unit message lost	(See page AS-24)
U110087	ECM message lost	(See page AS-24)
U120087	Passenger door module message lost	(See page AS-24)
U120187	Rear left door module message lost	(See page AS-24)
U120287	Rear right door module message lost	(See page AS-24)
U113187	EPS ECU message lost	(See page AS-24)
U124587	IVI message lost	(See page AS-24)
U115587	Instrument cluster control unit message lost	(See page AS-24)
U110187	TCU message lost	(See page AS-24)
U129387	HCU message lost	(See page AS-24)
U114687	GW message lost	(See page AS-24)
U041582	ESP message content error	(See page AS-24)
U041583	ESP message content error	(See page AS-24)
U041586	ESP message content error	(See page AS-24)
U041882	IBC message content error	(See page AS-24)
U041883	IBC message content error	(See page AS-24)
U041886	IBC message content error	(See page AS-24)
U040182	ECM message content error	(See page AS-24)
U040183	ECM message content error	(See page AS-24)
U054682	EnHost/IVI message content error	(See page AS-24)

DTC	Description	Reference page
U054683	EnHost/IVI message content error	(See page AS-24)
U040282	TCU message content error	(See page AS-24)
U040283	TCU message content error	(See page AS-24)
U059482	HCU message content error	(See page AS-24)
U059483	HCU message content error	(See page AS-24)
U042082	EPS ECU message content error	(See page AS-24)
U042083	EPS ECU message content error	(See page AS-24)
U042086	EPS ECU message content error	(See page AS-24)
U023287	Left lane change assist control unit node lost	(See page AS-24)

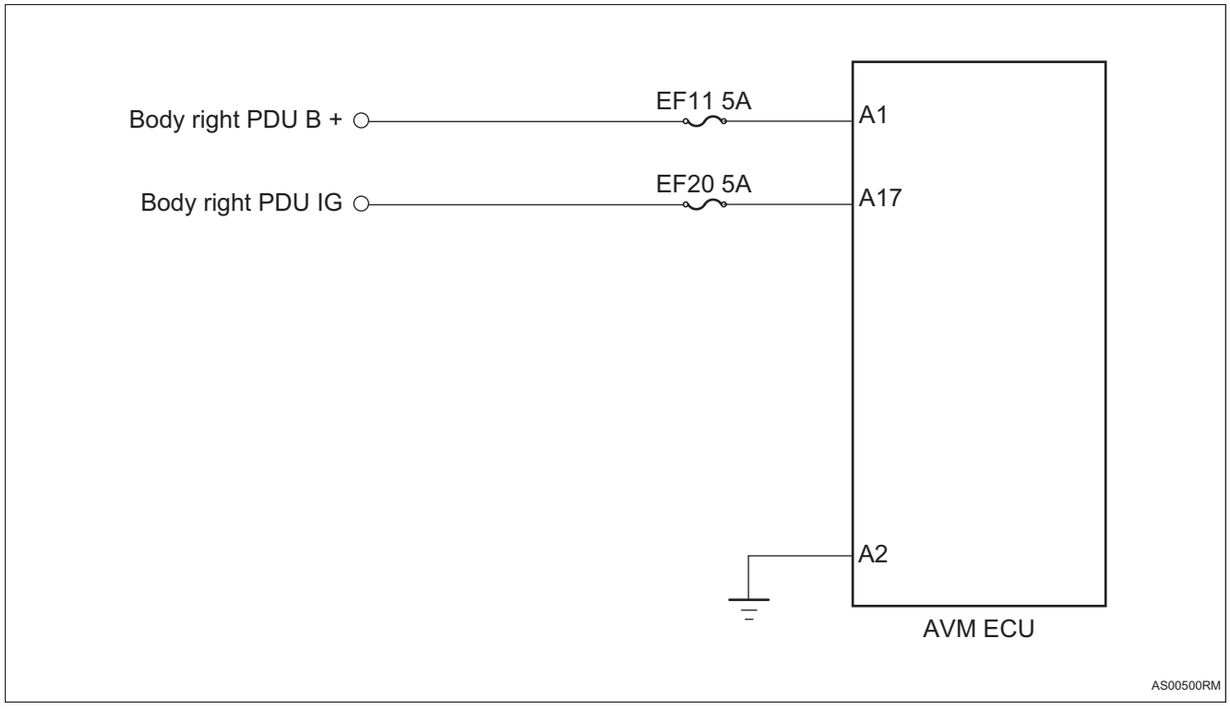
DTC	U300317	ECU overvoltage
DTC	U300316	ECU undervoltage

Description

When the AVM ECU input voltage is too high or too low, AVM ECU records the DTC.

DTC	DTC detection conditions	Faulty location
U300317	(a) ECU overvoltage.	• AVM ECU • Harness and connector • Battery/charging system
U300316	(a) ECU undervoltage.	• AVM ECU • Harness and connector • Battery/charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the engine and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery + - battery -	Always connected	About 11~14 V

NG	Overhaul the charging system

OK

2	**Check AVM ECU fuse**

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the AVM ECU fuse.

(d) Measure the resistance according to the values in the table below.

Standard value

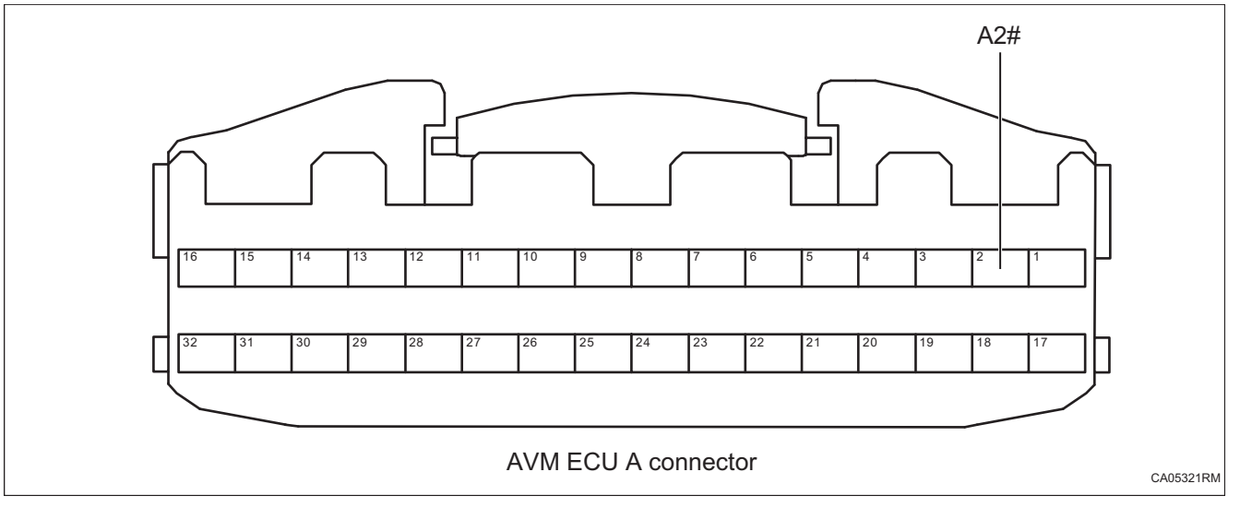
Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

AS

NG **Replace fuse**

OK

3	**Check AVM ECU ground**



(a) Disconnect the AVM ECU connector.

(b) Measure the resistance according to the values in the table below.

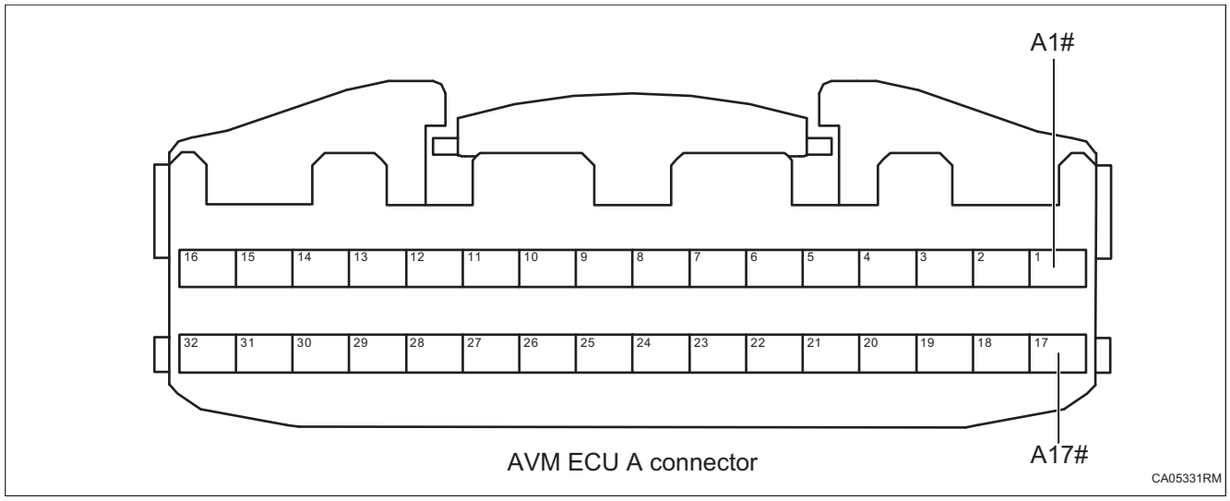
Standard value

Detector connection	Detection conditions	Specified state
AVM ECU connector A2# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

4	**Check AVM ECU power supply**



(a) Install the AVM ECU fuse.

(b) Connect the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
AVM ECU connector A1# - body GND	The ignition switch is set to "ON"	Battery voltage
AVM ECU connector A17# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Replace the AVM ECU (See page AS-27)**

AS

DTC	B1A8016	SOC power failure
DTC	B1A8287	Abnormal communication between MCU and SOC

Description

When the AVM ECU works abnormally, the AVM ECU records the DTC.

DTC	DTC detection conditions	Faulty location
B1A8016	(a) SOC power failure.	• AVM ECU
B1A8287	(a) Abnormal communication between MCU and SOC.	• AVM ECU

Inspection procedure

1	**Restart the AVM**

(a) Restart the AVM.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace the AVM ECU (See page AS-27)**

OK

2	**End**

DTC	B1A8142	Internal Flash error

Description

When there is an internal Flash error in AVM ECU, the AVM ECU records the DTC.

DTC	DTC detection conditions	Faulty location
B1A8142	(a) Internal Flash error.	• AVM ECU

Inspection procedure

1	**Replace the AVM ECU (See page AS-27)**

(a) Replace the AVM ECU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

OK

2	**End**

DTC	B1A8313	IFC fault
DTC	B1A8311	IFC overcurrent

Description

The AVM ECU records a DTC when the IFC works abnormally.

DTC	DTC detection conditions	Faulty location
B1A8313	(a) IFC fault.	• AVM ECU • Harness and connector • IFC
B1A8311	(a) IFC overcurrent.	• AVM ECU • Harness and connector • IFC

Inspection procedure

1	Check IFC harness and connector

(a) Check whether the IFC connector is connected tightly.

(b) Check whether the IFC harness and connector are broken or damaged.

(c) Check whether the IFC harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

2	Replace the IFC (See page AS-37)

(a) Replace the IFC.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace the AVM ECU (See page AS-27)**

OK

3	End

DTC	B1A8413	Rear camera fault
DTC	B1A8411	Rear camera overcurrent

Description

The AVM ECU records a DTC when the rear camera works abnormally.

DTC	DTC detection conditions	Faulty location
B1A8413	(a) Rear camera fault.	• AVM ECU • Harness and connector • Rear camera
B1A8411	(a) Rear camera overcurrent.	• AVM ECU • Harness and connector • Rear camera

Inspection procedure

1	Check rear camera harness and connector

(a) Check whether the rear camera connector is connected tightly.

(b) Check whether the rear camera harness and connector are broken or damaged.

(c) Check whether the rear camera harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

2	Replace the rear camera (See page PA-82)

(a) Replace the rear camera.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace the AVM ECU (See page AS-27)**

OK

3	End

DTC	B1A8513	Left camera fault
DTC	B1A8511	Left camera overcurrent

Description

The AVM ECU records a DTC when the left camera works abnormally.

DTC	DTC detection conditions	Faulty location
B1A8513	(a) Left camera fault.	• AVM ECU • Harness and connector • Left camera
B1A8511	(a) Left camera overcurrent.	• AVM ECU • Harness and connector • Left camera

Inspection procedure

1	Check left camera harness and connector

(a) Check whether the left camera connector is connected tightly.

(b) Check whether the left camera harness and connector are broken or damaged.

(c) Check whether the left camera harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

2	Replace the left camera (See page IM-3)

(a) Replace the left camera.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace the AVM ECU (See page AS-27)**

OK

3	End

DTC	B1A8613	Right camera fault
DTC	B1A8611	Right camera overcurrent

Description

The AVM ECU records a DTC when the right camera works abnormally.

DTC	DTC detection conditions	Faulty location
B1A8613	(a) Right camera fault.	• AVM ECU • Harness and connector • Right camera
B1A8611	(a) Rght camera overcurrent.	• AVM ECU • Harness and connector • Right camera

Inspection procedure

1	Check right camera harness and connector

(a) Check whether the right camera connector is connected tightly.

(b) Check whether the right camera harness and connector are broken or damaged.

(c) Check whether the right camera harness and connector are short-circuited or open-circuited.

NG → **Repair or replace the harness and connector**

OK

2	Replace the right camera (See page IM-3)

(a) Replace the right camera.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Read DTC again.

Criteria:

No DTC is output.

NG → **Replace the AVM ECU (See page AS-27)**

OK

3	End

DTC	B1A8F54	AVM not calibrated

Description

When the AVM ECU is out of calibration, AVM ECU records the DTC.

DTC	DTC detection conditions	Faulty location
B1A8F54	(a) Calibration failure.	• AVM ECU

Inspection procedure

1	Re-calibrate AVM ECU

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Re-calibrate the AVM ECU.

(d) Clear the DTC.

(e) Re-read the DTC

Criteria:

No DTC is output.

NG → **Replace the AVM ECU (See page AS-27)**

OK

2	End

DTC	U003788	Extension CAN bus off
DTC	U014687	GW node lost
DTC	U015987	PA node lost
DTC	U112187	ESP message lost
DTC	U112987	IBC message lost
DTC	U116487	A/C control unit message lost
DTC	U114087	BCM 1 message lost
DTC	U119987	Driver door module message lost
DTC	U113887	Driving mode selection control unit message lost
DTC	U110087	ECM message lost
DTC	U120087	Passenger door module message lost
DTC	U120187	Rear left door module message lost
DTC	U120287	Rear right door module message lost
DTC	U113187	EPS ECU message lost
DTC	U124587	IVI message lost
DTC	U115587	Instrument cluster control unit message lost
DTC	U110187	TCU message lost
DTC	U129387	HCU message lost
DTC	U114687	GW message lost
DTC	U041582	ESP message content error
DTC	U041583	ESP message content error
DTC	U041586	ESP message content error
DTC	U041882	IBC message content error
DTC	U041883	IBC message content error
DTC	U041886	IBC message content error
DTC	U040182	ECM message content error
DTC	U040183	ECM message content error
DTC	U054682	EnHost/IVI message content error

DTC	**U054683**	**EnHost/IVI message content error**
DTC	**U040282**	**TCU message content error**
DTC	**U040283**	**TCU message content error**
DTC	**U059482**	**HCU message content error**
DTC	**U059483**	**HCU message content error**
DTC	**U042082**	**EPS ECU message content error**
DTC	**U042083**	**EPS ECU message content error**
DTC	**U042086**	**EPS ECU message content error**
DTC	**U023287**	**Left lane change assist control unit node lost**

Description

When the communication between the AVM ECU and other systems is abnormal or interrupted, AVM ECU records the DTC.

DTC	DTC detection conditions	Faulty location
U003788	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U014687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U015987	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U112187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U112987	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U116487	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U119987	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U113887	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U120087	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U120187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

DTC	DTC detection conditions	Faulty location
U120287	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U113187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U124587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U115587	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U110187	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U129387	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U114687	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041582	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041583	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041586	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041882	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041883	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U041886	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U040182	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U040183	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U054682	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U054683	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U040282	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U040283	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059482	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U059483	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

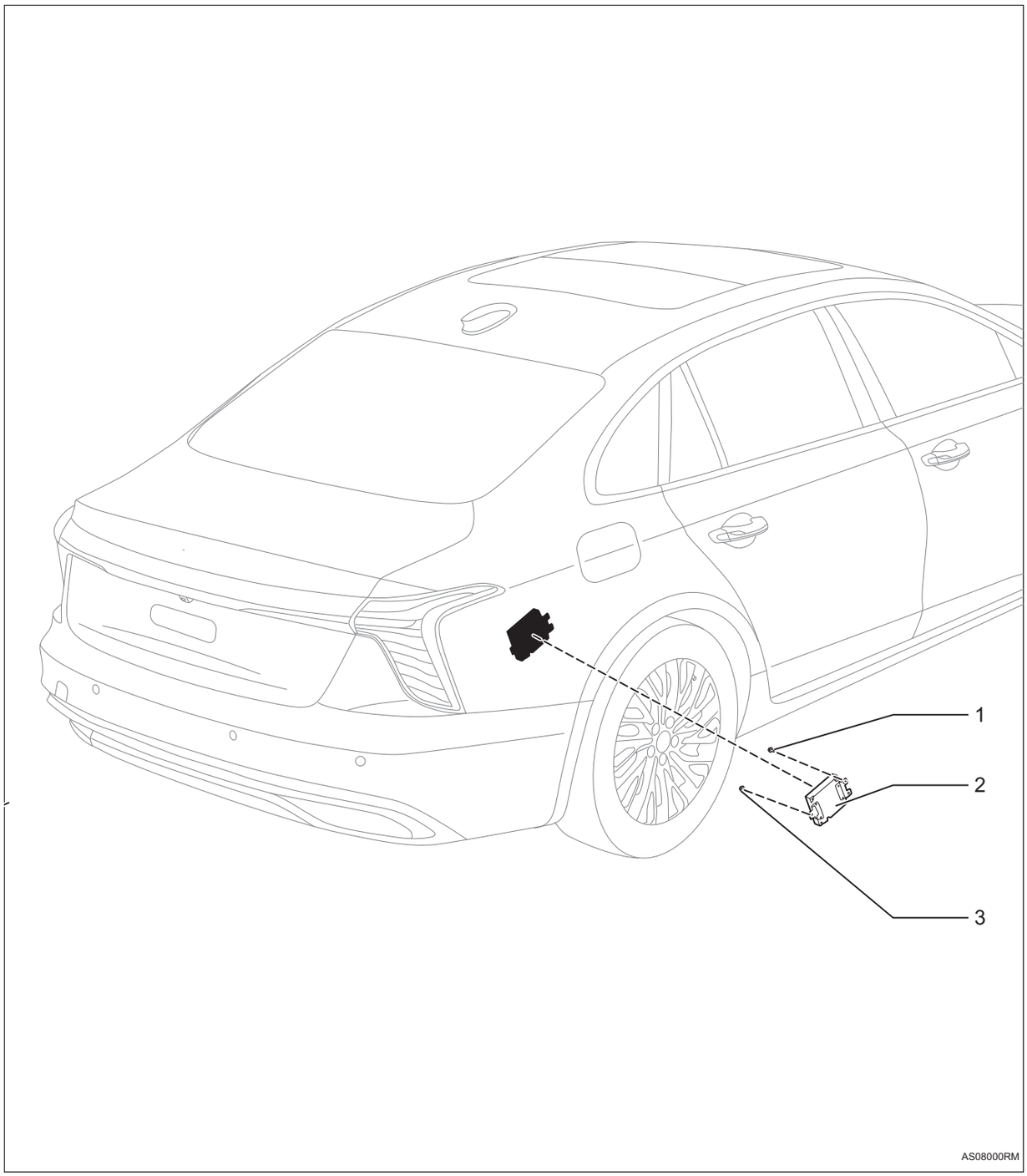
DTC	DTC detection conditions	Faulty location
U042082	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042083	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U042086	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector
U023287	(a) Abnormal or interrupted communication.	• Relevant control unit • Harness and connector

Inspection procedure

Note: For the communication DTCs, please refer to CAN communication system for specific analysis steps.

AVM ECU assembly

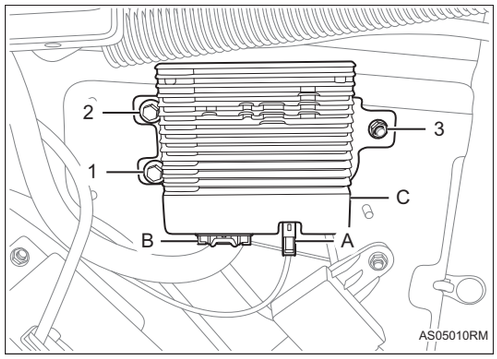
Parts



1. **Hexagon flange bolt**
   - X2
   - Torque: 12 ~ 17 N·m
2. **AVM ECU assembly**
3. **Hexagon flange nut**
   - Torque: 12 ~ 17 N·m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove trunk right covering (See page IR-33)**
3. **Removal AVM ECU assembly**



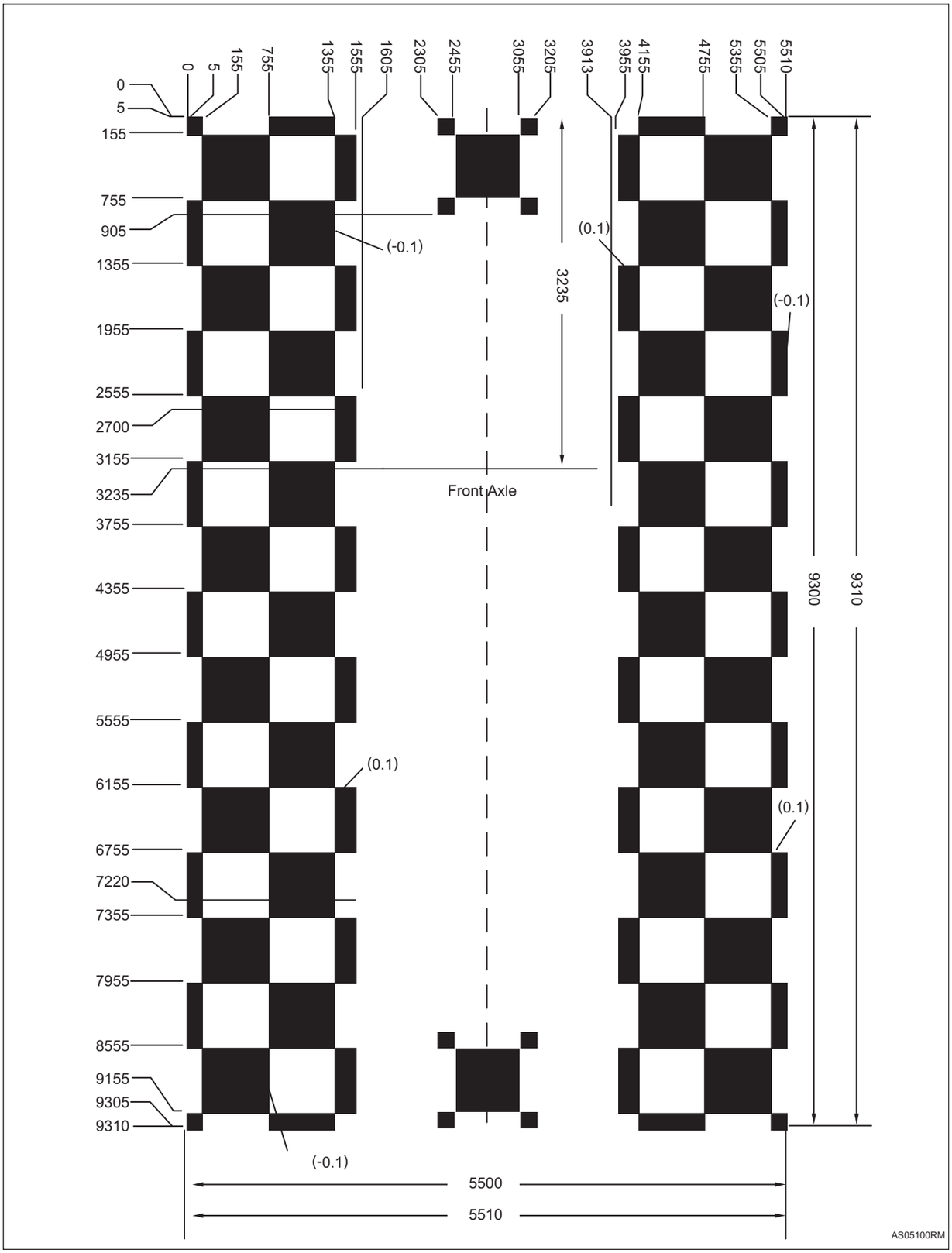
(a) Disconnect the harness connector-A-B-.

(b) Remove bolts -1-2- and nut -3-, and remove the panoramic image control unit assembly.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Calibration environmental requirements



1. **The detailed dimensions of the calibration site are shown in the figure above:**

   Caution:

   Calibration site size: width ⩾ 5.5 m, length ⩾ 9.3 m.

2. **Site requirements**

   (a) Wide and clean flat ground capable of meeting vehicle entry and calibration cloth laying;

3. **Ground flatness and calibration cloth laying requirements**

   (a) In order to ensure the calibration effect, the calibration site needs to be a flat ground as much as possible, and the calibration cloth will not have obvious unevenness after laying;

   (b) The calibration cloth shall be laid with care to be fully opened and flat, and each piece shall correspond to the requirements.

   (c) In order to ensure the calibration effect, the flatness of the ground after laying is required to be high, and the flatness error is required to be within +/-5 mm at any two-meter length.

   (d) It is recommended to use black-and-white epoxy floor paint for the drawing of calibration site, which involves wear resistance and matte performance. Better matte paint specifications can be selected according to the actual situation to achieve better wear resistance requirements.

4. **Requirements for placing body positioning device**

   (a) The wheel clamp and guide rail are preset on the site to ensure the parking accuracy. The guide rail is designed to the inside of the tire. The wheel clamp is designed along the tire direction as much as possible to avoid covering calibration elements on both sides.

5. **Lighting conditions**

   (a) The ambient light of the calibration site shall be mainly diffuse light, and the light source shall preferably be LED.

(b) Walls around the site are recommended to be white and free of other equipment to ensure that the automatic calibration site is not disturbed by surrounding scenes or light sources. In order to prevent sunlight from entering the calibration site through the doors and windows, it is required that the doors and windows around the site shall be pasted with thickened white cloths or light shields. The calibration pattern captured by the surround view camera shall be free of reflection.

6. Preservation of calibration cloth after calibration

(a) The calibration cloth shall be rolled flat after use and properly preserved.

Caution:

If the calibration cloth is soaked in water, please dry it and then roll it up for storage to avoid wrinkles during rolling that will affect subsequent use.

Setting calibration cloth

1. Set front and rear calibration cloth

(a) Mark the centers of the front and rear of the vehicle with a plumb.

(b) Pass the laser level gauge straight through the marked parts in the front and rear.

(c) Adjust the centerline of the front and rear calibration cloth to align with the laser level gauge line.

2. Set left/right calibration cloth

(a) Align the left/right calibration cloth with the side marking line of the set front/rear calibration cloth.

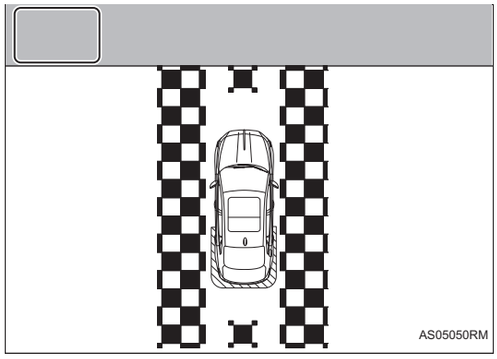
Calibration

1. After the vehicle drives to the calibration site and stops, enter the AVM panoramic interface manually. Click four times (at interval of less than 0.5 s) in the upper left corner of the single view (black box position as shown in the figure below) to enter the calibration mode.

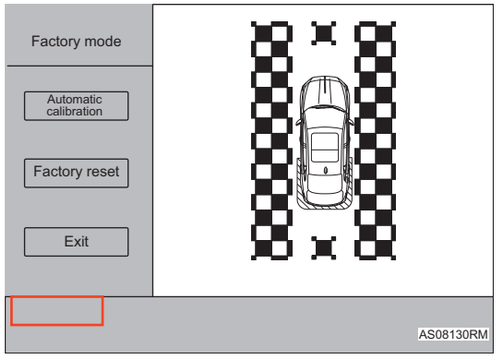
Hint:

During the calibration process, all the icons below are grayed out and cannot be operated.

At this time, keep the camera free from external objects, do not cut off the power supply, and do not open the door to enter and exit.

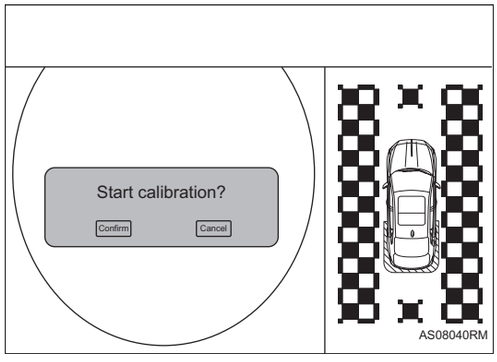


2. The calibration mode interface is as shown in the figure. Click the "automatic calibration" button.

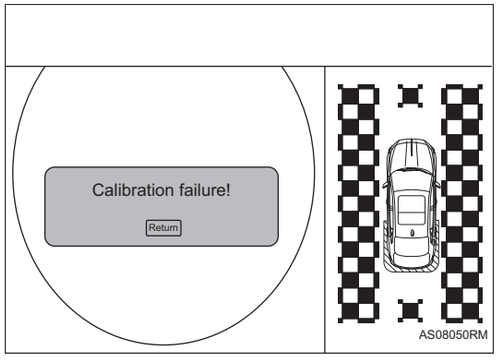


3. Automatic calibration

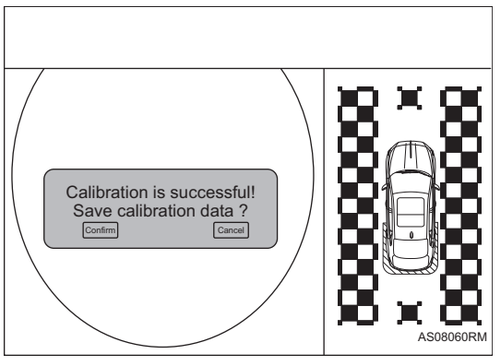
(a) The operator clicks the "automatic calibration" button to enter the following interface. Click the "OK" button to start the automatic calibration function, and the system will automatically perform calibration within about 5 seconds. After clicking the "Cancel" button, the display screen will return to the previous interface.



(b) The screen of successful calibration is shown in the figure below. Click the "Confirm" button to save the calibration data. After saving the data, return to the AVM screen. Click the "Cancel" button to return to the previous screen.

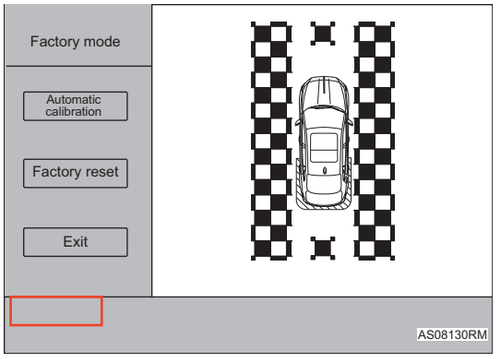


AS

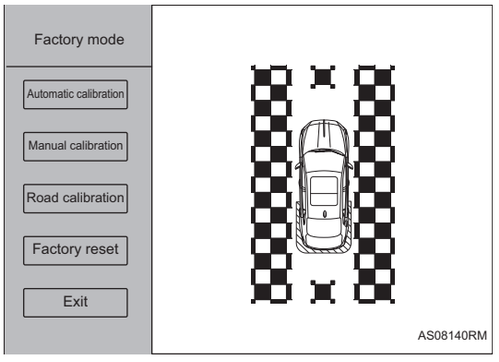


(c) The calibration success is shown in the figure below. Click the "OK" button to save the calibration data. After saving the data, return to the AVM interface. Click the "Cancel" button to return to the previous interface.

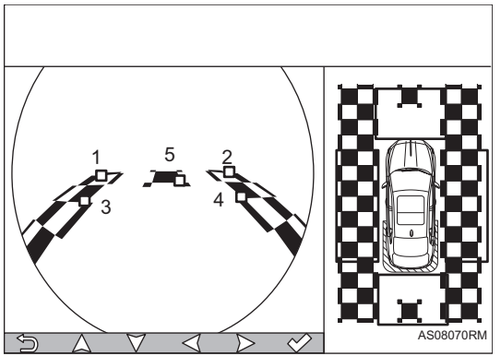
4. Manual calibration process



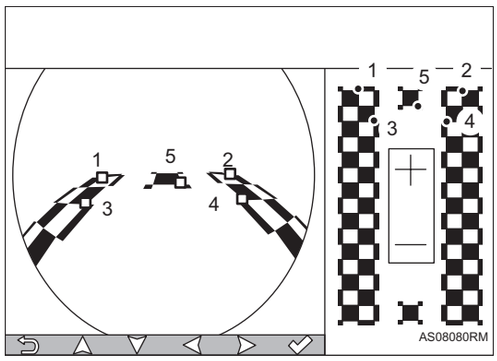
(a) Click the red box area -8- times to turn on the manual calibration mode



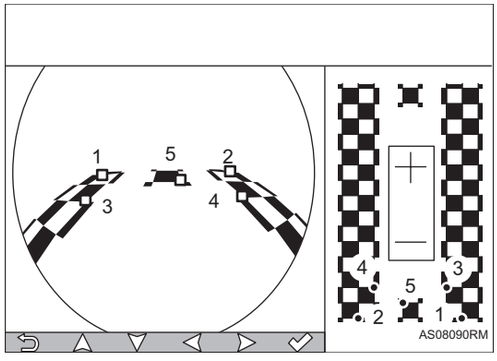
(b) Click the "manual calibration" button to enter the manual calibration mode.



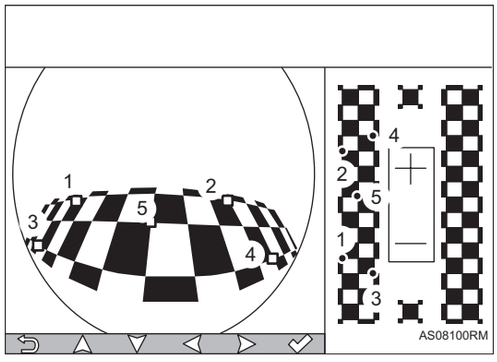
(c) -1- (green marked point is displayed) represents the currently selected point, -2-5- (blue marked point is displayed) represents the position of calibration point; The position of the selected point can be adjusted by the button in the figure below, or the selected point can be directly dragged by touch. After the adjustment is completed, click the √ button to complete the point position adjustment confirmation. Click the black box position on the right to switch the camera screen.



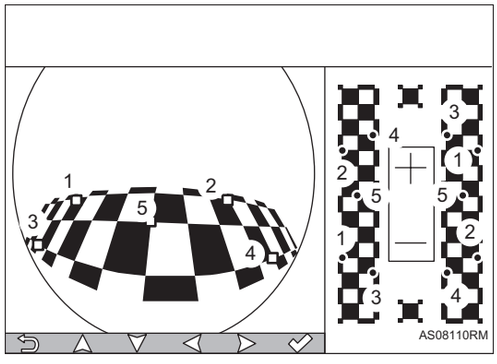
(d) Front view -5- calibrated points and the corresponding points in top view.



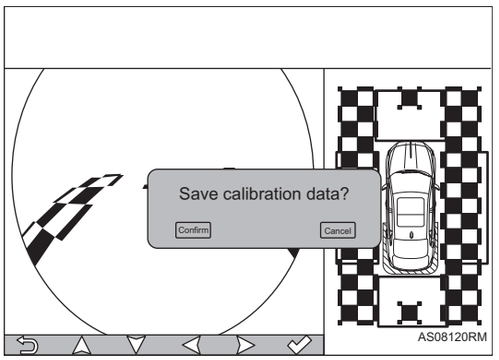
(e) Rear view -5- calibrated points and the corresponding points in top view.



(f) Left view -5- calibrated points and the corresponding points in top view.



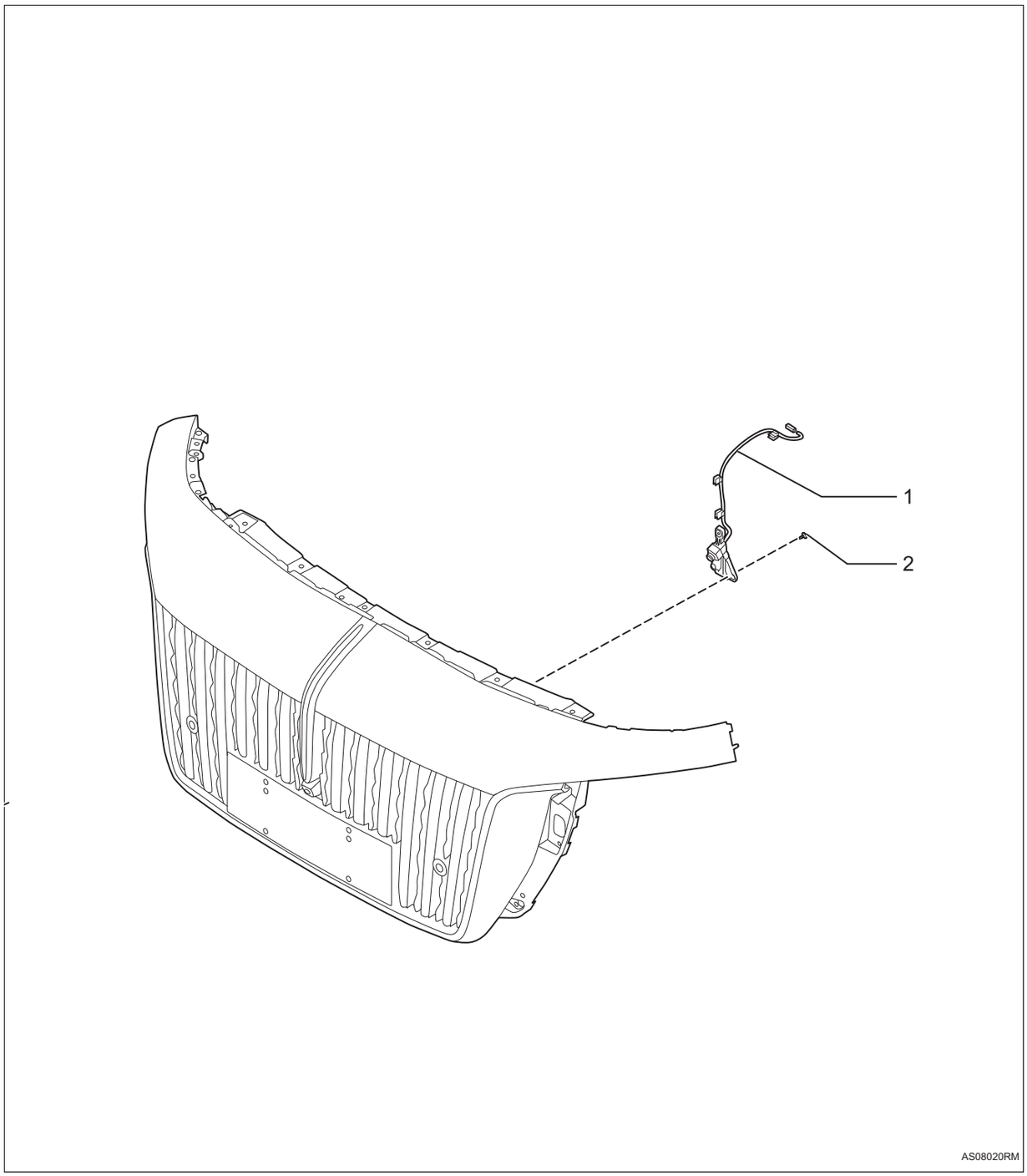
(g) Right view -5- calibrated points and the corresponding points in top view.



(h) After the four-way calibration is completed, click the "Back" button, so that the prompt shown in the following figure appears. Click the "OK" button to save the data, and return to the AVM screen after saving the data. After clicking the "Cancel", the display screen will return to the previous interface.

IFC & bracket assembly

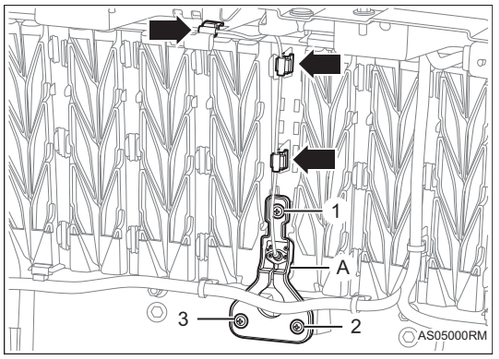
Parts



1. **IFC & bracket assembly**
2. **Screw**
   - X3

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove front radiator grille (See page ET-29)**
3. **Remove IFC & bracket assembly**



(a) Detach the harness clip as arrowed of the IFC & bracket assembly.

(b) Remove the screw -1-3- and remove the IFC & bracket assembly-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

CAN communication system

GW **CA-1**
Precautions CA-1
Location of parts CA-3
System diagram CA-7
System description CA-16
ECU terminal CA-17
Terminal resistor CA-18
DTC chart CA-18
B170016 ..... CA-21
B170017 ..... CA-21
B170200 ..... CA-25
B170344 ..... CA-26
B170345 ..... CA-26
B170346 ..... CA-26
B172000 ..... CA-27
B172100 ..... CA-27
B172200 ..... CA-27
B172300 ..... CA-27
B172400 ..... CA-27
U000188 ..... CA-33
U000287 ..... CA-33
U002888 ..... CA-40
U002987 ..... CA-40
U003788 ..... CA-47
U003887 ..... CA-47
U004688 ..... CA-54
U004787 ..... CA-54
U005588 ..... CA-61
U005687 ..... CA-61
U006488 ..... CA-67
U006587 ..... CA-67
U007588 ..... CA-74
U008088 ..... CA-81
U008087 ..... CA-81
U010087 ..... CA-88
U010187 ..... CA-93
U010387 ..... CA-98
U011087 ..... CA-101
U012987 ..... CA-106

U012187 .....CA-111
U013187 .....CA-116
U013887 .....CA-119
U014087 .....CA-124
U015187 .....CA-128
U015587 .....CA-133
U015887 .....CA-138
U023A87 .....CA-141
U015987 .....CA-145
U024287 .....CA-149
U016487 .....CA-153
U019987 .....CA-157
U020087 .....CA-161
U020187 .....CA-165
U020287 .....CA-169
U020887 .....CA-173
U023387 .....CA-177
U023587 .....CA-181
U024387 .....CA-184
U024587 .....CA-189
U024687 .....CA-193
U029187 .....CA-197
U029387 .....CA-200
U029887 .....CA-205
U029A87 .....CA-208
U02D587 .....CA-213
U02E187 .....CA-216
U02E387 .....CA-220
U100588 .....CA-224
U130486 .....CA-224
U130986 .....CA-224
U011187 .....CA-224
U012087 .....CA-224
U100688 .....CA-230
U133686 .....CA-230
U133786 .....CA-230
U130F86 .....CA-230
U131A86 .....CA-230
U011F87 .....CA-230
U02D987 .....CA-230
U029087 .....CA-230
U028887 .....CA-230
U14408A CA-237

U14A28E CA-237
U14418A CA-241
U14428A CA-245
U14438A CA-249
U14928D CA-249
U160100 ..... CA-253
Central GW assembly CA-256
Parts CA-256
Removal CA-257
Installation CA-257

CA

GW

Precautions

1. Safety precautions for high voltage operation

(a) A service technician needs to have the low-voltage electrician certificate and technical training certificate to repair the vehicle using this manual.

Warning:

Before repairing the high voltage system or adjacent high voltage system components, be sure to carefully read the "Instructions and precautions for maintenance work" in the introduction carefully!

2. ENGINE START/STOP button (ignition switch) representation:

Conventional vehicle

Representation	ENGINE START/STOP button (status)
ENGINE START/STOP button (ignition switch) in OFF position	OFF (OFF)
ENGINE START/STOP button (ignition switch) in ON(IG) position	On (IG)
Engine start	On (start)

HEV

Representation	Ignition switch (location)	Vehicle status
ENGINE START/STOP button (ignition switch) in OFF position	LOCK	LOCK (LOCK)
ENGINE START/STOP button (ignition switch) in ON(IG) position	ON	On (IG)
Vehicle started	START	Start (READY)

3. when the battery cable is disconnected and reconnected, some systems require initialization.

4. General repair instructions

(a) When checking the gateway system, it may affect the airbag operation. Therefore, before carrying out maintenance work, be sure to carefully read and confirm the precautions for airbag.

(b) When the part needs to be replaced or the connector needs to be disconnected during maintenance of GW, disconnect the battery negative cable.

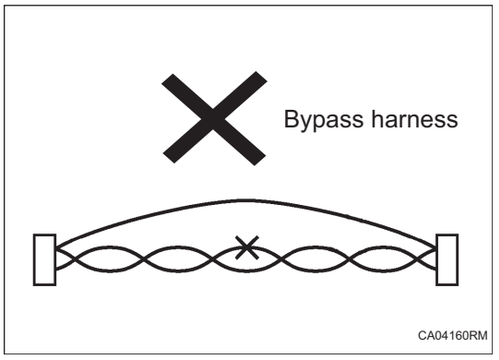
(c) The door control system needs to be initialized after reconnecting the battery. And use the HQ-VDS to "clear the DTC" for all electronic control systems.

5. Bus maintenance

(a) After welding and repairing the bus, wrap the repaired part with insulating tape.

Notice:

- Always install the CANL bus and CANH bus together.
- When installing, make sure to strand them together.
- If the CAN bus is not twisted together, they are more vulnerable to electrical noise interference.



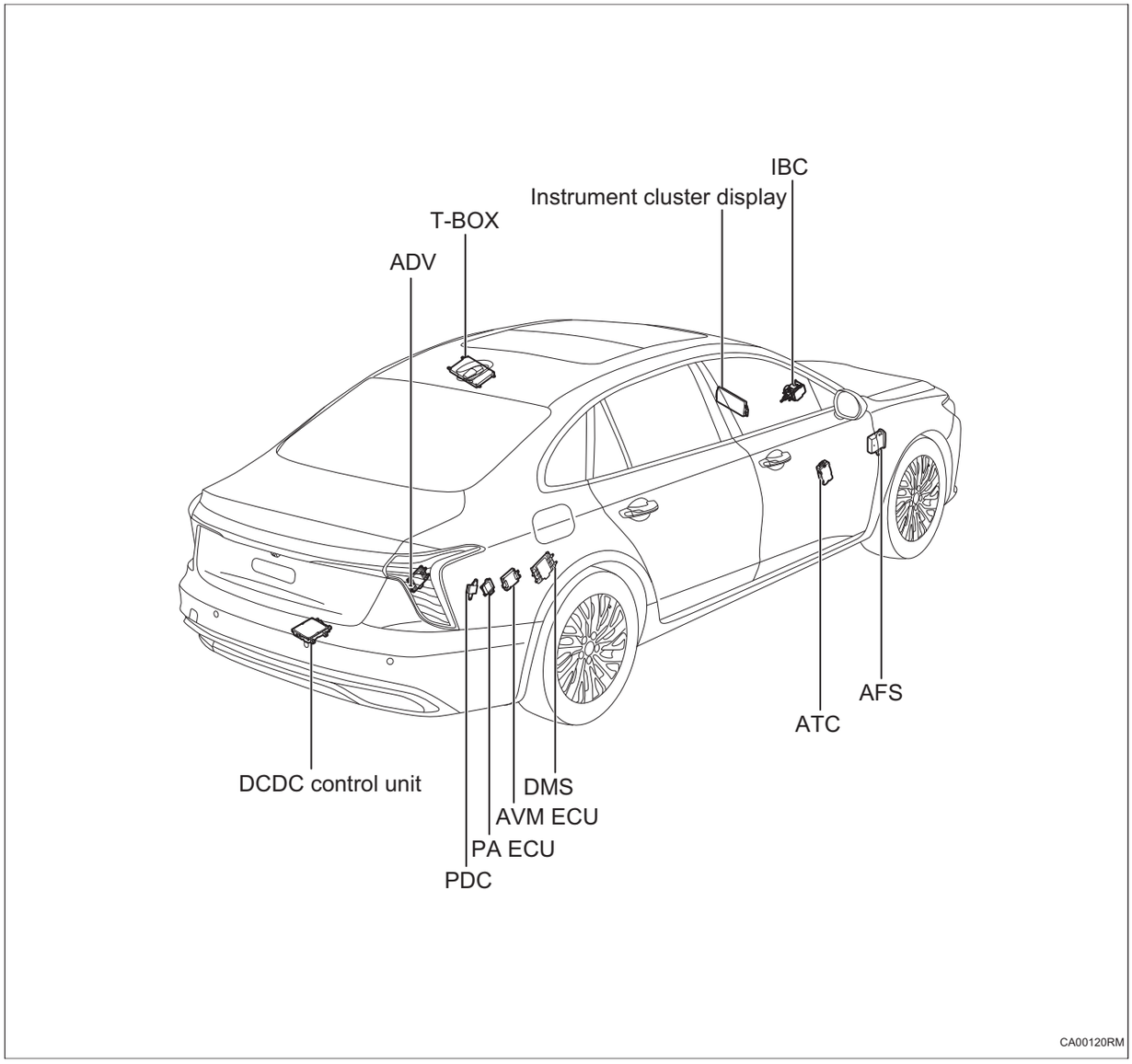
(b) Do not use bypass harness between connectors.

Notice:

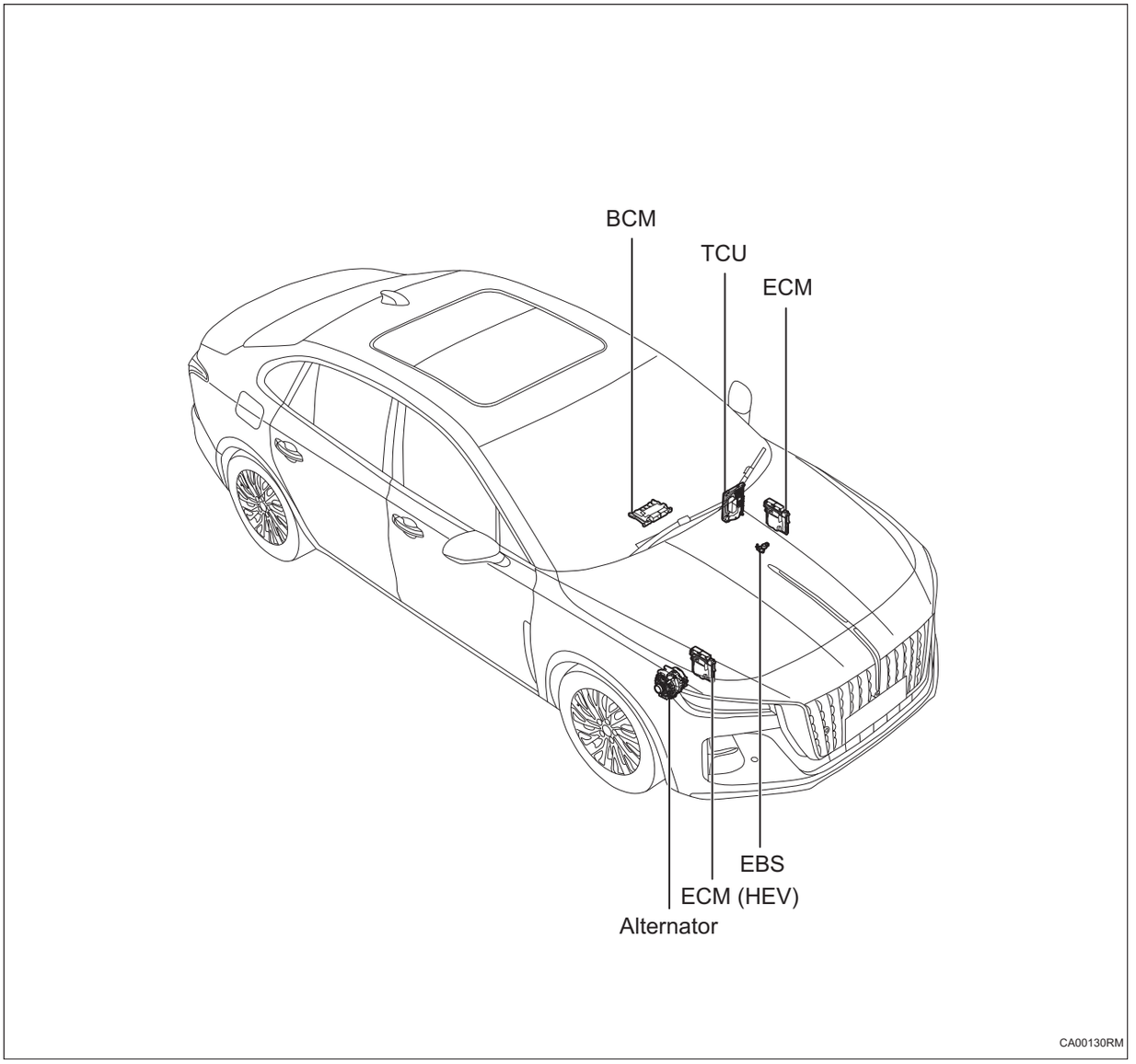
If a bypass harness is used, the twisted bus will lose its immunity to interference.

(c) During service operations, do not use wires to short CANH or CAN-L wires between the two connectors, which will affect bus transmission energy.

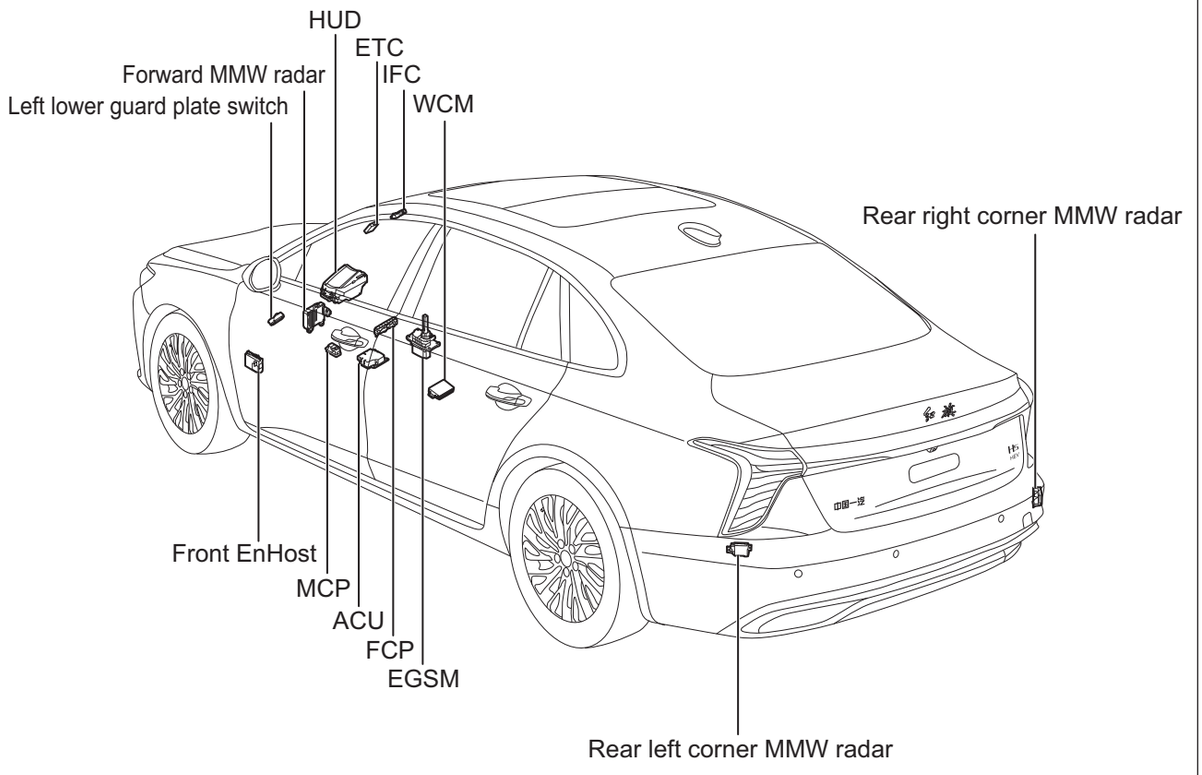
Location of parts



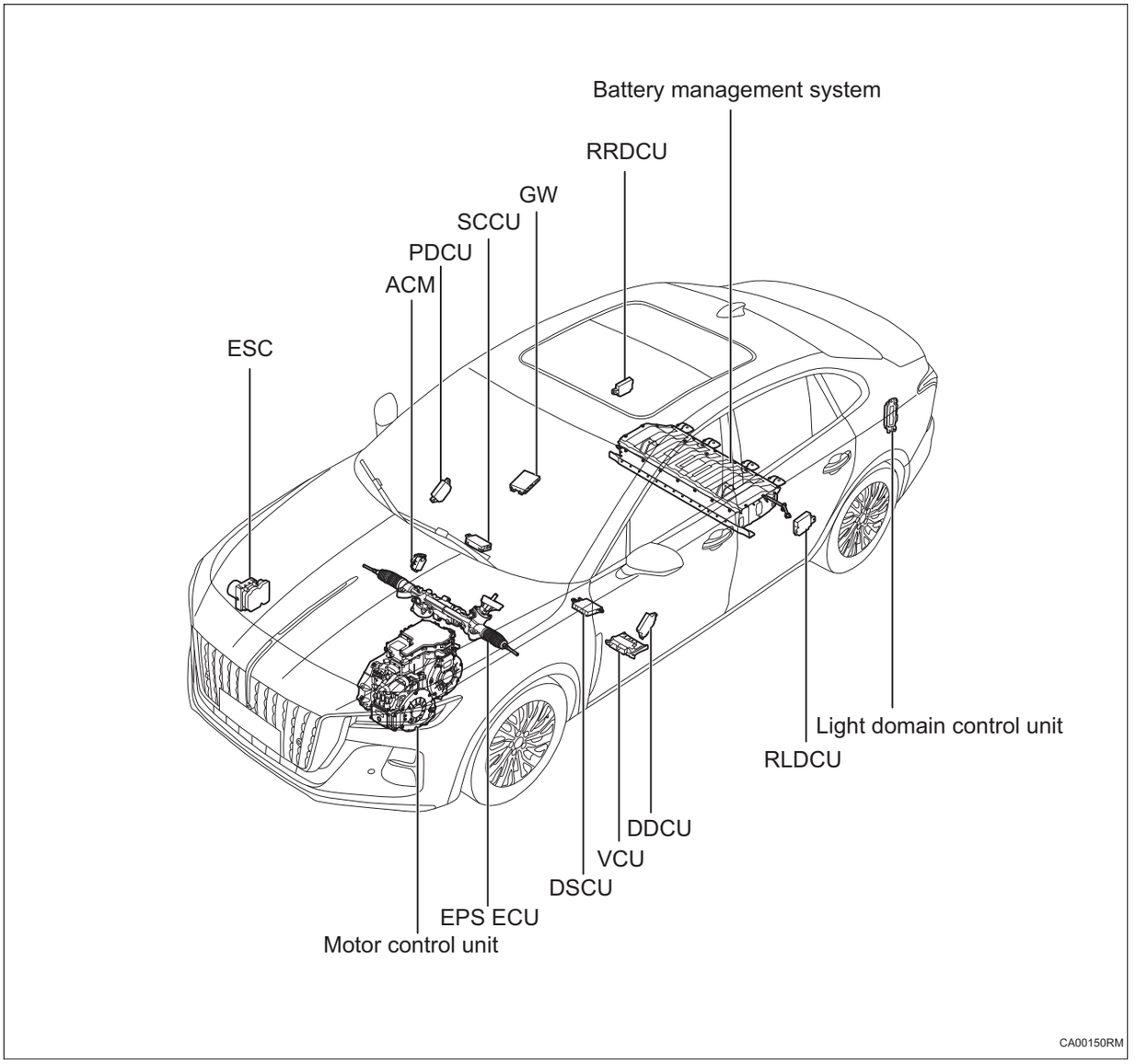
Location of parts



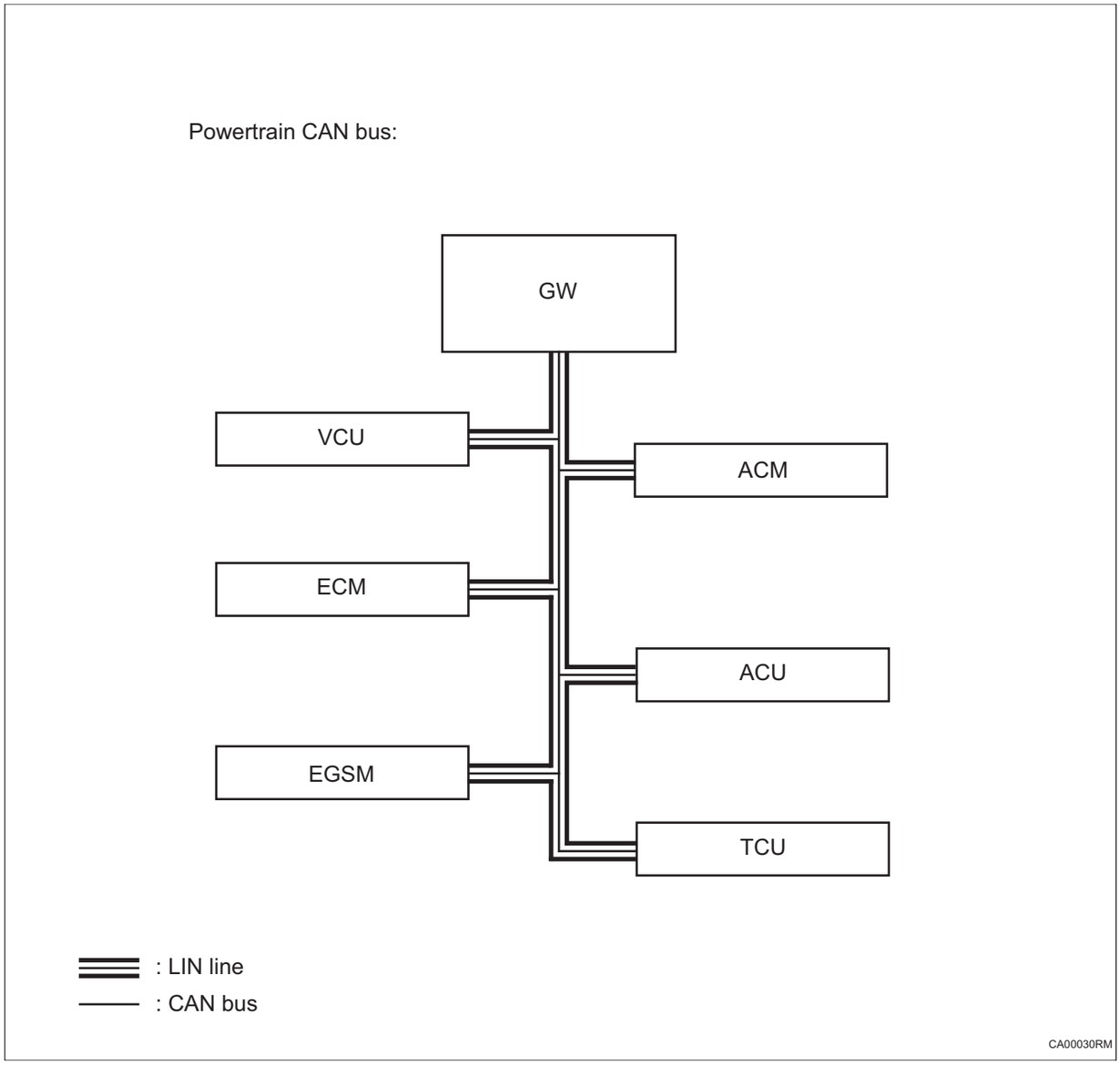
Location of parts



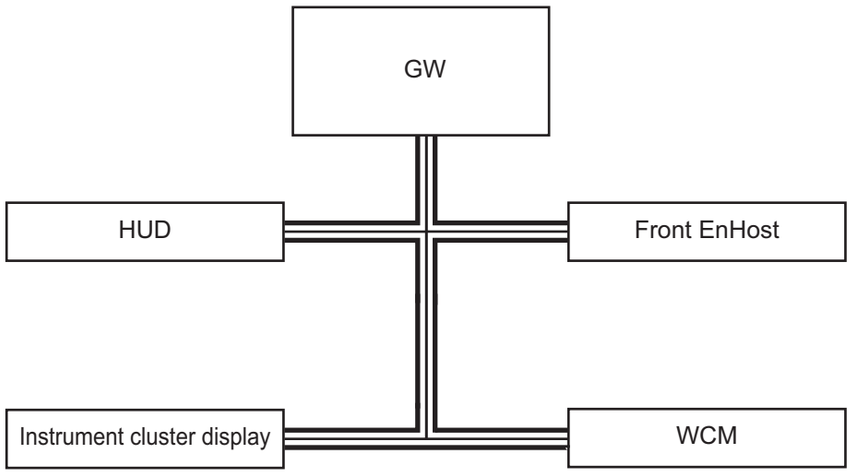
Location of parts



System diagram



Information CAN bus:

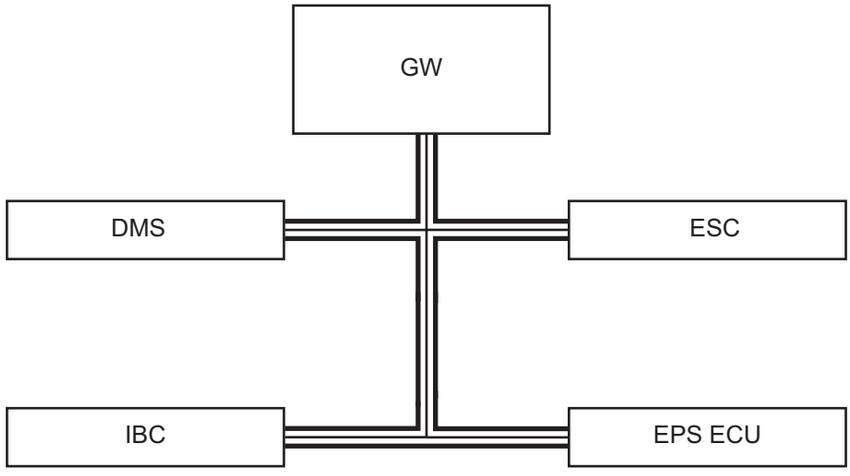


: LIN line

: CAN bus

CA00040RM

Chassis CAN bus:

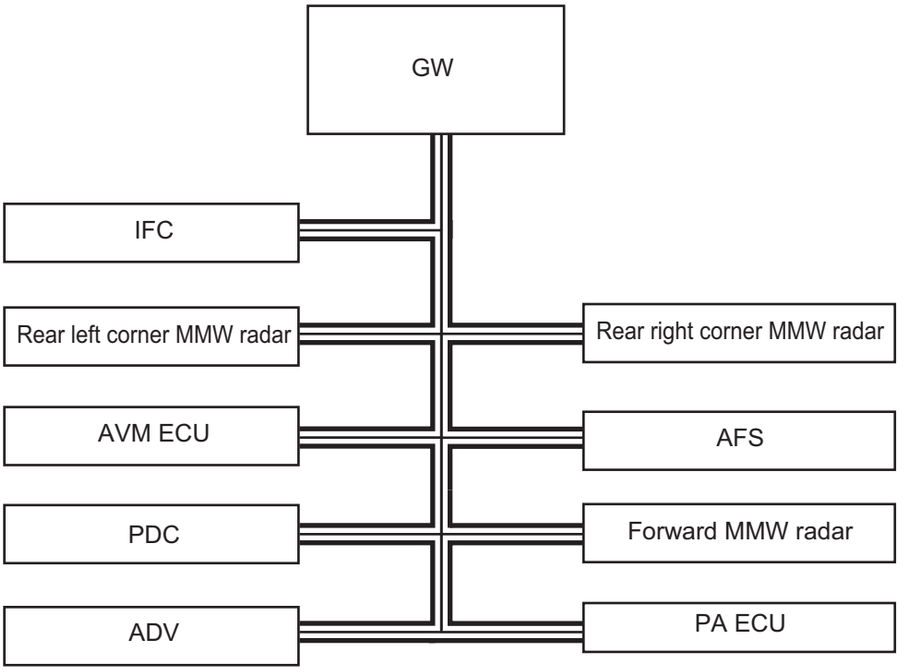


: LIN line

: CAN bus

CA00050RM

Driver assistance CAN bus:

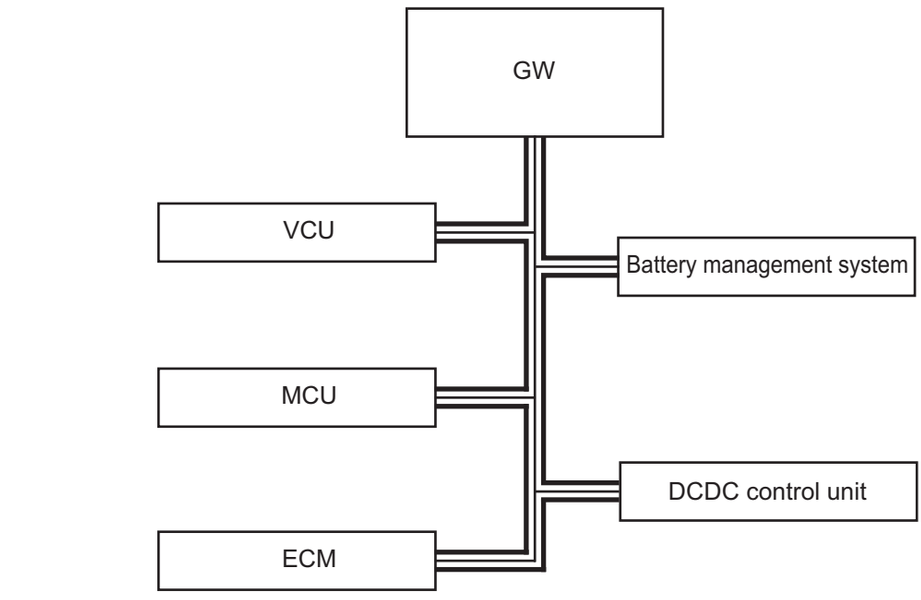


: LIN line

: CAN bus

CA00060RM

Hybrid CAN bus:

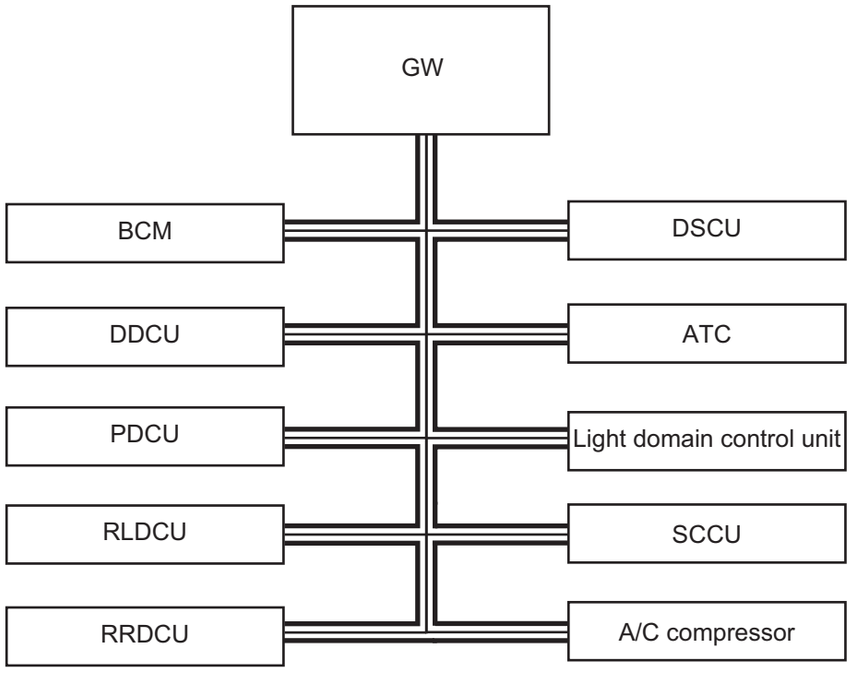


: LIN line

: CAN bus

CA00070RM

Comfort CAN bus:

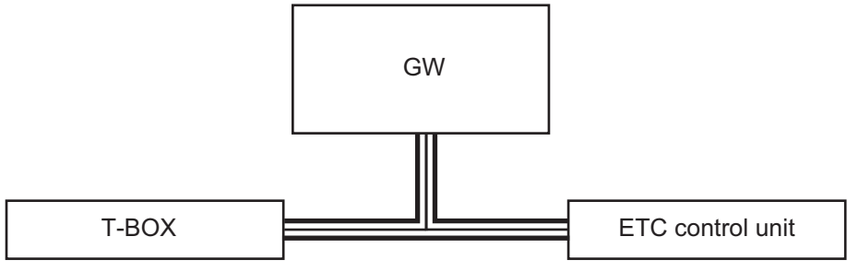


: LIN line

: CAN bus

CA00080RM

Interconnection CAN bus:



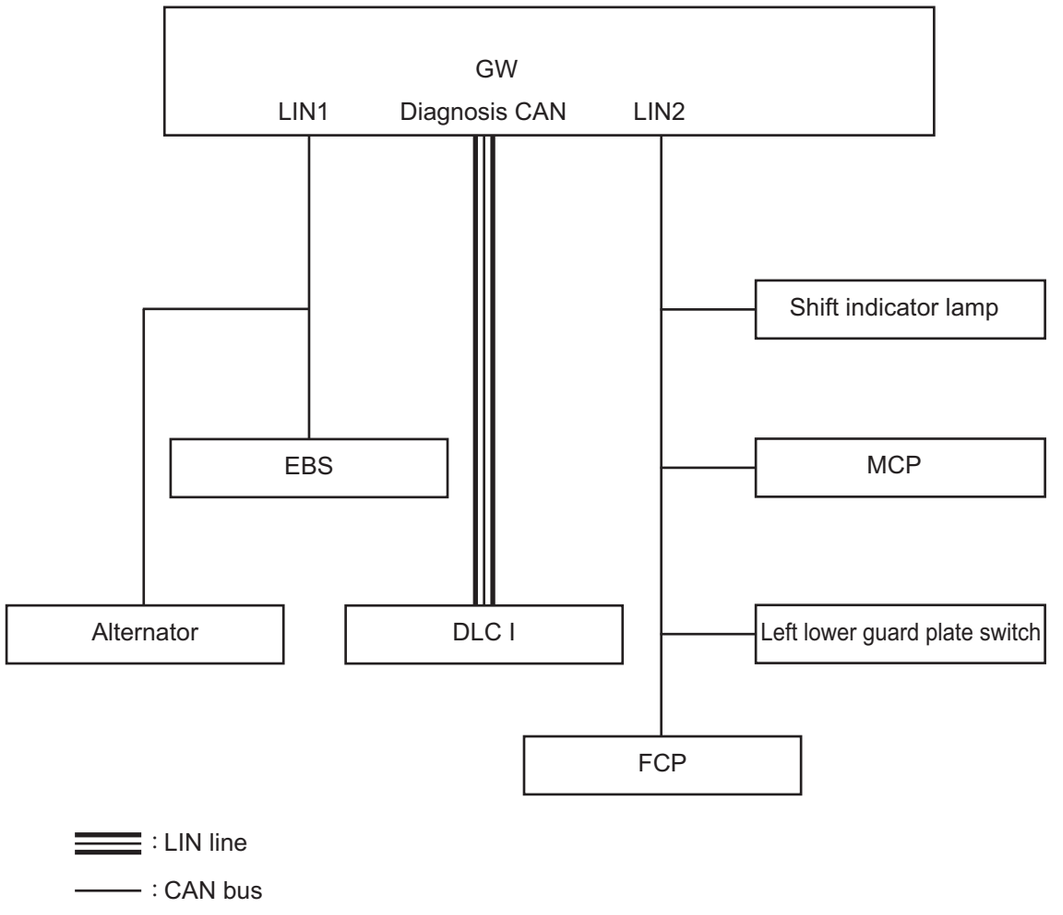
: LIN line

: CAN bus

CA00090RM

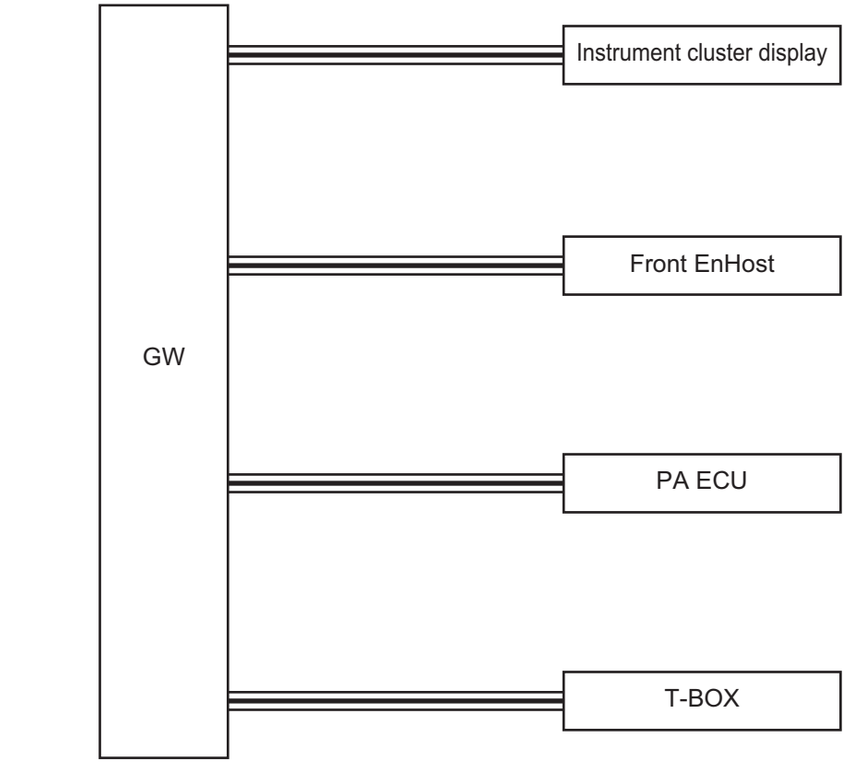
CA

Diagnose CAN and LIN bus:



CA00010RM

Ethernet:



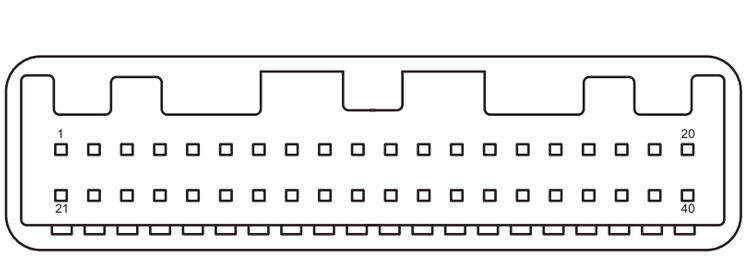
: Ethernet

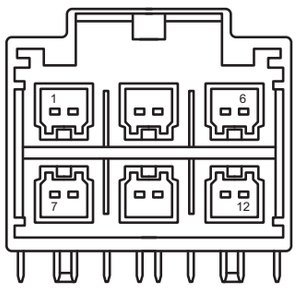
CA00110RM

System description

1. **The vehicle is equipped with a number of modern high-tech electronic control systems, the communication between each system is managed by the GW, and the LAN control can realize the data exchange and communication function of each electronic control system. The system has good data communication capability and self-diagnosis function.**
2. **The vehicle network system consists of CAN subnet, LIN subnet and on-board ethernet.**
3. **CAN combines CAN-H and CAN-L into one pair, and implements communication function under differential voltage to ensure high-speed communication.**

ECU terminal





GW A GW B

CA00010RM

CA

GW-A			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	DIAG_SW1_P6_RXN	21	DIAG_SW1_P6_TXN
2	DIAG_SW1_P6_RXP	22	DIAG_SW1_P6_TXP
3	KL.15-1	23	-
4	-	24	ActiveLine
5	-	25	PT_CAN0_H
6	Diag_CAN7_L	26	PT_CAN0_L
7	Diag_CAN7_H	27	HEV_CAN1_L
8	-	28	HEV_CAN1_H
9	-	29	Comfort_CAN2_H
10	-	30	Comfort_CAN2_L
11	-	31	chassis CAN L
12	-	32	chassis CAN H
13	-	33	-
14	Infor_CAN6_L	34	-
15	Infor_CAN6_H	35	GW-LIN1(DP)
16	Connect_CAN_H	36	GW-LIN0(EBS)
17	Connect_CAN_L	37	-
18	ADAS_CAN4_L	38	GND
19	ADAS_CAN4_H	39	GND
20	VBAT_2(R_BAT	40	VBAT_1(F_BAT)

GW-B			
Pin No.	**DEFINITIONS**	**Pin No.**	**DEFINITIONS**
1	ETH_IVI_SW1_P2_MDIP	7	ETH_TBOX_SW1_P1_MDIN
2	ETH_IVI_SW1_P2_MDIN	8	ETH_TBOX_SW1_P1_MDIP

GW-B			
Pin No.	DEFINITIONS	Pin No.	DEFINITIONS
3	-	9	-
4	-	10	-
5	ETH_IC_SW1_P4_MDIP	11	ETH_AVM_SW1_P3_MDIN
6	ETH_IC_SW1_P4_MDIN	12	ETH_AVM_SW1_P3_MDIP

Terminal resistor

CAN network	Terminal resistor
Powertrain CAN	About 120 Ω
Comfort CAN	About 120 Ω
Information CAN	About 120 Ω
Chassis CAN	About 120 Ω
Driver assistance CAN	About 120 Ω
Interconnection CAN	About 120 Ω
Diagnosis CAN	About 60 Ω

DTC chart

DTC	Description	Reference page
B170016	System undervoltage	(See page CA-21)
B170017	System overvoltage	(See page CA-21)
B170200	Excessive deviation between the mileage recorded by the gateway and the value displayed on instrument cluster	(See page CA-25)
B170344	Gateway MCU RAM failure	(See page CA-26)
B170345	Gateway MCU ROM failure	(See page CA-26)
B170346	Gateway EEPROM faulure	(See page CA-26)
B172000	EBS open circuit	(See page CA-27)
B172100	EBS current sampling failure	(See page CA-27)
B172200	EBS voltage sampling failure	(See page CA-27)
B172300	EBS temperature sampling fault	(See page CA-27)
B172400	EBS calibration data errors	(See page CA-27)
U000188	Powertrain CAN bus off	(See page CA-33)
U002888	Body/comfort CAN bus off	(See page CA-40)
U003788	Driver assistance/extension CAN bus off	(See page CA-47)
U004688	Information CAN bus off	(See page CA-54)
U006488	Chassis CAN bus off	(See page CA-67)
U007588	Diagnostic CAN bus off	(See page CA-74)
U008088	T-box CAN bus off	(See page CA-81)
U000287	Powertrain CAN bus global timeout	(See page CA-33)
U010087	ECM node lost	(See page CA-88)

DTC	Description	Reference page
U010187	TCU node lost	(See page CA-93)
U010387	EGSM node lost	(See page CA-98)
U029187	ACM node lost	(See page CA-197)
U015187	ACU node lost	(See page CA-128)
U006587	Chassis CAN bus global timeout	(See page CA-67)
U012187	ESC IBC node lost	(See page CA-111)
U013187	EPS ECU node lost	(See page CA-116)
U002987	Comfort CAN bus global timeout	(See page CA-40)
U014087	BCM 1 node lost	(See page CA-124)
U019987	Driver door module node lost	(See page CA-157)
U020087	Passenger door module node lost	(See page CA-161)
U020187	Rear left door module node lost	(See page CA-165)
U020287	Rear right door module node lost	(See page CA-169)
U020887	Driver seat control unit node lost	(See page CA-173)
U02E387	Headlamp control unit node lost	(See page CA-220)
U016487	A/C control unit 1 node lost	(See page CA-153)
U004787	Information CAN bus global timeout	(See page CA-54)
U024587	EnHost node lost	(See page CA-189)
U015587	IPC node lost	(See page CA-133)
U003887	Driver assistance CAN bus global timeout	(See page CA-47)
U015987	PA node lost	(See page CA-145)
U008087	Interconnection CAN bus global timeout	(See page CA-81)
U02D587	ETC system node lost	(See page CA-213)
U100588	GW LIN1 physical bus error	(See page CA-224)
U130486	EBS LIN communication error	(See page CA-224)
U130986	Alternator regulator LIN communication error	(See page CA-224)
U011187	EBS node loss	(See page CA-224)
U012087	Alternator governor node lost	(See page CA-224)
U100688	GW LIN2 physical bus error	(See page CA-230)
U133686	Middle passage control panel LIN communication error	(See page CA-230)
U133786	Front control panel LIN communication error.	(See page CA-230)
U130F86	Gear position indicator control unit LIN communication error	(See page CA-230)
U131A86	Left lower guard plate switch panel communication error	(See page CA-230)
U011F87	Middle passage control panel node lost	(See page CA-230)
U02D987	Front control panel node lost	(See page CA-230)
U029087	Gear position indicator control unit node lost	(See page CA-230)
U028887	Left lower guard plate switch panel node lost	(See page CA-230)

DTC	Description	Reference page
U14408A	GW Eth1 (Port1.2 IVI1) connection failure	(See page CA-237)
U14A28E	IVI1 SOMEIP no response	(See page CA-237)
U14438A	GW Eth4(Port2.2 TBox) connection failure	(See page CA-249)
U14928D	TBOX PDU message timeout	(See page CA-249)
U160100	CAN firewall message length error	(See page CA-253)
U013887	DMS node lost	(See page CA-119)
U015887	HUD node lost	(See page CA-138)
U023587	IFC node lost	(See page CA-181)
U024287	AVM ECU integrated ultrasonic sensor node lost	(See page CA-149)
U023A87	AVM ECU integrated ultrasonic sensor node lost	(See page CA-141)
U023387	LCDA node lost	(See page CA-177)
U024387	ADV node lost	(See page CA-184)
U02E187	IHC node lost	(See page CA-216)
U14418A	GW Eth2(Port1.2 IC) connection failure	(See page CA-241)
U14428A	GW Eth3(Port1.4APA) connection failure	(See page CA-245)
U029387	HCU node lost	(See page CA-200)
U011087	MCU 1 node lost	(See page CA-101)
U029A87	BMS node lost	(See page CA-208)
U029887	DCDC (high voltage) node lost	(See page CA-205)
U024687	SCCU node lost	(See page CA-193)
U005588	Hybrid/electric CAN bus off	(See page CA-61)
U005687	Hybrid/electric CAN bus global timeout	(See page CA-61)
U012987	IBC node lost	(See page CA-106)

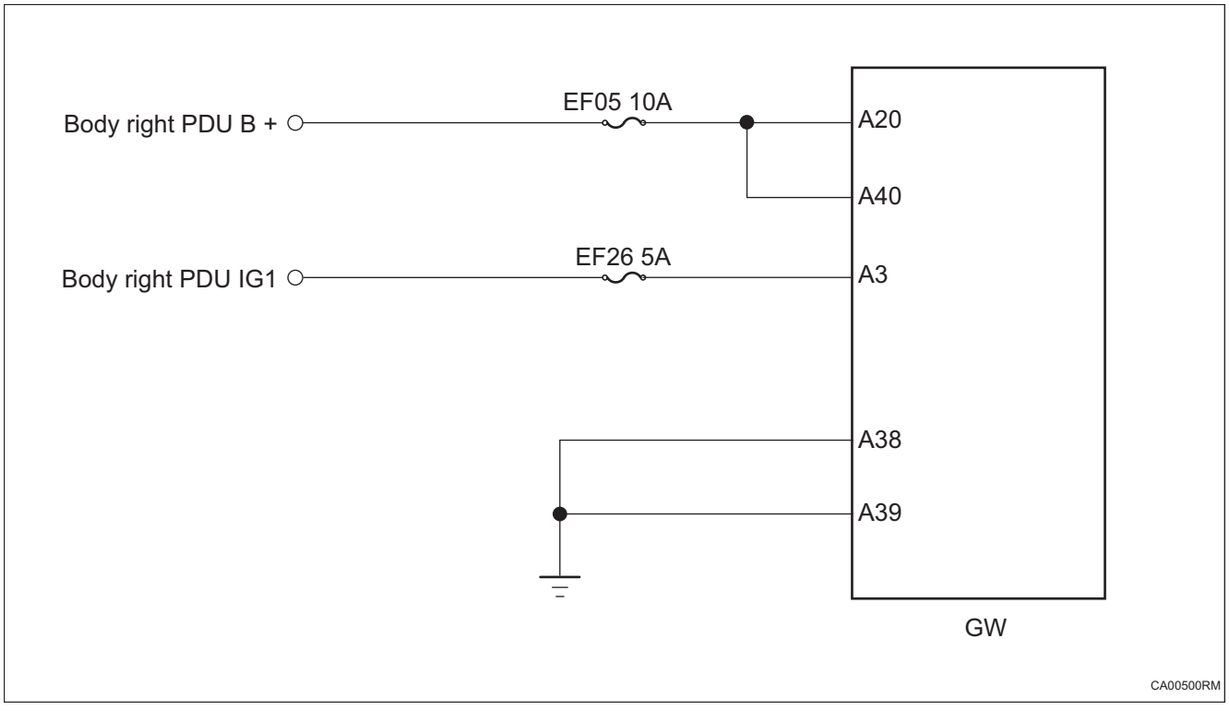
DTC	B170016	System undervoltage
DTC	B170017	System overvoltage

Description

When the GW power supply is out of the normal operating range, the GW records the DTC.

DTC	DTC detection conditions	Faulty location
B170016	(a) System undervoltage.	• GW • Harness and connector • Charging system
B170017	(a) System overvoltage.	• GW • Harness and connector • Charging system

Circuit diagram



Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery + - battery -	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2	Check GW fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the GW fuse.

(d) Measure the resistance according to the values in the table below.

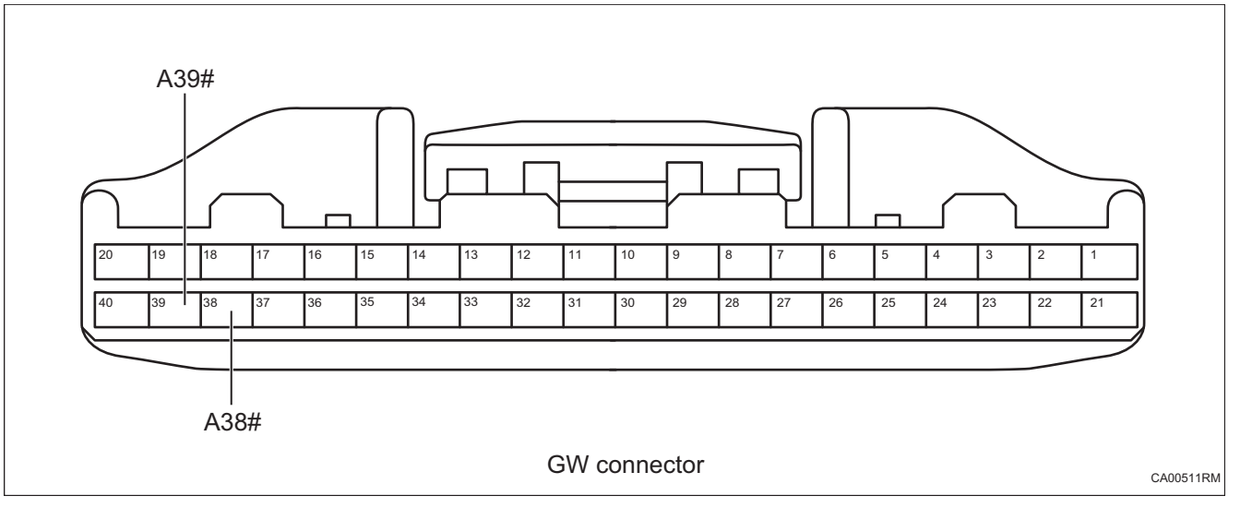
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

OK

3	Check GW ground



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the GW connector.

(d) Measure the resistance according to the values in the table below.

Standard value

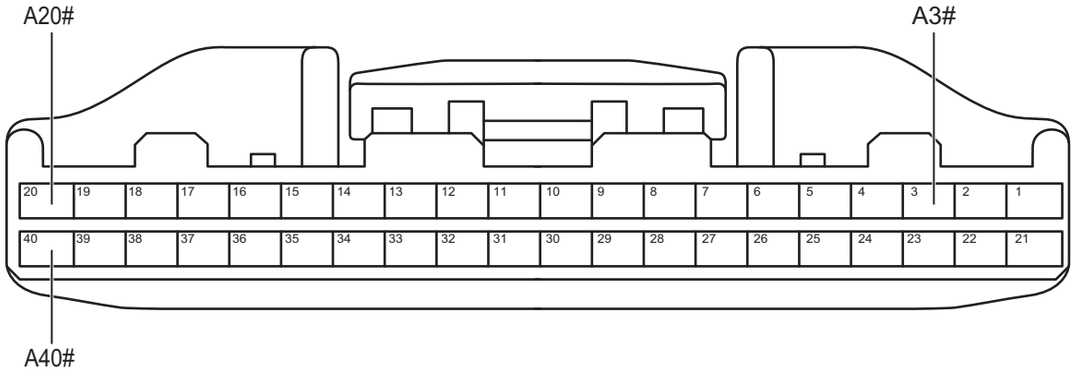
Detector connection	Detection conditions	Specified state
GW connector A38# -body GND	Always connected	Less than 1Ω

Detector connection	Detection conditions	Specified state
GW connector A39# -body GND	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

4	Check GW power supply



GW connector

CA00521RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
GW connector A3# -body GND	The ignition switch is set to "ON"	Battery voltage
GW connector A20# -body GND	The ignition switch is set to "ON"	Battery voltage
GW connector A40# -body GND	The ignition switch is set to "ON"	Battery voltage

NG **Repair or replace the harness and connector**

CA

OK

5	Replace GW (See page CA-256)

DTC	B170200	Excessive deviation between the mileage recorded by the gateway and the value displayed on instrument cluster

Description

When the GW recorded kilometers are inconsistent with the value displayed on instrument cluster, the GW records the DTC.

DTC	DTC detection conditions	Faulty location
B170200	(a) The mileage recorded by the gateway deviates too much from the value displayed on instrument cluster.	• Instrument cluster display • GW

Inspection procedure

1	GW executes automatic configuration module program

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) GW executes automatic configuration module program.

(d) Clear the DTC.

(e) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

2	Replace the instrument cluster display

CA

DTC	B170344	Gateway MCU RAM failure
DTC	B170345	Gateway MCU RAM failure
DTC	B170346	Gateway EEPROM faulure

Description

When the GW internal data or hardware fails, the GW records DTC.

DTC	DTC detection conditions	Faulty location
B170344	(a) Gateway MCU RAM failure.	• GW
B170345	(a) Gateway MCU RAM failure.	• GW
B170346	(a) GW EEPROM fault.	• GW

Inspection procedure

1	**Clear DTC**

(a) Connect the HQ-VDS.

(b) Set the ignition switch to "ON".

(c) Clear the DTC.

(d) Re-read the DTC

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

2	**End**

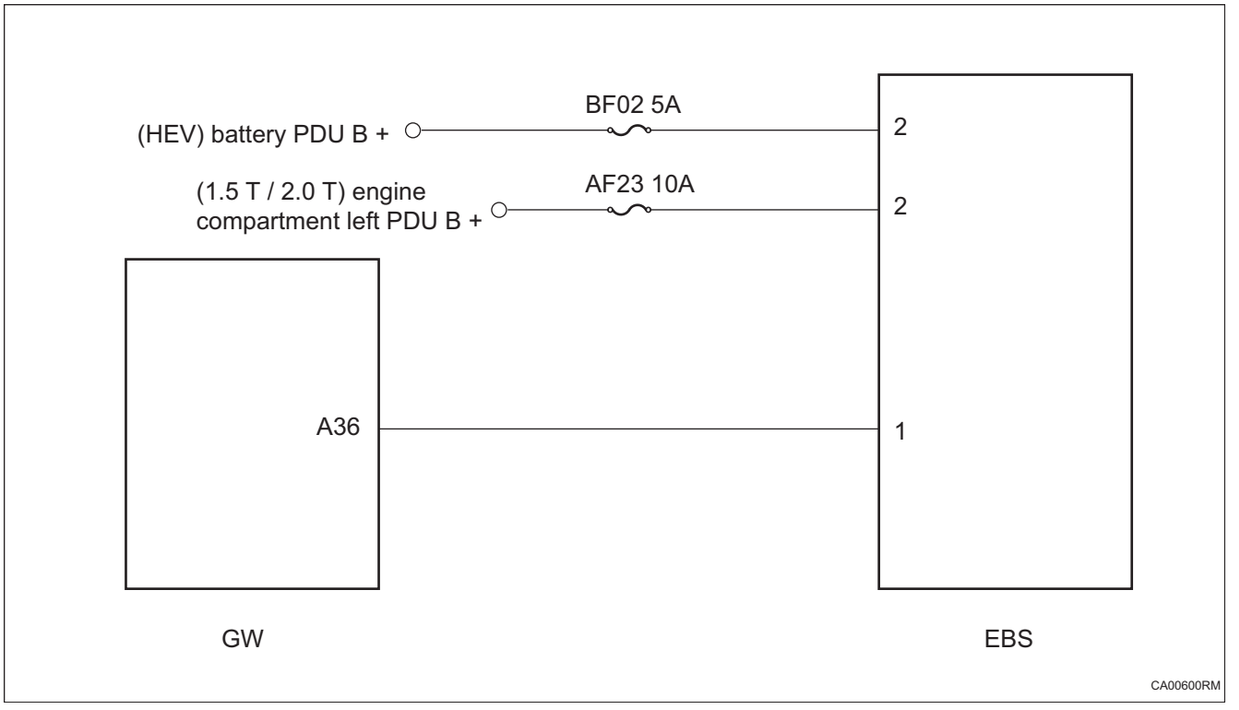
DTC	B172000	EBS open circuit
DTC	B172100	EBS current sampling failure
DTC	B172200	EBS voltage sampling failure
DTC	B172300	EBS temperature sampling fault
DTC	B172400	EBS calibration data errors

Description

When the communication between the EBS and the GW is abnormal or interrupted, the GW records the DTC.

DTC	DTC detection conditions	Faulty location
B172000	(a) EBS open circuit.	• Battery • EBS • LIN line and connector • GW
B172100	(a) EBS current sampling failure.	• Battery • EBS • LIN line and connector • GW
B172200	(a) EBS voltage sampling failure.	• Battery • EBS • LIN line and connector • GW
B172300	(a) EBS temperature sampling fault	• Battery • EBS • LIN line and connector • GW
B172400	(a) EBS calibration data error.	• Battery • EBS • LIN line and connector • GW

Circuit diagram



CA

Inspection procedure

1	Check the battery voltage

(a) Start the vehicle and measure the battery voltage.

Standard value

Detector connection	Detection conditions	Specified state
Battery positive terminal -battery negative terminal	Always connected	About 11~14 V

NG → **Overhaul the charging system**

OK

2	Check EBS fuse

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Remove the EBS fuse.

(d) Measure the resistance according to the values in the table below.

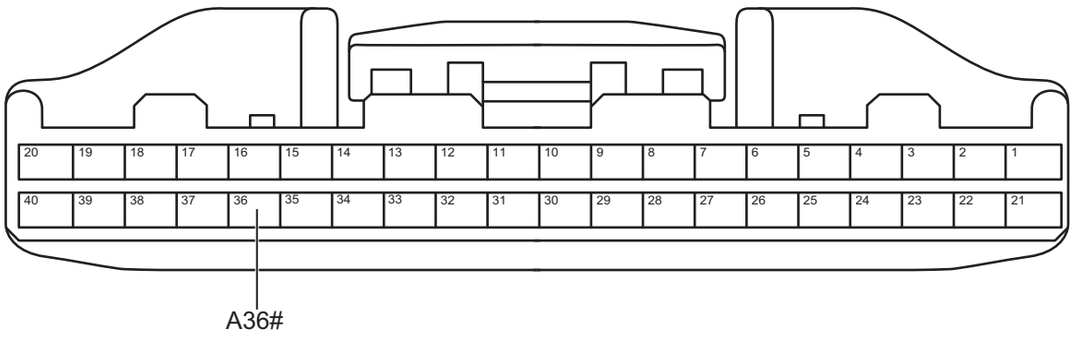
Standard value

Detector connection	Detection conditions	Specified state
Two ends of fuse	Always connected	Less than 1Ω

NG → **Replace fuse**

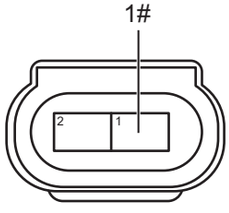
OK

3 Check the EBS harness and connector for open circuit

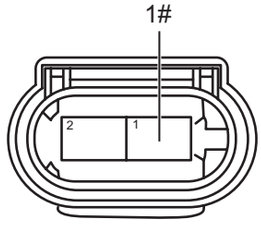


GW A connector

CA00611RM



EBS (HEV) connector



EBS (1.5 T/2.0 T) connector

CA00621RM

(a) Measure the resistance according to the values in the table below.

Standard value

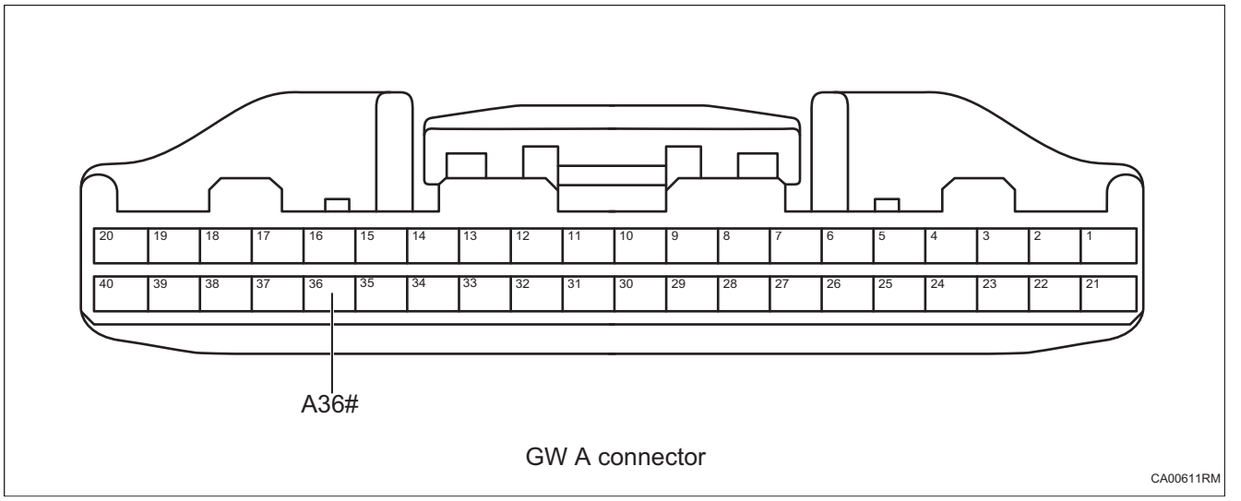
Detector connection	Detection conditions	Specified state
EBS connector 1#-GW connector A36#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

CA

OK

4	Check EBS harness and connector wire for circuit shorted to ground



GW A connector

CA00611RM

CA

(a) Measure the resistance according to the values in the table below.

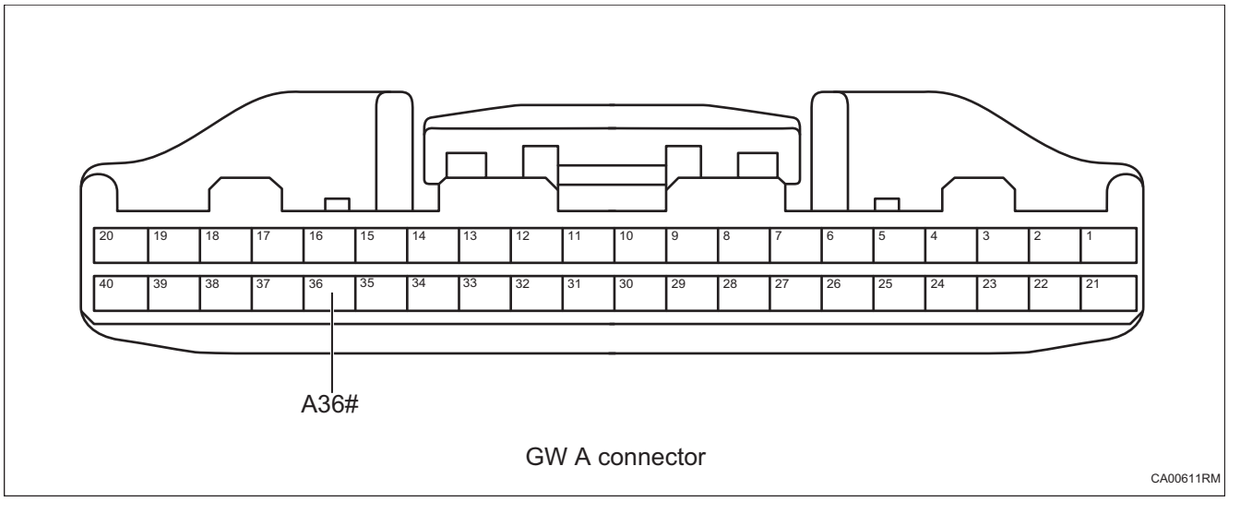
Standard value

Detector connection	Detection conditions	Specified state
GW connector A36# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

5	Check EBS harness and connector wire for circuit shorted to power supply



GW A connector

CA00611RM

(a) Install the fuse.

(b) Connect the battery negative terminal.

(c) Set the ignition switch to "ON".

(d) Measure the voltage according to the values in the table below.

Standard value

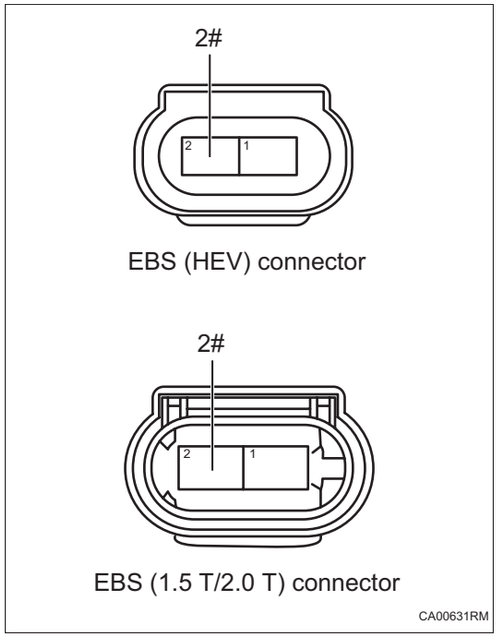
Detector connection	Detection conditions	Specified state
GW connector A36# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

CA

OK

6	Check the EBS power supply



(a) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
EBS connector 2# -body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

7	Replace the EBS (See page CH-17)

(a) Replace the EBS.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

8	**End**

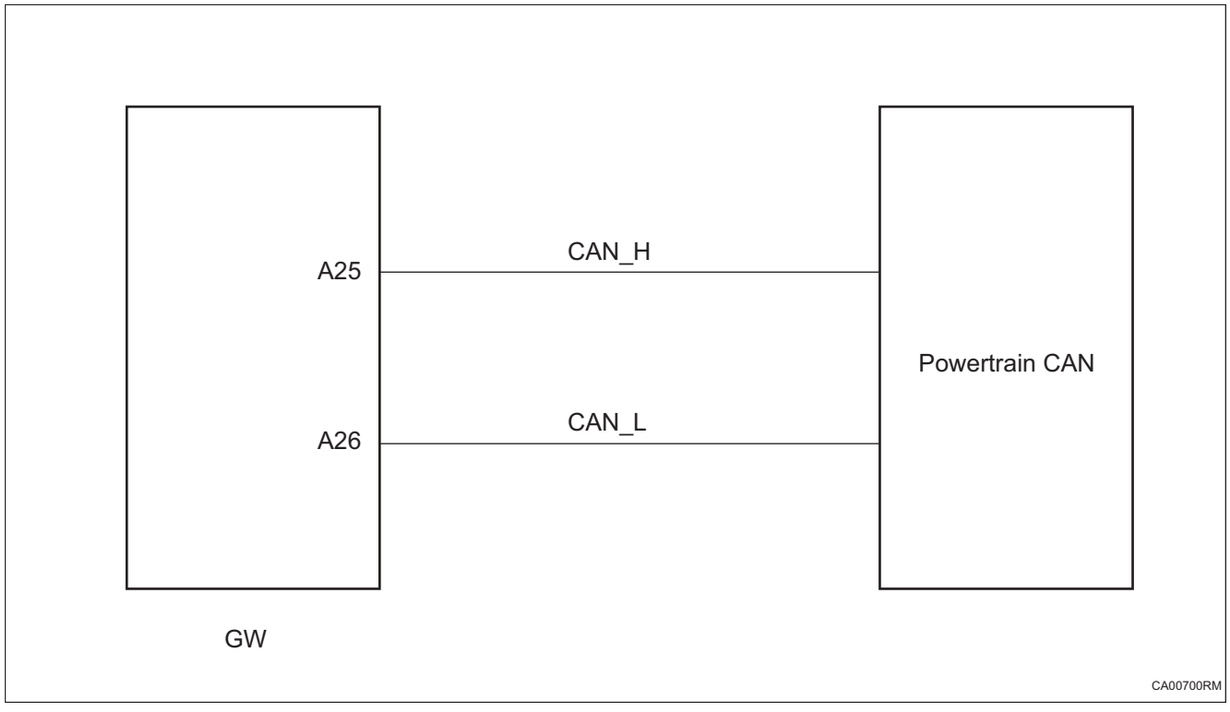
DTC	U000188	Powertrain CAN bus off
DTC	U000287	Powertrain CAN bus global timeout

Description

When the GW powertrain CAN communication is abnormal or interrupted, the GW records DTC.

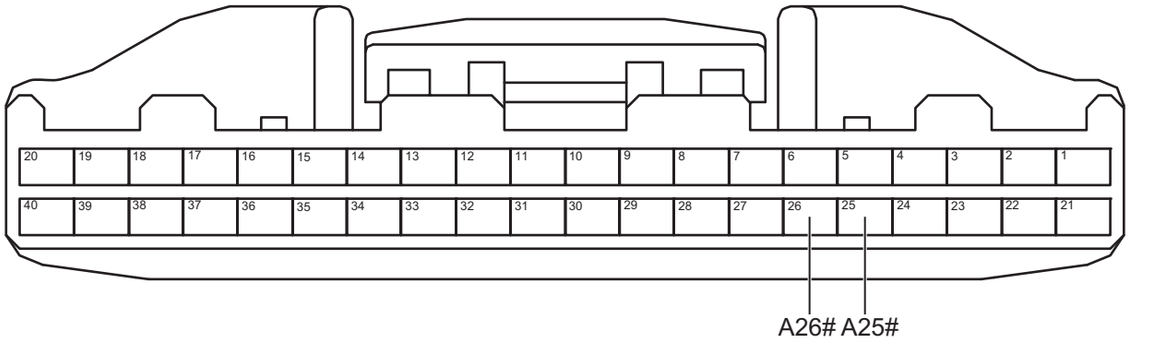
DTC	DTC detection conditions	Faulty location
U000188	(a) Powertrain CAN bus off.	• CAN line and connector • GW
U000287	(a) Powertrain CAN bus global timeout.	• CAN line and connector • GW

Circuit diagram



Inspection procedure

1	**Check whether there is short circuit between the powertrain CAN bus CAN-L and CAN-H**



GW A connector

CA00711RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the powertrain CAN bus.

(d) Measure the resistance according to the values in the table below.

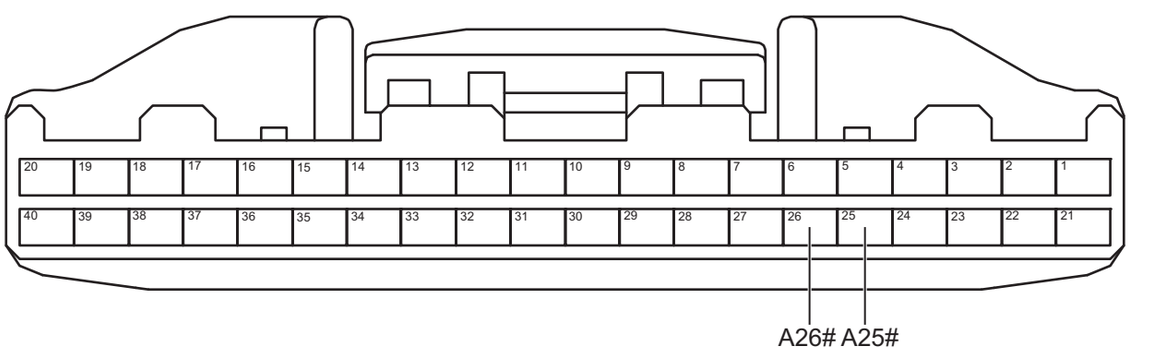
Standard value

Detector connection	Detection conditions	Specified state
GW connector A25# - GW connector A26#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

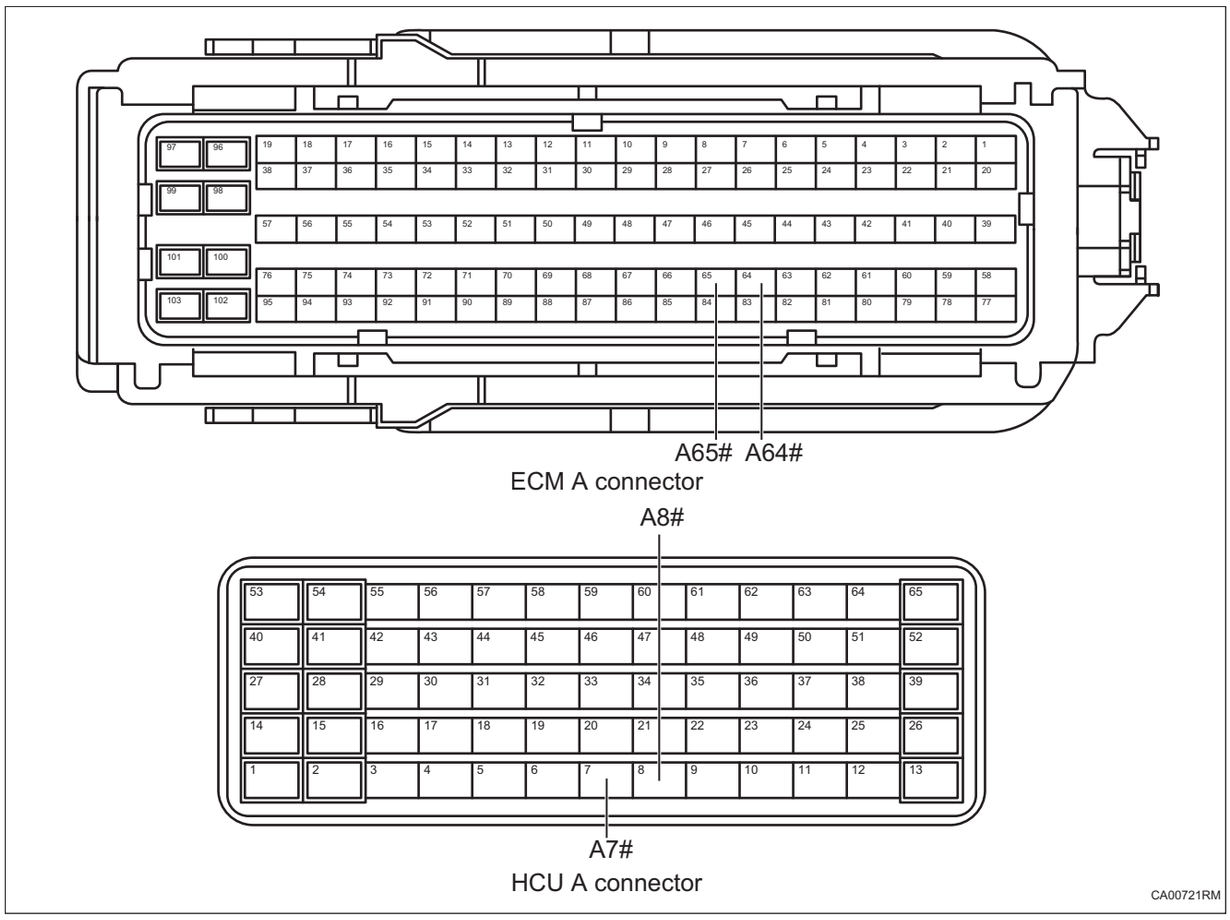
OK

2	Check powertrain CAN bus for open circuit (GW-ECM/HCU)



GW A connector

CA00711RM



(a) Measure the resistance according to the values in the table below.

Standard value

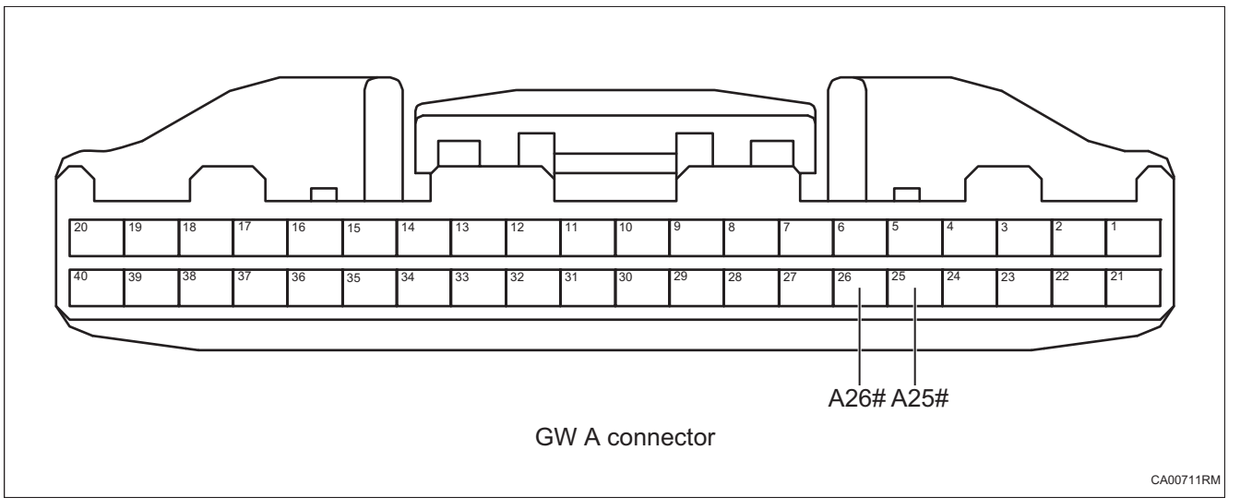
Detector connection	Detection conditions	Specified state
ECM A65# - GW connector A25#	Always connected	Less than 1Ω
ECM A64# - GW connector A26#	Always connected	Less than 1Ω
HCU A8#-GW connector A25#	Always connected	Less than 1Ω
HCU A7#-GW connector A26#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check powertrain CAN bus for circuit shorted to ground**

CA



GW A connector

CA00711RM

CA

(a) Measure the resistance according to the values in the table below.

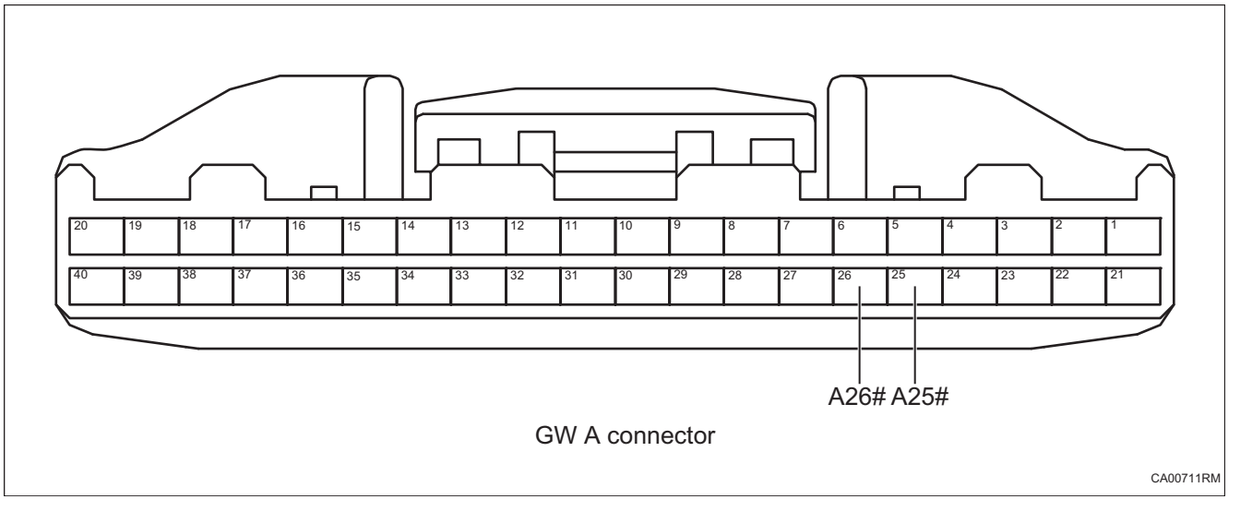
Standard value

Detector connection	Detection conditions	Specified state
GW connector A25# -body GND	Always connected	10 KΩ or greater
GW connector A26# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check powertrain CAN bus for circuit shorted to power supply



GW A connector

CA00711RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

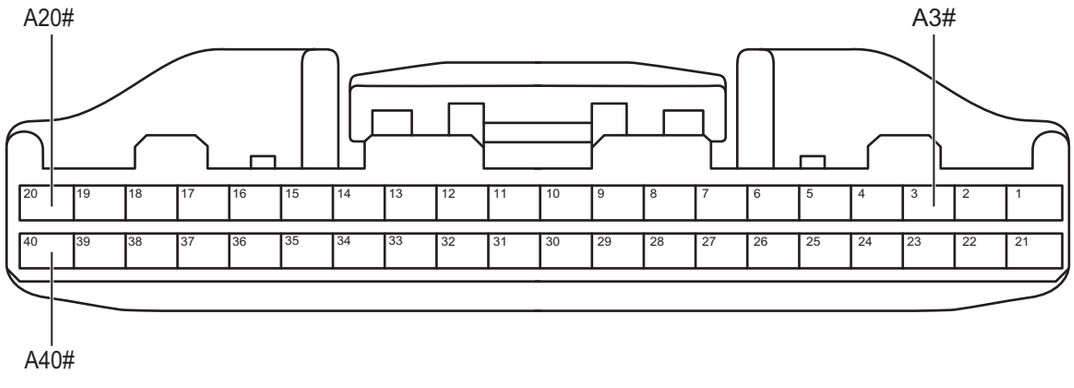
Detector connection	Detection conditions	Specified state
GW connector A25# -body GND	Set the ignition switch to "ON"	Less than 1 V
GW connector A26# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

CA

OK

5 Check GW power supply



GW A connector

CA00521RM

(a) Measure the voltage according to the values in the table below.

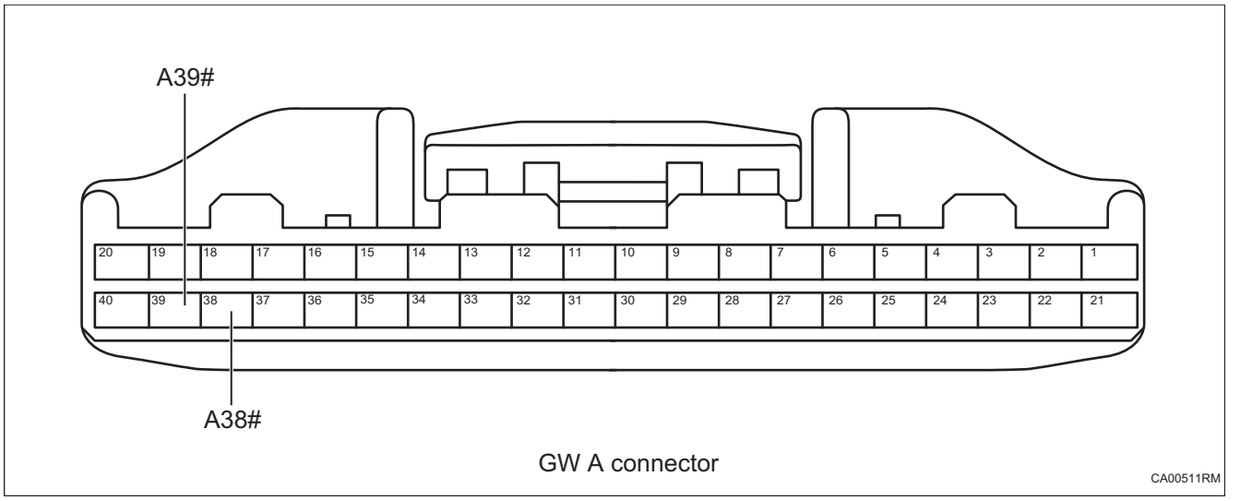
Standard value

Detector connection	Detection conditions	Specified state
GW connector A3# -body GND	Set the ignition switch to "ON"	Battery voltage
GW connector A20# -body GND	Set the ignition switch to "ON"	Battery voltage
GW connector A40# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

6	Check GW ground



GW A connector

CA00511RM

(a) Measure the resistance according to the values in the table below.

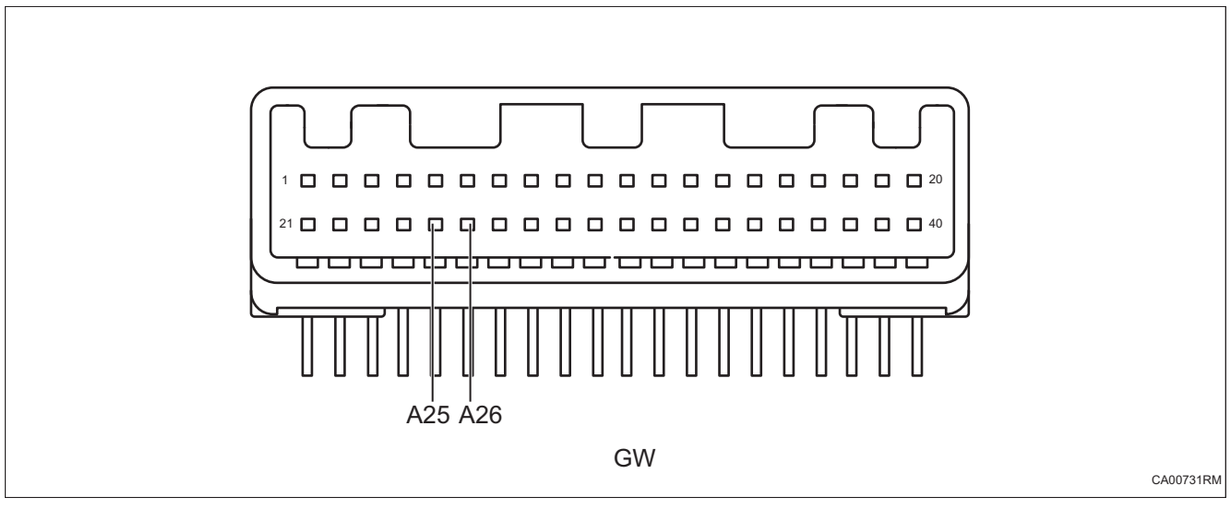
Standard value

Detector connection	Detection conditions	Specified state
GW connector A38# -body GND	Always connected	Less than 1Ω
GW connector A39# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

7	Check GW terminal resistor



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
GW A25#- GW A26#	Always connected	About 120 Ω

NG → **Replace GW (See page CA-256)**

OK

8	**End**

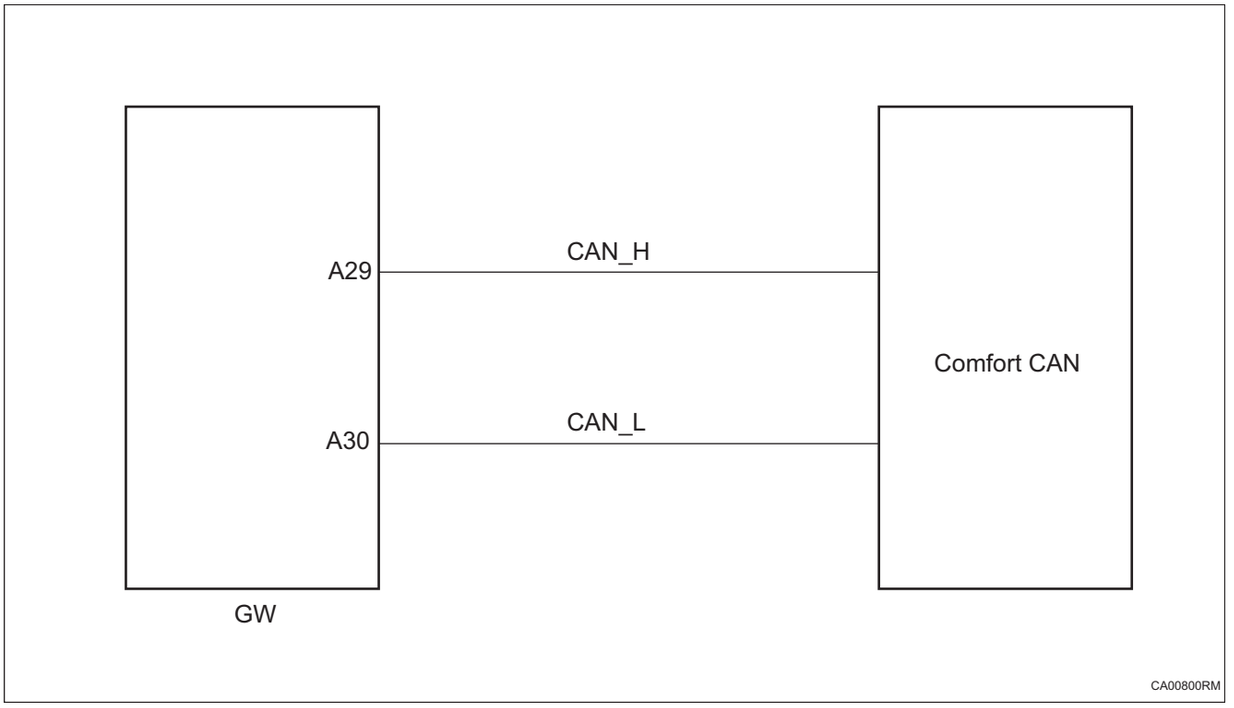
DTC	U002888	Body/comfort CAN bus off
DTC	U002987	Comfort CAN bus global timeout

Description

When the GW comfort CAN communication is abnormal or interrupted, the GW records DTC.

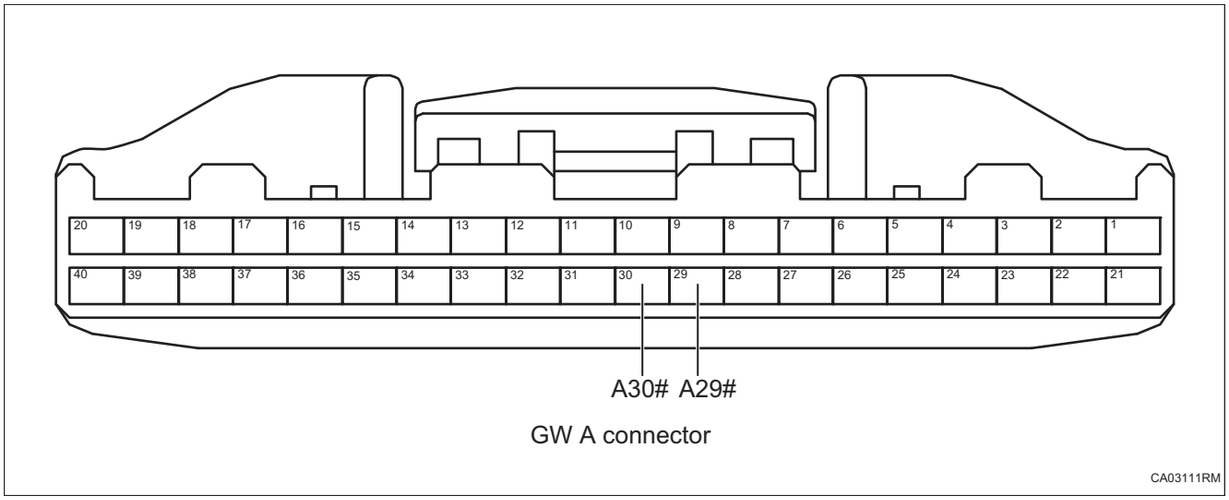
DTC	DTC detection conditions	Faulty location
U002888	(a) Comfort CAN bus off.	• CAN line and connector • GW
U002987	(a) Comfort CAN bus global timeout.	• CAN line and connector • GW

Circuit diagram



Inspection procedure

1	Check whether there is short circuit between the comfort CAN bus CAN-L and CAN-H



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the comfort CAN bus.

(d) Measure the resistance according to the values in the table below.

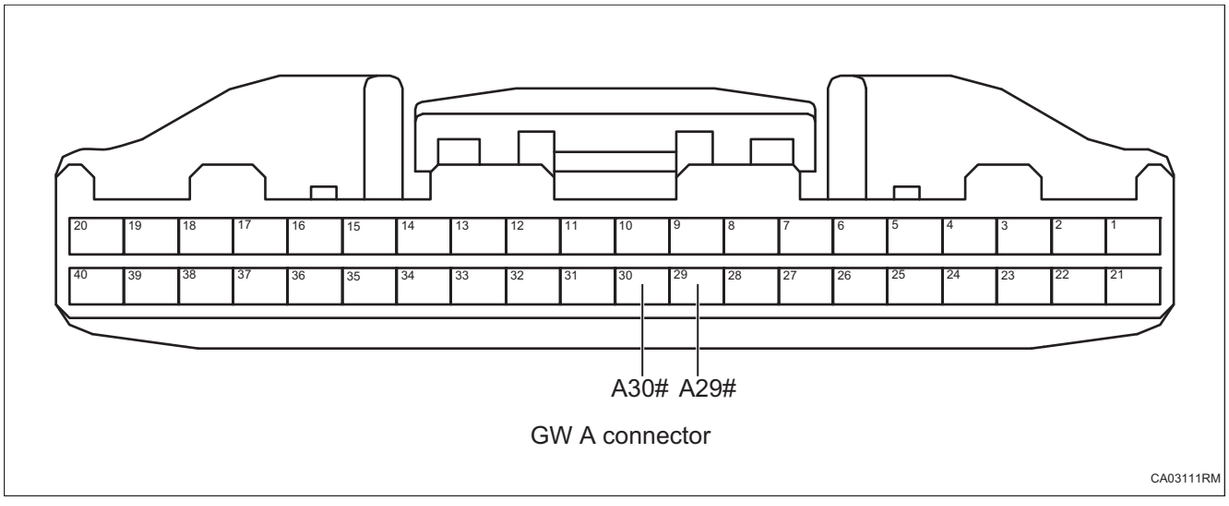
Standard value

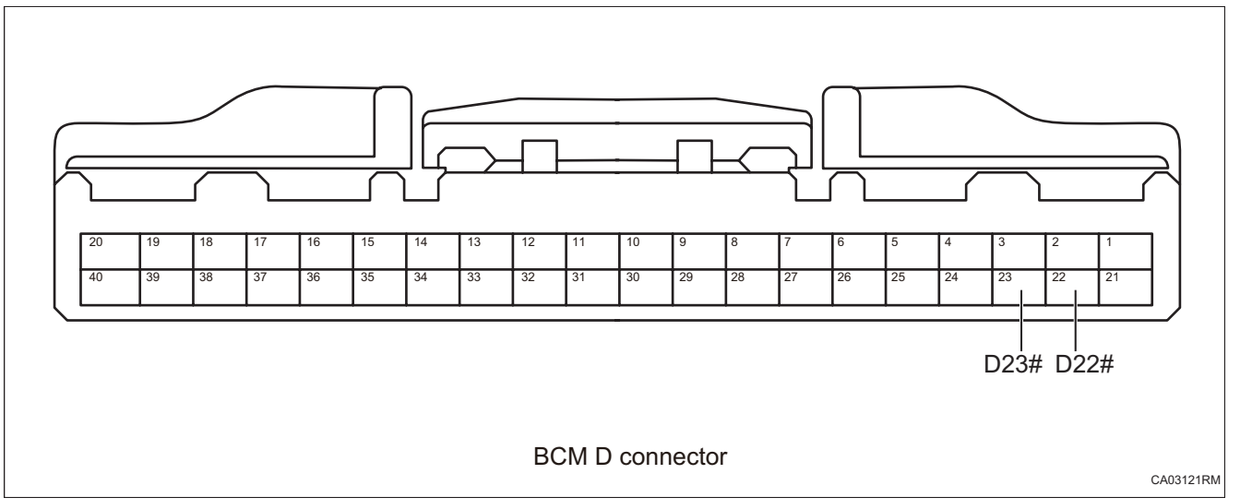
Detector connection	Detection conditions	Specified state
GW connector A29# - GW connector A30#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

2	Check comfort CAN bus for open circuit (GW-BCM)





BCM D connector

CA03121RM

CA

(a) Measure the resistance according to the values in the table below.

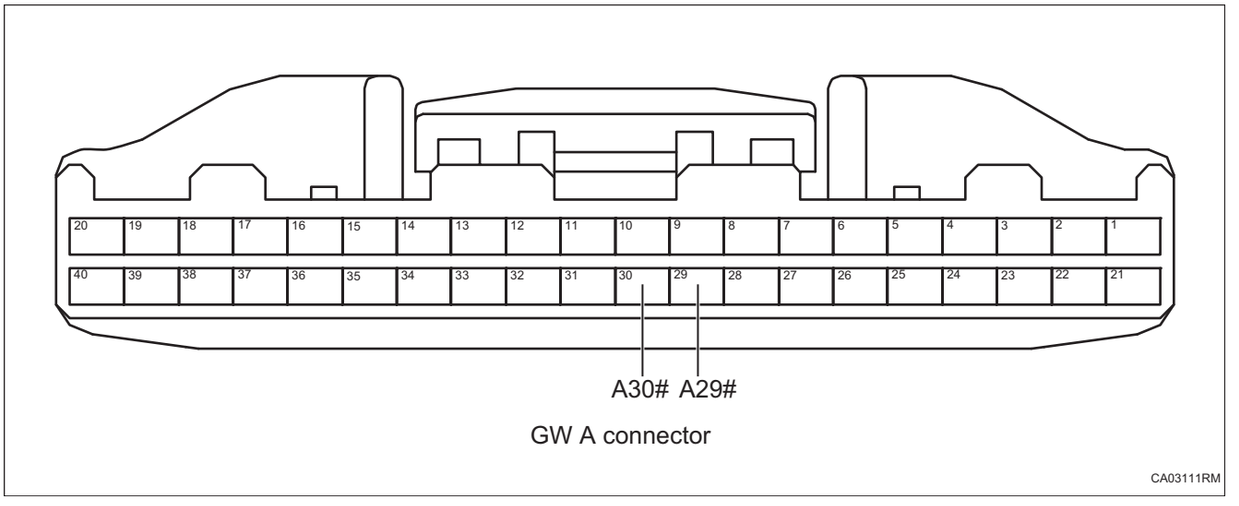
Standard value

Detector connection	Detection conditions	Specified state
BCM connector D22# - GW connector A29#	Always connected	Less than 1Ω
BCM connector D23# - GW connector A30#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	Check comfort CAN bus for circuit shorted to ground



GW A connector

CA03111RM

(a) Measure the resistance according to the values in the table below.

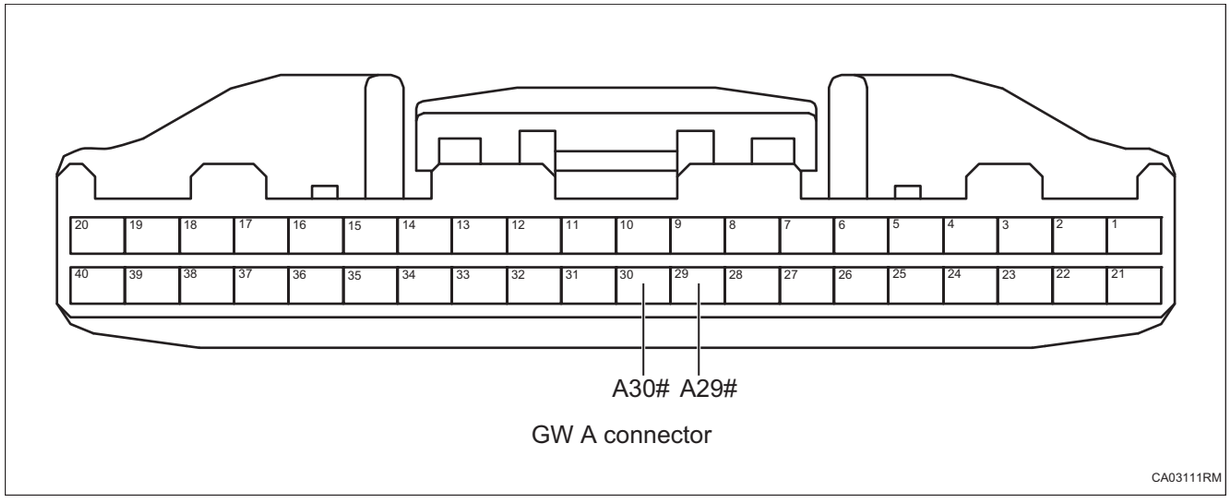
Standard value

Detector connection	Detection conditions	Specified state
GW connector A29# -body GND	Always connected	10 KΩ or greater
GW connector A30# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check comfort CAN bus for circuit shorted to power supply



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

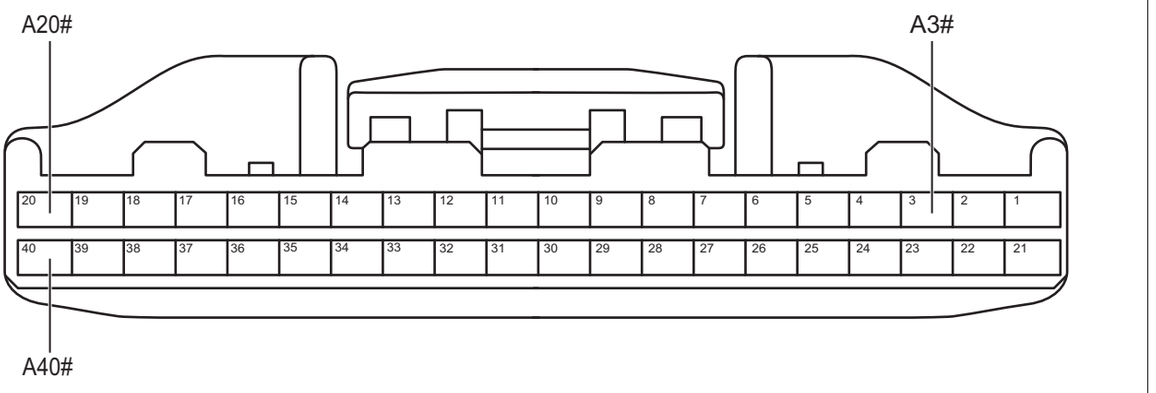
Detector connection	Detection conditions	Specified state
GW connector A29# -body GND	Set the ignition switch to "ON"	Less than 1 V
GW connector A30# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

CA

OK

5	Check GW power supply



GW A connector

CA00521RM

(a) Measure the voltage according to the values in the table below.

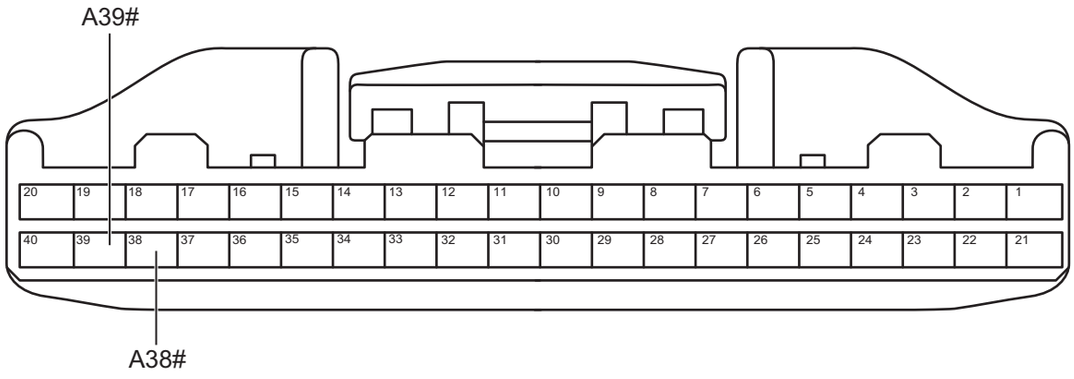
Standard value

Detector connection	Detection conditions	Specified state
GW connector A3# -body GND	Set the ignition switch to "ON"	Battery voltage
GW connector A20# -body GND	Set the ignition switch to "ON"	Battery voltage
GW connector A40# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

6	Check GW ground



GW A connector

CA00511RM

(a) Measure the resistance according to the values in the table below.

CA

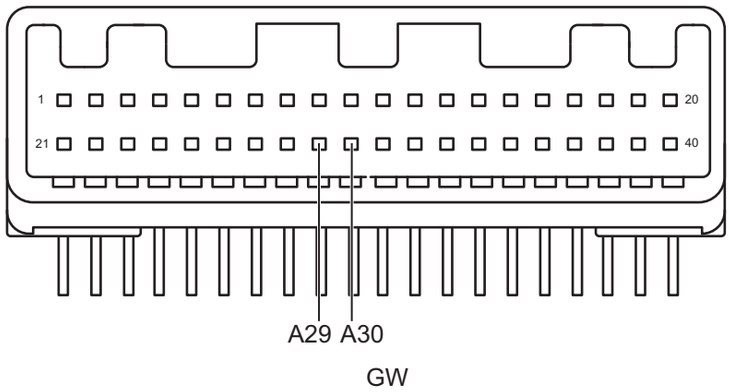
Standard value

Detector connection	Detection conditions	Specified state
GW connector A38# -body GND	Always connected	Less than 1Ω
GW connector A39# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

7	Check GW terminal resistor



GW

CA00811RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
GW A29#- GW A30#	Always connected	120Ω

NG → **Replace GW (See page CA-256)**

OK

8	**End**

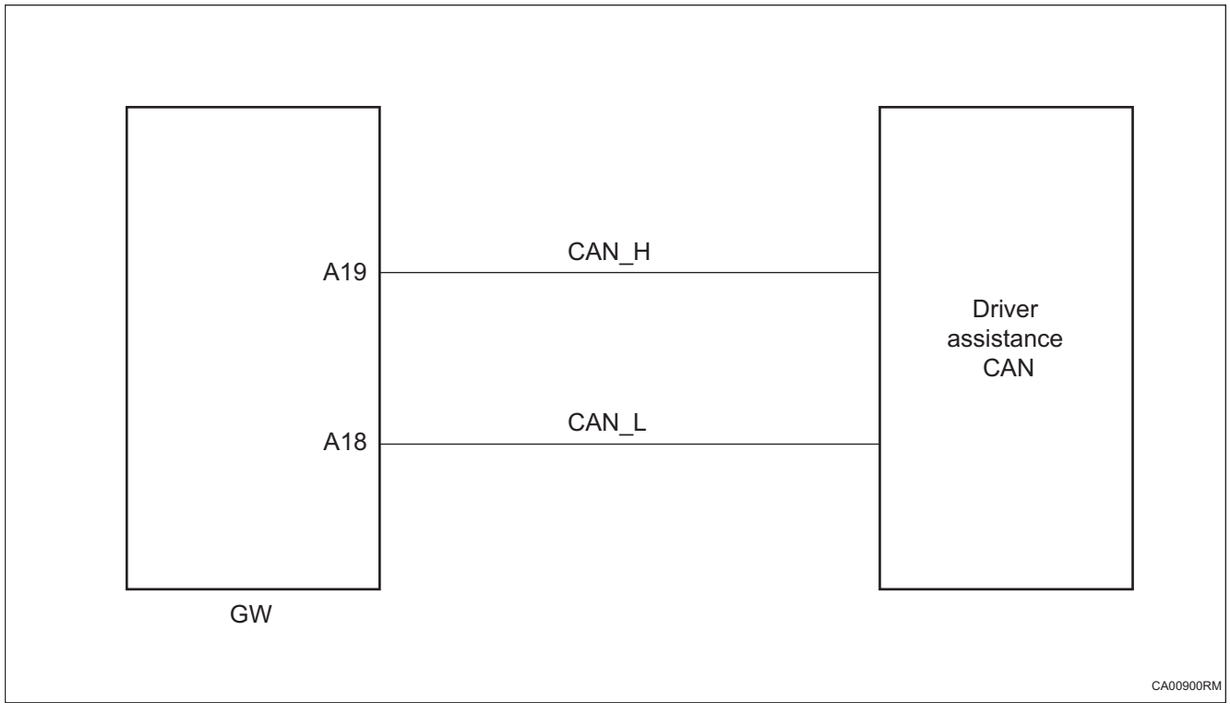
DTC	U003788	Driver assistance/extension CAN bus off
DTC	U003887	Driver assistance CAN bus global timeout

Description

When the GW driver assistance CAN communication is abnormal or interrupted, the GW records the DTC.

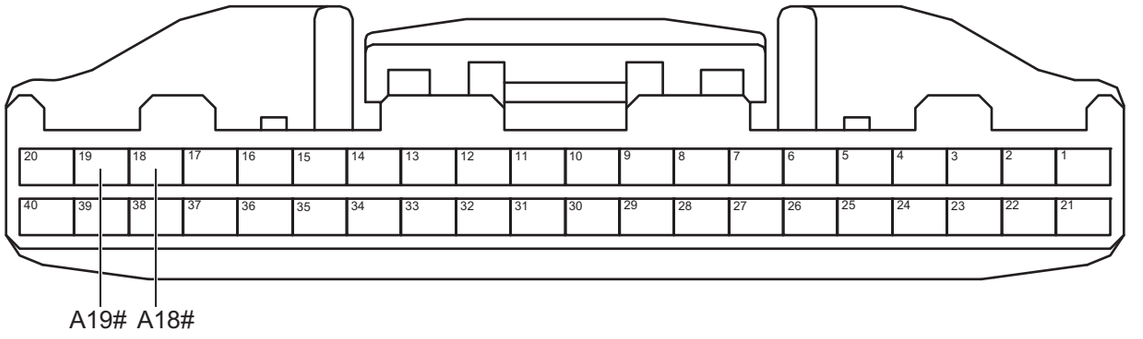
DTC	DTC detection conditions	Faulty location
U003788	(a) Driver assistance/extended CAN bus off.	• CAN line and connector • GW
U003887	(a) Driver assistance CAN bus global time-out.	• CAN line and connector • GW

Circuit diagram



Inspection procedure

1	**Check whether there is short circuit between the driver assistance CAN bus CAN-L and CAN-H**



GW A connector

CA03211RM

CA

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the driver assistance CAN bus.

(d) Measure the resistance according to the values in the table below.

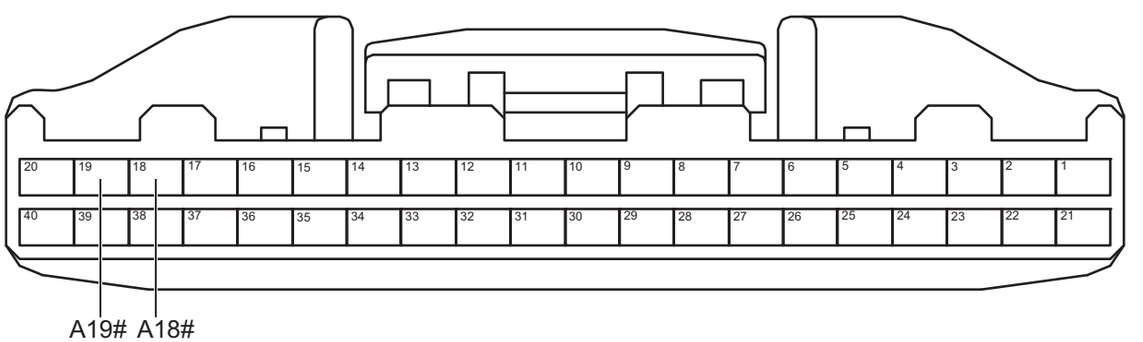
Standard value

Detector connection	Detection conditions	Specified state
GW connector A19# - GW connector A18#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

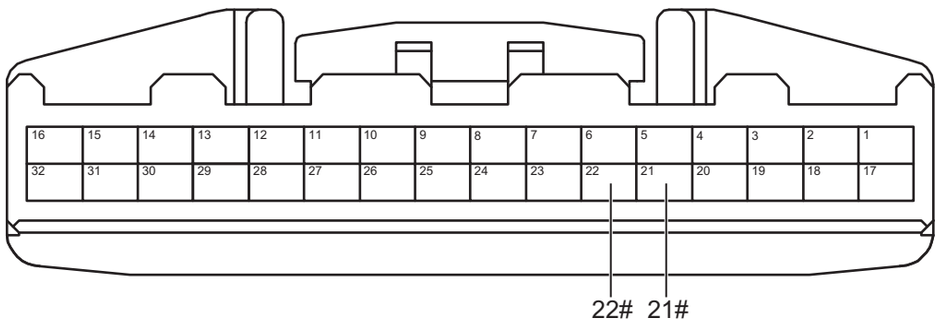
OK

2	**Check driver assistance CAN bus for open circuit (GW-PDC)**



GW A connector

CA03211RM



PDC connector

CA00911RM

(a) Measure the resistance according to the values in the table below.

CA

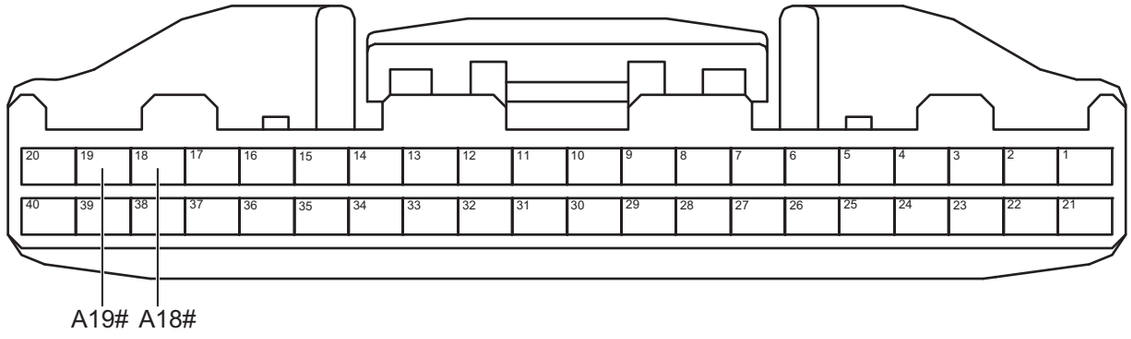
Standard value

Detector connection	Detection conditions	Specified state
PDC connector 22# - GW connector A19#	Always connected	Less than 1Ω
PDC connector 21# - GW connector A18#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check driver assistance CAN bus for circuit shorted to ground



GW A connector

CA03211RM

(a) Measure the resistance according to the values in the table below.

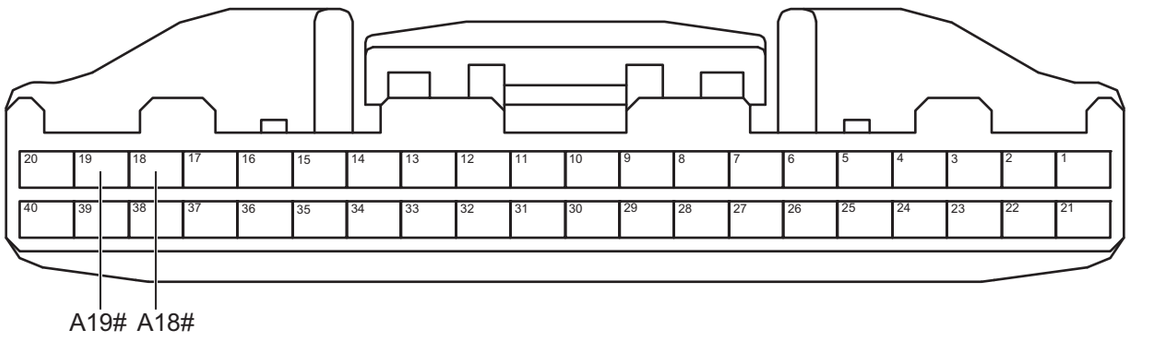
Standard value

Detector connection	Detection conditions	Specified state
GW connector A19# -body GND	Always connected	10 KΩ or greater
GW connector A18# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check driver assistance CAN bus for circuit shorted to power supply



GW A connector

CA03211RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

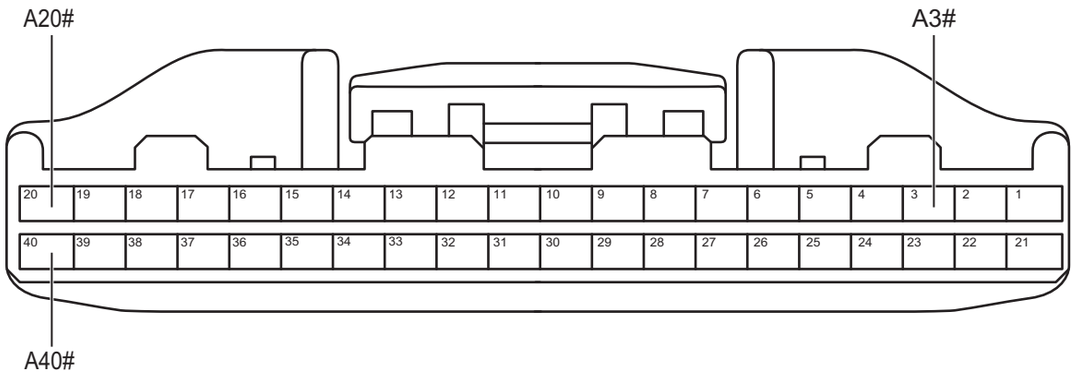
Standard value

Detector connection	Detection conditions	Specified state
GW connector A19# -body GND	Set the ignition switch to "ON"	Less than 1 V
GW connector A18# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Check GW power supply



GW A connector

CA00521RM

(a) Measure the voltage according to the values in the table below.

Standard value

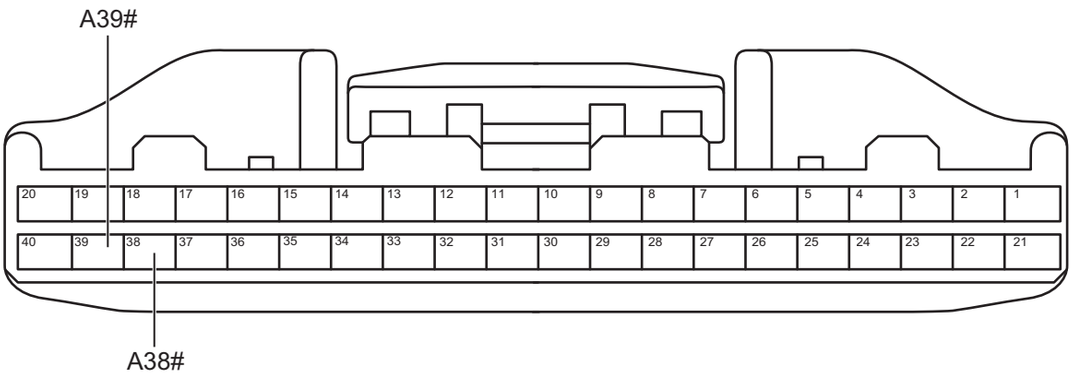
Detector connection	Detection conditions	Specified state
GW connector A3# -body GND	Set the ignition switch to "ON"	Battery voltage
GW connector A20# -body GND	Set the ignition switch to "ON"	Battery voltage
GW connector A40# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

6	Check GW ground

CA



GW A connector

CA00511RM

CA

(a) Measure the resistance according to the values in the table below.

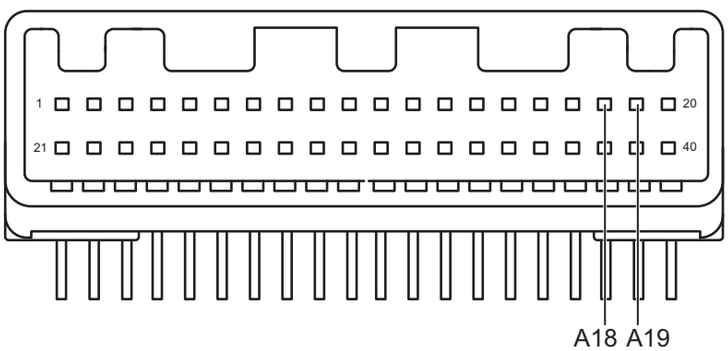
Standard value

Detector connection	Detection conditions	Specified state
GW connector A38# -body GND	Always connected	Less than 1Ω
GW connector A39# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

7	Check GW terminal resistor



GW

CA00921RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
GW A19#- GW A18#	Always connected	About 120 Ω

NG → **Replace GW (See page CA-256)**

OK

8	**End**

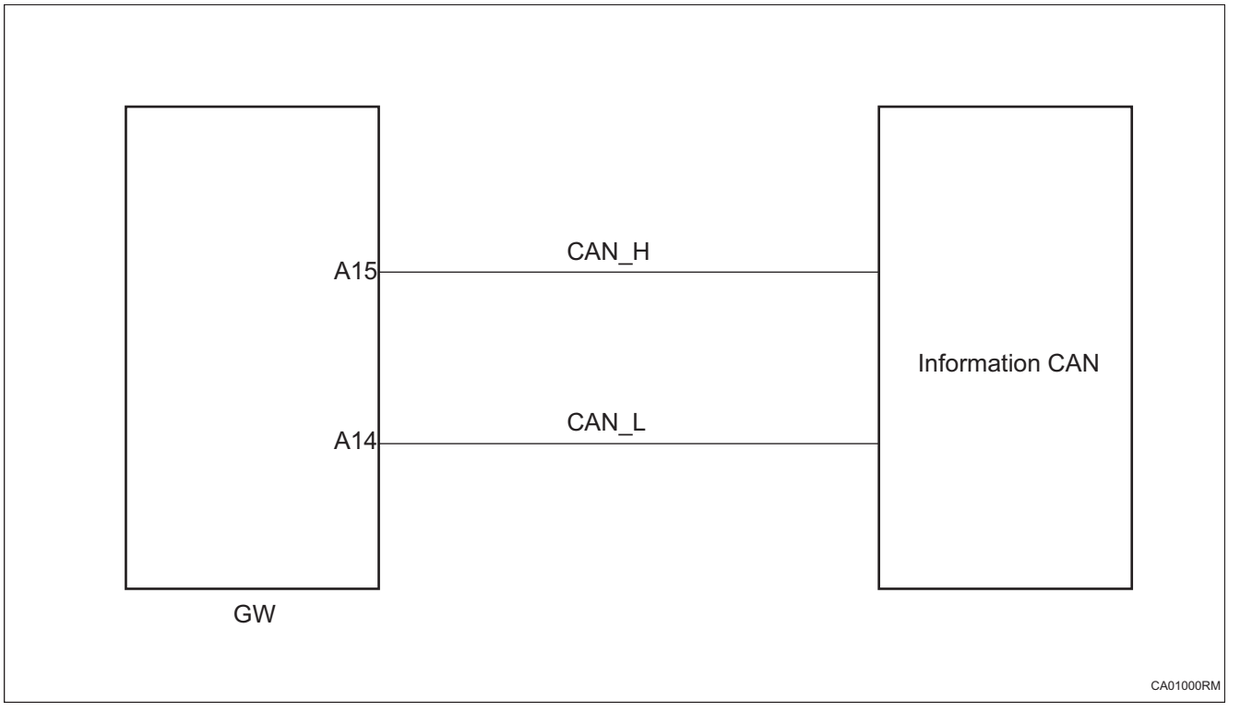
DTC	U004688	Information CAN bus off
DTC	U004787	Information CAN bus global timeout

Description

When the GW infromation CAN communication is abnormal or interrupted, the GW records DTC.

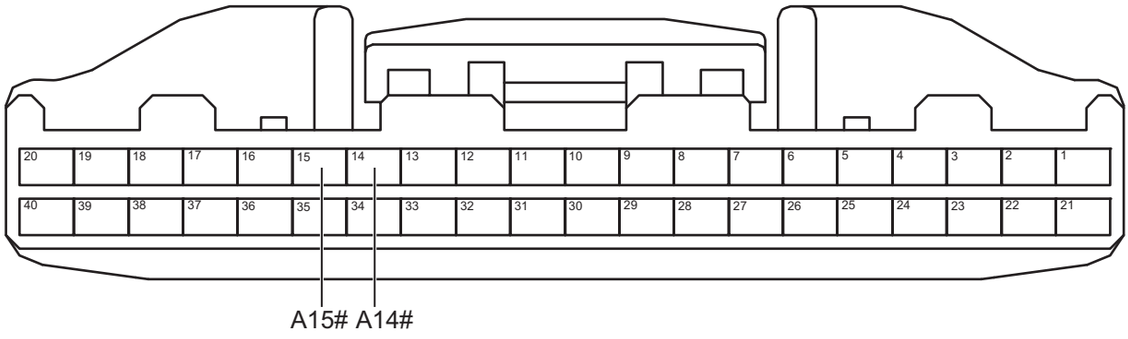
DTC	DTC detection conditions	Faulty location
U004688	(a) Information CAN bus off.	• CAN line and connector • GW
U004787	(a) Information CAN bus global timeout.	• CAN line and connector • GW

Circuit diagram



Inspection procedure

1	Check whether there is short circuit between the information CAN bus CAN-L and CAN-H



GW A connector

CA03011RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the information CAN bus.

(d) Measure the resistance according to the values in the table below.

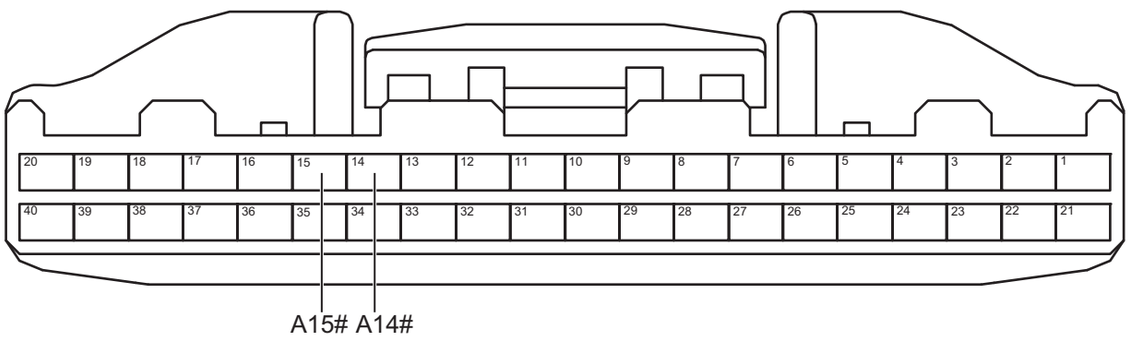
Standard value

Detector connection	Detection conditions	Specified state
GW connector A15# - GW connector A14#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

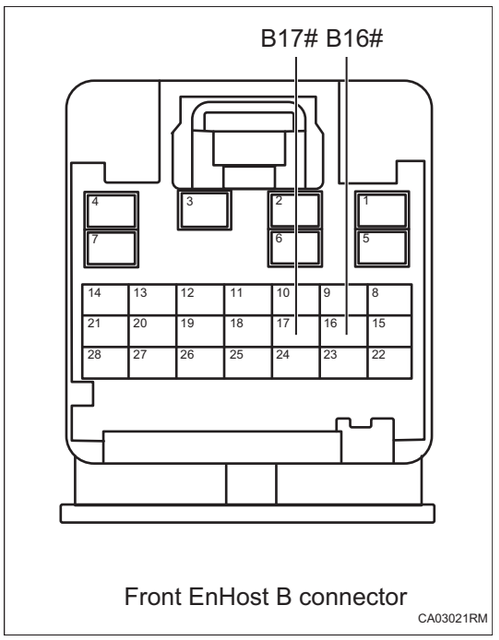
OK

2	**Check information CAN bus for open circuit (GW-front EnHost)**



GW A connector

CA03011RM



(a) Measure the resistance according to the values in the table below.

Standard value

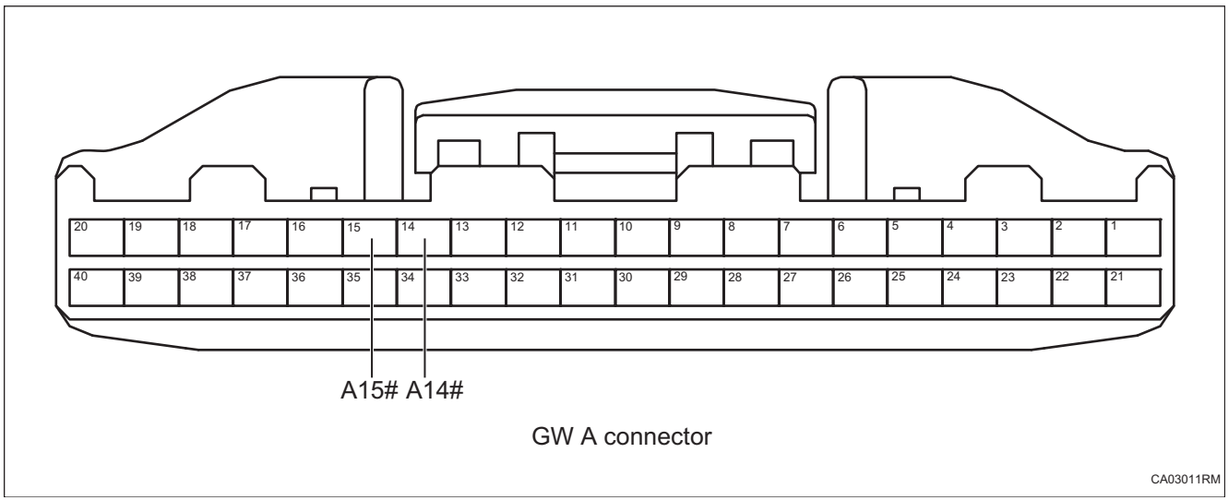
Detector connection	Detection conditions	Specified state
Front EnHost connector B17#-GW connector A15#	Always connected	Less than 1Ω
Front EnHost connector B16#-GW connector A14#	Always connected	Less than 1Ω

CA

NG → **Repair or replace the harness and connector**

OK

3	Check information CAN bus for circuit shorted to ground



(a) Measure the resistance according to the values in the table below.

Standard value

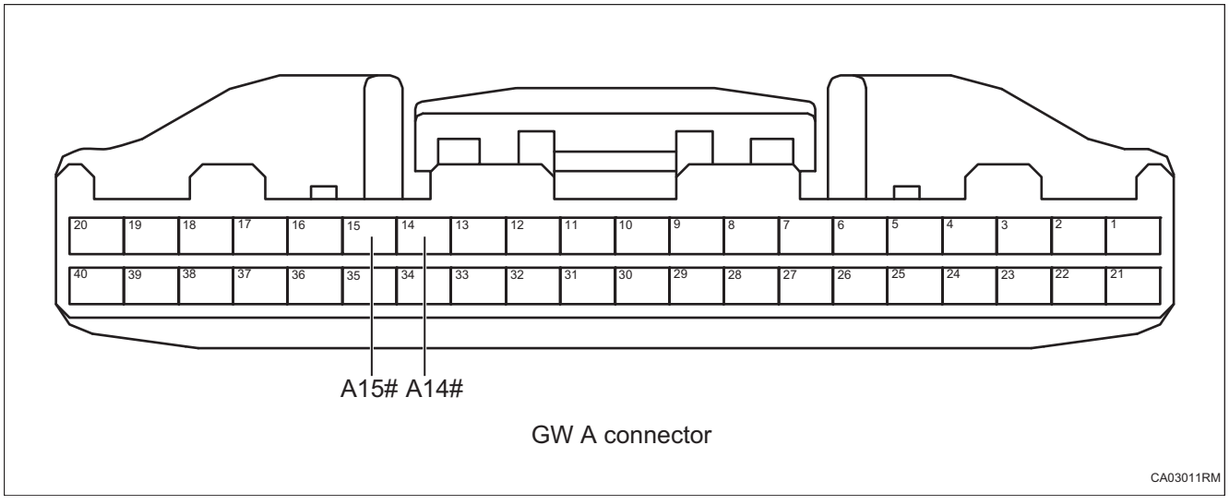
Detector connection	Detection conditions	Specified state
GW connector A14# -body GND	Always connected	10 KΩ or greater

Detector connection	Detection conditions	Specified state
GW connector A15# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check information CAN bus for circuit shorted to power supply



GW A connector

CA03011RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

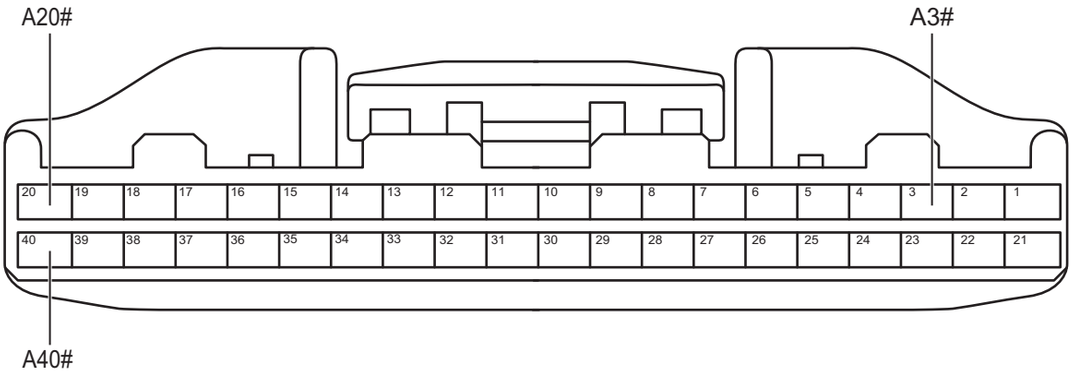
Detector connection	Detection conditions	Specified state
GW connector A14# -body GND	Set the ignition switch to "ON"	Less than 1 V
GW connector A15# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Check GW power supply

CA



GW A connector

CA00521RM

CA

(a) Measure the voltage according to the values in the table below.

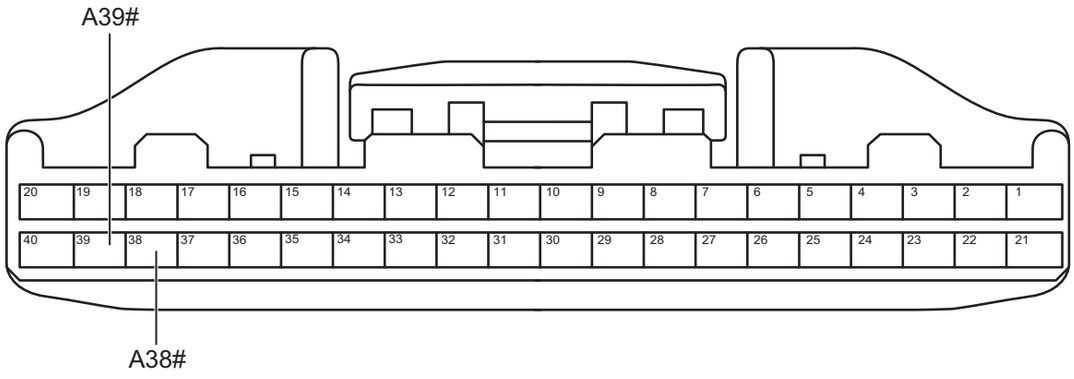
Standard value

Detector connection	Detection conditions	Specified state
GW connector A3# -body GND	Set the ignition switch to "ON"	Battery voltage
GW connector A20# -body GND	Set the ignition switch to "ON"	Battery voltage
GW connector A40# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

6	**Check GW ground**



GW A connector

CA00511RM

(a) Measure the resistance according to the values in the table below.

CA

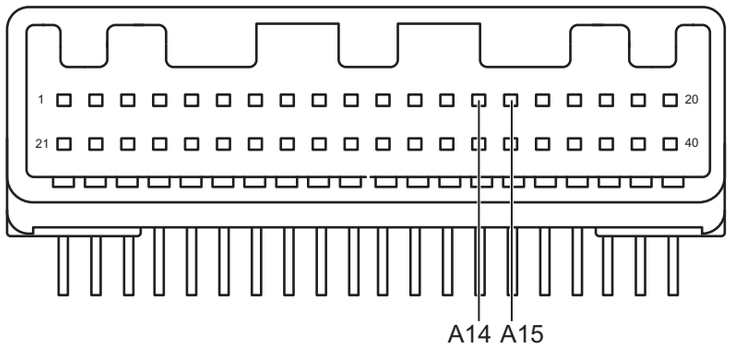
Standard value

Detector connection	Detection conditions	Specified state
GW connector A38# -body GND	Always connected	Less than 1Ω
GW connector A39# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

7	Check GW terminal resistor



GW

CA01011RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
GW A14#- GW A15#	Always connected	About 120 Ω

NG → **Replace GW (See page CA-256)**

OK

8	**End**

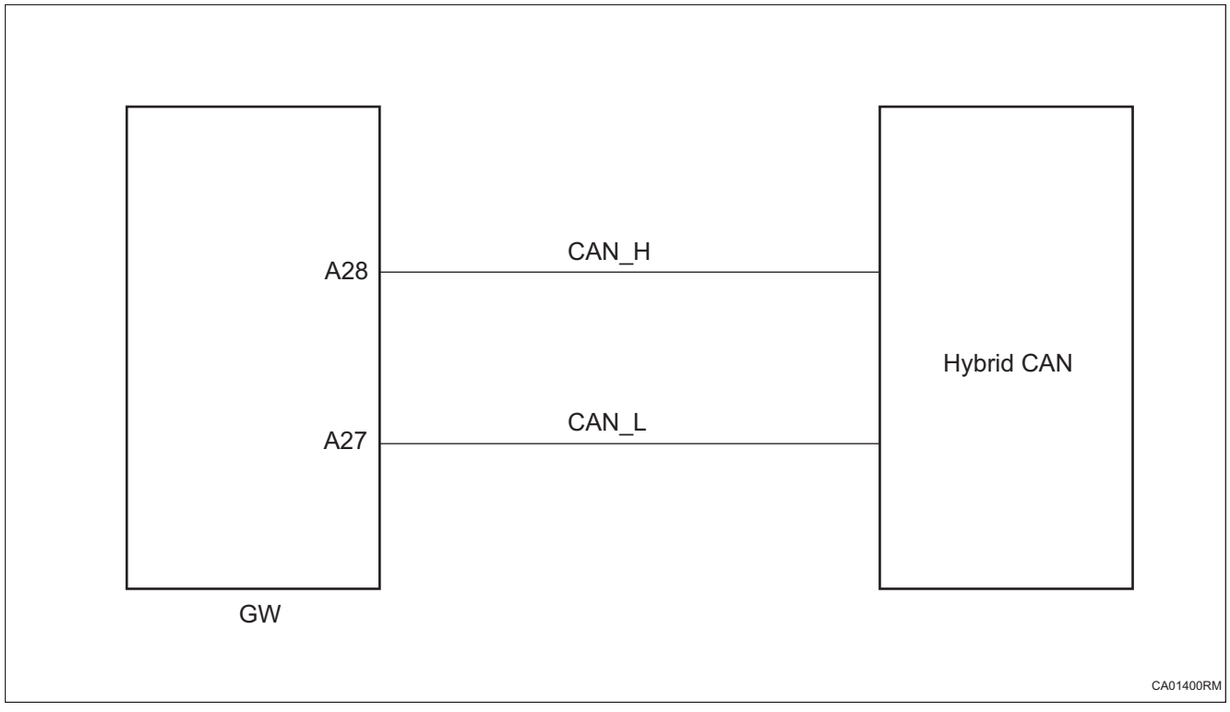
DTC	U005588	Hybrid/electric CAN bus off
DTC	U005687	Hybrid/electric CAN bus global timeout

Description

When the GW hybrid CAN communication is abnormal or interrupted, the GW records DTC.

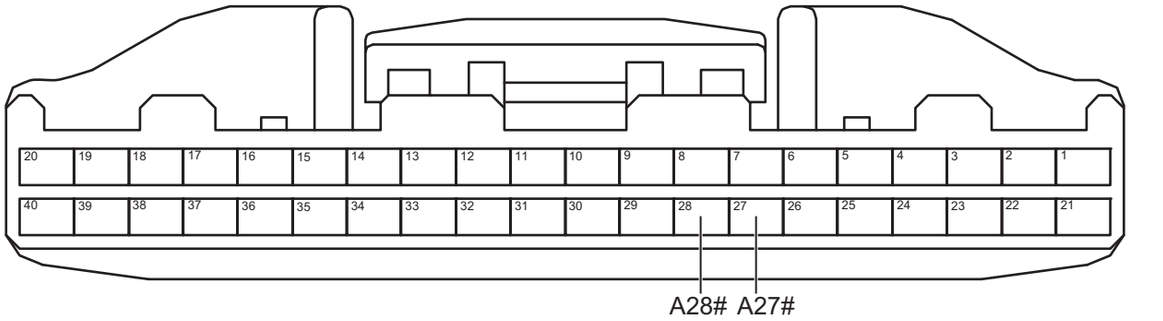
DTC	DTC detection conditions	Faulty location
U005588	(a) Hybrid/electric CAN bus off.	• CAN line and connector • GW
U005687	(a) Hybrid/electric CAN bus global timeout.	• CAN line and connector • GW

Circuit diagram



Inspection procedure

1	Check whether there is short circuit between the hybrid CAN bus CAN-L and CAN-H



GW A connector

CA01411RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the hybrid CAN bus.

(d) Measure the resistance according to the values in the table below.

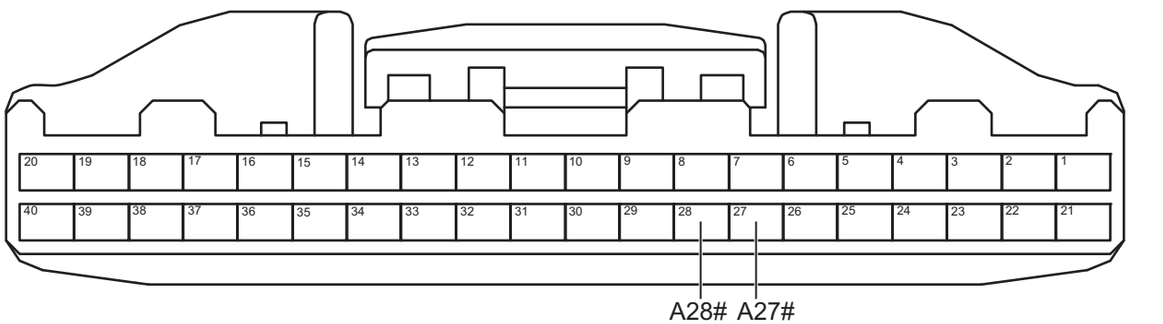
Standard value

Detector connection	Detection conditions	Specified state
GW connector A28# - GW connector A27#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

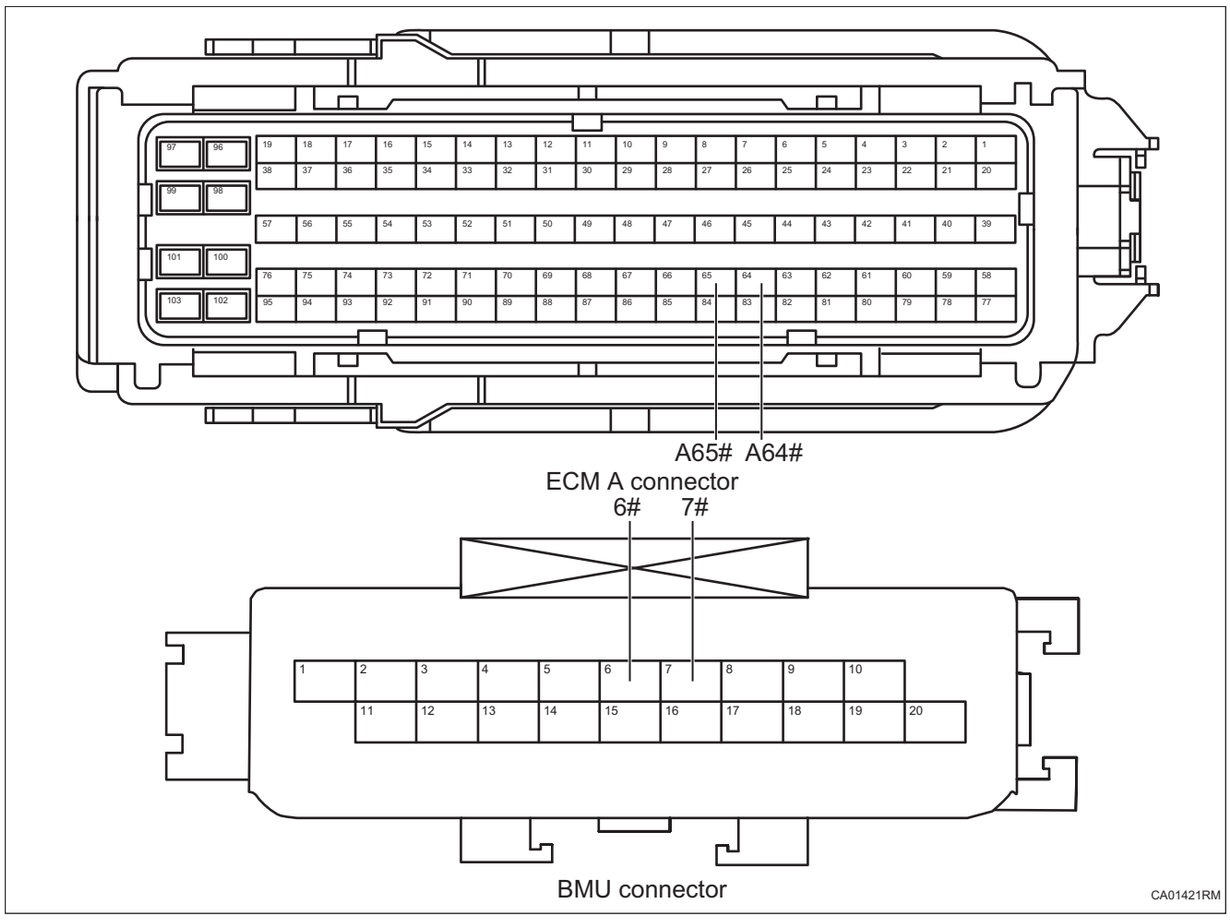
OK

2	Check hybrid CAN bus for open circuit (GW-BMU/ECM)



GW A connector

CA01411RM



(a) Measure the resistance according to the values in the table below.

Standard value

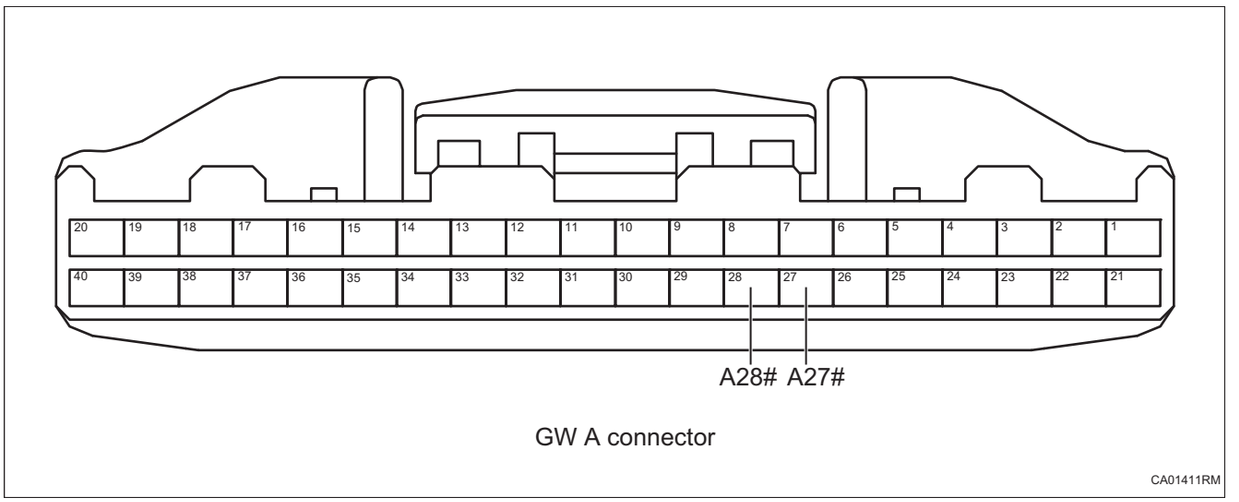
Detector connection	Detection conditions	Specified state
BMU connector 7# - GW connector A28#	Always connected	Less than 1Ω
BMU connector 6# -GW connector A27#	Always connected	Less than 1Ω
ECM connector A65# -GW connector A28#	Always connected	Less than 1Ω
ECM connector A64# -GW connector A27#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	**Check hybrid CAN bus for circuit shorted to ground**

CA



GW A connector

CA01411RM

(a) Measure the resistance according to the values in the table below.

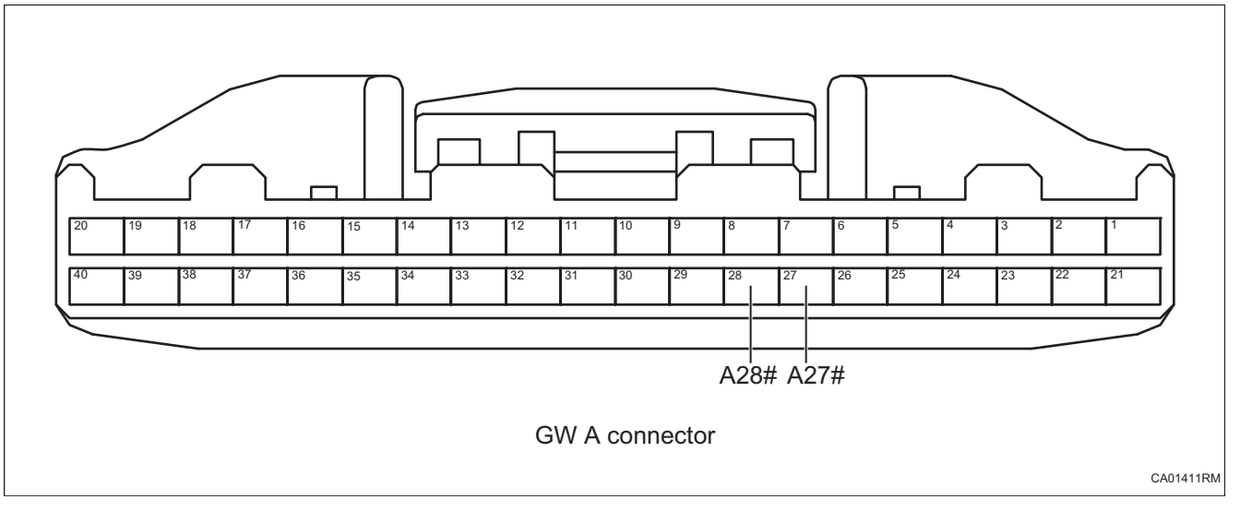
Standard value

Detector connection	Detection conditions	Specified state
GW connector A27# -body GND	Always connected	10 KΩ or greater
GW connector A28# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check hybrid CAN bus for circuit shorted to power supply



GW A connector

CA01411RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

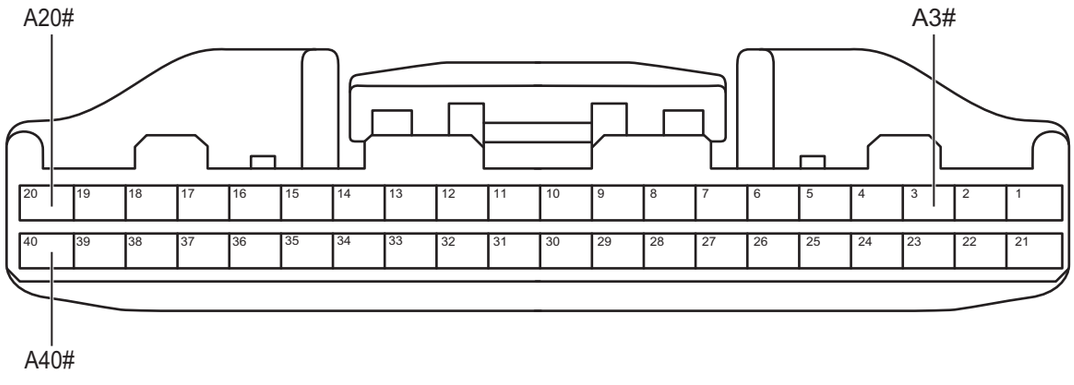
Standard value

Detector connection	Detection conditions	Specified state
GW connector A27# -body GND	Set the ignition switch to "ON"	Less than 1 V
GW connector A28# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5 Check GW power supply



GW A connector

CA00521RM

(a) Measure the voltage according to the values in the table below.

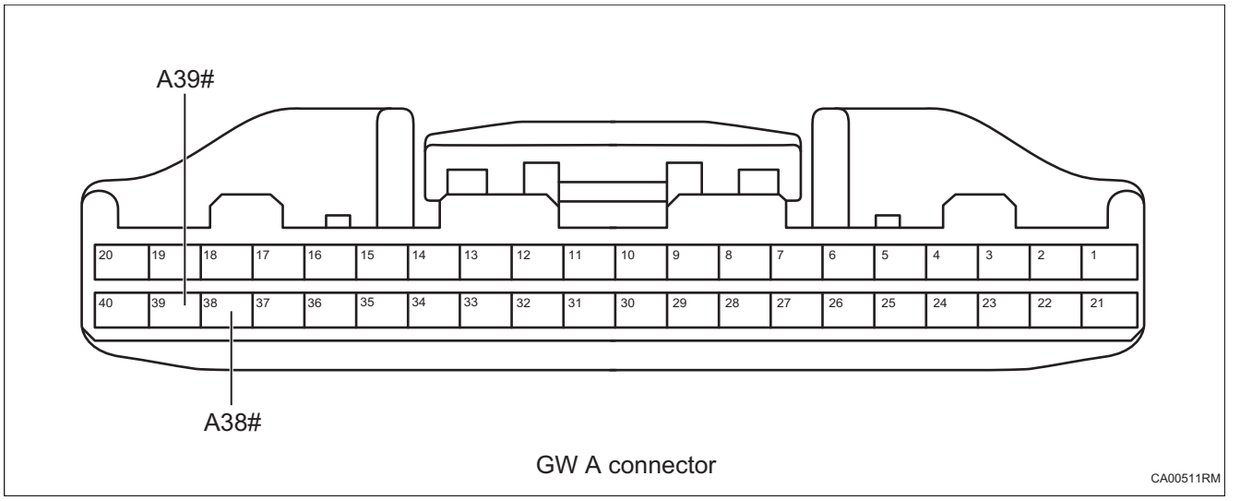
Standard value

Detector connection	Detection conditions	Specified state
GW connector A3# -body GND	Set the ignition switch to "ON"	Battery voltage
GW connector A20# -body GND	Set the ignition switch to "ON"	Battery voltage
GW connector A40# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

6	Check GW ground



GW A connector

CA00511RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
GW connector A38# -body GND	Always connected	Less than 1Ω
GW connector A39# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

7	Replace GW (See page CA-256)

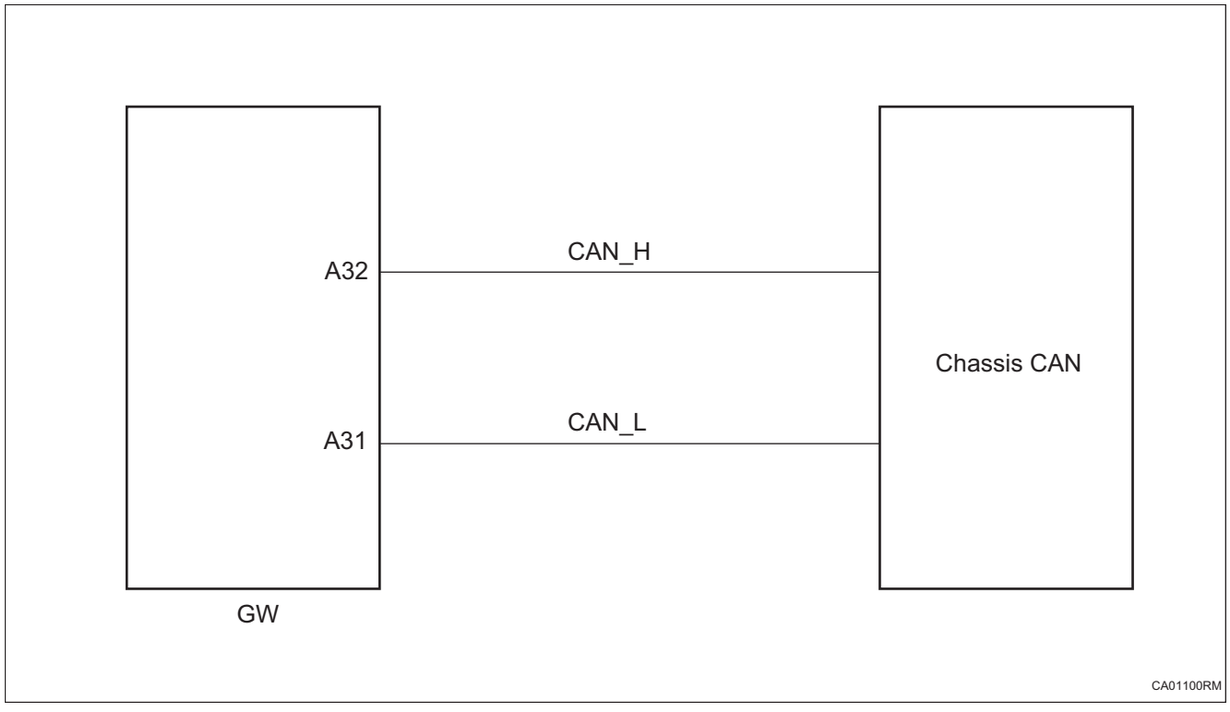
DTC	U006488	Chassis CAN bus off
DTC	U006587	Chassis CAN bus global timeout

Description

When the CAN communication of the GW chassis is abnormal or interrupted, the GW records DTC.

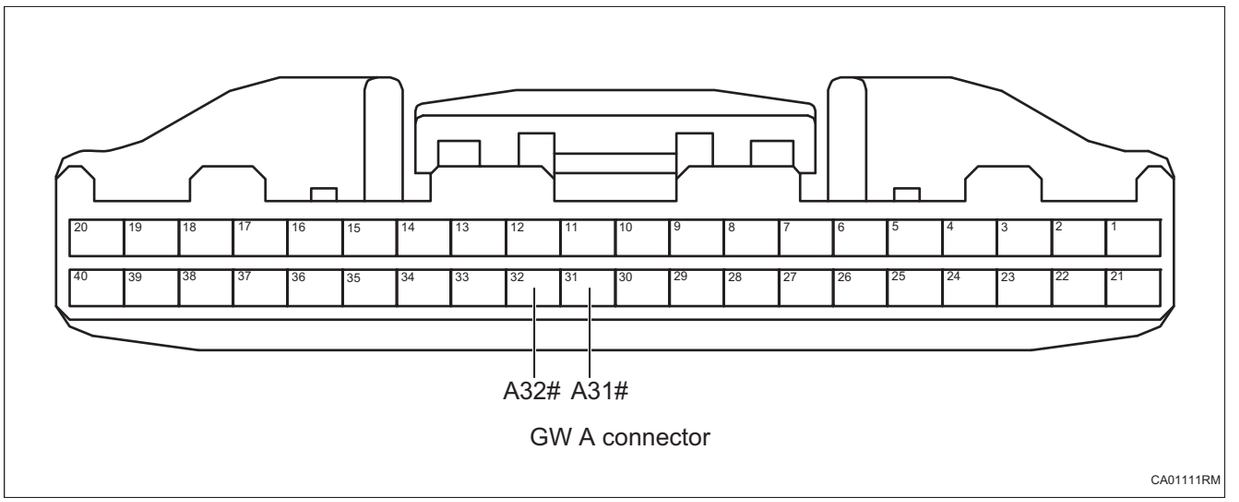
DTC	DTC detection conditions	Faulty location
U006488	(a) Chassis CAN bus off.	• CAN line and connector • GW
U006587	(a) Chassis CAN bus global timeout.	• CAN line and connector • GW

Circuit diagram



Inspection procedure

1	Check whether there is short circuit between chassis CAN bus CAN-L and CAN-H



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the chassis CAN bus.

(d) Measure the resistance according to the values in the table below.

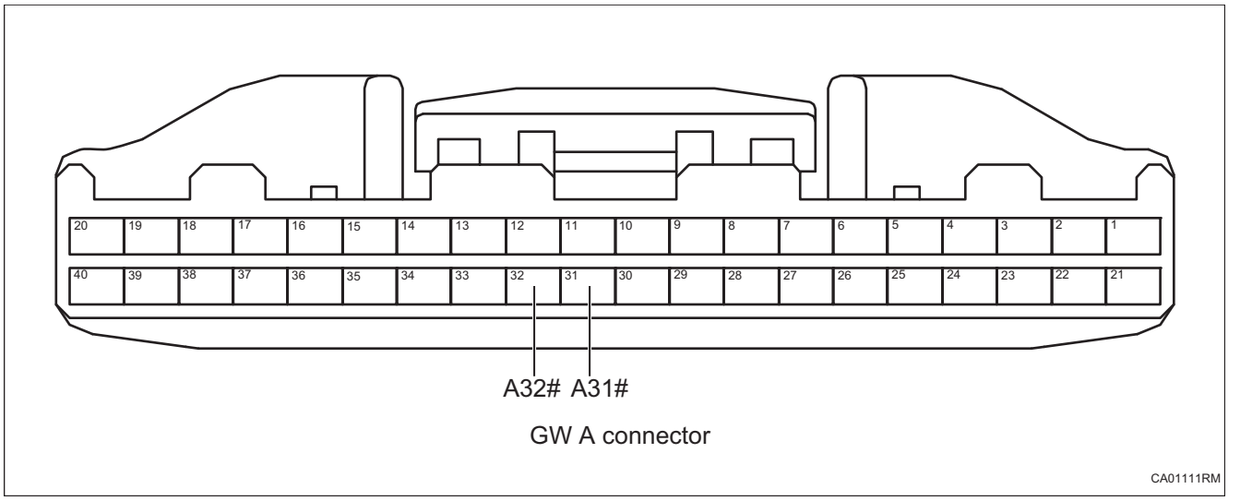
Standard value

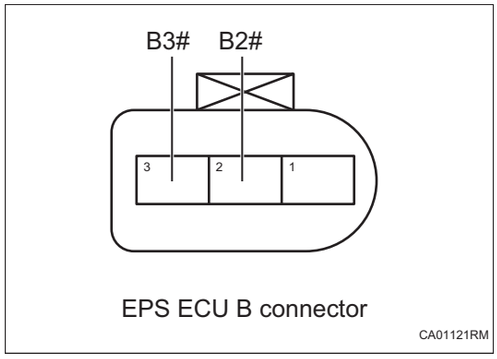
Detector connection	Detection conditions	Specified state
GW connector A32# -GW connector A31#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

2	Check chassis CAN bus for open circuit (GW-EPS ECU)





(a) Measure the resistance according to the values in the table below.

Standard value

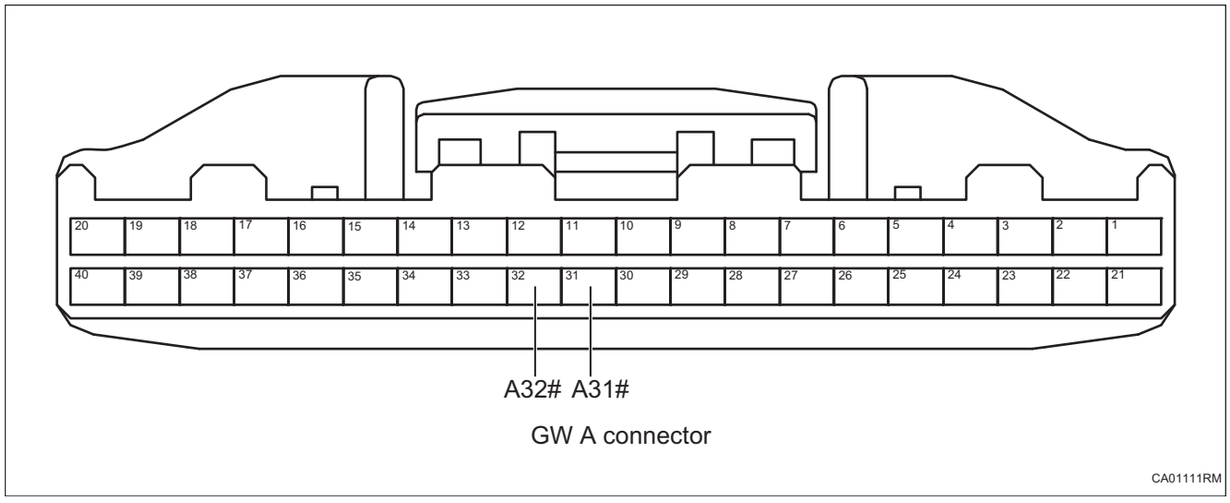
Detector connection	Detection conditions	Specified state
EPS ECU connector B2# -GW connector A32#	Always connected	Less than 1Ω
EPS ECU connector B3# -GW connector A31#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

CA

3	Check chassis CAN bus for circuit shorted to ground



(a) Measure the resistance according to the values in the table below.

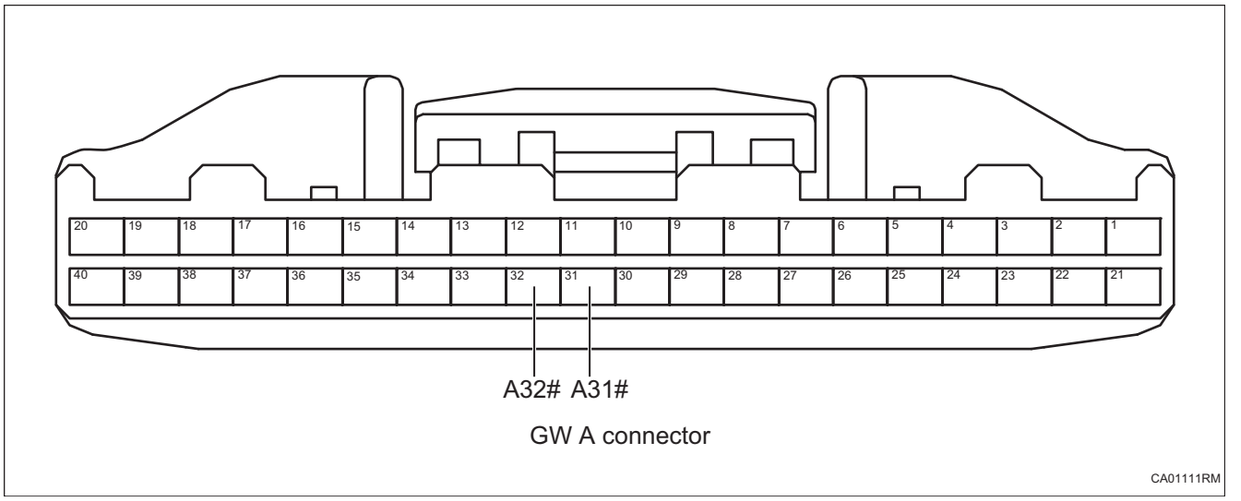
Standard value

Detector connection	Detection conditions	Specified state
GW connector A31# -body GND	Always connected	10 KΩ or greater
GW connector A32# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check chassis CAN bus for circuit shorted to power supply



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

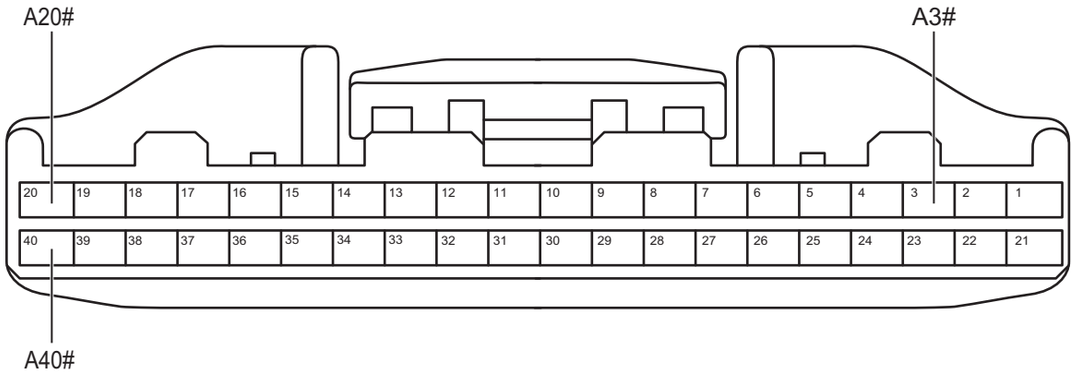
Detector connection	Detection conditions	Specified state
GW connector A31# -body GND	Set the ignition switch to "ON"	Less than 1 V
GW connector A32# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Check GW power supply

CA



GW A connector

CA00521RM

(a) Measure the voltage according to the values in the table below.

Standard value

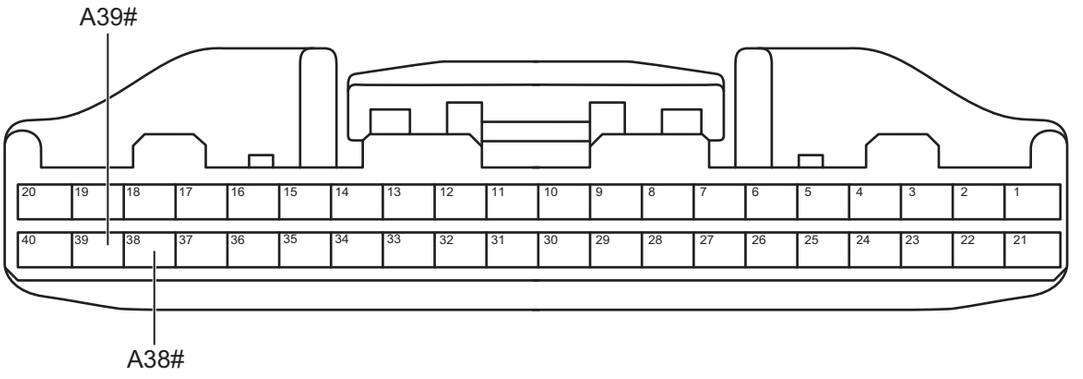
Detector connection	Detection conditions	Specified state
GW connector A3# -body GND	Set the ignition switch to "ON"	Battery voltage
GW connector A20# -body GND	Set the ignition switch to "ON"	Battery voltage
GW connector A40# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

6	**Check GW ground**

CA



GW A connector

CA00511RM

CA

(a) Measure the resistance according to the values in the table below.

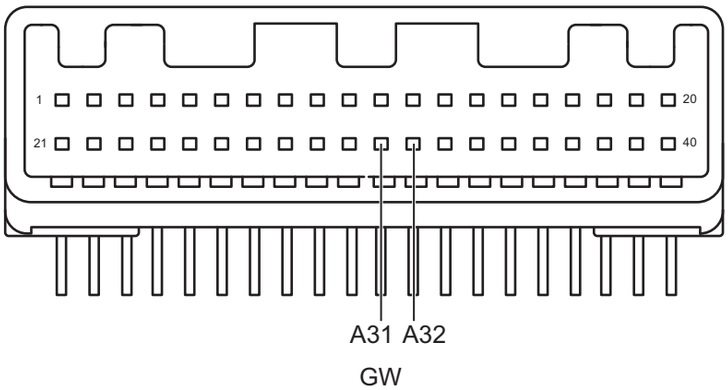
Standard value

Detector connection	Detection conditions	Specified state
GW connector A38# -body GND	Always connected	Less than 1Ω
GW connector A39# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

7	Check GW terminal resistor



GW

CA01131RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
GW A31#- GW A32#	Always connected	About 120 Ω

NG → **Replace GW (See page CA-256)**

OK

8	**End**

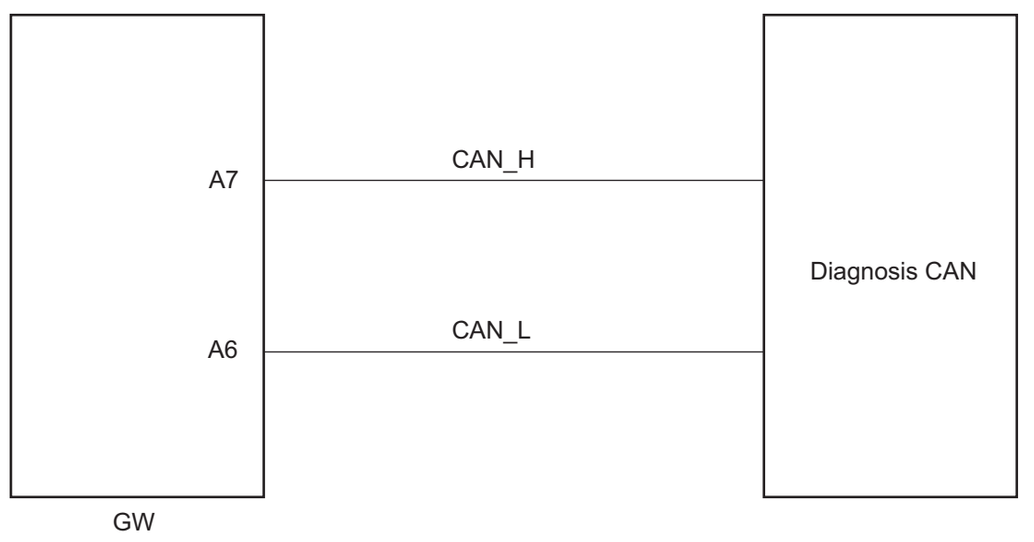
DTC	U007588	Diagnostic CAN bus off

Description

When the GW diagnosis CAN communication is abnormal or interrupted, the GW records DTC.

DTC	DTC detection conditions	Faulty location
U007588	(a) Diagnosis CAN bus off.	• CAN line and connector • GW

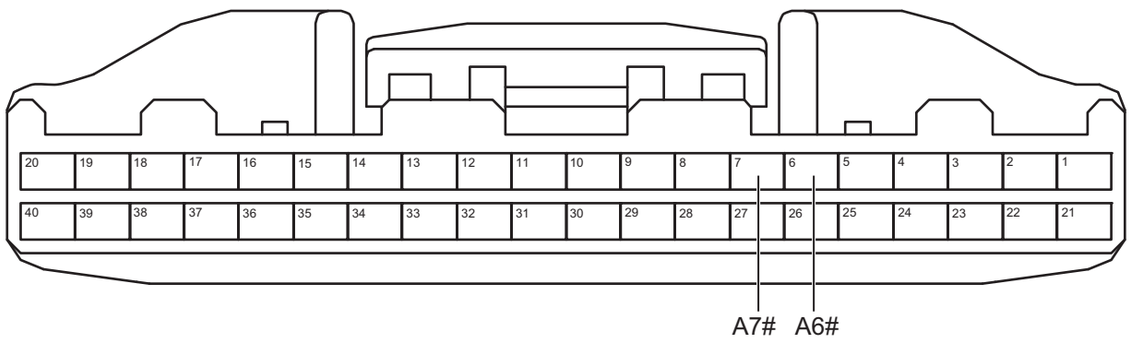
Circuit diagram



CA01200RM

Inspection procedure

1	Check whether there is short circuit between diagnosis CAN bus CAN-L and CAN-H



GW A connector

CA01211RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the diagnosis CAN bus.

(d) Measure the resistance according to the values in the table below.

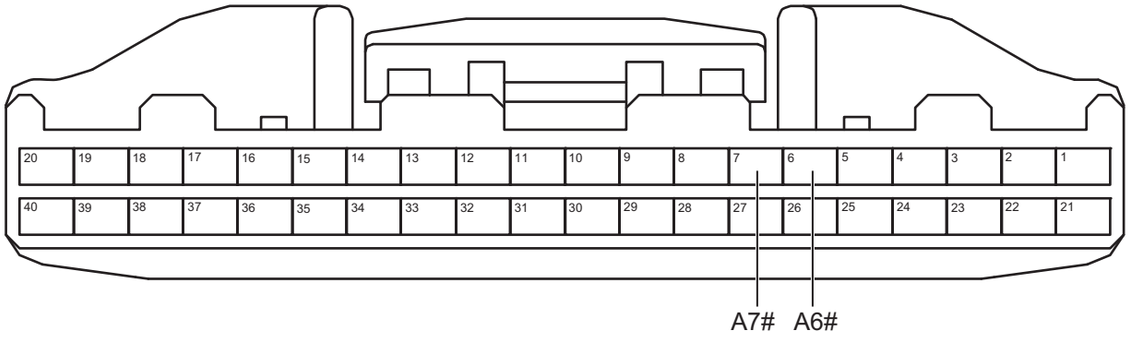
Standard value

Detector connection	Detection conditions	Specified state
GW connector A7# -GW connector A6#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

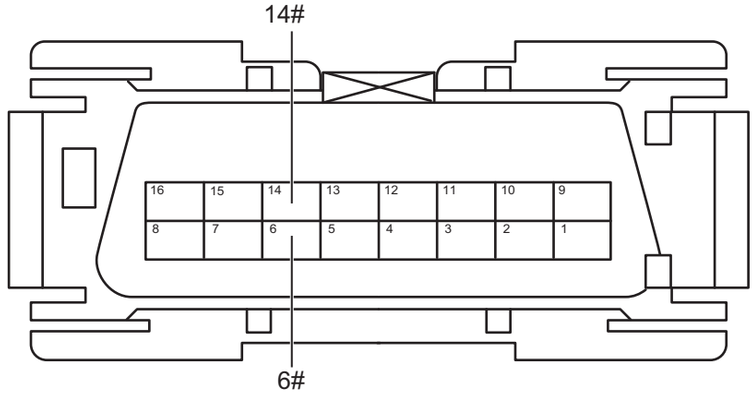
OK

2	Check diagnosis CAN bus for open circuit (GW-DLC I)



GW A connector

CA01211RM



DLC I connector

CA01221RM

(a) Measure the resistance according to the values in the table below.

Standard value

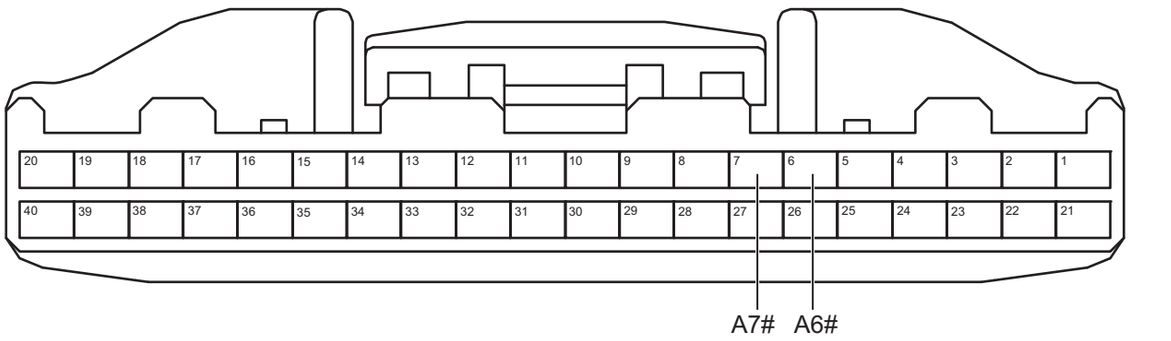
Detector connection	Detection conditions	Specified state
DLC I connector 6#-GW connector A7#	Always connected	Less than 1Ω
DLC I connector 14#-GW connector A6#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

CA

3	Check diagnosis CAN bus for circuit shorted to ground



GW A connector

CA01211RM

(a) Measure the resistance according to the values in the table below.

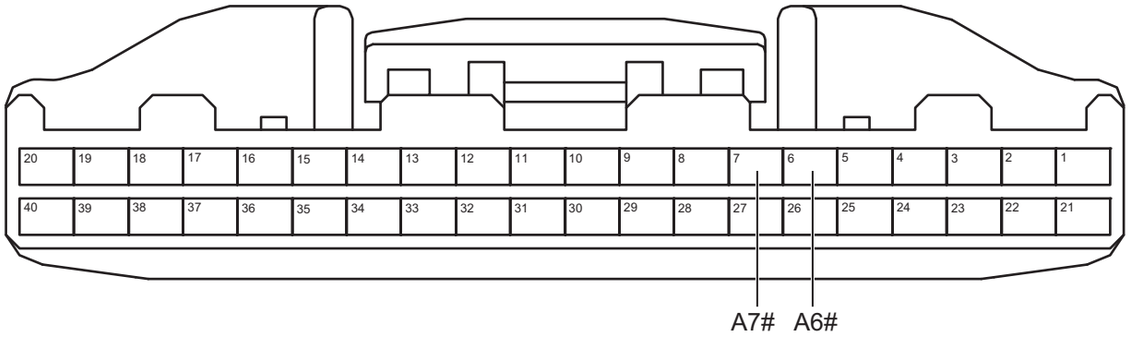
Standard value

Detector connection	Detection conditions	Specified state
GW connector A6# -body GND	Always connected	10 KΩ or greater
GW connector A7# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check diagnosis CAN bus for circuit shorted to power supply



GW A connector

CA01211RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

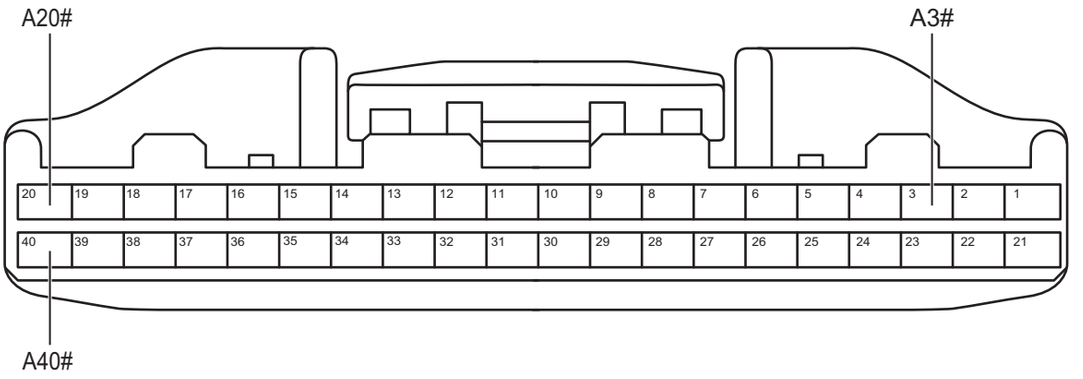
Detector connection	Detection conditions	Specified state
GW connector A6# -body GND	Set the ignition switch to "ON"	Less than 1 V
GW connector A7# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Check GW power supply

CA



GW A connector

CA00521RM

(a) Measure the voltage according to the values in the table below.

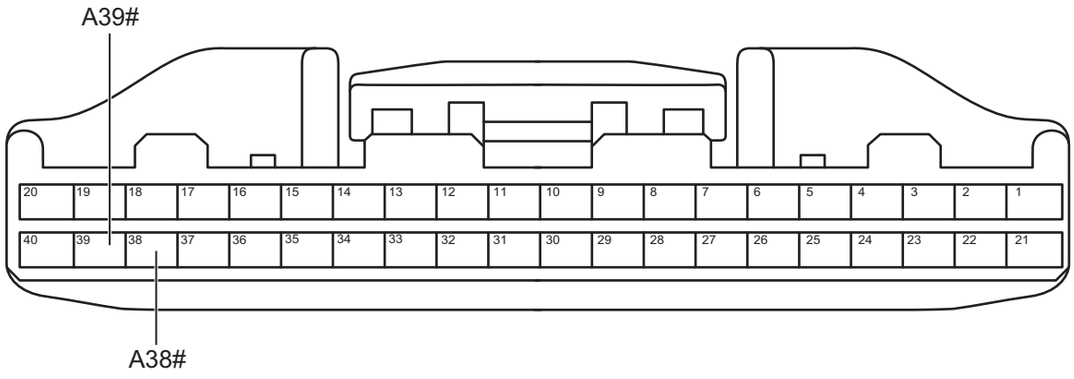
Standard value

Detector connection	Detection conditions	Specified state
GW connector A3# -body GND	Set the ignition switch to "ON"	Battery voltage
GW connector A20# -body GND	Set the ignition switch to "ON"	Battery voltage
GW connector A40# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

6	**Check GW ground**



GW A connector

CA00511RM

(a) Measure the resistance according to the values in the table below.

CA

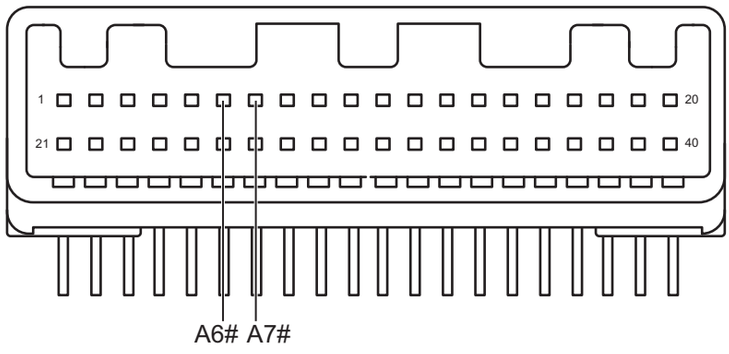
Standard value

Detector connection	Detection conditions	Specified state
GW connector A38# -body GND	Always connected	Less than 1Ω
GW connector A39# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

7	Check GW terminal resistor



GW

CA01231RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
GW A6#- GW A7#	Always connected	About 60 Ω

NG → **Replace GW (See page CA-256)**

OK

8	**End**

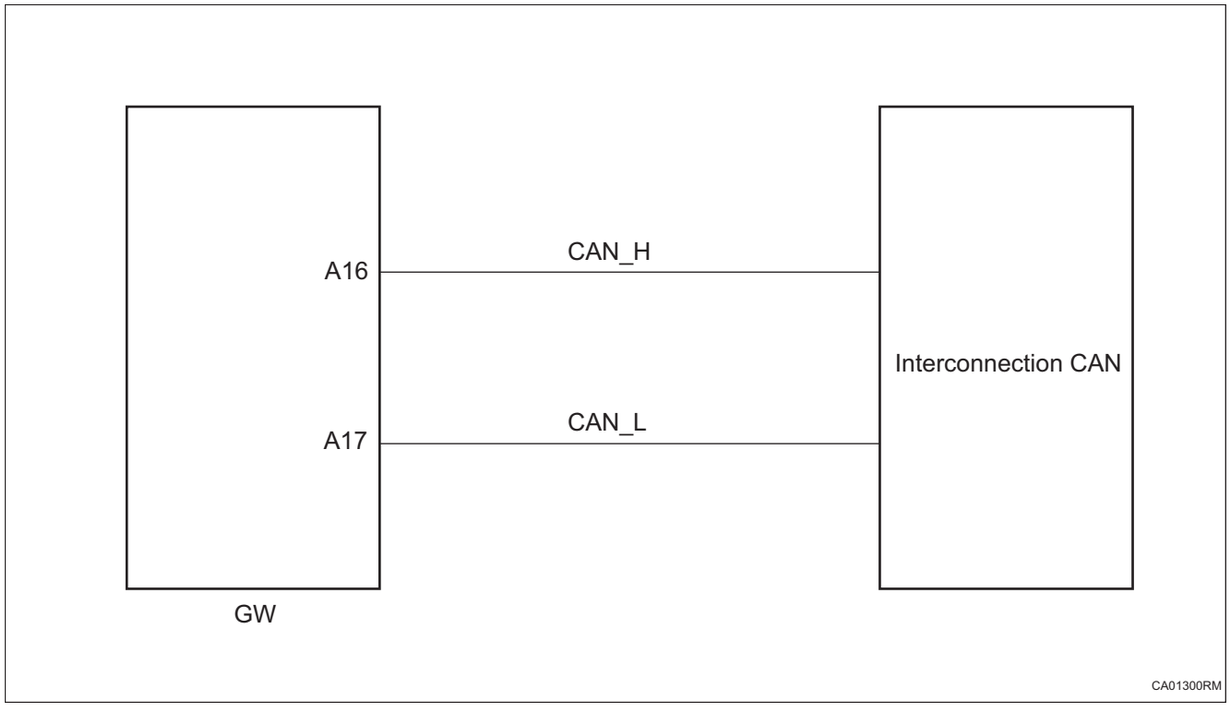
DTC	U008088	T-box CAN bus off
DTC	U008087	Interconnection CAN bus global timeout

Description

When the GW interconnection CAN communication is abnormal or interrupted, the GW records DTC.

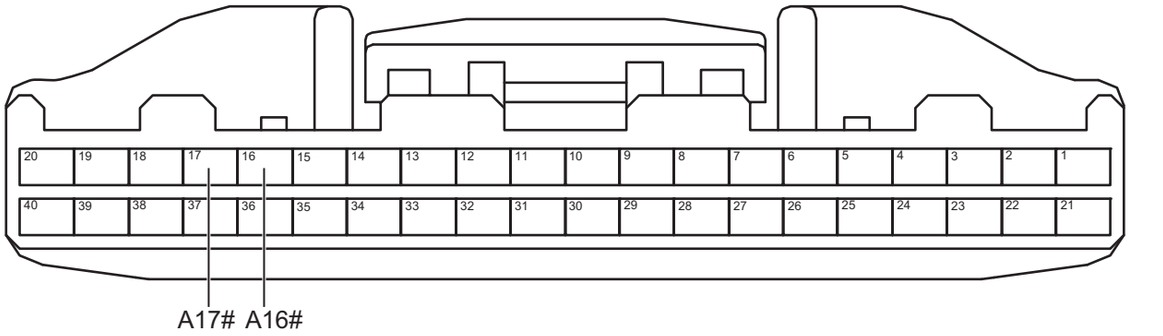
DTC	DTC detection conditions	Faulty location
U008088	(a) T-box CAN bus off.	• CAN line and connector • GW
U008087	(a) Interconnection CAN bus global timeout.	• CAN line and connector • GW

Circuit diagram



Inspection procedure

1	Check whether there is short circuit between interconnection CAN bus CAN-L and CAN-H



GW A connector

CA01311RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the interconnection CAN bus.

(d) Measure the resistance according to the values in the table below.

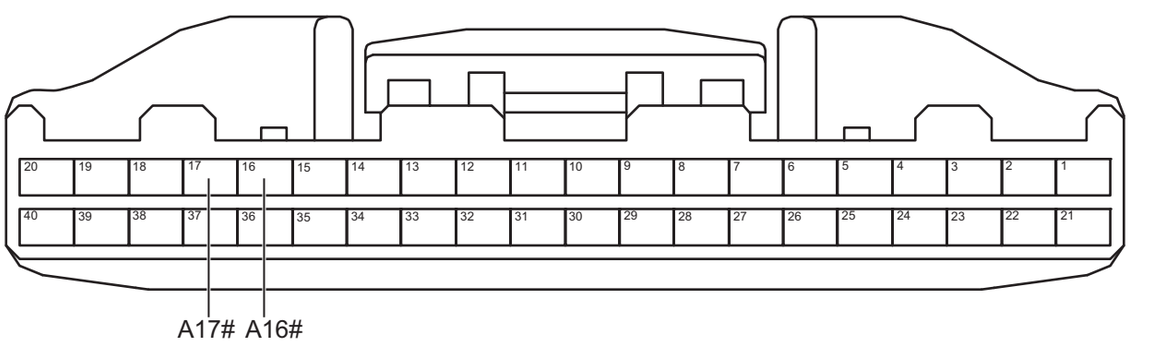
Standard value

Detector connection	Detection conditions	Specified state
GW connector A16# -GW connector A17#	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

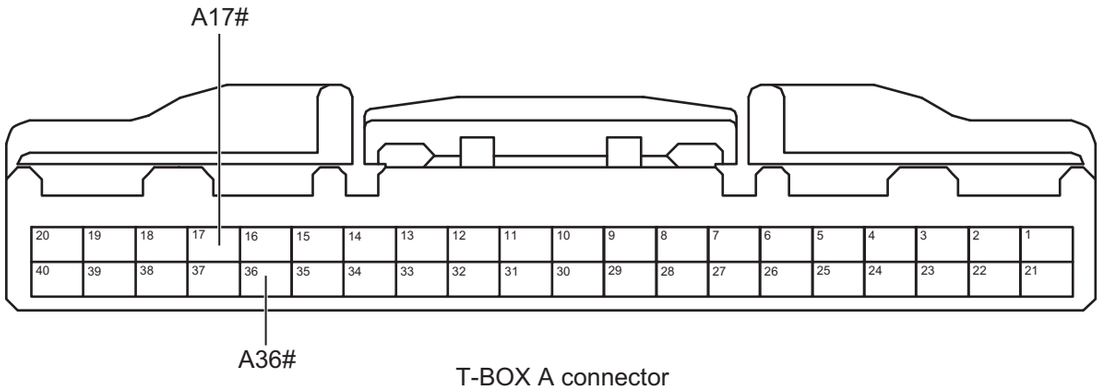
OK

2	**Check interconnection CAN bus for open circuit (GW-T-BOX)**



GW A connector

CA01311RM



(a) Measure the resistance according to the values in the table below.

CA

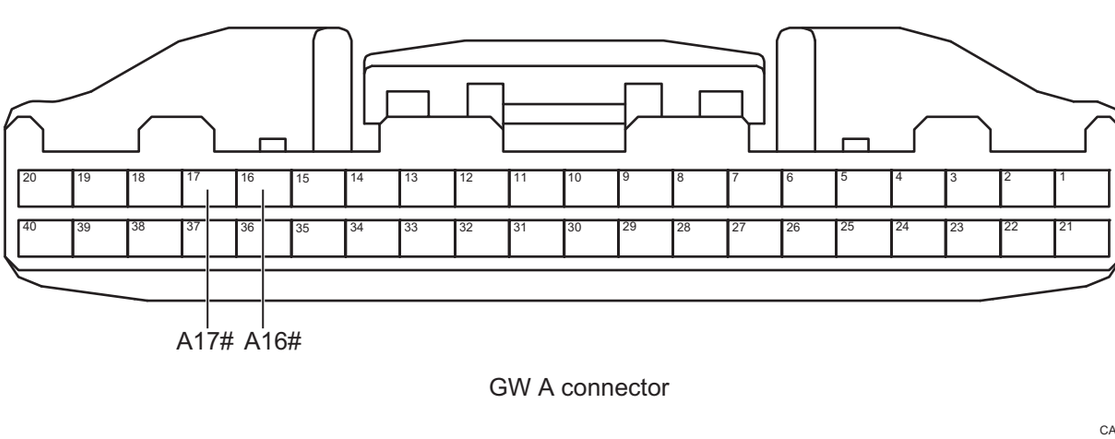
Standard value

Detector connection	Detection conditions	Specified state
T-BOX connector A17#-GW connector A16#	Always connected	Less than 1Ω
T-BOX connector A36# GW connector A17#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	Check interconnection CAN bus for circuit shorted to ground



(a) Measure the resistance according to the values in the table below.

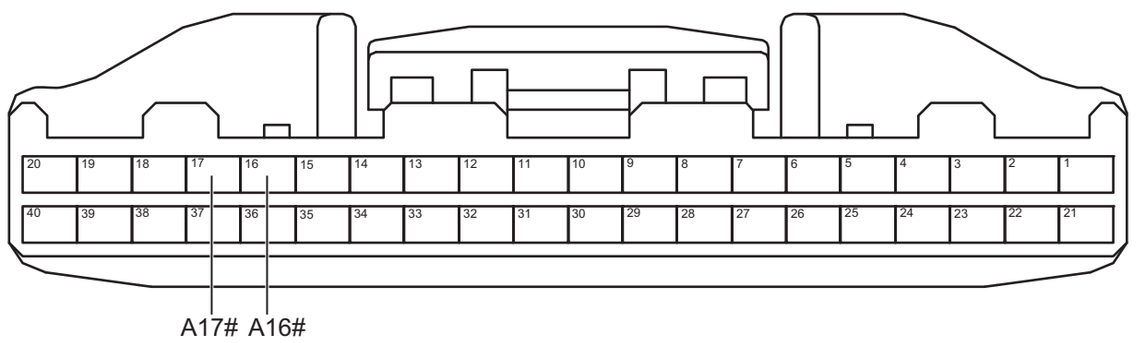
Standard value

Detector connection	Detection conditions	Specified state
GW connector A17# -body GND	Always connected	10 KΩ or greater
GW connector A16# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

4	Check interconnection CAN bus for circuit shorted to power supply



GW A connector

CA01311RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

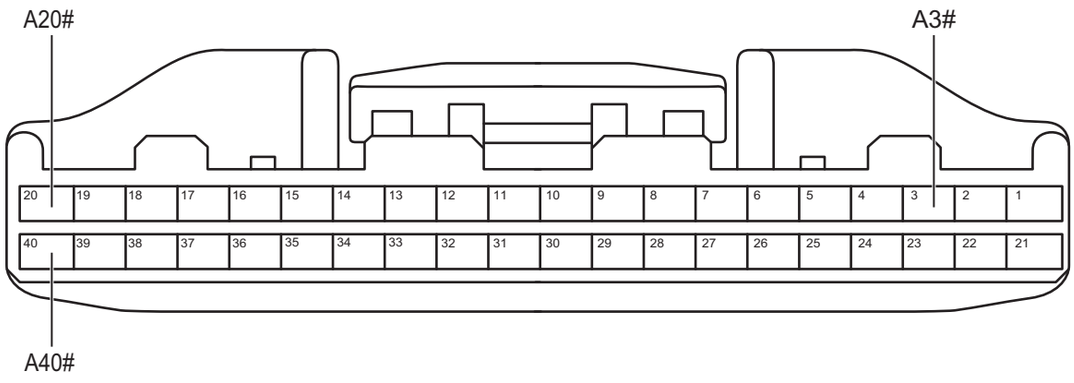
Standard value

Detector connection	Detection conditions	Specified state
GW connector A17# -body GND	Set the ignition switch to "ON"	Less than 1 V
GW connector A16# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

5	Check GW power supply



GW A connector

CA00521RM

(a) Measure the voltage according to the values in the table below.

Standard value

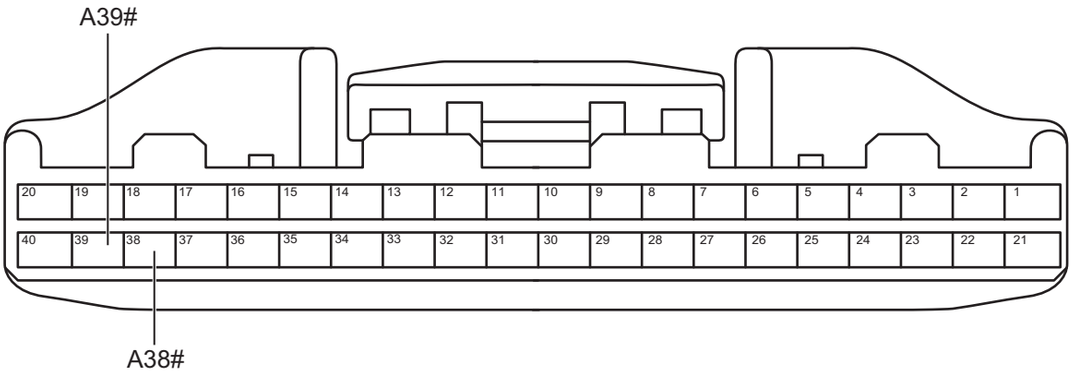
Detector connection	Detection conditions	Specified state
GW connector A3# -body GND	Set the ignition switch to "ON"	Battery voltage
GW connector A20# -body GND	Set the ignition switch to "ON"	Battery voltage
GW connector A40# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

6	Check GW ground

CA



GW A connector

CA00511RM

CA

(a) Measure the resistance according to the values in the table below.

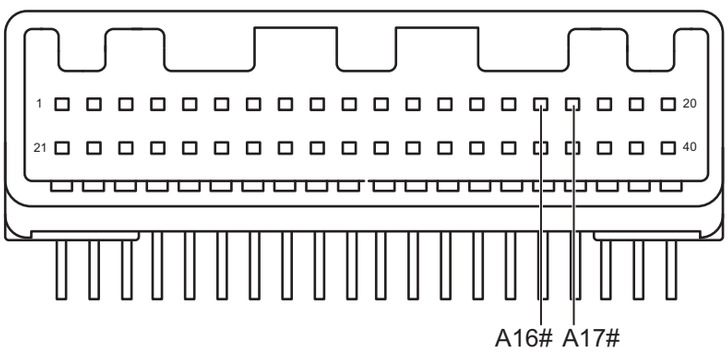
Standard value

Detector connection	Detection conditions	Specified state
GW connector A38# -body GND	Always connected	Less than 1Ω
GW connector A39# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

7	Check GW terminal resistor



GW

CA01331RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
GW A17#- GW A16#	Always connected	About 120 Ω

NG → **Replace GW (See page CA-256)**

OK

8	**End**

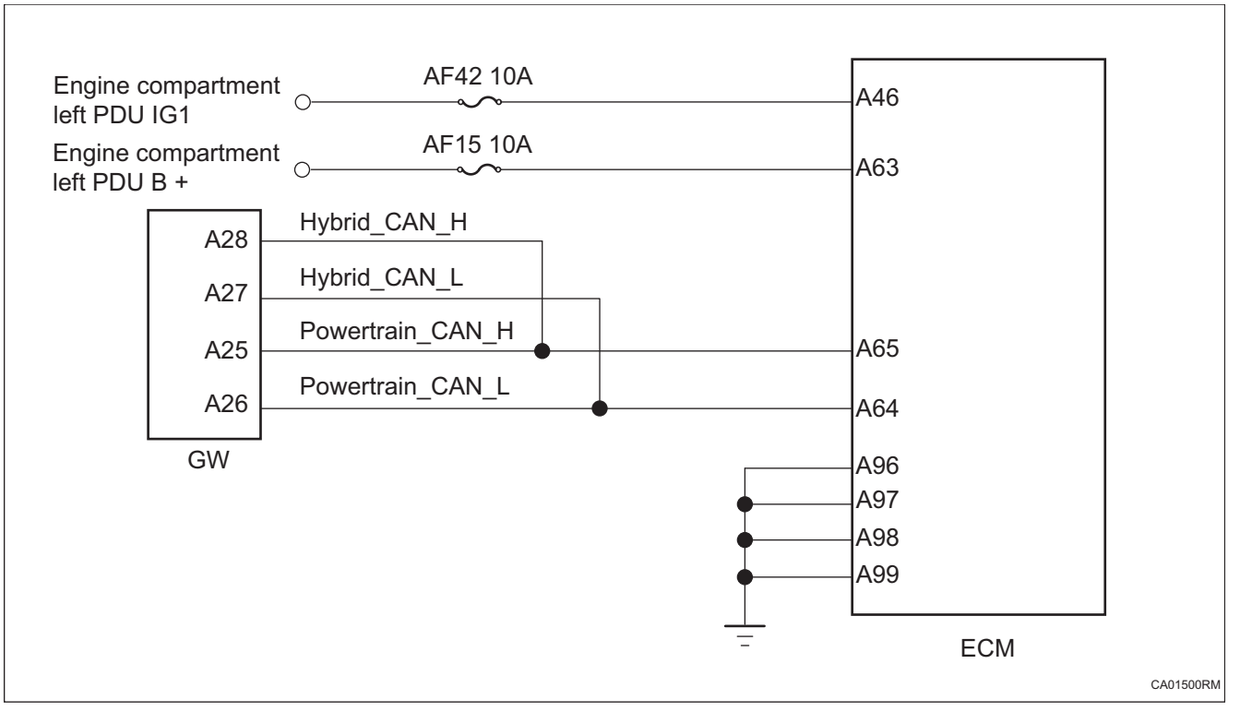
DTC	U010087	ECM node lost

Description

When the communication between the GW and the ECM is abnormal or interrupted, the GW records the DTC.

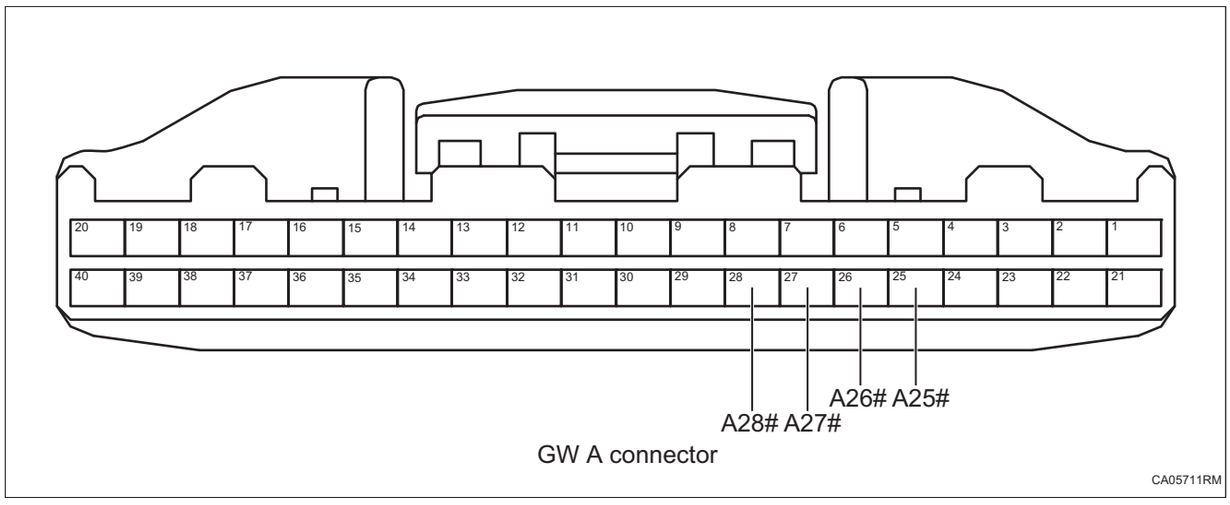
DTC	DTC detection conditions	Faulty location
U010087	(a) ECM node lost.	• ECM • CAN line and connector • GW

Circuit diagram



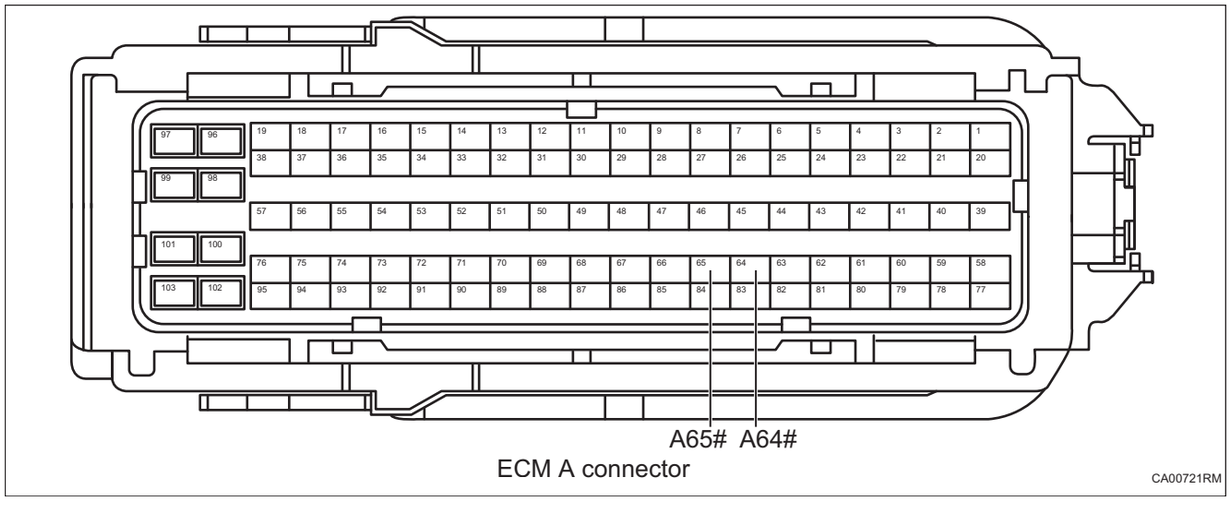
Inspection procedure

1	Check powertrain CAN and hybrid CAN bus for open circuit (GW-ECM)



GW A connector

CA05711RM



ECM A connector

CA00721RM

CA

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the power-train CAN bus and hybrid CAN bus.

(d) Measure the resistance according to the values in the table below.

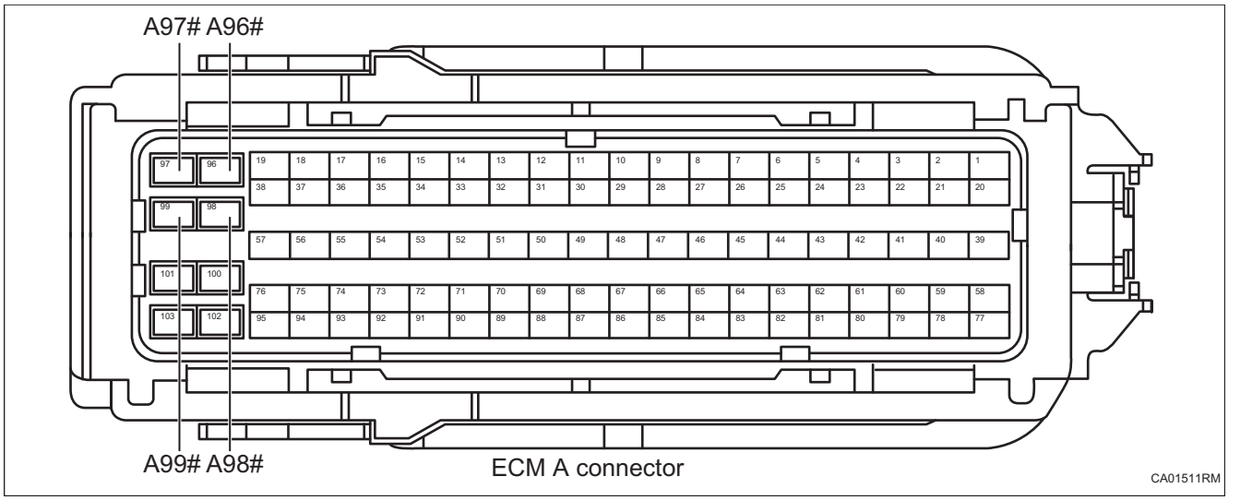
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A65# -GW connector A28#	Always connected	Less than 1Ω
ECM connector A64# -GW connector A27#	Always connected	Less than 1Ω
ECM connector A65# -GW connector A25#	Always connected	Less than 1Ω
ECM connector A64# -GW connector A26#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check ECM ground



(a) Measure the resistance according to the values in the table below.

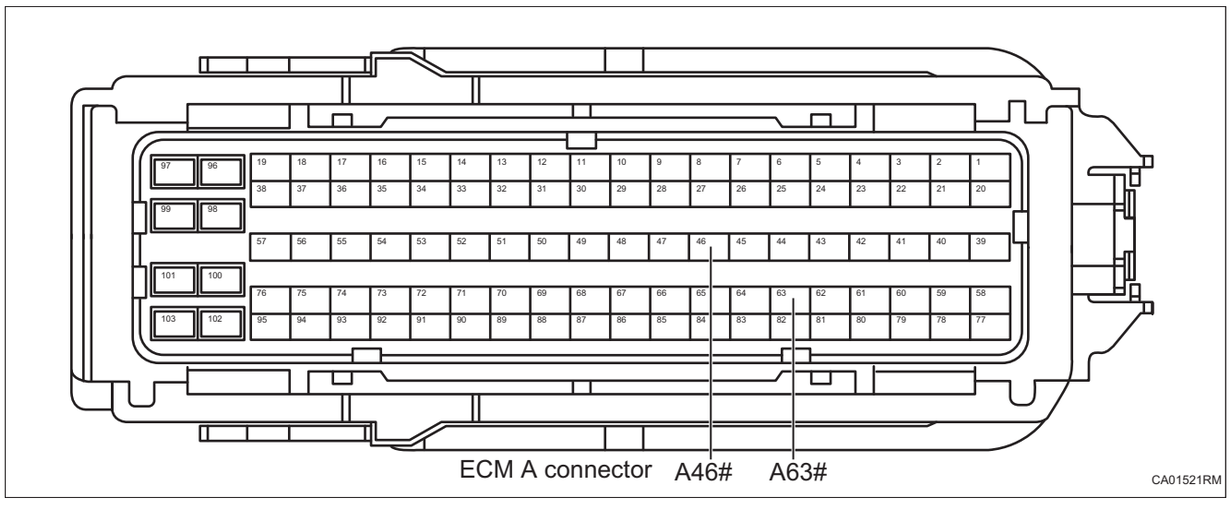
Standard value

Detector connection	Detection conditions	Specified state
ECM connector A96# -engine GND	Always connected	Less than 1Ω
ECM connector A97# -engine GND	Always connected	Less than 1Ω
ECM connector A98# -engine GND	Always connected	Less than 1Ω
ECM connector A99# -engine GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check ECM power supply



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

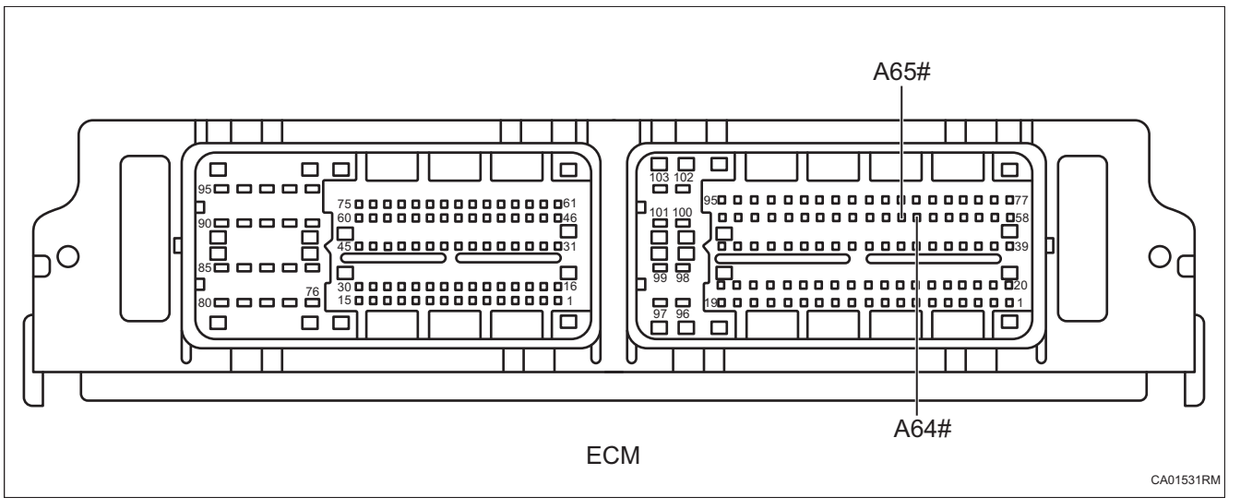
Detector connection	Detection conditions	Specified state
ECM connector A46# -engine GND	The ignition switch is set to "ON"	Battery voltage
ECM connector A63# -engine GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

4	**Check ECM terminal resistor**

CA



CA

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ECM A65#- ECM A64#	Always connected	About 120 Ω

NG → **Replace ECM (See page ES-54) (See page ES-450)**

OK

5	**Replace GW (See page CA-256)**

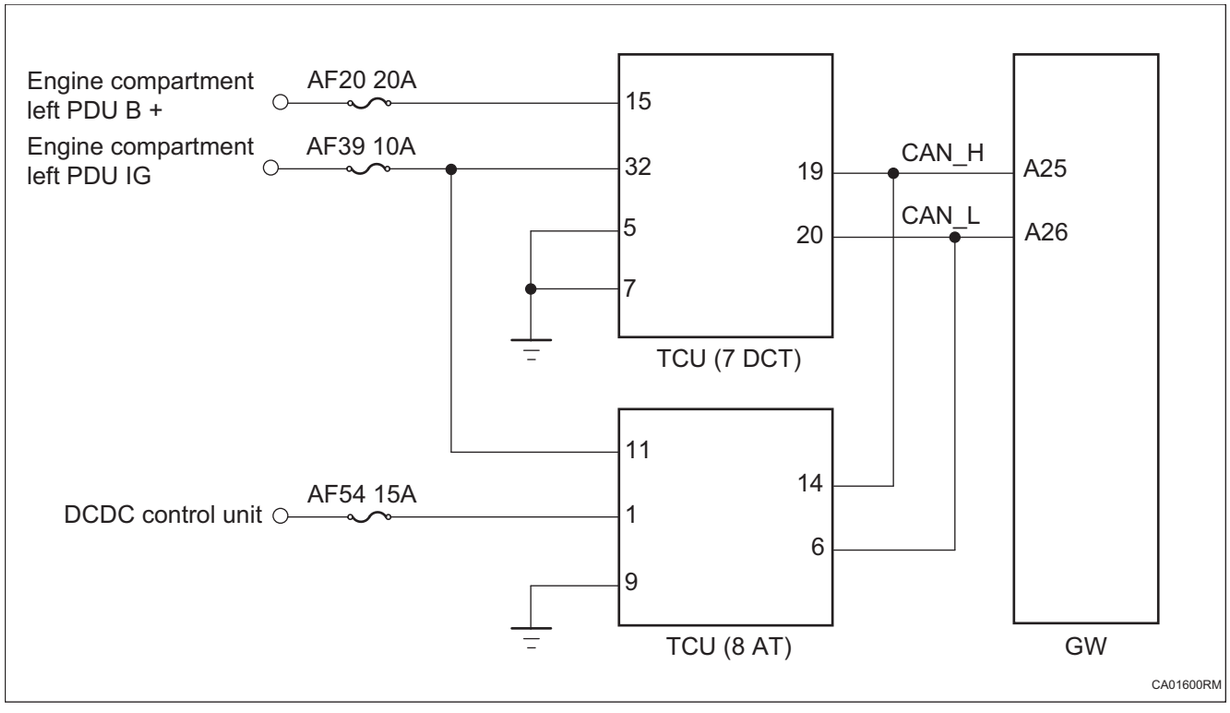
DTC	U010187	TCU node lost

Description

When the communication between the GW and the TCU is abnormal or interrupted, the GW records the DTC.

DTC	DTC detection conditions	Faulty location
U010187	(a) TCU node lost.	• GW • CAN line and connector • TCU

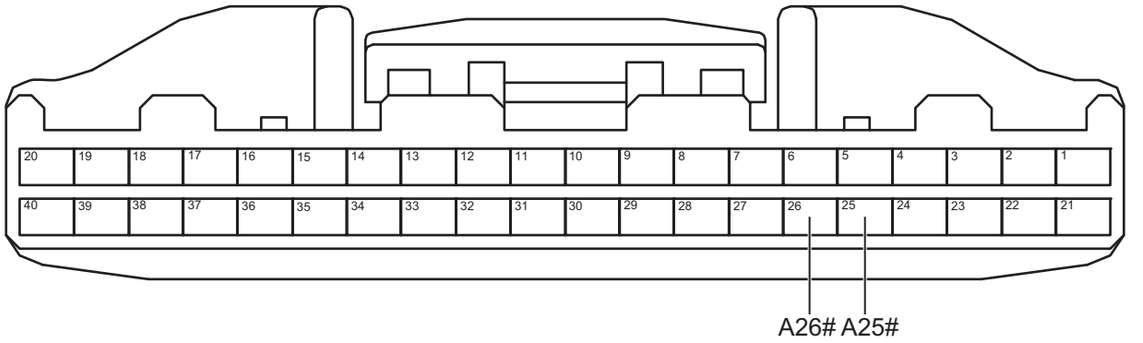
Circuit diagram



Inspection procedure

1	Check powertrain CAN bus for open circuit (GW-TCU)

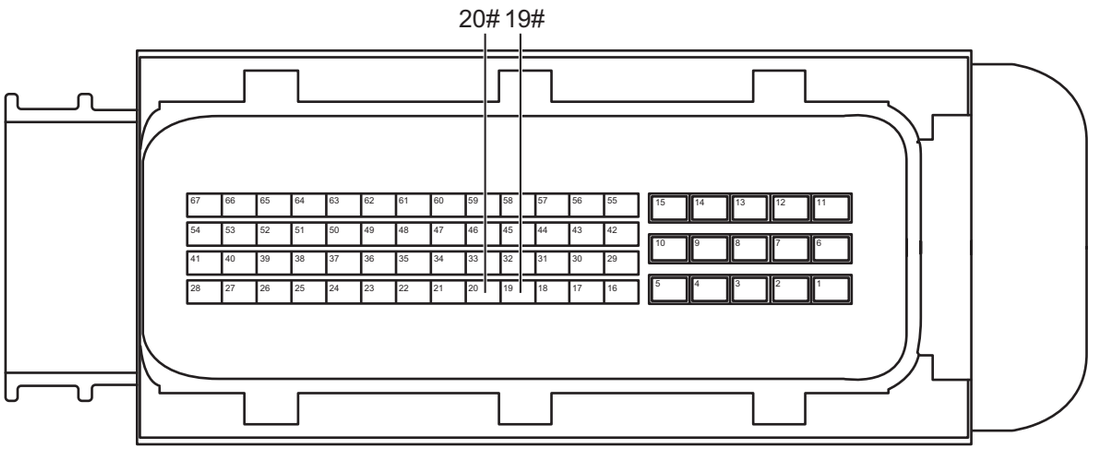
CA



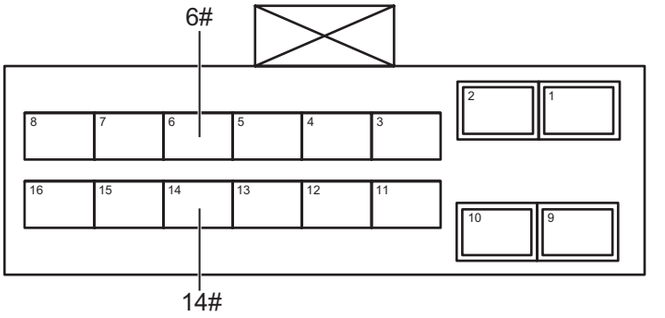
GW A connector

CA00711RM

CA



TCU (7DCT) connector



TCU (8AT) connector

CA01611RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the power-train CAN bus.

(d) Measure the resistance according to the values in the table below.

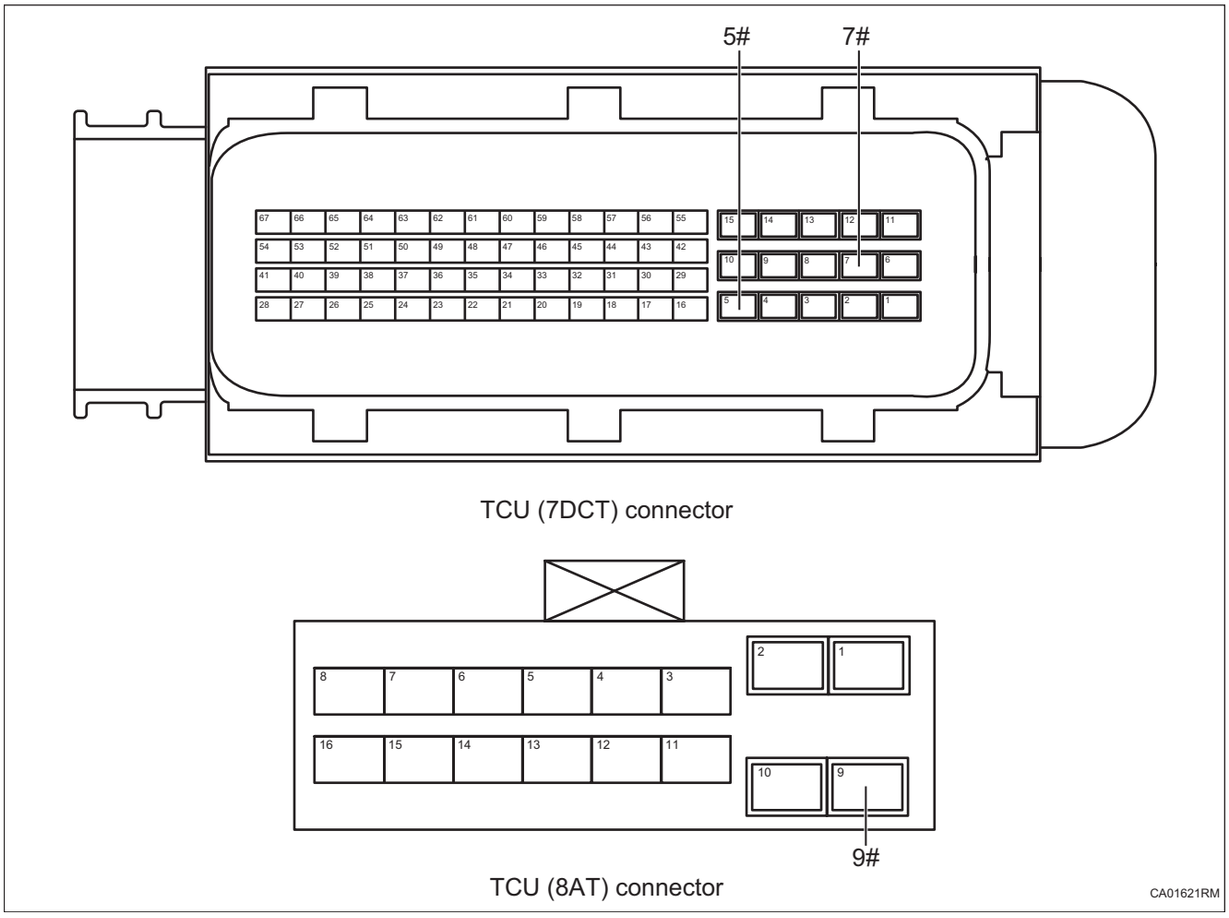
Standard value

Detector connection	Detection conditions	Specified state
TCU (7 DCT) connector 19# -GW connector A25#	Always connected	Less than 1Ω
TCU (7 DCT) connector 20# -GW connector A26#	Always connected	Less than 1Ω
TCU (8 AT) connector 14# -GW connector A25#	Always connected	Less than 1Ω
TCU (8 AT) connector 6# -GW connector A26#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check TCU ground



(a) Measure the resistance according to the values in the table below.

Standard value

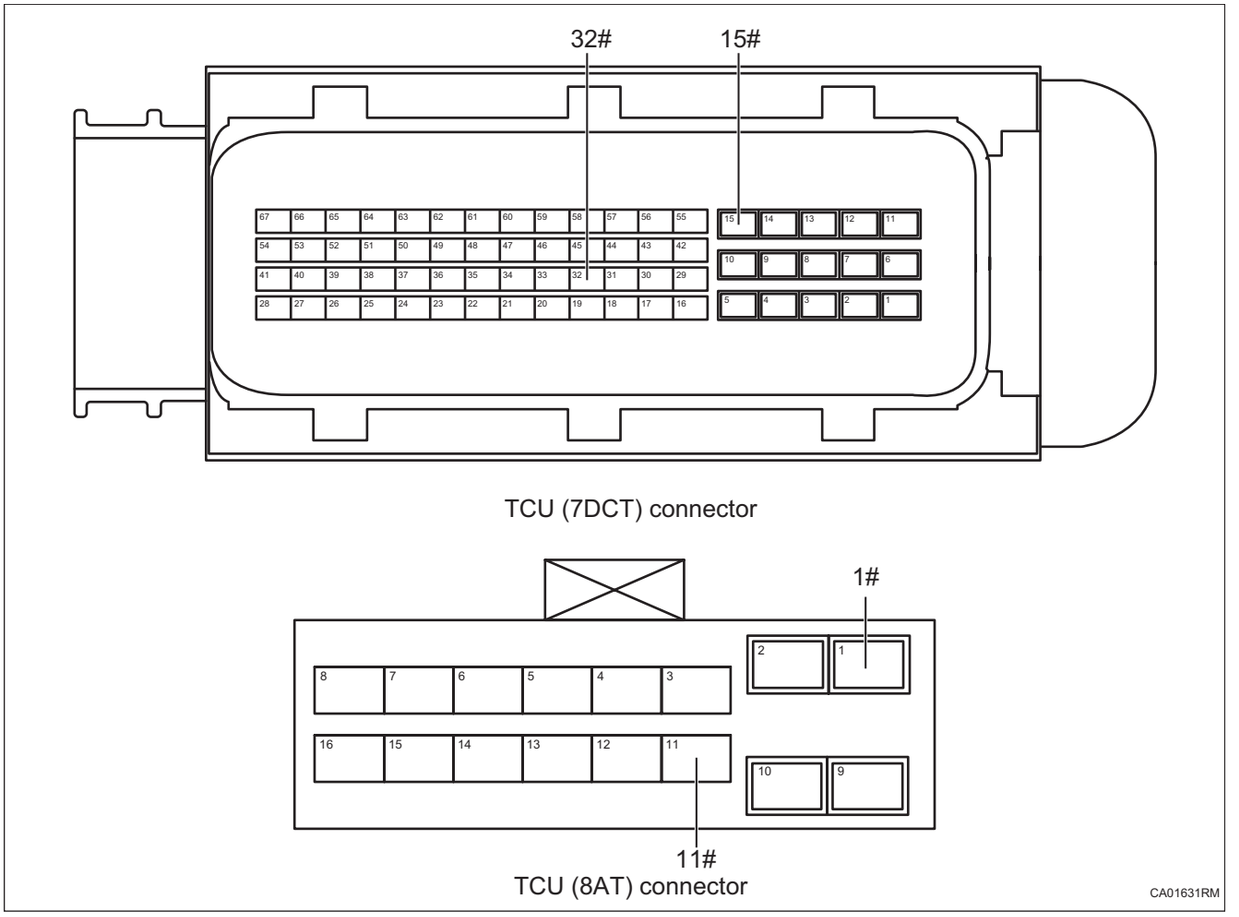
Detector connection	Detection conditions	Specified state
TCU (7DCT) connector 5# - body GND	Always connected	Less than 1Ω
TCU (7DCT) connector 7# - body GND	Always connected	Less than 1Ω
TCU (8AT) connector 9# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

CA

3 Check TCU power supply



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
TCU (7DCT) connector 15# - body GND	Set the ignition switch to "ON"	Battery voltage
TCU (7DCT) connector 32# - body GND	Set the ignition switch to "ON"	Battery voltage
TCU (8AT) connector 11# -body GND	Set the ignition switch to "ON"	Battery voltage
TCU (8AT) connector 1# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

CA

OK

4	**Replace TCU (7DCT or 8AT) (See page AX-224) (See page AX-155)**

(a) Replace the TCU (7DCT or 8AT).

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

5	**End**

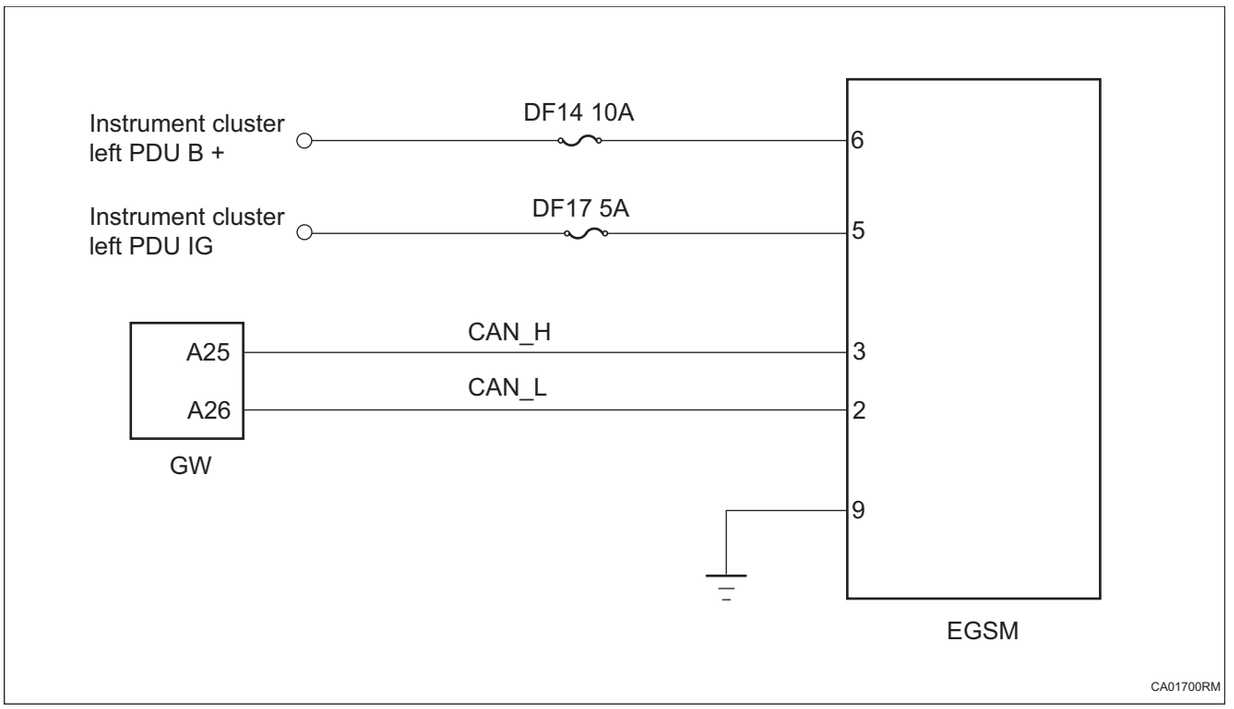
DTC	U010387	EGSM node lost

Description

When the communication between the GW and the EGSM is abnormal or interrupted, the GW records the DTC.

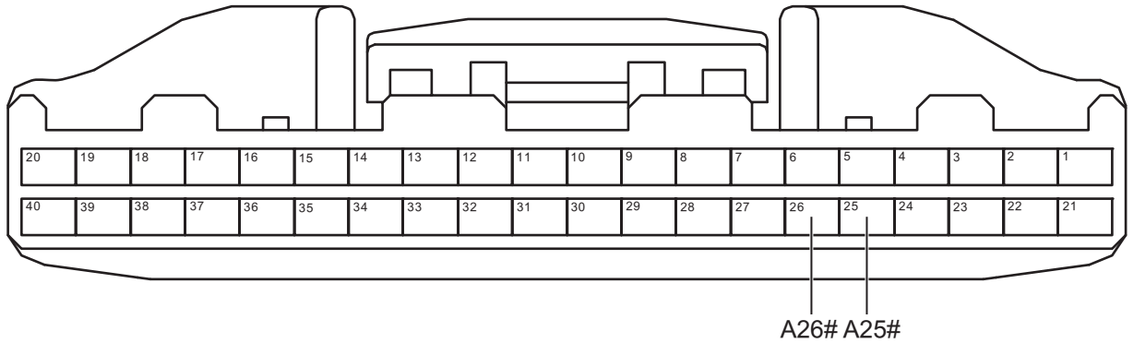
DTC	DTC detection conditions	Faulty location
U010387	(a) EGSM node lost.	• EGSM • CAN line and connector • GW

Circuit diagram



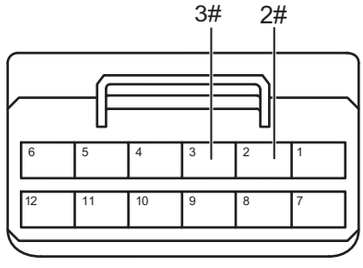
Inspection procedure

1	Check powertrain CAN bus for open circuit (GW-EGSM)



GW A connector

CA00711RM



EGSM connector

CA01711RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the power-train CAN bus.

(d) Measure the resistance according to the values in the table below.

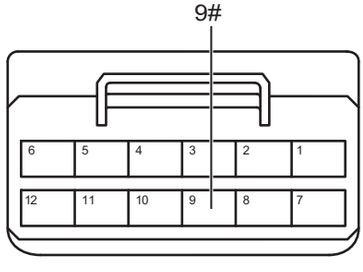
Standard value

Detector connection	Detection conditions	Specified state
EGSM connector 3#-GW connector A25#	Always connected	Less than 1Ω
EGSM connector 2#-GW connector A26#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

2 Check EGSM ground



EGSM connector

CA01721RM

(a) Measure the resistance according to the values in the table below.

Standard value

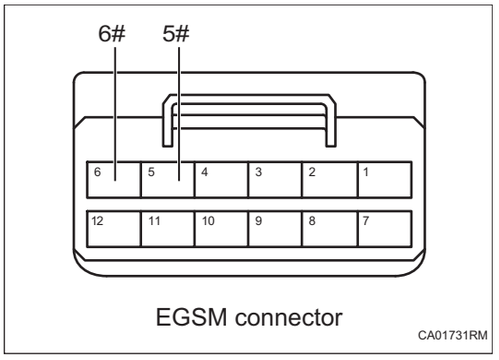
Detector connection	Detection conditions	Specified state
EGSM connector 9# -body GND	Always connected	Less than 1Ω

CA

NG → **Repair or replace the harness and connector**

OK

3	Check the EGSM power supply



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
EGSM connector 5# -body GND	Set the ignition switch to "ON"	Battery voltage
EGSM connector 6# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

4	Replace the EGSM (See page EG-31)

(a) Replace the EGSM.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

5	End

CA

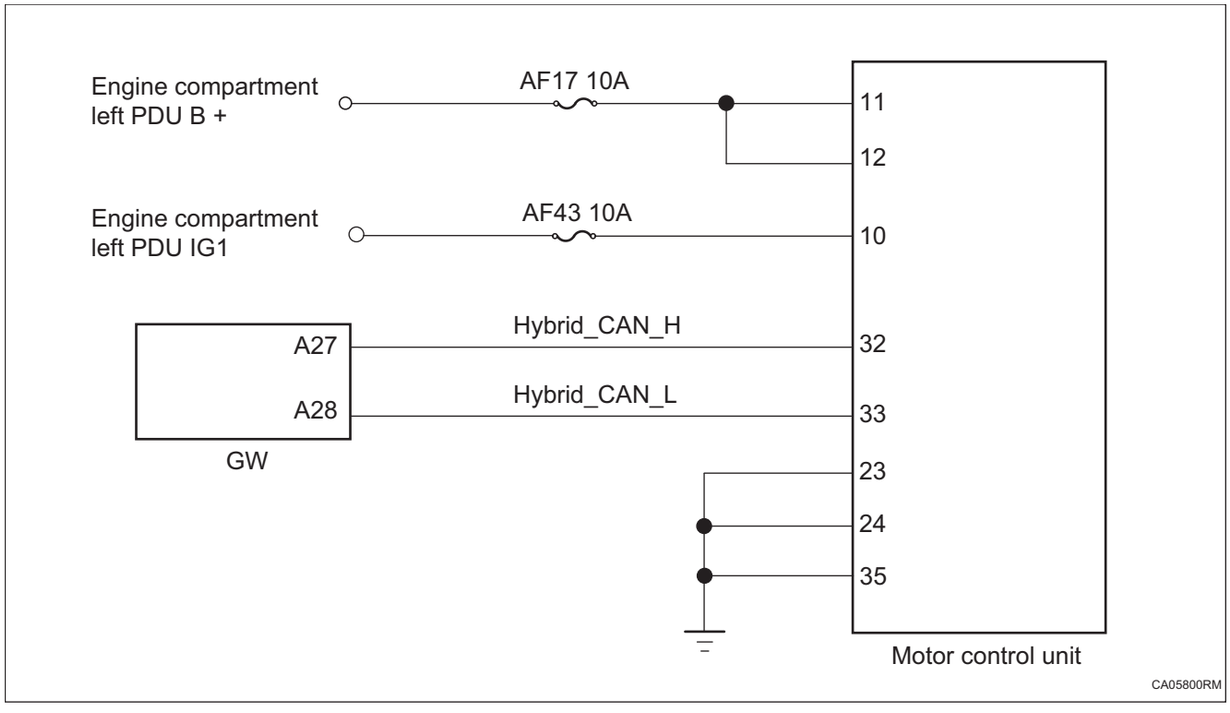
DTC	U011087	MCU 1 node lost

Description

When the communication between the GW and the MCU is abnormal or interrupted, the GW records the DTC.

DTC	DTC detection conditions	Faulty location
U011087	(a) MCU node lost.	• MCU • CAN line and connection unit • GW

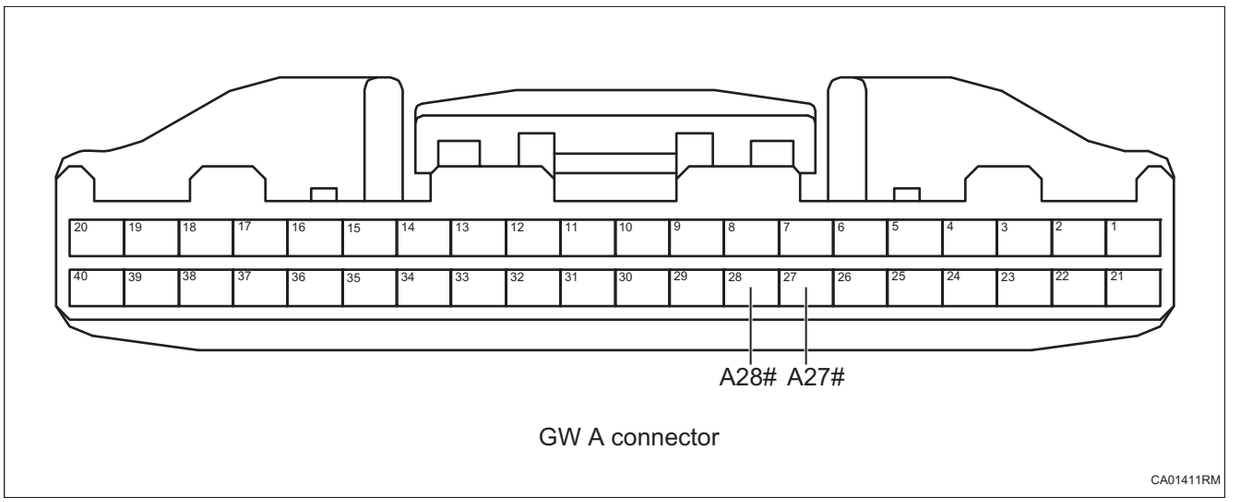
Circuit diagram



Inspection procedure

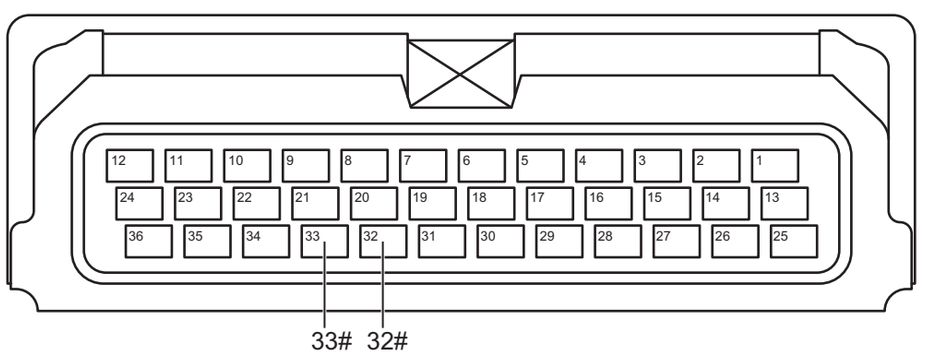
1	Check hybrid CAN bus for open circuit (GW-MCU)

CA



GW A connector

CA01411RM



MCU connector

CA05811RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the electric hybrid CAN bus.

(d) Measure the resistance according to the values in the table below.

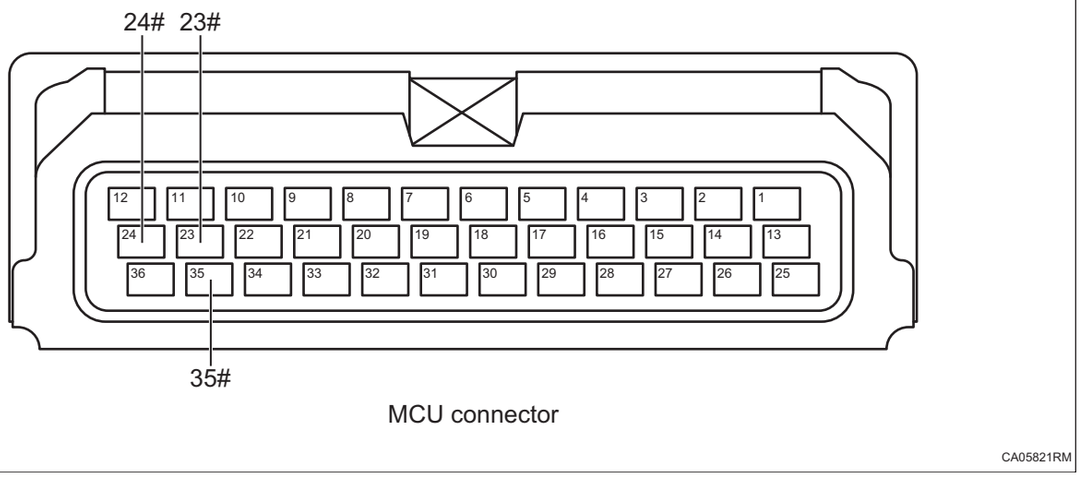
Standard value

Detector connection	Detection conditions	Specified state
MCU connector 32# -GW connector A27#	Always connected	Less than 1Ω
MCU connector 33# -GW connector A28#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check MCU ground



(a) Measure the resistance according to the values in the table below.

Standard value

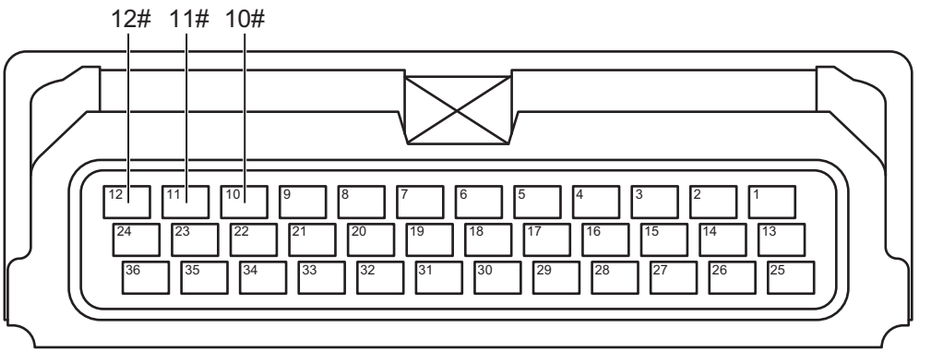
Detector connection	Detection conditions	Specified state
MCU connector 23# -body GND	Always connected	Less than 1Ω
MCU connector 24# -body GND	Always connected	Less than 1Ω
MCU connector 35# -body GND	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	Check the MCU power supply

CA



MCU connector

CA05831RM

CA

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
MCU connector 10# -body GND	Set the ignition switch to "ON"	Battery voltage
MCU connector 11# -body GND	Set the ignition switch to "ON"	Battery voltage
MCU connector 12# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

4	**Replace the MCU (See page MC-70)**

(a) Replace the MCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

5	End

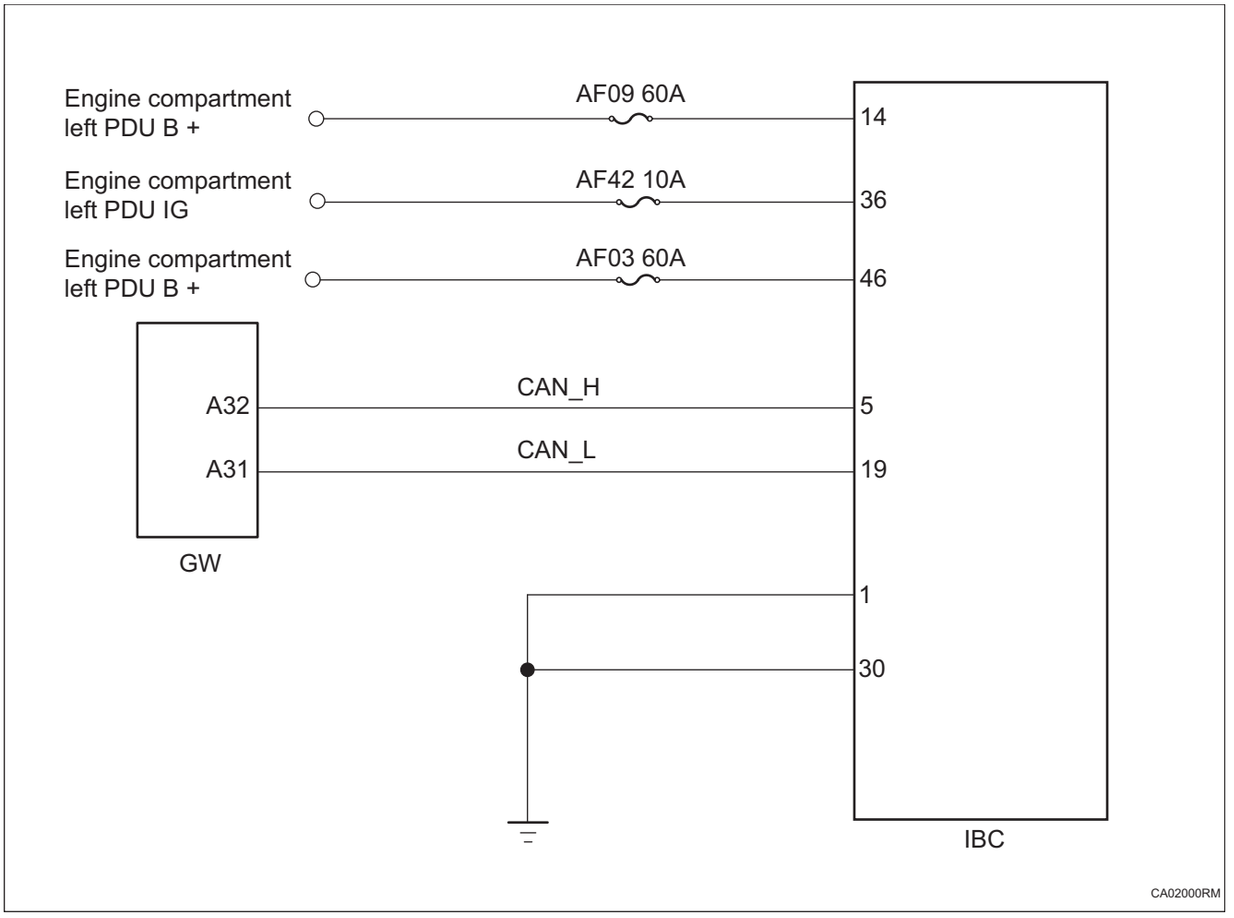
DTC	U012987	IBC node lost

Description

When the communication between the GW and the IBC is abnormal or interrupted, the GW records the DTC.

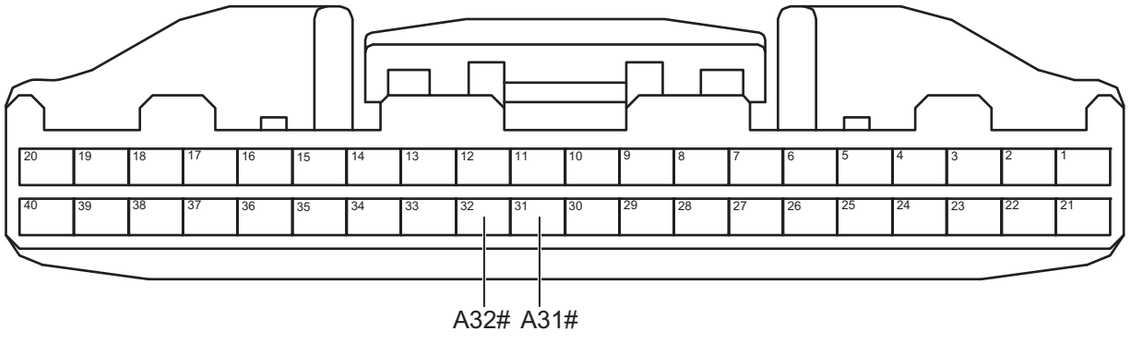
DTC	DTC detection conditions	Faulty location
U012987	(a) IBC node lost.	• GW • CAN line and connector • IBC

Circuit diagram



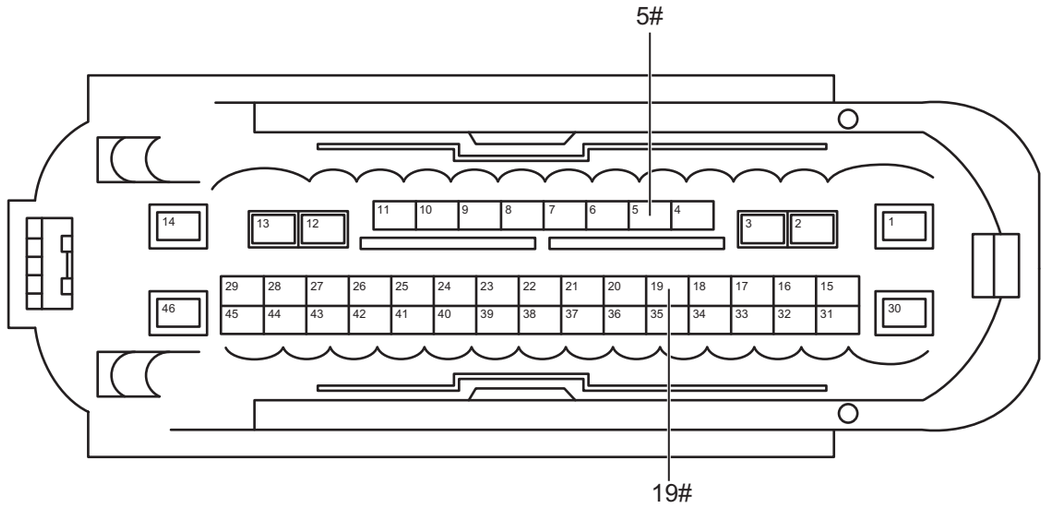
Inspection procedure

1	Check chassis CAN bus for open circuit (GW-IBC)



GW A connector

CA01111RM



IBC connector

CA02011RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the chassis CAN bus.

(d) Measure the resistance according to the values in the table below.

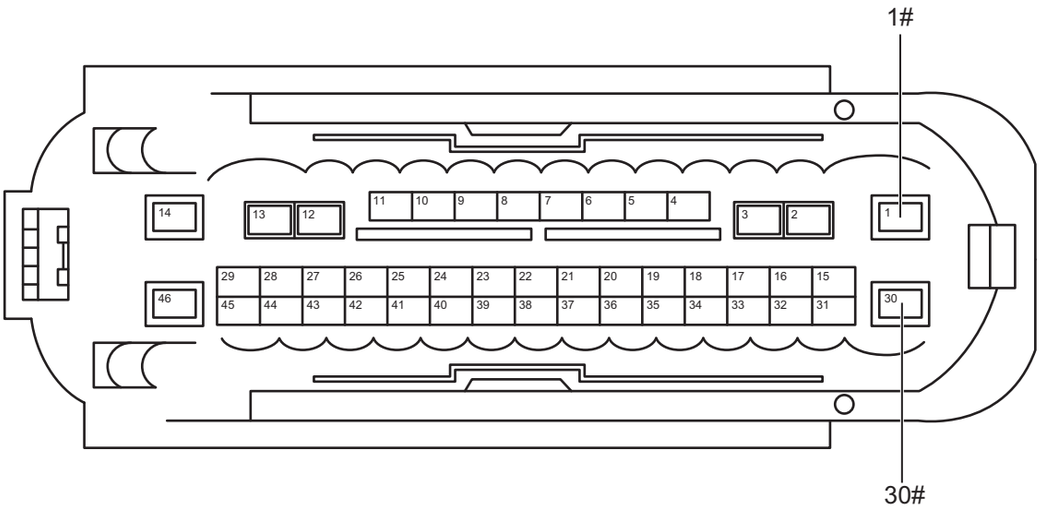
Standard value

Detector connection	Detection conditions	Specified state
IBC connector 5#-GW connector A32#	Always connected	Less than 1Ω
IBC connector 19#-GW connector A31#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check the IBC ground



IBC connector

CA02021RM

(a) Measure the resistance according to the values in the table below.

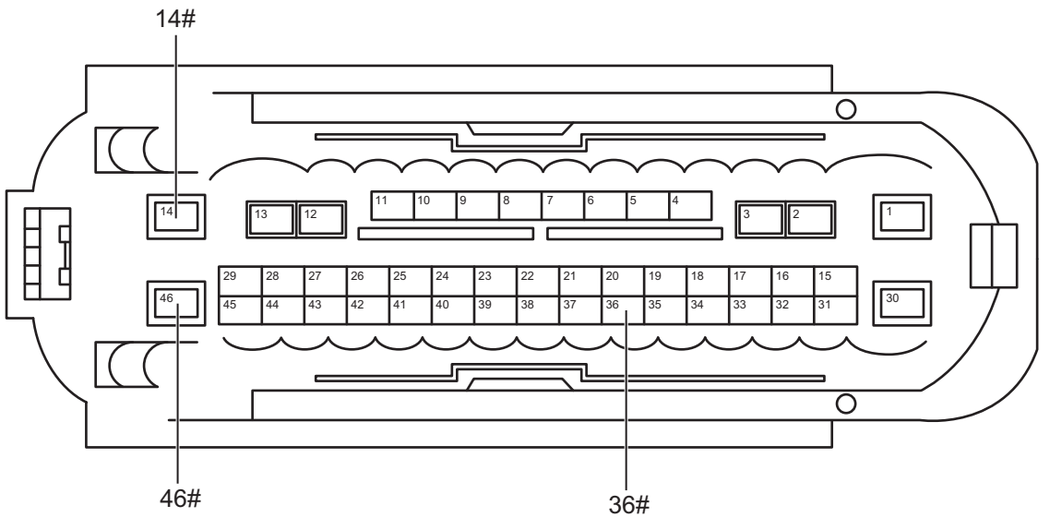
Standard value

Detector connection	Detection conditions	Specified state
IBC connector 1# - body GND	Always connected	Less than 1Ω
IBC connector 30# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check the IBC power supply



IBC connector

CA02031RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
IBC connector 14# - body GND	Set the ignition switch to "ON"	Battery voltage
IBC connector 36# - body GND	Set the ignition switch to "ON"	Battery voltage
IBC connector 46# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

4	**Replace the IBC (See page BC-118)**

(a) Replace the IBC.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

CA

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

5	**End**

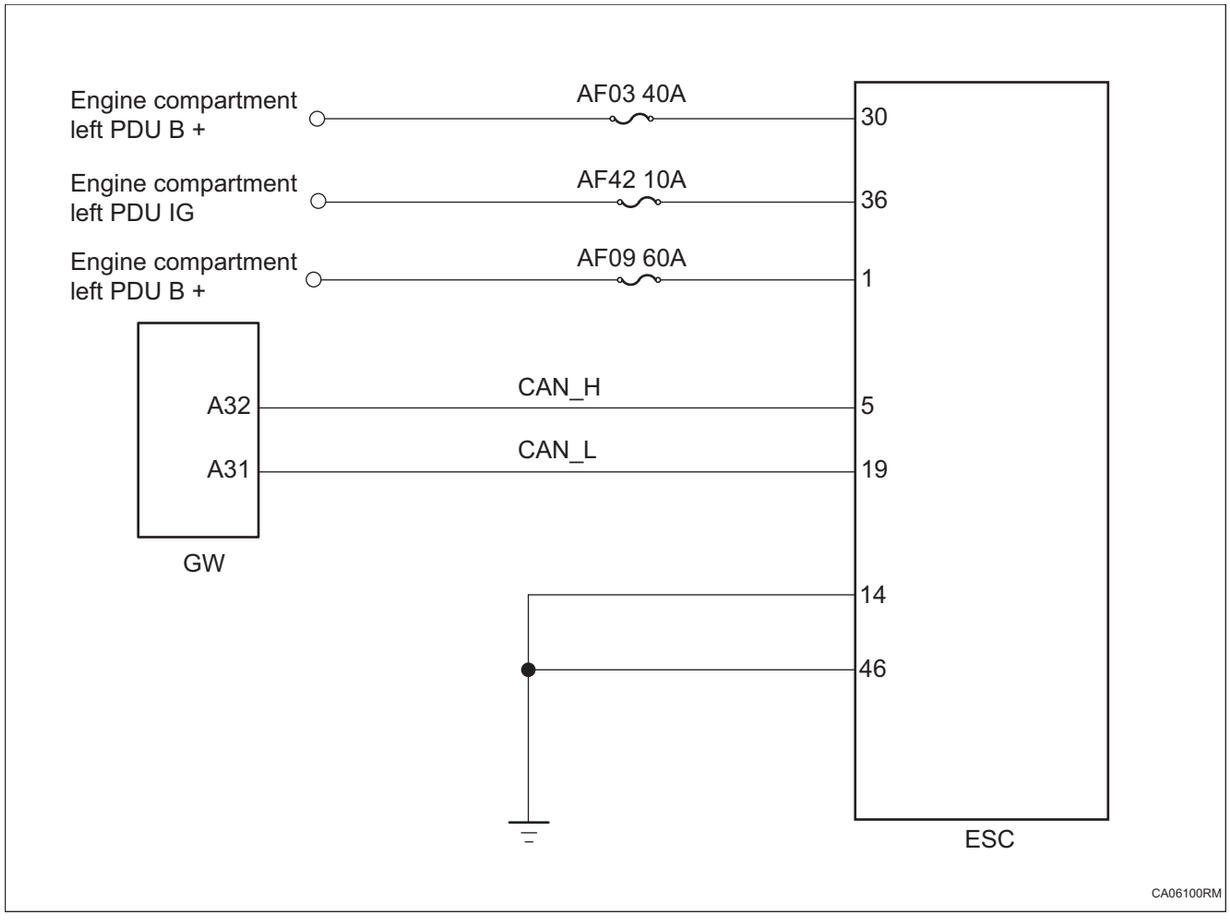
DTC	U012187	ESC IBC node lost

Description

When the communication between the GW and the ESC is abnormal or interrupted, the GW records the DTC.

DTC	DTC detection conditions	Faulty location
U012187	(a) ESC IBC node lost.	• GW • CAN line and connector • ESC

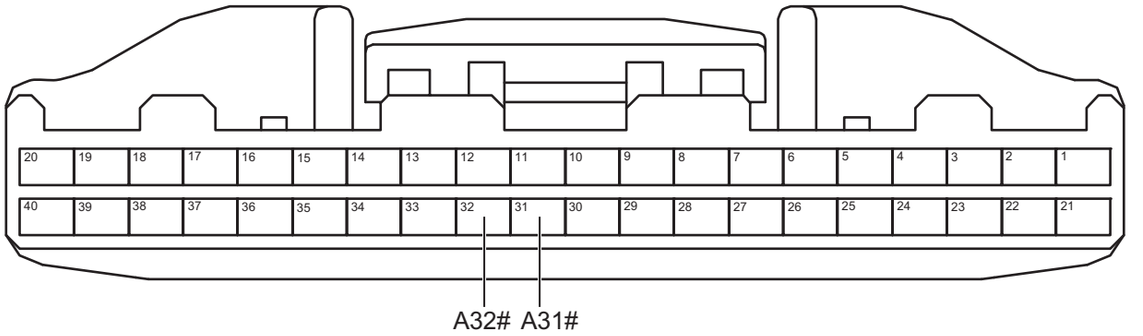
Circuit diagram



Inspection procedure

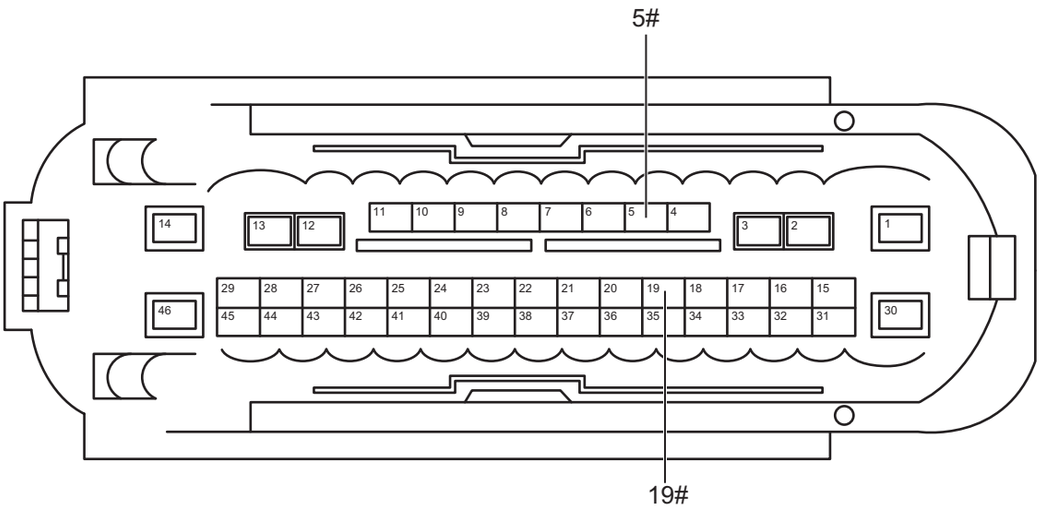
1	Check chassis CAN bus for open circuit (GW-ESC)

CA



GW A connector

CA01111RM



ESC connector

CA06111RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the chassis CAN bus.

(d) Measure the resistance according to the values in the table below.

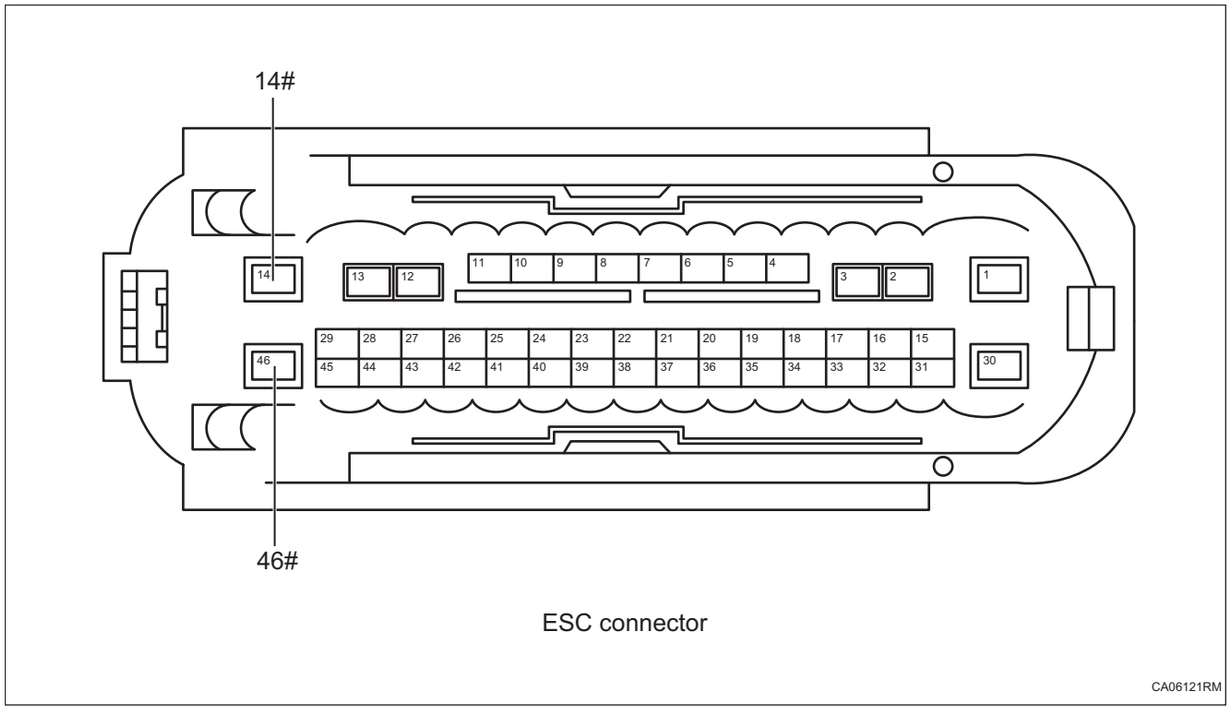
Standard value

Detector connection	Detection conditions	Specified state
ESC connector 5# -GW connector A32#	Always connected	Less than 1Ω
ESC connector 19# -GW connector A31#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check ESC ground



ESC connector

(a) Measure the resistance according to the values in the table below.

Standard value

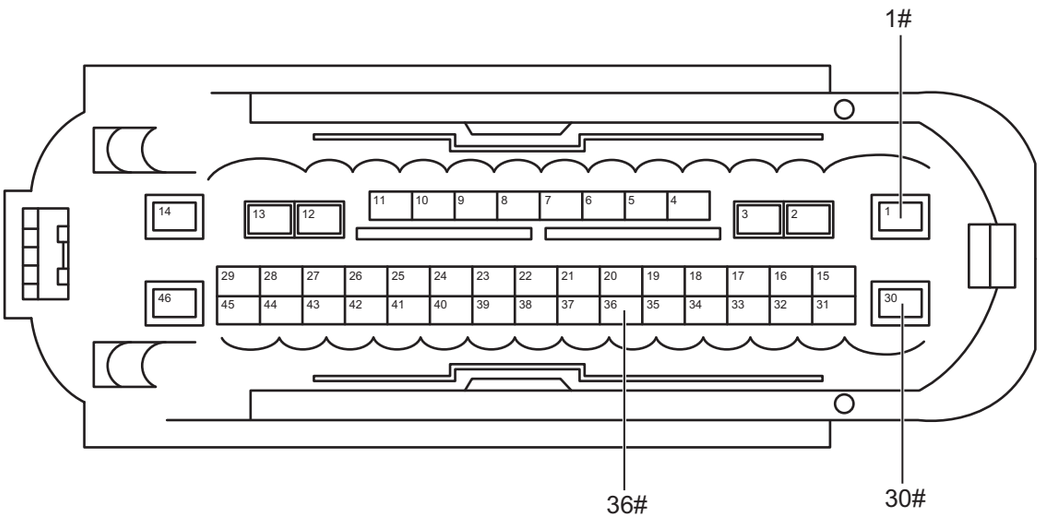
Detector connection	Detection conditions	Specified state
ESC connector 14# - body GND	Always connected	Less than 1Ω
ESC connector 46# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check the ESC power supply

CA



ESC connector

CA06131RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ESC connector 1# - body GND	Set the ignition switch to "ON"	Battery voltage
ESC connector 36# - body GND	Set the ignition switch to "ON"	Battery voltage
ESC connector 30# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

4	**Replace ESC (See page BC-87)**

(a) Replace the ESC.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

5	**End**

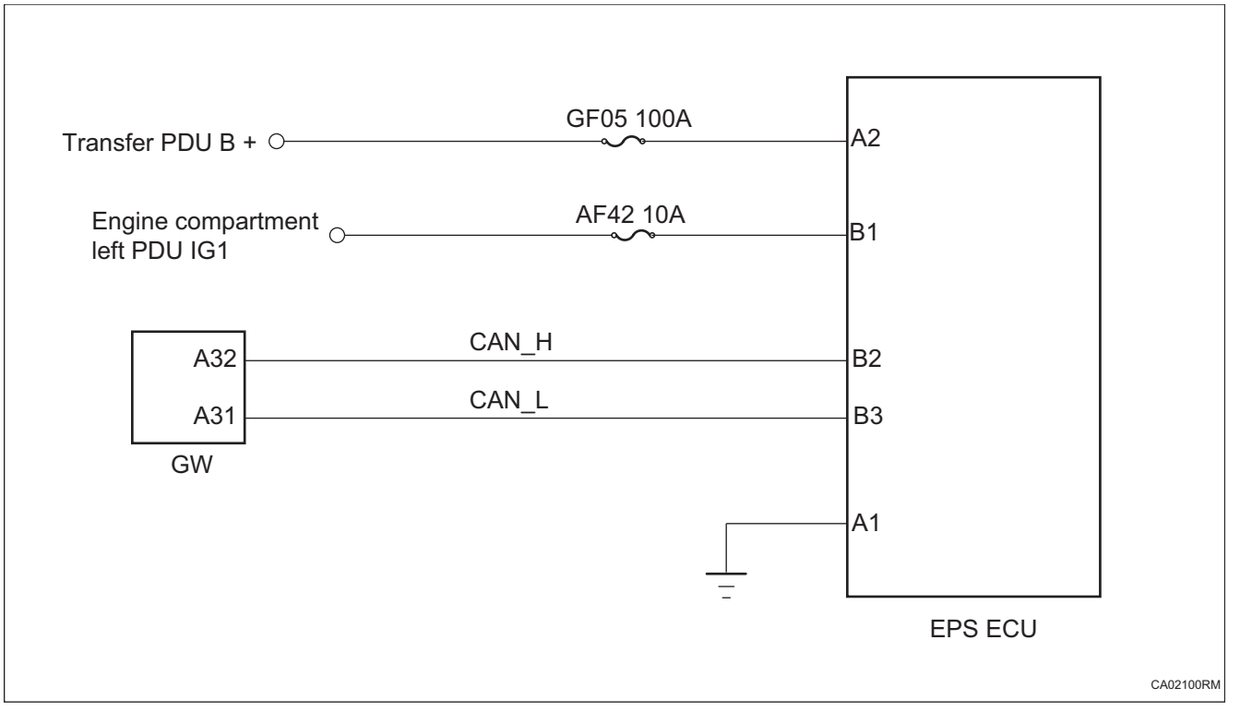
DTC	U013187	EPS ECU node lost

Description

When the communication between the GW and the EPS ECU is abnormal or interrupted, the GW records the DTC.

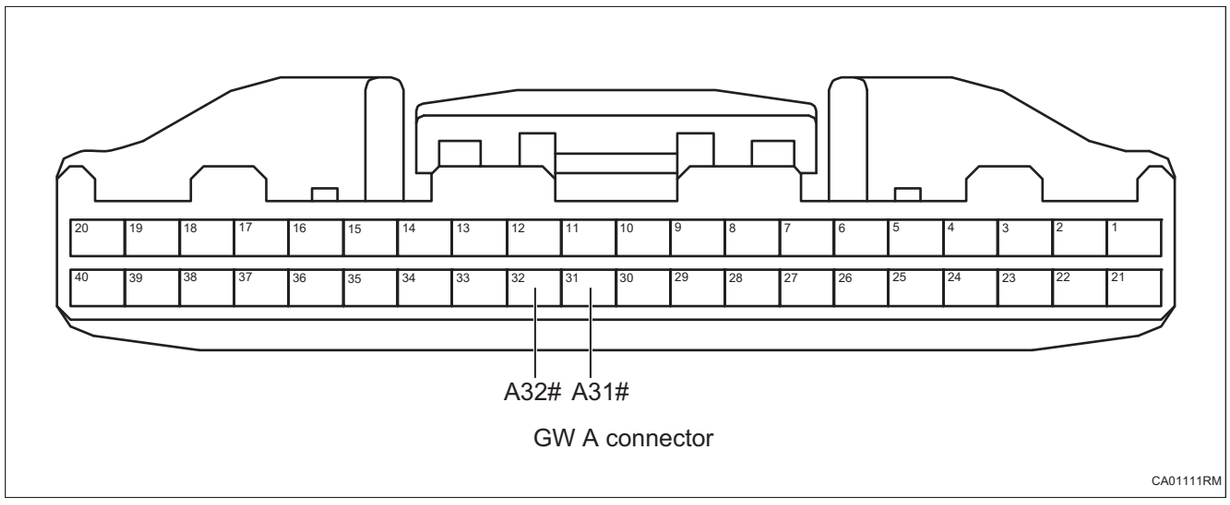
DTC	DTC detection conditions	Faulty location
U013187	(a) EPS ECU node lost.	• EPS ECU • CAN line and connector • GW

Circuit diagram



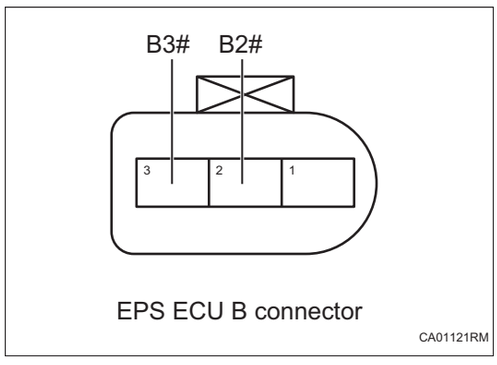
Inspection procedure

1	Check chassis CAN bus for open circuit (GW-EPS ECU)



GW A connector

CA01111RM



EPS ECU B connector

CA01121RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the chassis CAN bus.

(d) Measure the resistance according to the values in the table below.

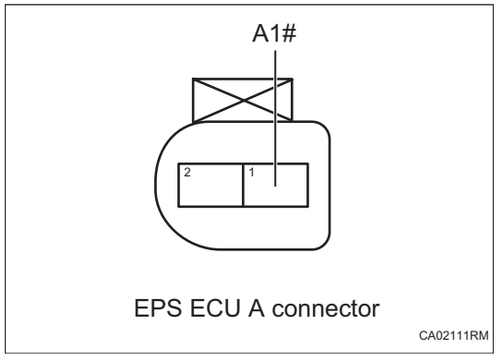
Standard value

Detector connection	Detection conditions	Specified state
EPS ECU connector B2# -GW connector A32#	Always connected	Less than 1Ω
EPS ECU connector B3# -GW connector A31#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2 Check EPS ECU ground



EPS ECU A connector

CA02111RM

(a) Measure the resistance according to the values in the table below.

Standard value

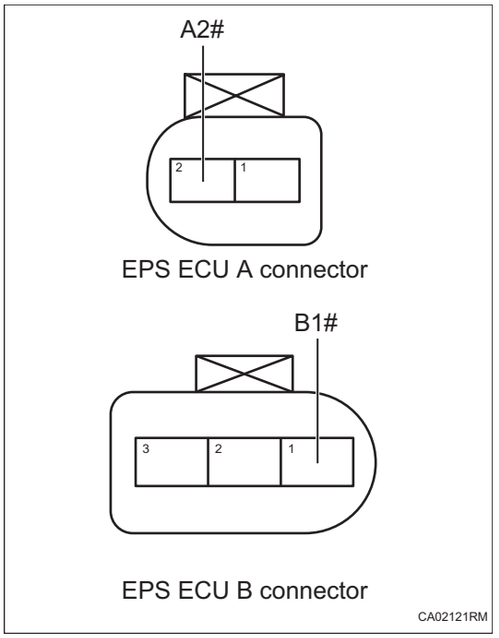
Detector connection	Detection conditions	Specified state
EPS ECU connector A1# - body GND	Always connected	Less than 1Ω

CA

NG → **Repair or replace the harness and connector**

OK

3	Check EPS ECU power supply



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
EPS ECU connector A2# - body GND	Set the ignition switch to "ON"	Battery voltage
EPS ECU connector B1# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

4	Replace the EPS ECU (See page PS-25)

(a) Replace the EPS ECU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

5	End

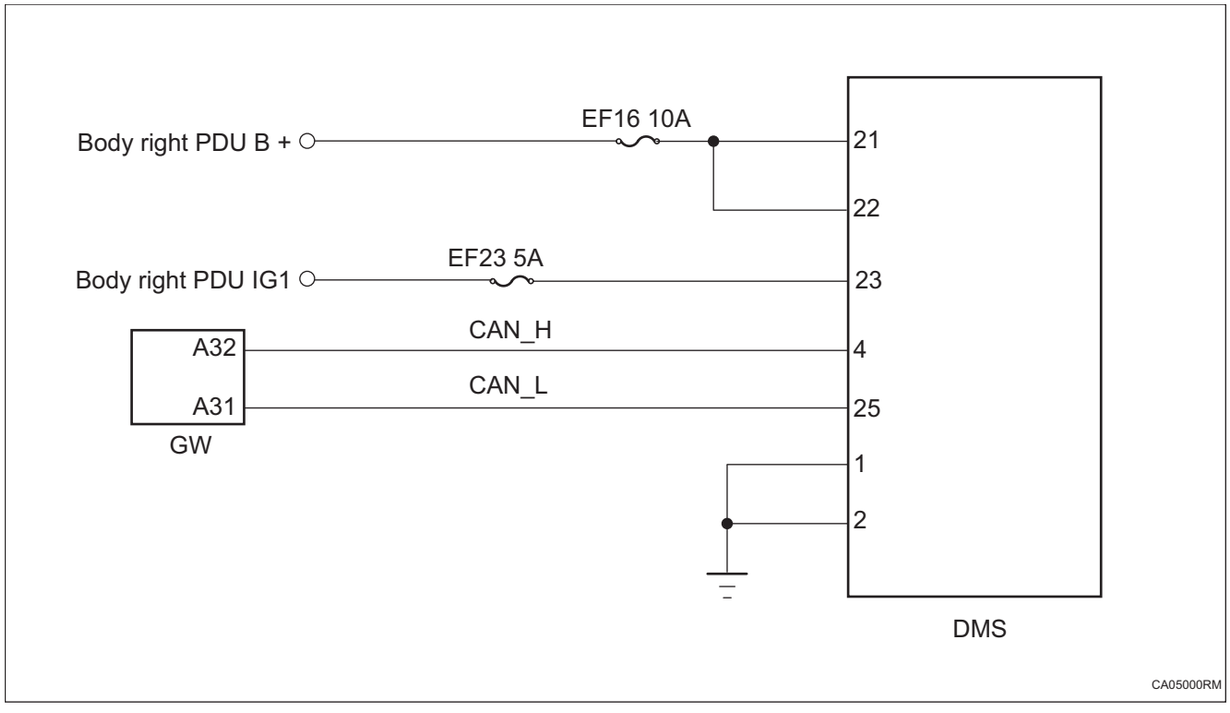
DTC	U013887	DMS node lost

Description

When the communication between the GW and the DMS is abnormal or interrupted, the GW records the DTC.

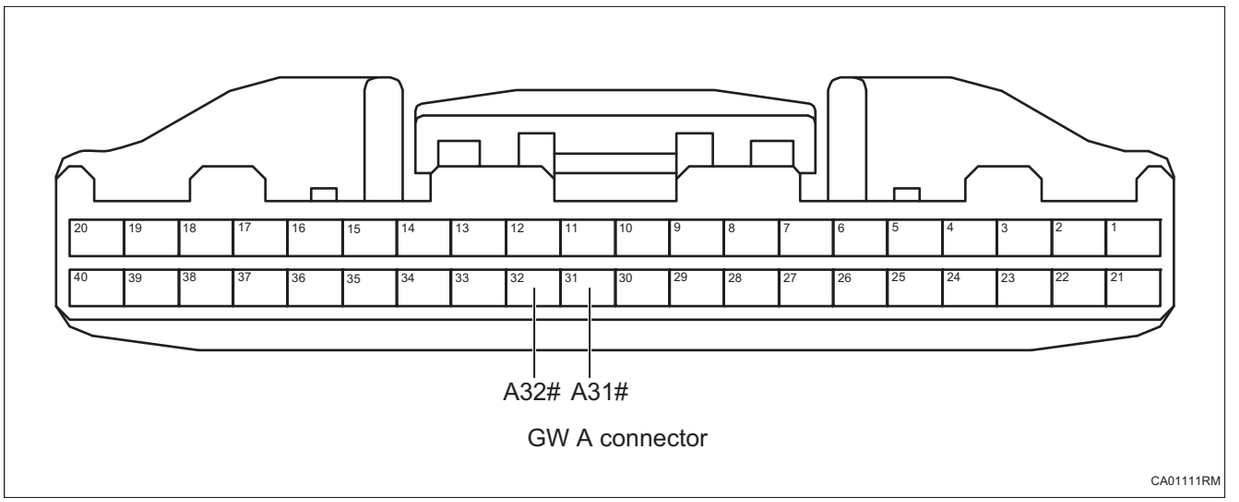
DTC	DTC detection conditions	Faulty location
U013887	(a) DMS node lost.	• DMS • CAN line and connector • GW

Circuit diagram



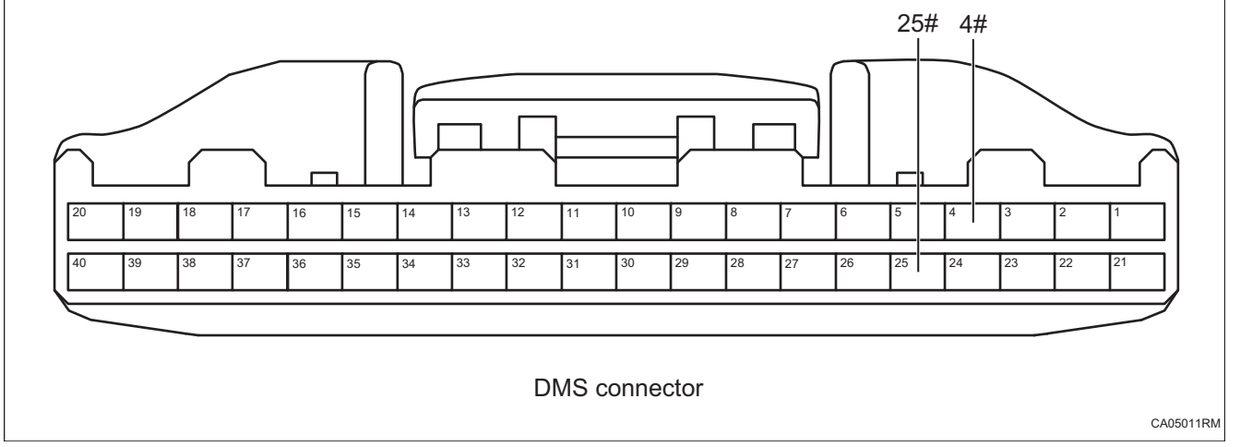
Inspection procedure

1	Check chassis CAN bus for open circuit (GW-DMS)



GW A connector

CA01111RM



DMS connector

CA05011RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the chassis CAN bus.

(d) Measure the resistance according to the values in the table below.

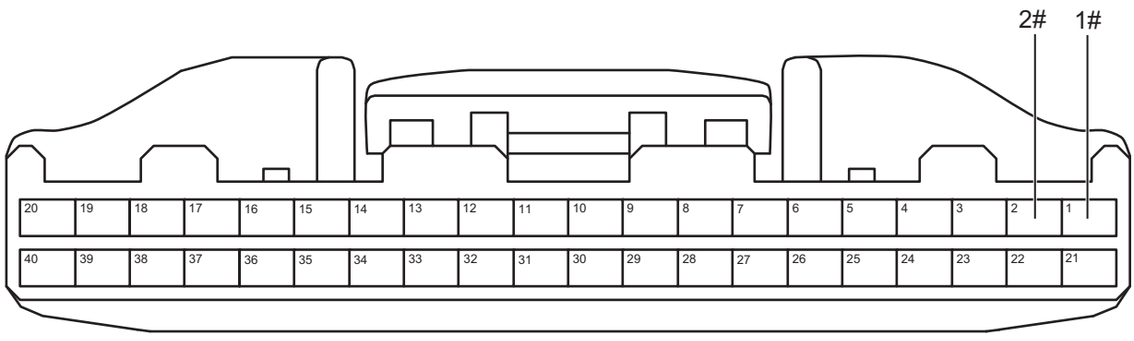
Standard value

Detector connection	Detection conditions	Specified state
DMS connector 4# -GW connector A32#	Always connected	Less than 1Ω
DMS connector 25# -GW connector A31#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check DMS ground



DMS connector

CA05021RM

(a) Measure the resistance according to the values in the table below.

Standard value

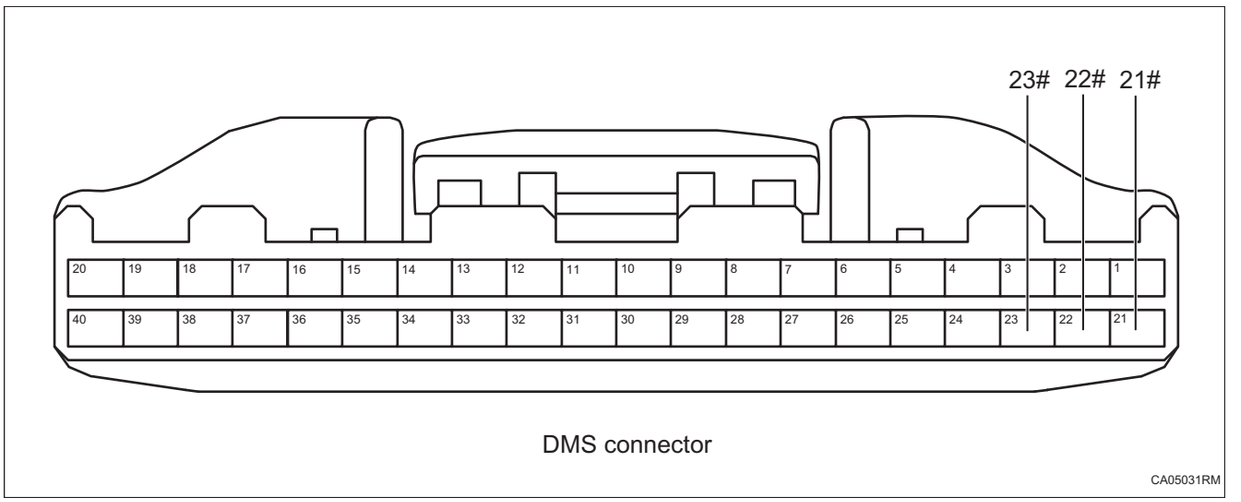
Detector connection	Detection conditions	Specified state
DMS connector 1# -body GND	Always connected	Less than 1Ω
DMS connector 2# -body GND	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	Check DMS power supply

CA



CA

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DMS connector 21# -body GND	Set the ignition switch to "ON"	Battery voltage
DMS connector 22# -body GND	Set the ignition switch to "ON"	Battery voltage
DMS connector 23# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

4	**Replace the DMS (See page DM-23)**

(a) Replace the DMS.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

5	End

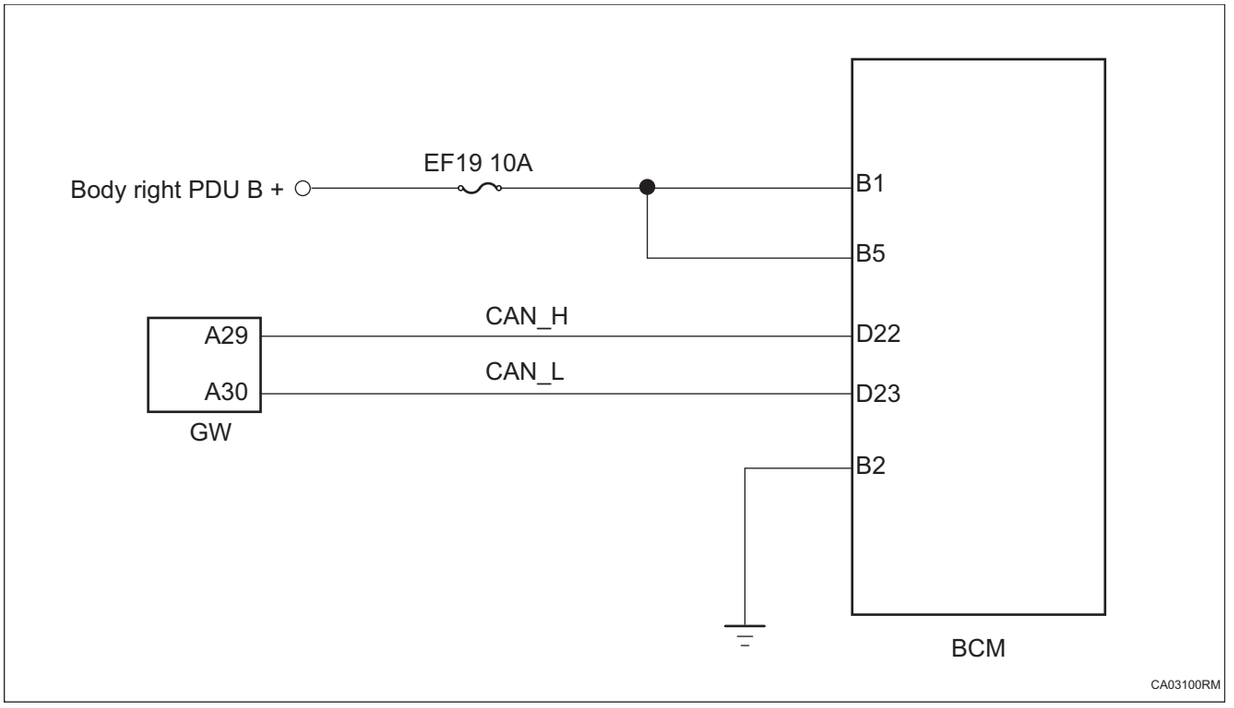
DTC	U014087	BCM 1 node lost

Description

When the communication between the GW and the BCM is abnormal or interrupted, the GW records the DTC.

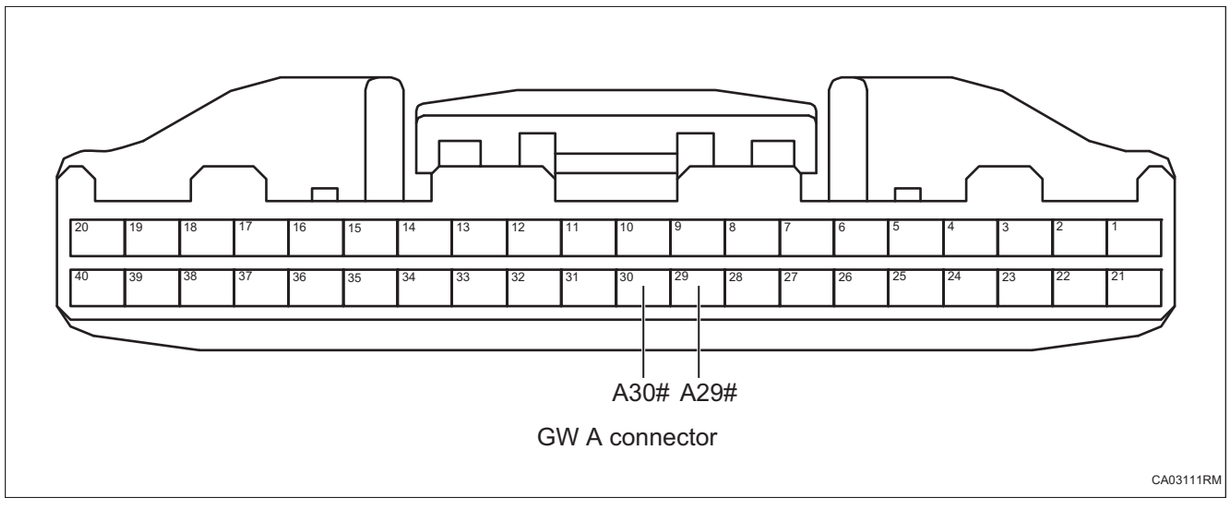
DTC	DTC detection conditions	Faulty location
U014087	(a) BCM 1 node is lost.	• BCM • CAN line and connector • GW

Circuit diagram



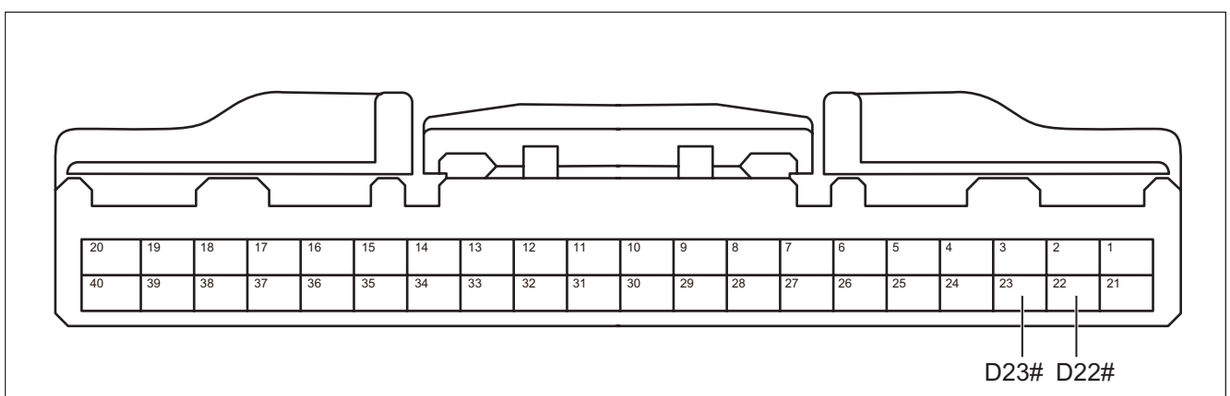
Inspection procedure

1	Check comfort CAN bus for open circuit (GW-BCM)



GW A connector

CA03111RM



BCM D connector

CA03121RM

CA

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the comfort CAN bus.

(d) Measure the resistance according to the values in the table below.

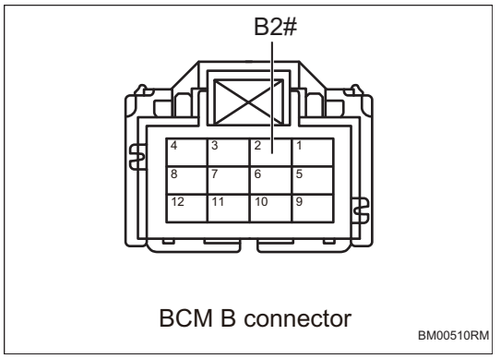
Standard value

Detector connection	Detection conditions	Specified state
BCM connector D22# - GW connector A29#	Always connected	Less than 1Ω
BCM connector D23# - GW connector A30#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check BCM ground



(a) Measure the resistance according to the values in the table below.

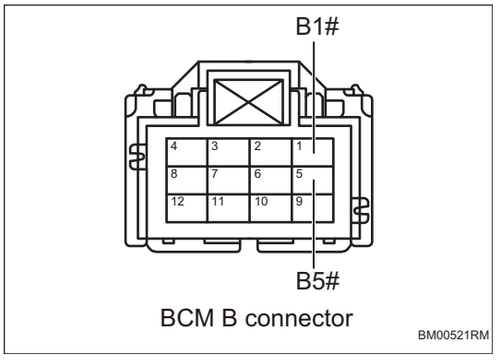
Standard value

Detector connection	Detection conditions	Specified state
BCM connector B2# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check BCM power supply



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

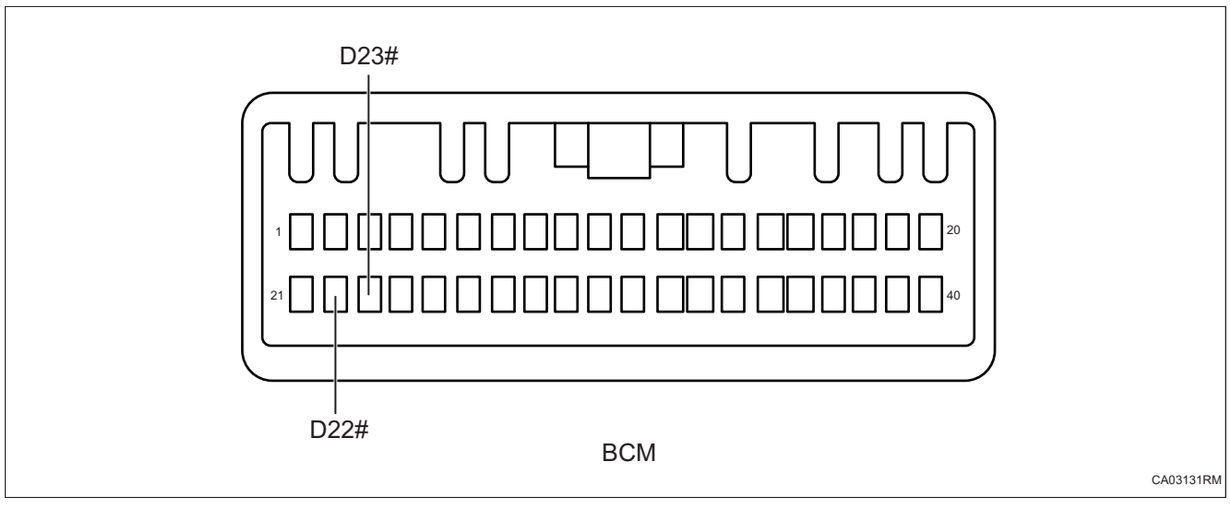
Standard value

Detector connection	Detection conditions	Specified state
BCM connector B1# -body GND	The ignition switch is set to "ON"	Battery voltage
BCM connector B5# -body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

4	Check BCM terminal resistor



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BCM D22# - BCM D23#	Always connected	About 120 Ω

NG → **Replace the BCM (See page BM-114)**

OK

5	**Replace GW (See page CA-256)**

CA

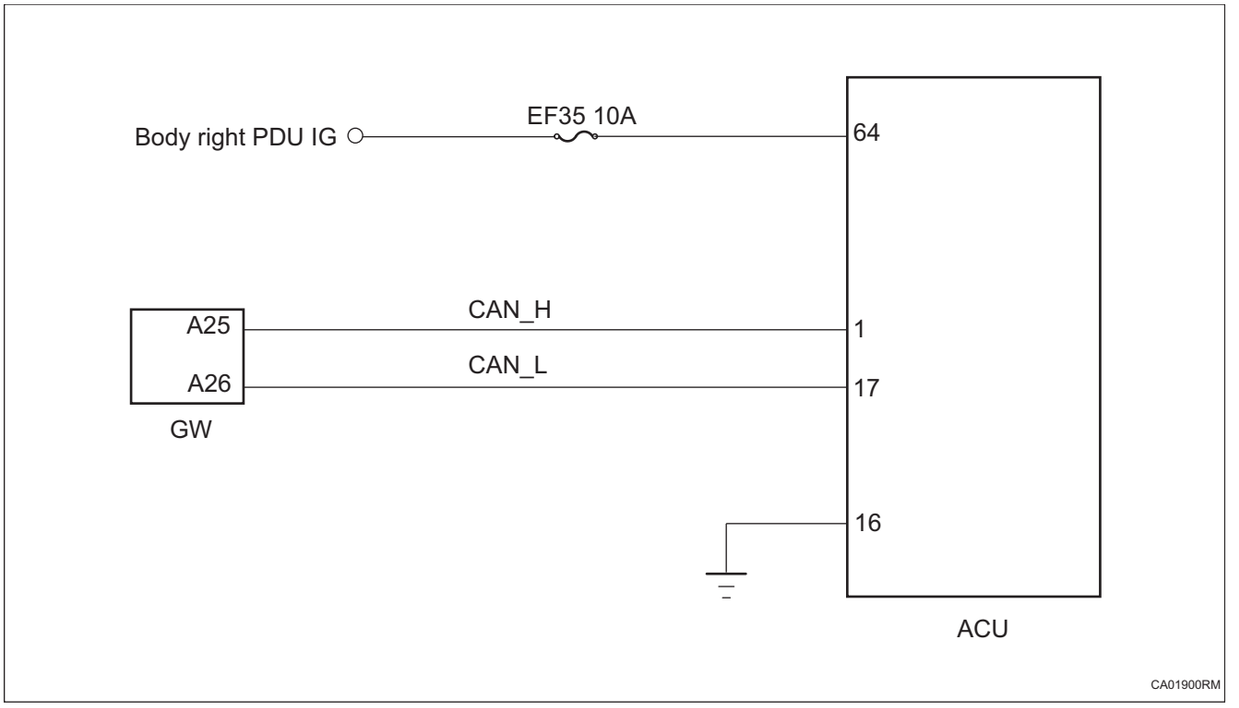
DTC	U015187	ACU node lost

Description

When the communication between the GW and the ACU is abnormal or interrupted, the GW records the DTC.

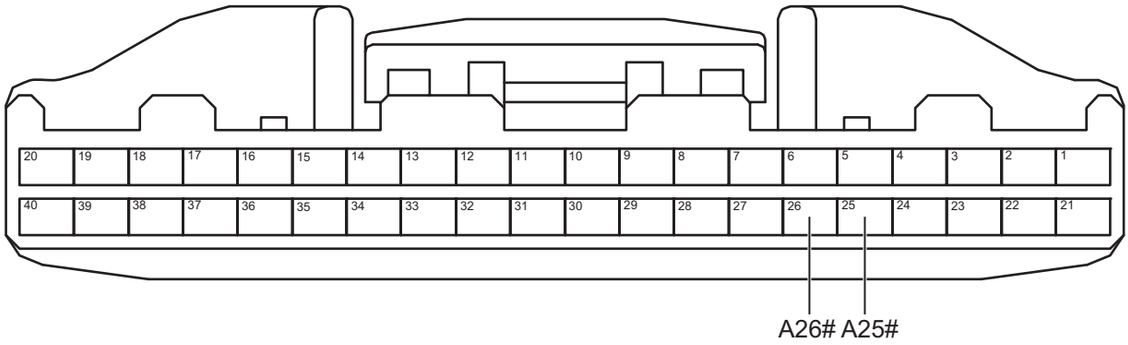
DTC	DTC detection conditions	Faulty location
U015187	(a) ACU node lost.	• ACU • CAN line and connector • GW

Circuit diagram



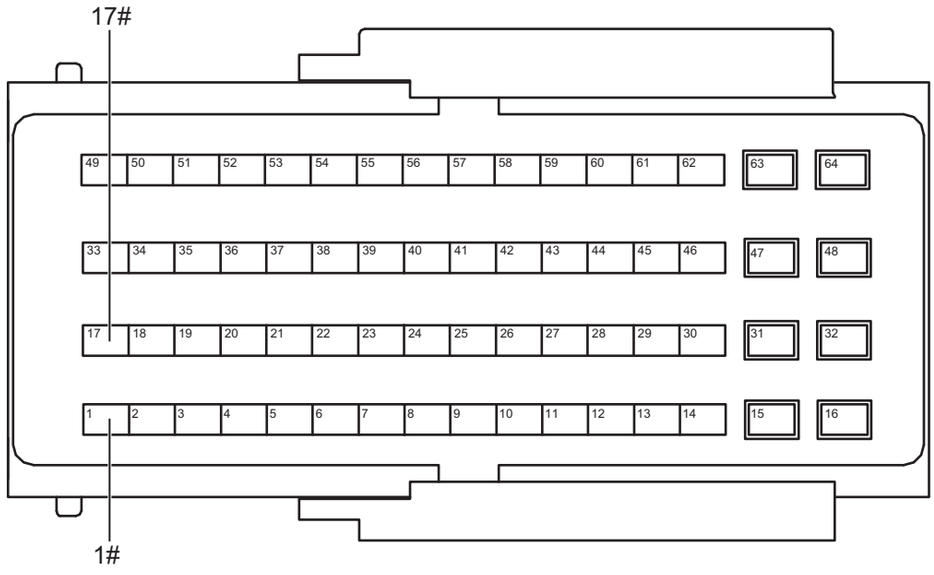
Inspection procedure

1	**Check whether powertrain CAN bus circuit is open (GW - ACU)**



GW A connector

CA00711RM



ACU connector

CA01911RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the power-train CAN bus.

(d) Measure the resistance according to the values in the table below.

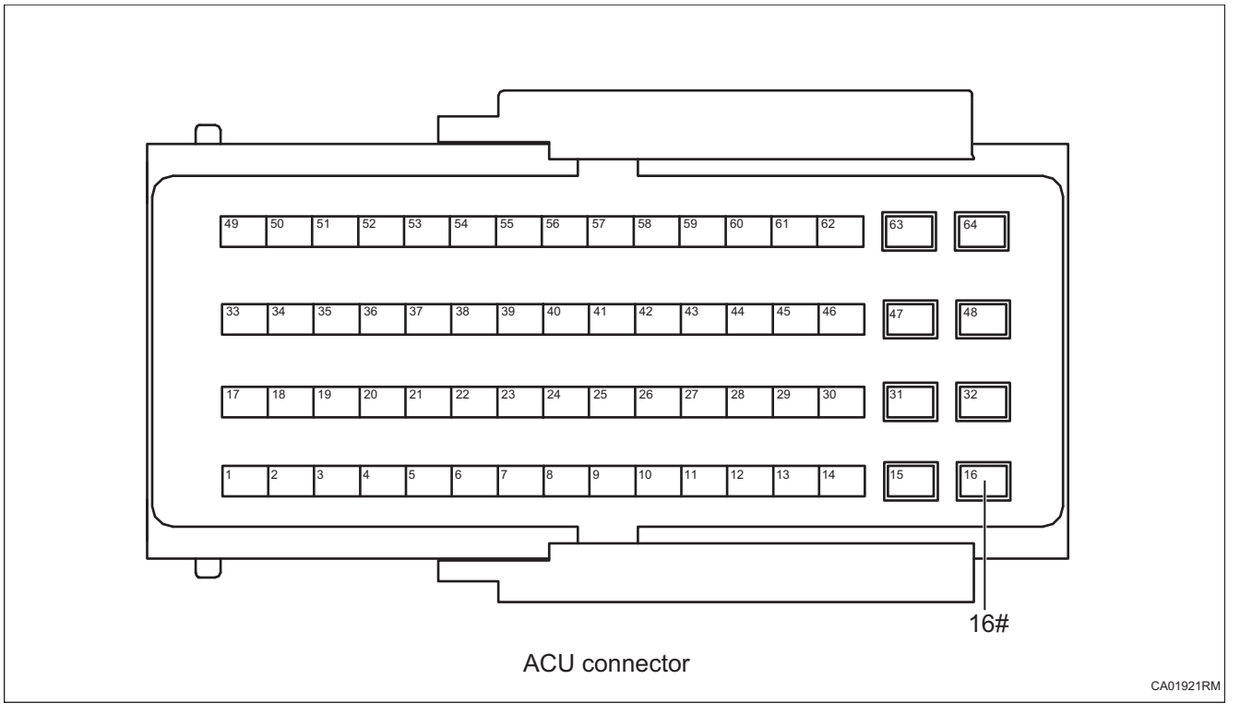
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 1# -GW connector A25#	Always connected	Less than 1Ω
ACU connector 17# -GW connector A26#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check ACU ground



ACU connector

CA01921RM

(a) Measure the resistance according to the values in the table below.

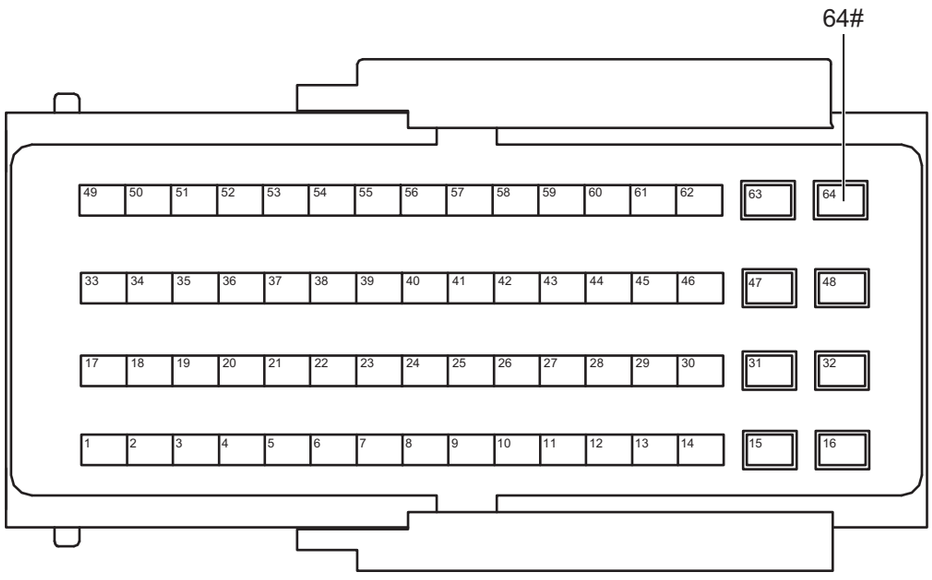
Standard value

Detector connection	Detection conditions	Specified state
ACU connector 16# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check ACU power supply



ACU connector

CA01931RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACU connector 64# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

4	**Replace ACU (See page RS-218)**

(a) Replace the ACU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

CA

OK

5	End

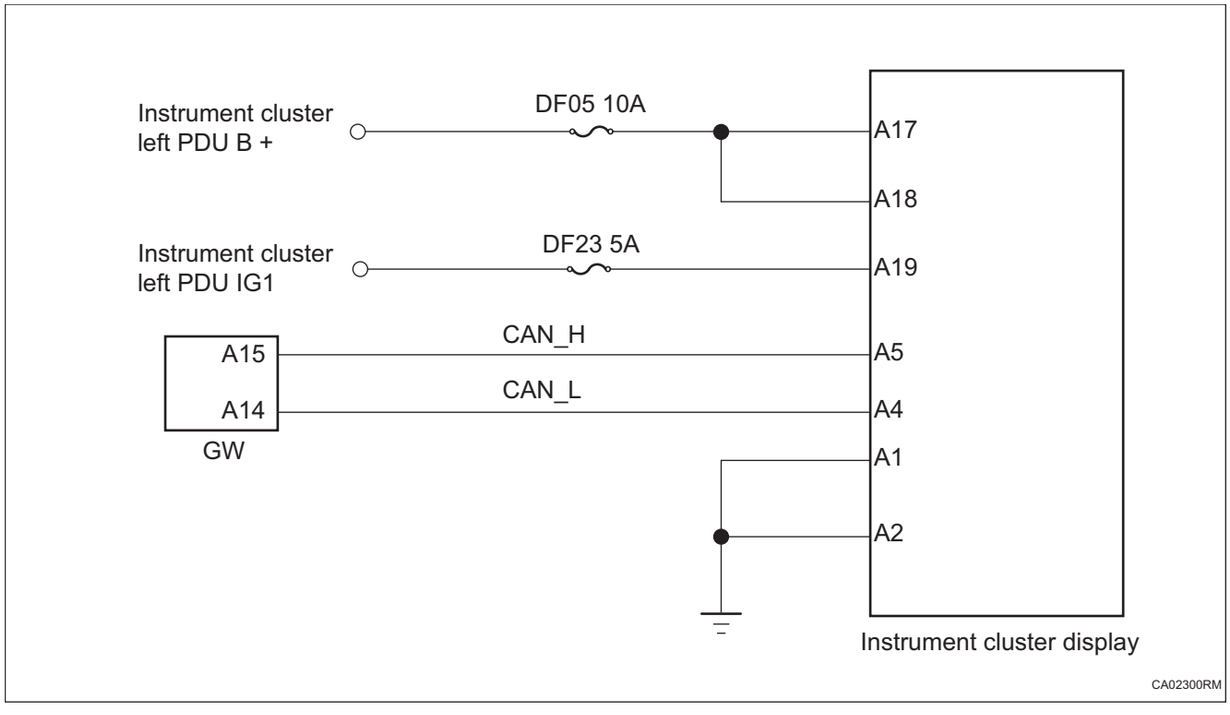
DTC	U015587	IPC node lost

Description

When the communication between the GW and the instrument cluster display is abnormal or interrupted, the GW records the DTC.

DTC	DTC detection conditions	Faulty location
U015587	(a) IPC node lost.	• GW • CAN line and connector • Instrument cluster display

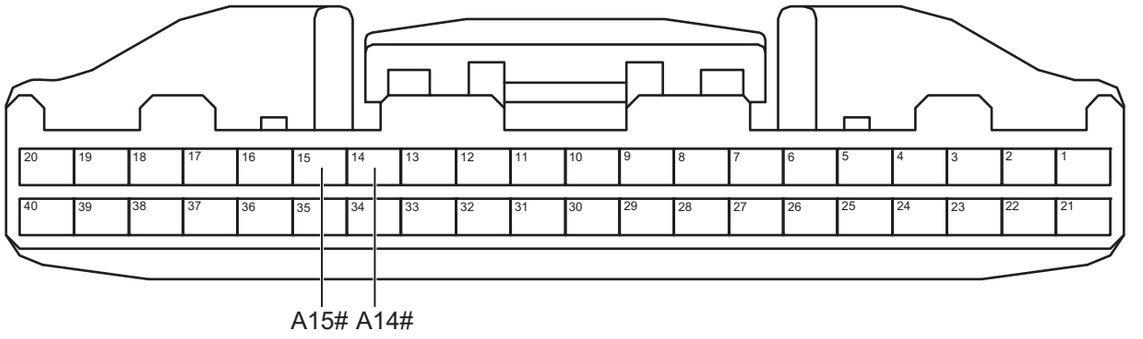
Circuit diagram



Inspection procedure

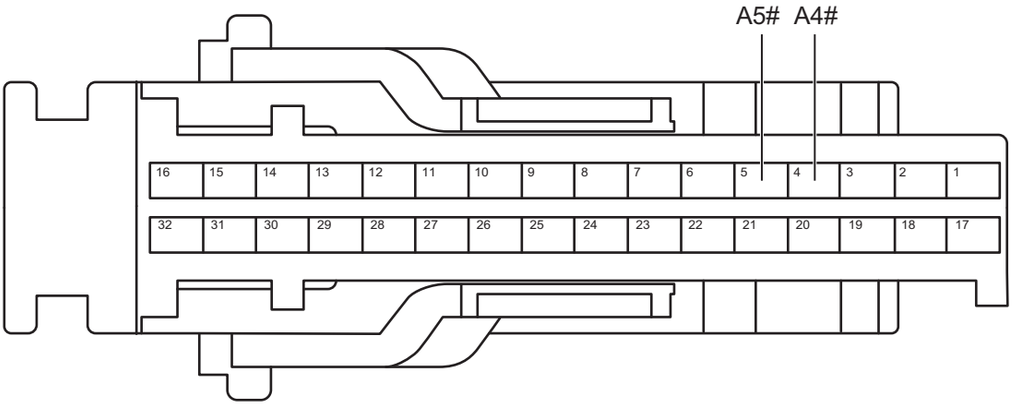
1	Check whether information CAN bus circuit is open (GW - instrument cluster display)

CA



GW A connector

CA03011RM



Instrument cluster display A connector

CA02311RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the information CAN bus.

(d) Measure the resistance according to the values in the table below.

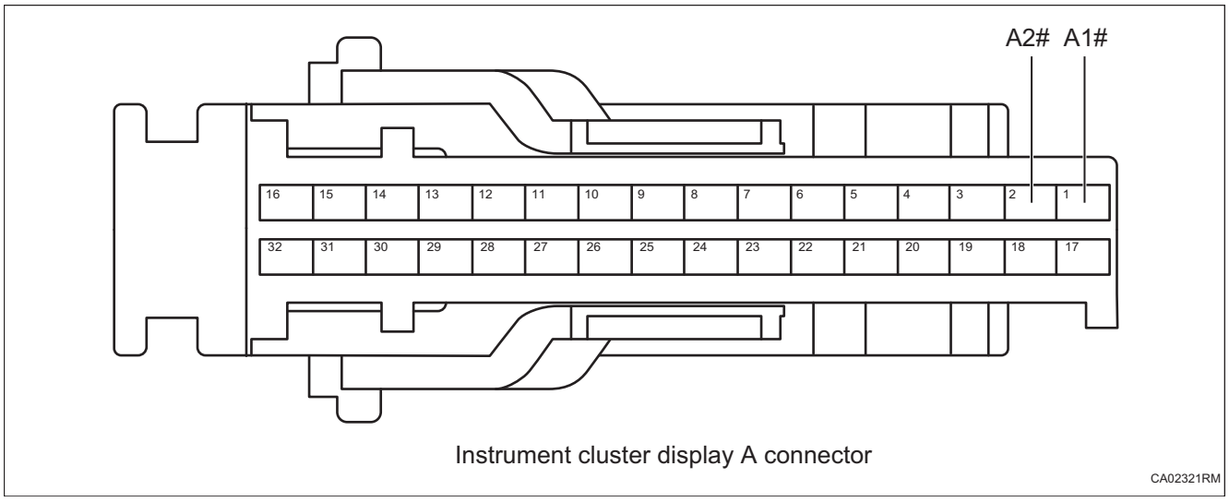
Standard value

Detector connection	Detection conditions	Specified state
Instrument cluster display connector A5# -GW connector A15#	Always connected	Less than 1Ω
Instrument cluster display connector A4# -GW connector A14#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check the instrument cluster display ground



Instrument cluster display A connector

(a) Measure the resistance according to the values in the table below.

Standard value

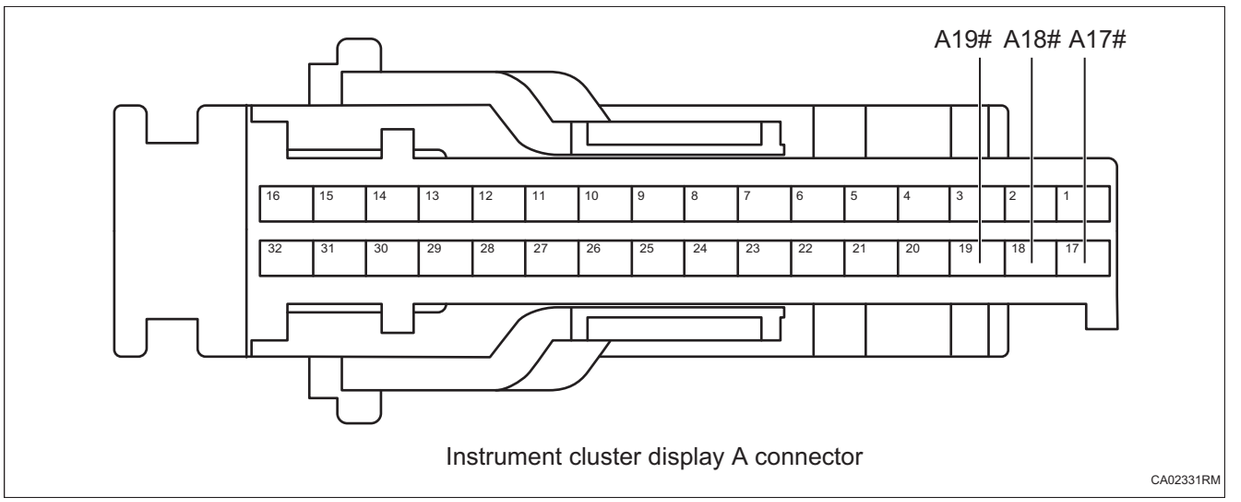
Detector connection	Detection conditions	Specified state
Instrument cluster display connector A1# - body GND	Always connected	Less than 1Ω
Instrument cluster display connector A2# - body GND	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	Check the instrument cluster display power supply

CA



Instrument cluster display A connector

CA

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Instrument cluster display connector A17# - body GND	The ignition switch is set to "ON"	Battery voltage
Instrument cluster display connector A18# - body GND	The ignition switch is set to "ON"	Battery voltage
Instrument cluster display connector A19# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

4	**Replace instrument cluster display (See page ME-39)**

(a) Replace the instrument cluster display.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

5	End

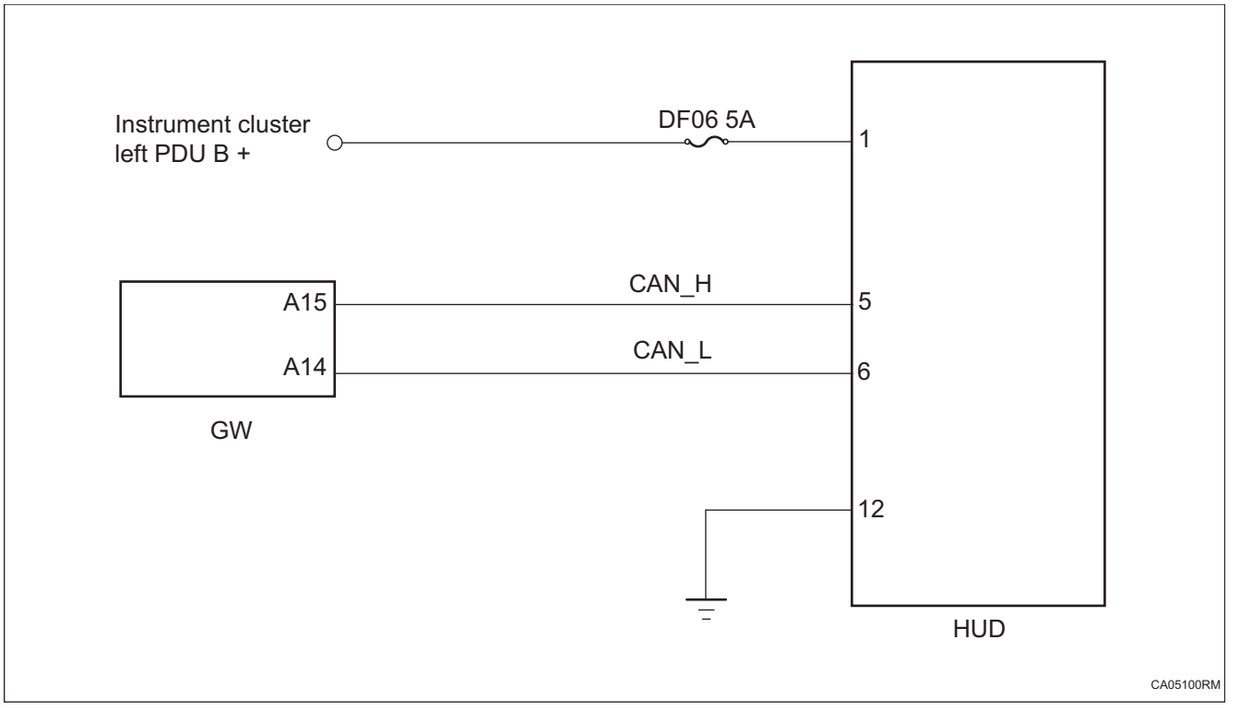
DTC	U015887	HUD node lost

Description

When the communication between the HUD and the GW is abnormal or interrupted, the GW records the DTC.

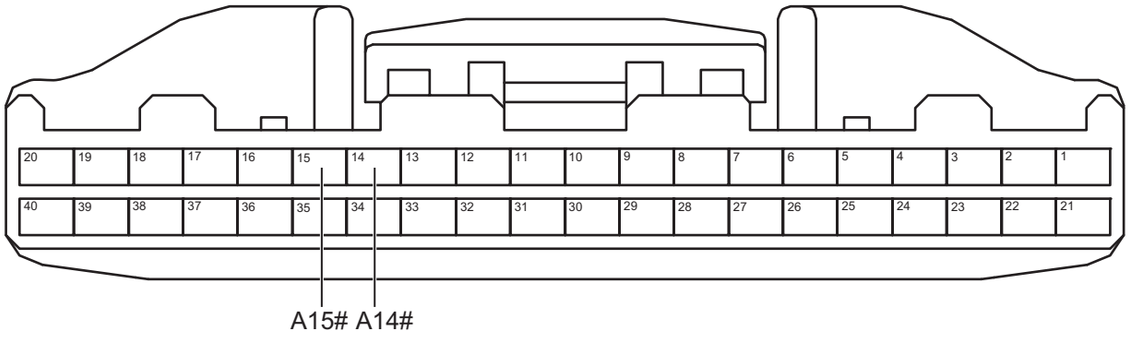
DTC	DTC detection conditions	Faulty location
U015887	(a) HUD node lost.	• HUD • CAN line and connector • GW

Circuit diagram



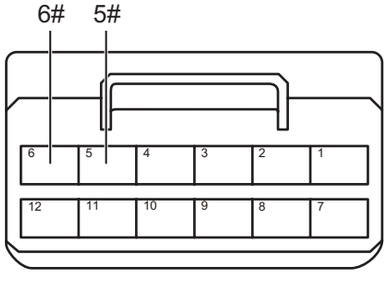
Inspection procedure

1	**Check whether information CAN bus circuit is open (GW - HUD)**



GW A connector

CA03011RM



HUD connector

CA05111RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the information CAN bus.

(d) Measure the resistance according to the values in the table below.

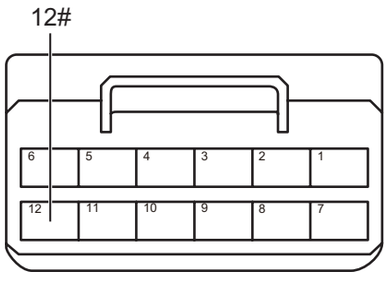
Standard value

Detector connection	Detection conditions	Specified state
HUD connector 5# -GW connector A15#	Always connected	Less than 1Ω
HUD connector 6# -GW connector A14#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

2	Check HUD ground



HUD connector

CA05121RM

(a) Measure the resistance according to the values in the table below.

Standard value

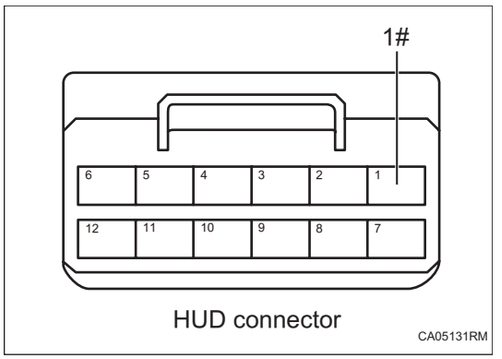
Detector connection	Detection conditions	Specified state
HUD connector 12# - body GND	Always connected	Less than 1Ω

CA

NG → **Repair or replace the harness and connector**

OK

3	Check HUD power supply



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
HUD connector 1# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

4	Replace the HUD (See page HD-17)

(a) Replace the HUD.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

CA

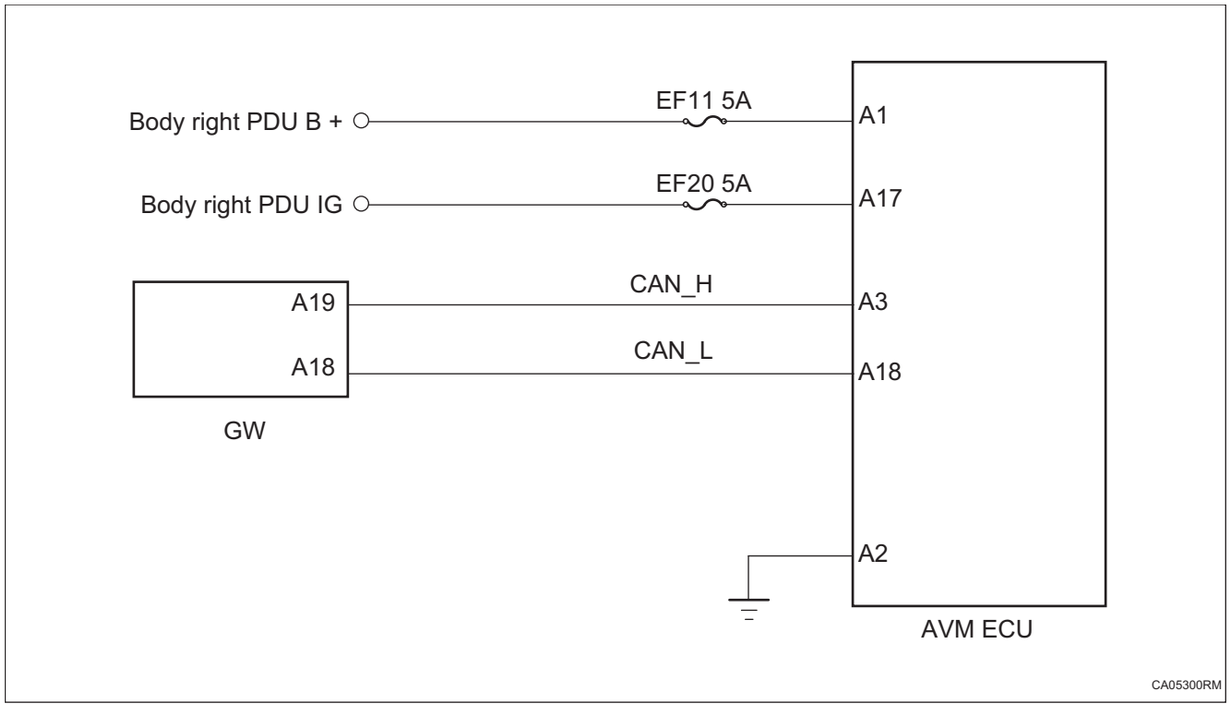
DTC	U023A87	AVM ECU integrated ultrasonic sensor node lost

Description

When the communication between the AVM ECU and the GW is abnormal or interrupted, the GW records the DTC.

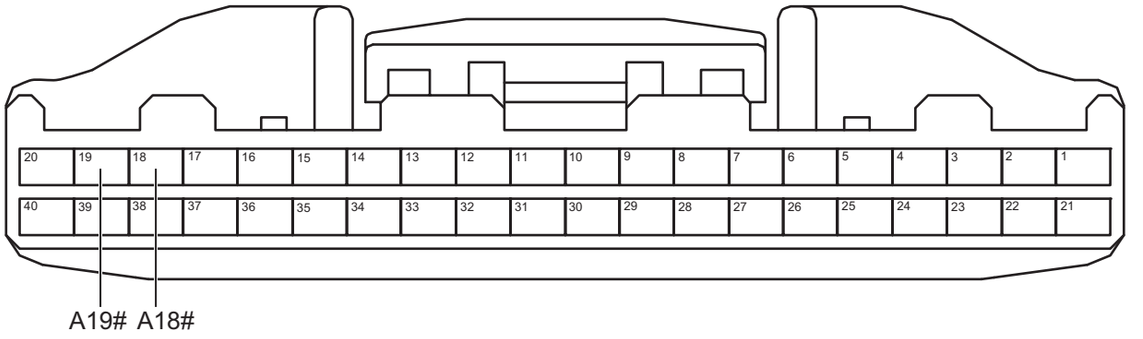
DTC	DTC detection conditions	Faulty location
U023A87	(a) AVM ECU integrated ultrasonic sensor node lost.	• AVM ECU • CAN line and connector • GW

Circuit diagram



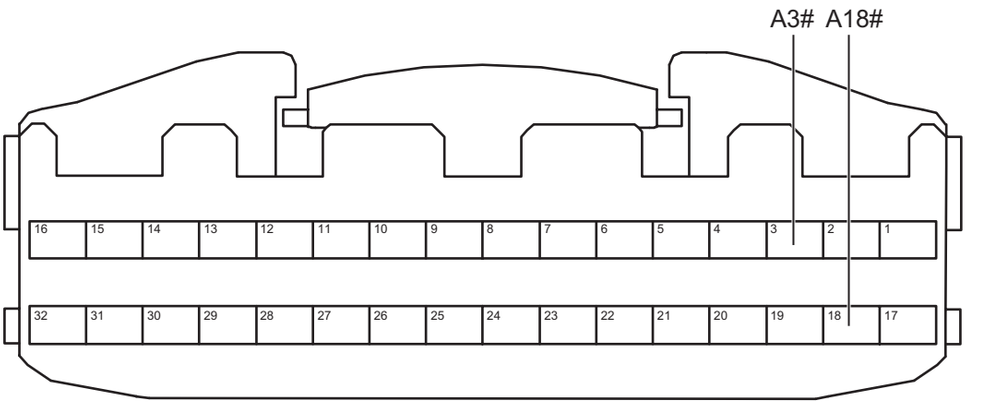
Inspection procedure

1	**Check whether driver assistance CAN bus circuit is open (GW - AVM ECU)**



GW A connector

CA03211RM



AVM ECU A connector

CA05311RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the driver assistance CAN bus.

(d) Measure the resistance according to the values in the table below.

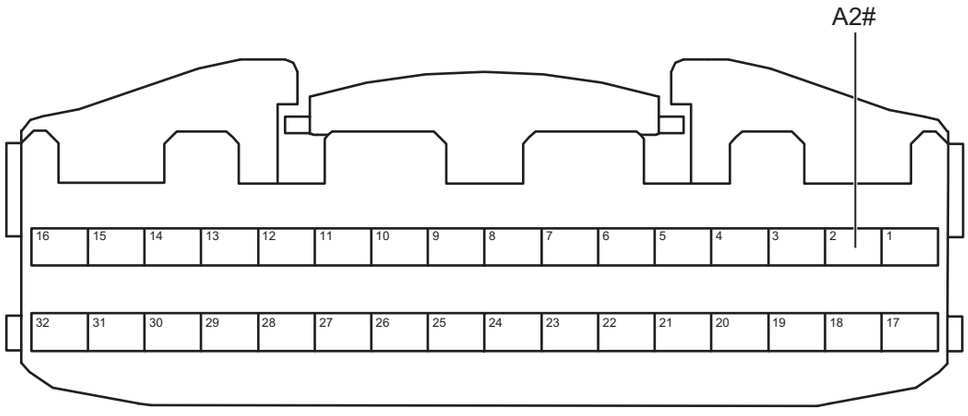
Standard value

Detector connection	Detection conditions	Specified state
AVM ECU connector A5# -GW connector A19#	Always connected	Less than 1Ω
AVM ECU connector A4# -GW connector A18#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check AVM ECU ground



AVM ECU A connector

CA05321RM

(a) Measure the resistance according to the values in the table below.

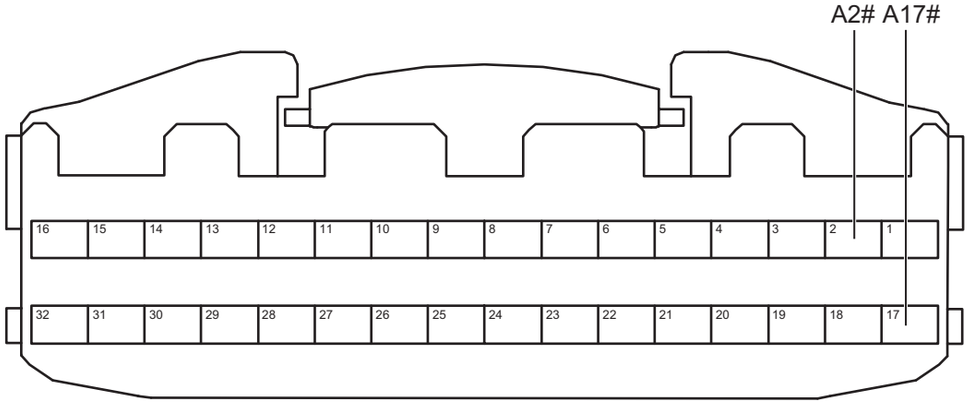
Standard value

Detector connection	Detection conditions	Specified state
AVM ECU connector A2# - body GND	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	Check AVM ECU power supply



AVM ECU A connector

CA05331RM

CA

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
AVM ECU connector A1# - body GND	Set the ignition switch to "ON"	Battery voltage
AVM ECU connector A17# - body GND	Set the ignition switch to "ON"	Battery voltage

CA

NG → **Repair or replace harness and connector and fuse**

OK

4	**Replace the AVM ECU (See page AS-27)**

(a) Replace the AVM ECU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

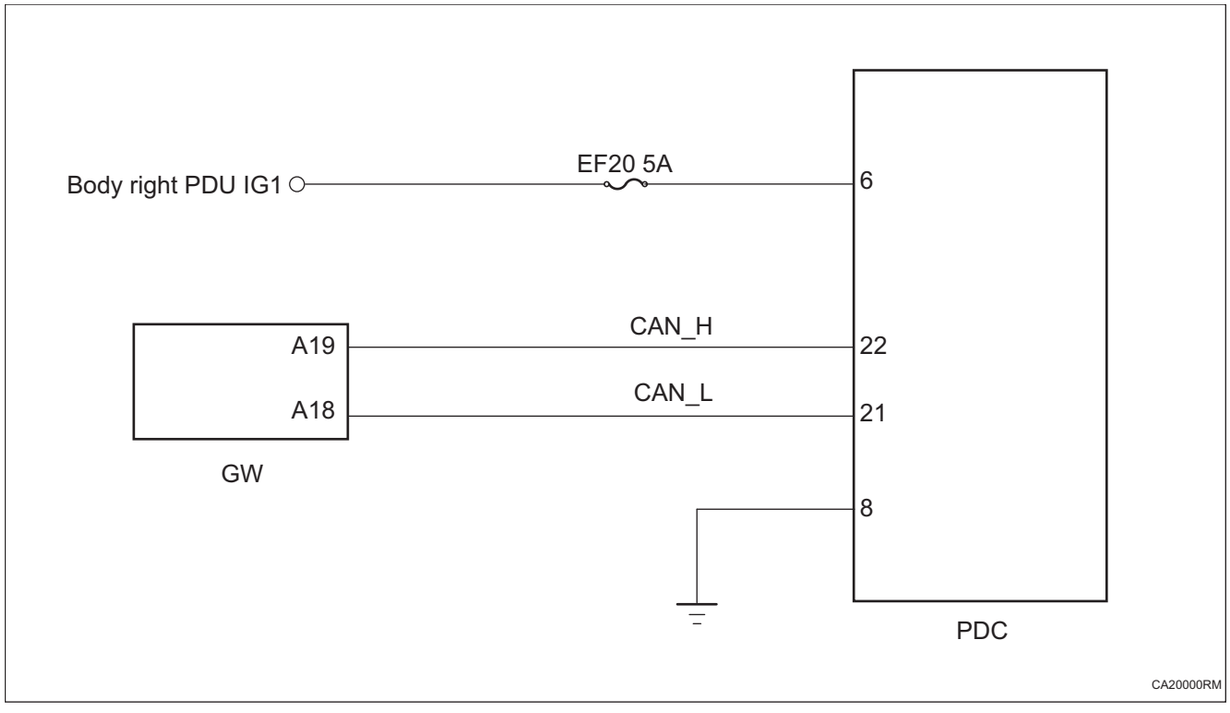
DTC	U015987	PA node lost

Description

When the communication between the PDC and the GW is abnormal or interrupted, the GW will record the DTC.

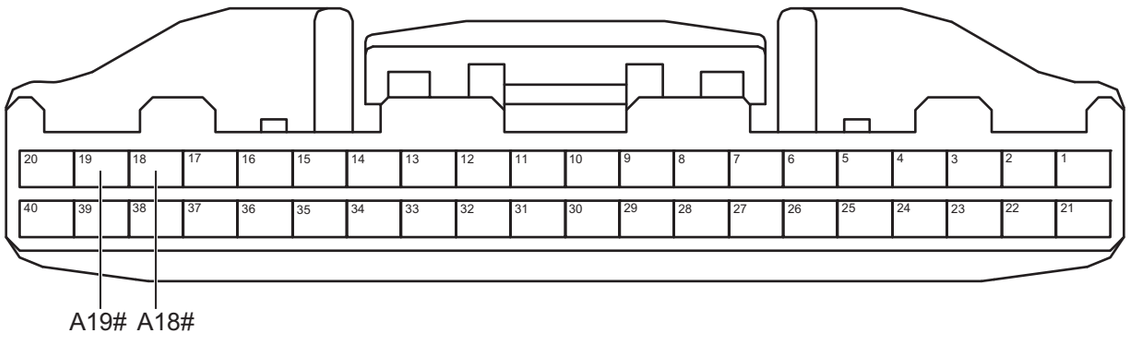
DTC	DTC detection conditions	Faulty location
U015987	(a) PA node lost.	• PDC • CAN line and connection unit • GW

Circuit diagram



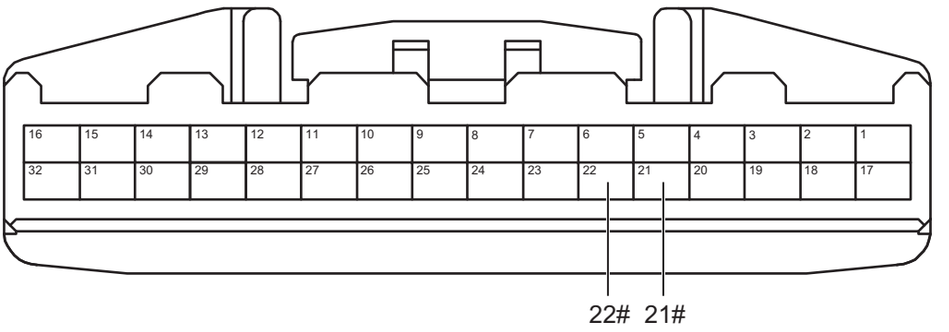
Inspection procedure

1	**Check whether driver assistance CAN bus circuit is open (GW - PDC)**



AVM ECU A connector

CA03211RM



PDC connector

CA00911RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the driver assistance CAN bus.

(d) Measure the resistance according to the values in the table below.

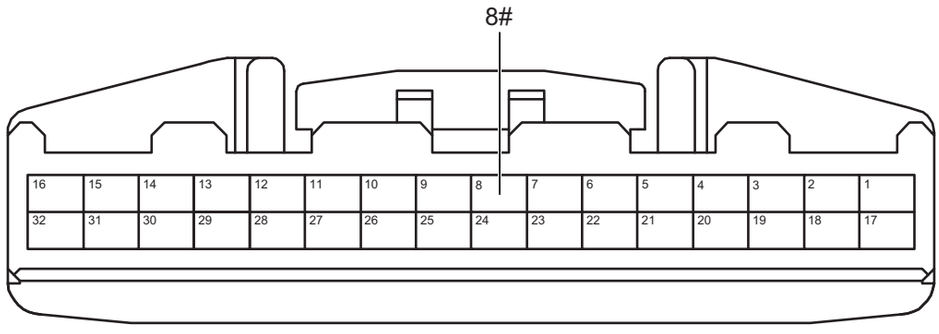
Standard value

Detector connection	Detection conditions	Specified state
PDC connector 22# -GW connector A19#	Always connected	Less than 1Ω
PDC connector 21# -GW connector A18#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check PDC ground



PDC connector

PM01411RM

(a) Measure the resistance according to the values in the table below.

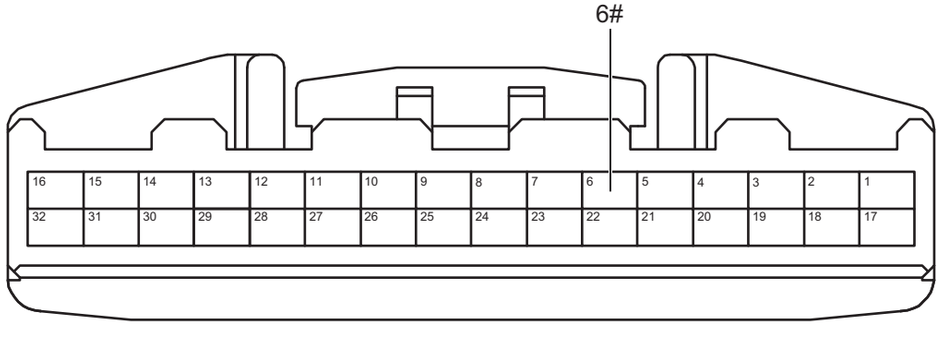
Standard value

Detector connection	Detection conditions	Specified state
PDC connector 8# - body GND	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	Check PDC power supply



PDC connector

PM01421RM

CA

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PDC connector 6# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

4	**Replace PDC (See page PM-57)**

(a) Replace the PDC.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

5	**End**

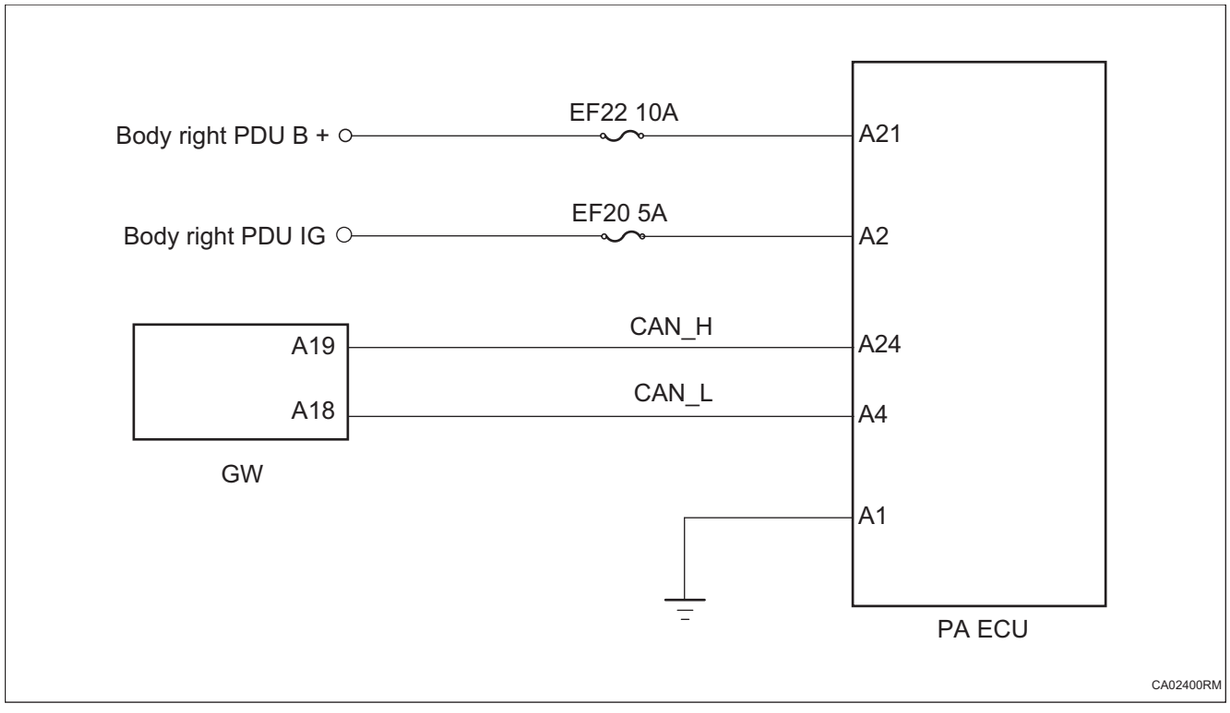
DTC	U024287	AVM ECU integrated ultrasonic sensor node lost

Description

When the communication between the PA ECU and the GW is abnormal or interrupted, the GW records a DTC.

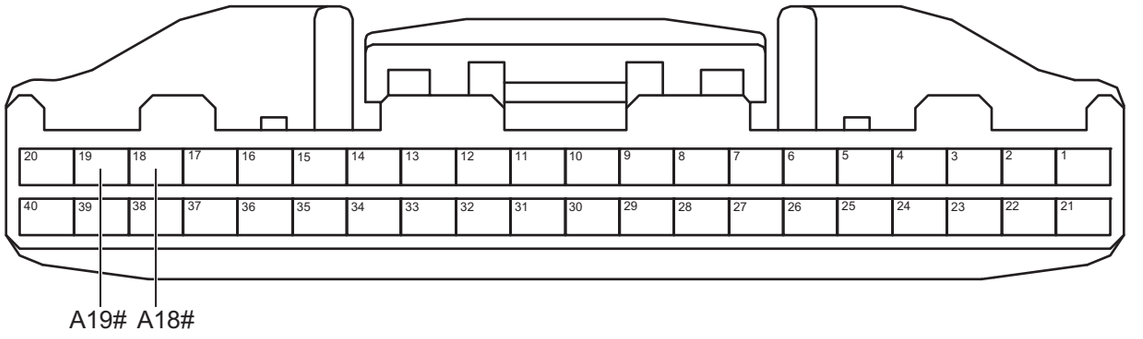
DTC	DTC detection conditions	Faulty location
U024287	(a) AVM ECU integrated ultrasonic sensor node lost.	• PA ECU • CAN line and connection unit • GW

Circuit diagram



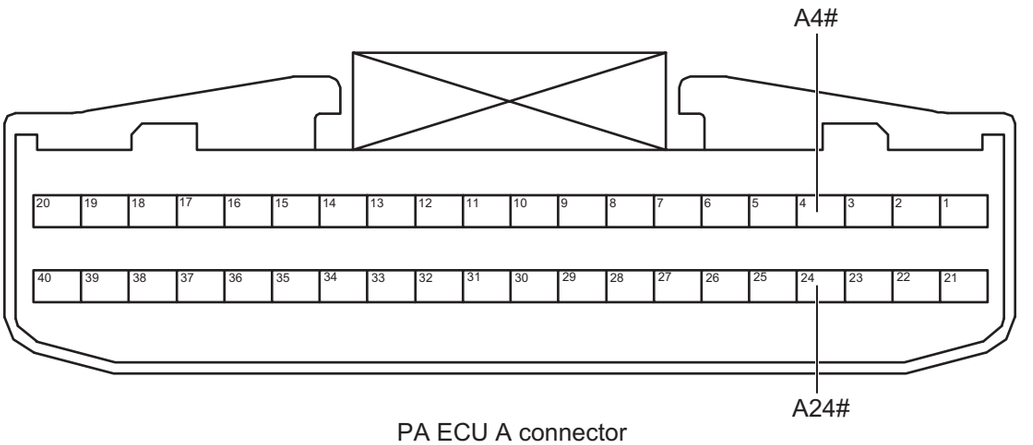
Inspection procedure

1	Check whether driver assistance CAN bus circuit is open (GW - PA ECU)



AVM ECU A connector

CA03211RM



PA ECU A connector

CA02411RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the driver assistance CAN bus.

(d) Measure the resistance according to the values in the table below.

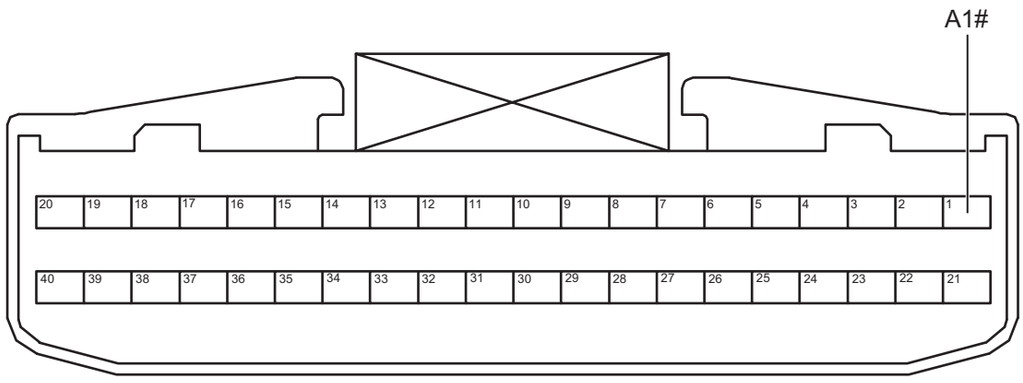
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A24#-GW connector A19#	Always connected	Less than 1Ω
PA ECU connector A4#-GW connector A18#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check PA ECU ground



PA ECU A connector

CA02421RM

(a) Measure the resistance according to the values in the table below.

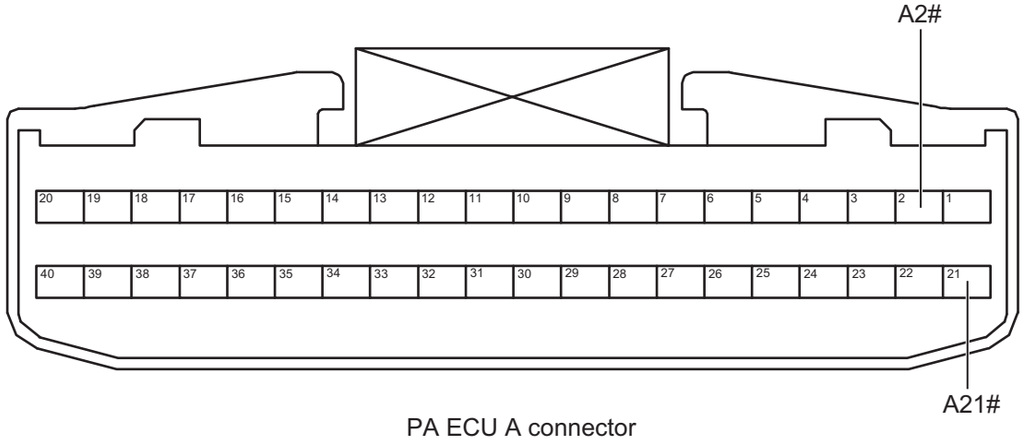
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A1# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check PA ECU power supply



PA ECU A connector

CA02431RM

CA

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A21# -body GND	Set the ignition switch to "ON"	Battery voltage
PA ECU connector A2# -body GND	Set the ignition switch to "ON"	Battery voltage

CA

NG → **Repair or replace harness and connector and fuse**

OK

4	**Replace PA ECU (See page PA-79)**

(a) Replace the PA ECU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

5	**End**

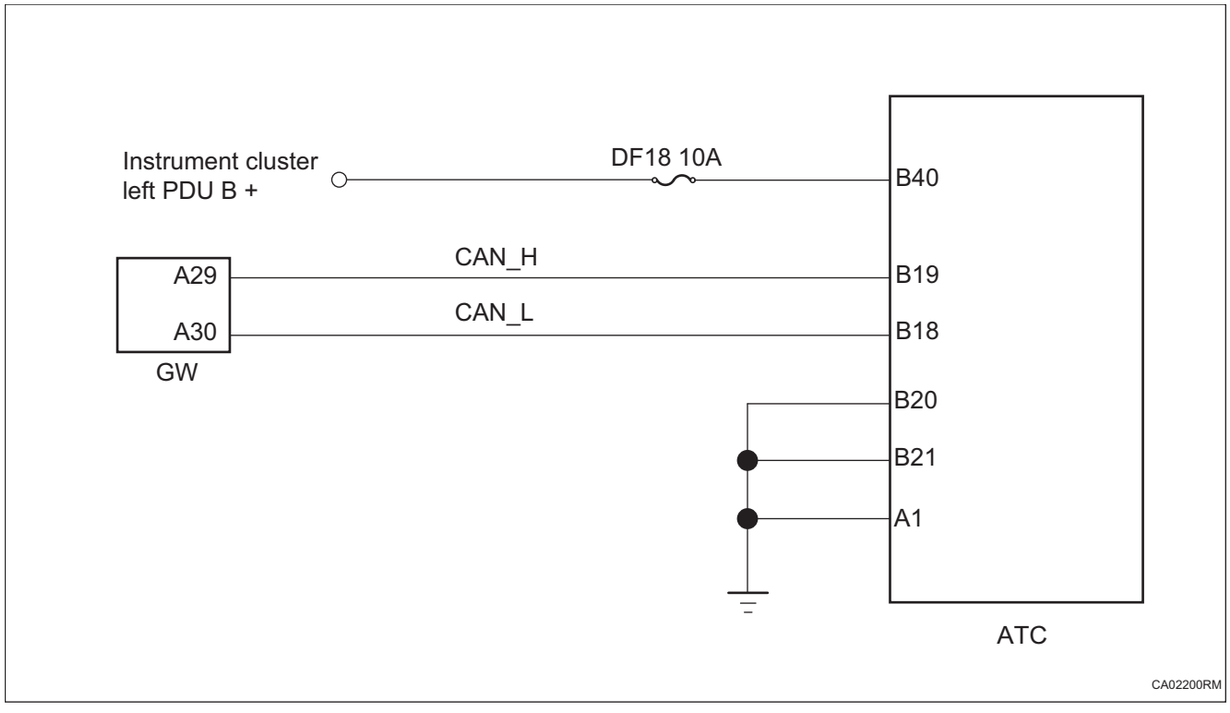
DTC	U016487	A/C control unit 1 node lost

Description

When the communication between the GW and the ATC is abnormal or interrupted, the GW will record the DTC.

DTC	DTC detection conditions	Faulty location
U016487	(a) A/C control unit 1 node lost.	• ATC • CAN line and connector • GW

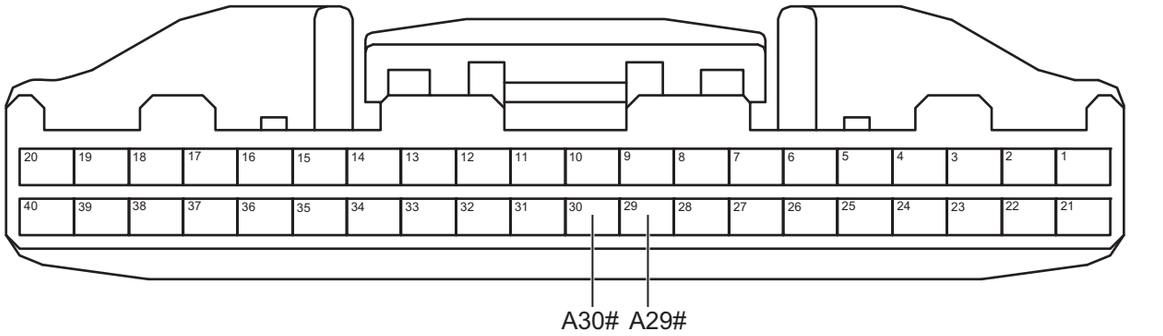
Circuit diagram



Inspection procedure

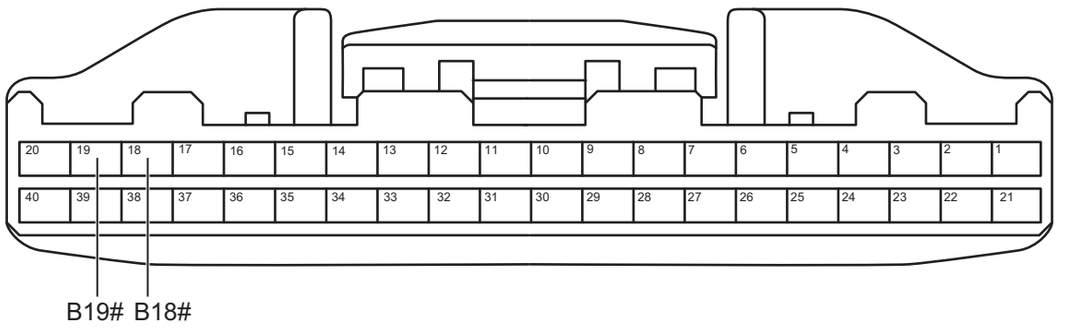
1	Check whether comfort CAN bus circuit is open (GW - ATC)

CA



GW A connector

CA03111RM



ATC B connector

CA02211RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the comfort CAN bus.

(d) Measure the resistance according to the values in the table below.

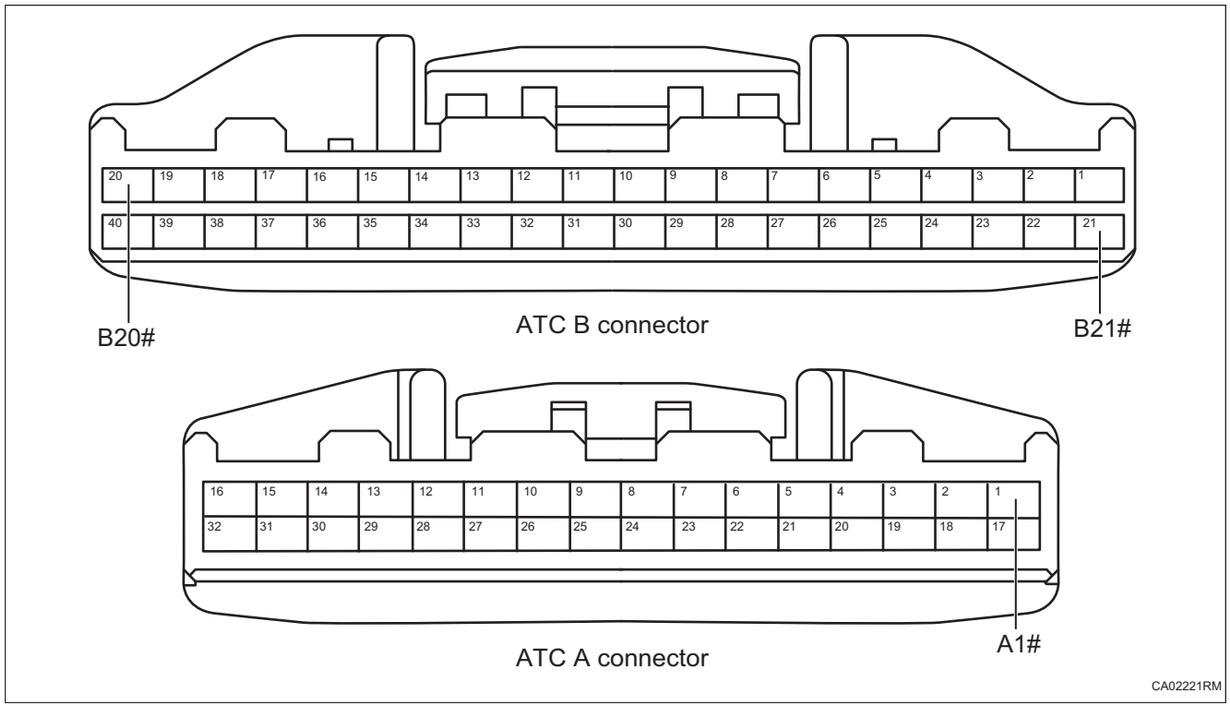
Standard value

Detector connection	Detection conditions	Specified state
ATC connector B19# -GW connector A29#	Always connected	Less than 1Ω
ATC connector B18# -GW connector A30#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check ATC ground



(a) Measure the resistance according to the values in the table below.

Standard value

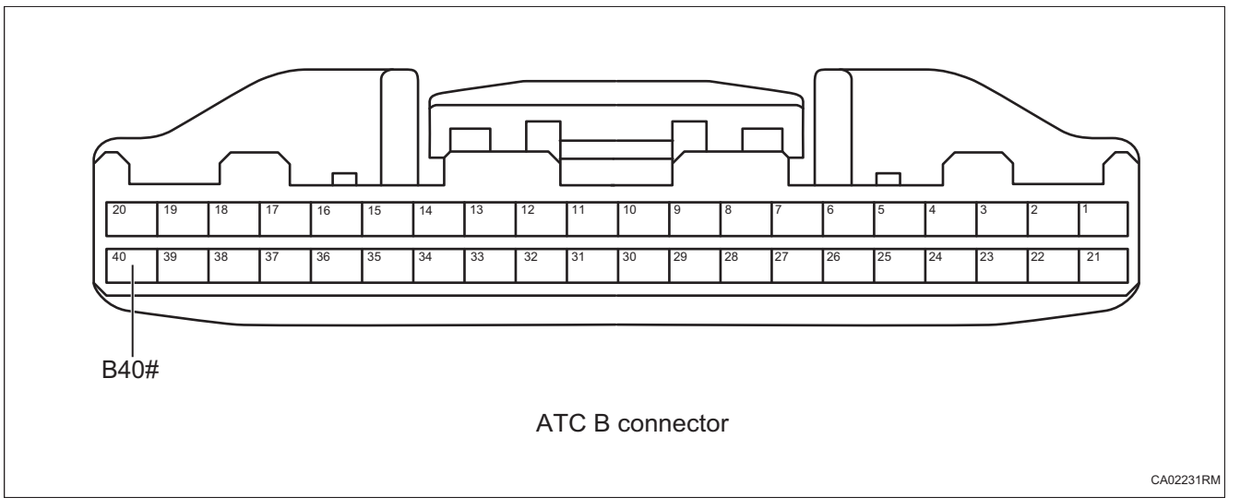
Detector connection	Detection conditions	Specified state
ATC connector B20# - body GND	Always connected	Less than 1Ω
ATC connector B21# - body GND	Always connected	Less than 1Ω
ATC connector A1# - body GND	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	Check ATC power supply

CA



CA

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ATC connector B40# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

4	**Replace the ATC (See page AC-101)**

(a) Replace the ATC.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

5	**End**

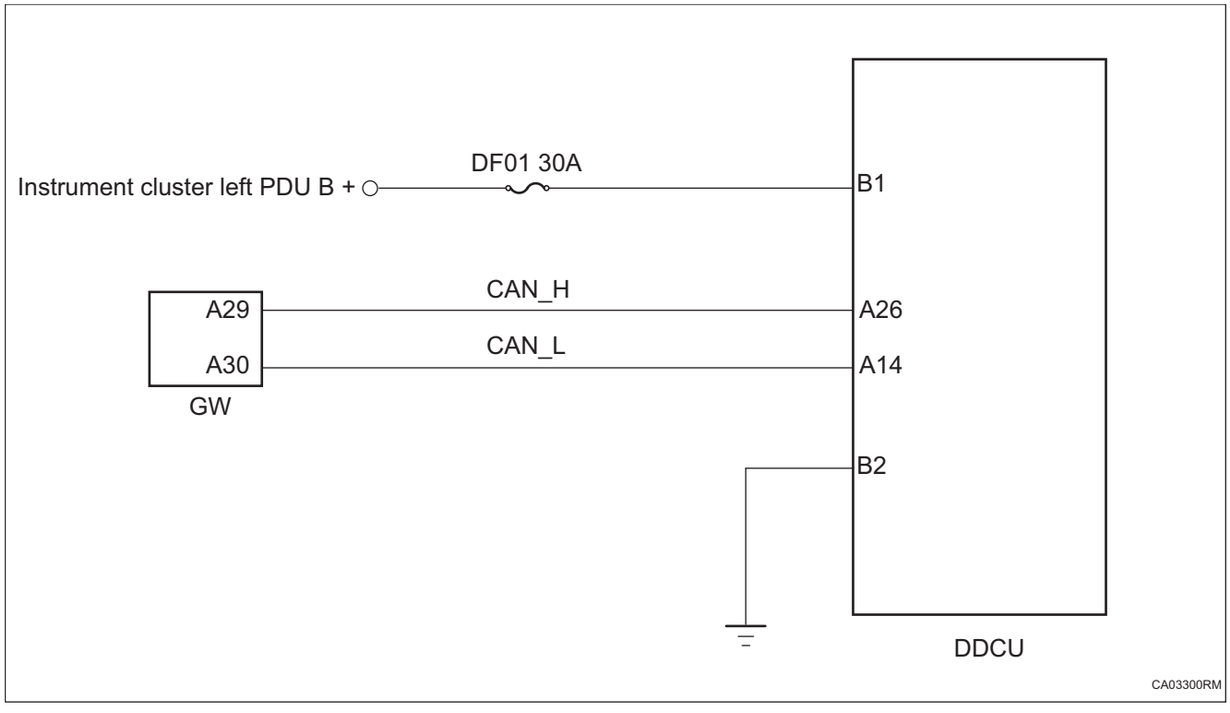
DTC	U019987	Driver door module node lost

Description

When the communication between the GW and the DDCU is abnormal or interrupted, the GW will record the DTC.

DTC	DTC detection conditions	Faulty location
U019987	(a) Driver door module node lost.	• DDCU • CAN line and connector • GW

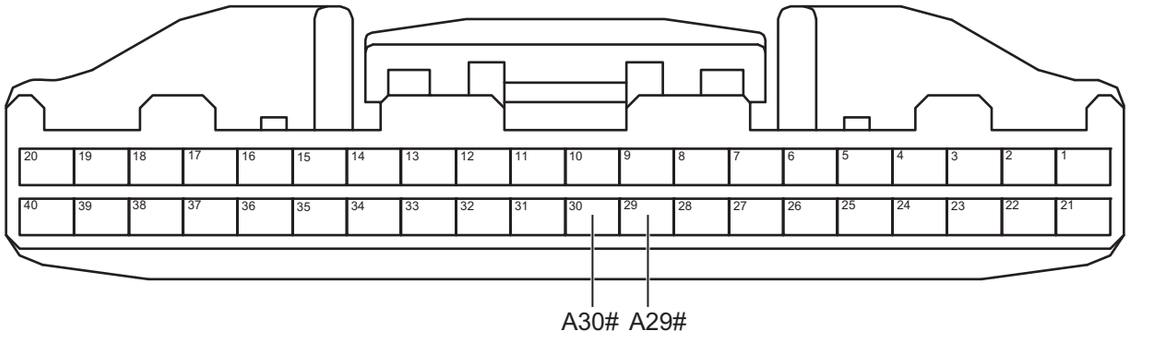
Circuit diagram



Inspection procedure

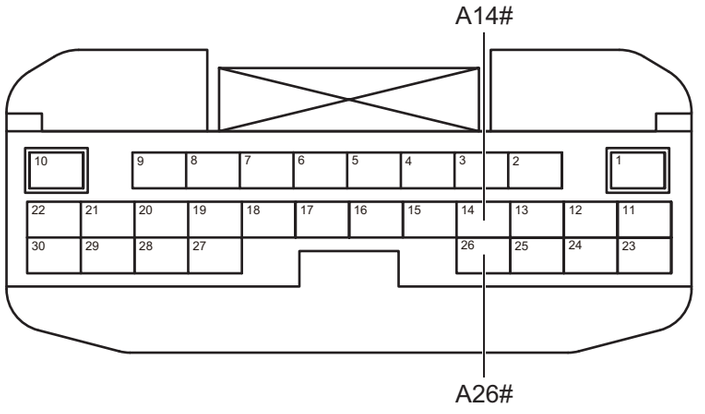
1	Check whether comfort CAN bus circuit is open (GW - DDCU)

CA



GW A connector

CA03111RM



DDCU A connector

CA03311RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the comfort CAN bus.

(d) Measure the resistance according to the values in the table below.

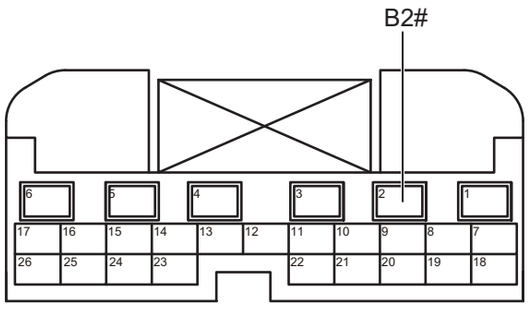
Standard value

Detector connection	Detection conditions	Specified state
DDCU connector A26# - GW connector A29#	Always connected	Less than 1Ω
DDCU connector A14# - GW connector A30#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check DDCU ground



DDCU B connector

ED00510RM

(a) Disconnect the DDCU connector.

(b) Measure the resistance according to the values in the table below.

Standard value

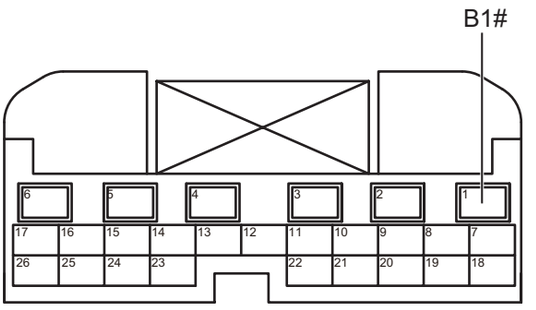
Detector connection	Detection conditions	Specified state
DDCU connector B2# - body GND	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	Check DDCU power supply

CA



DDCU B connector

ED00521RM

CA

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DDCU connector B1# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

4	**Replace the DDCU (See page ED-32)**

(a) Replace the DDCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

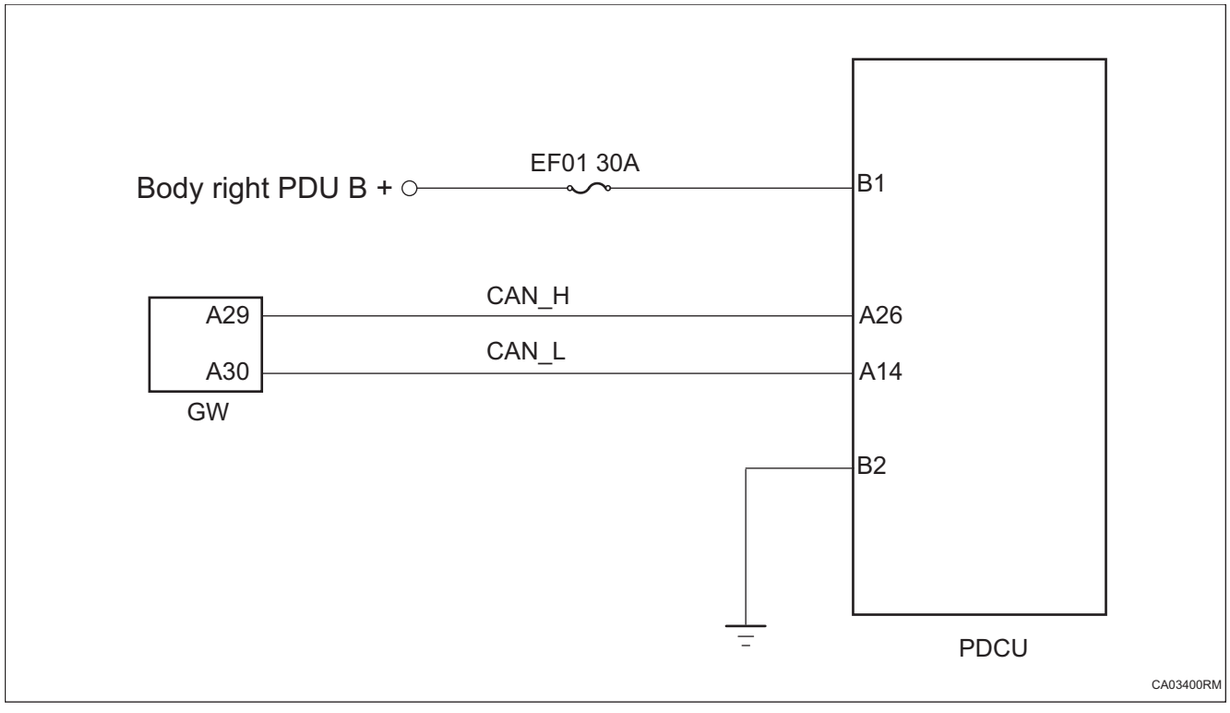
DTC	U020087	Passenger door module node lost

Description

When the communication between the GW and the PDCU is abnormal or interrupted, the GW will record the DTC.

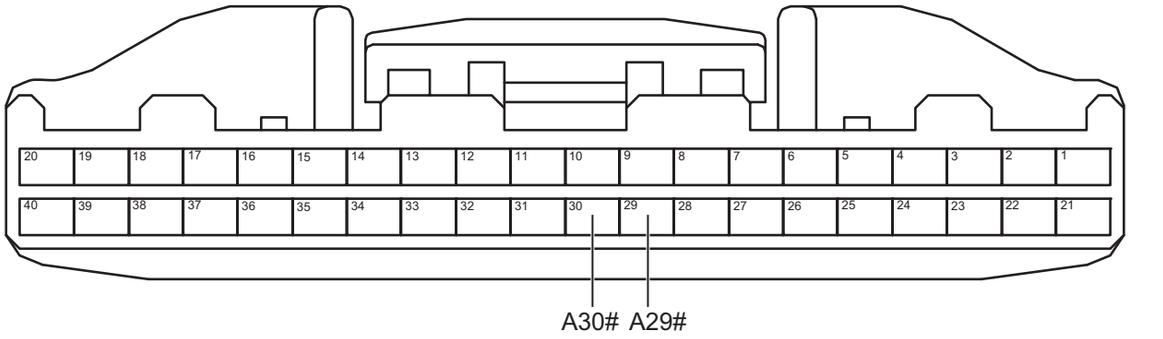
DTC	DTC detection conditions	Faulty location
U020087	(a) Passenger door module node lost.	• PDCU • CAN line and connector • GW

Circuit diagram



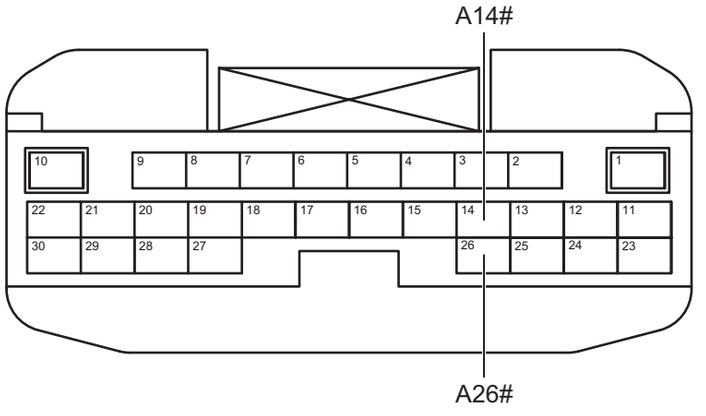
Inspection procedure

1	Check whether comfort CAN bus circuit is open (GW - PDCU)



GW A connector

CA03111RM



PDCU A connector

CA03411RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the comfort CAN bus.

(d) Measure the resistance according to the values in the table below.

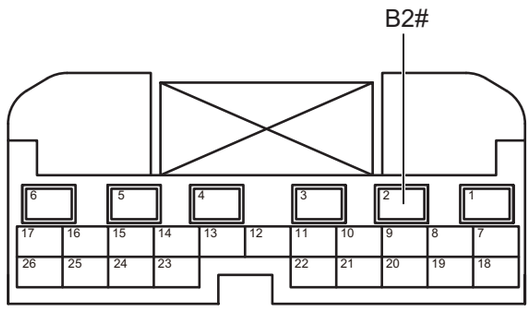
Standard value

Detector connection	Detection conditions	Specified state
PDCU connector A26# -GW connector A29#	Always connected	Less than 1Ω
PDCU connector A14# -GW connector A30#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

2	Check PDCU ground



PDCU B connector

ED02010RM

(a) Disconnect the PDCU connector.

(b) Measure the resistance according to the values in the table below.

Standard value

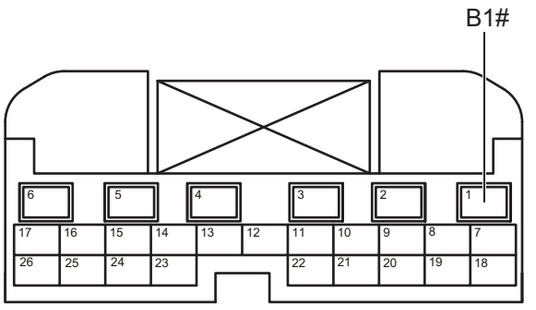
Detector connection	Detection conditions	Specified state
PDCU connector B2# - body GND	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	Check PDCU power supply

CA



PDCU B connector

ED02021RM

CA

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PDCU connector B1# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

4	**Replace the PDCU (See page ED-32)**

(a) Replace the PDCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

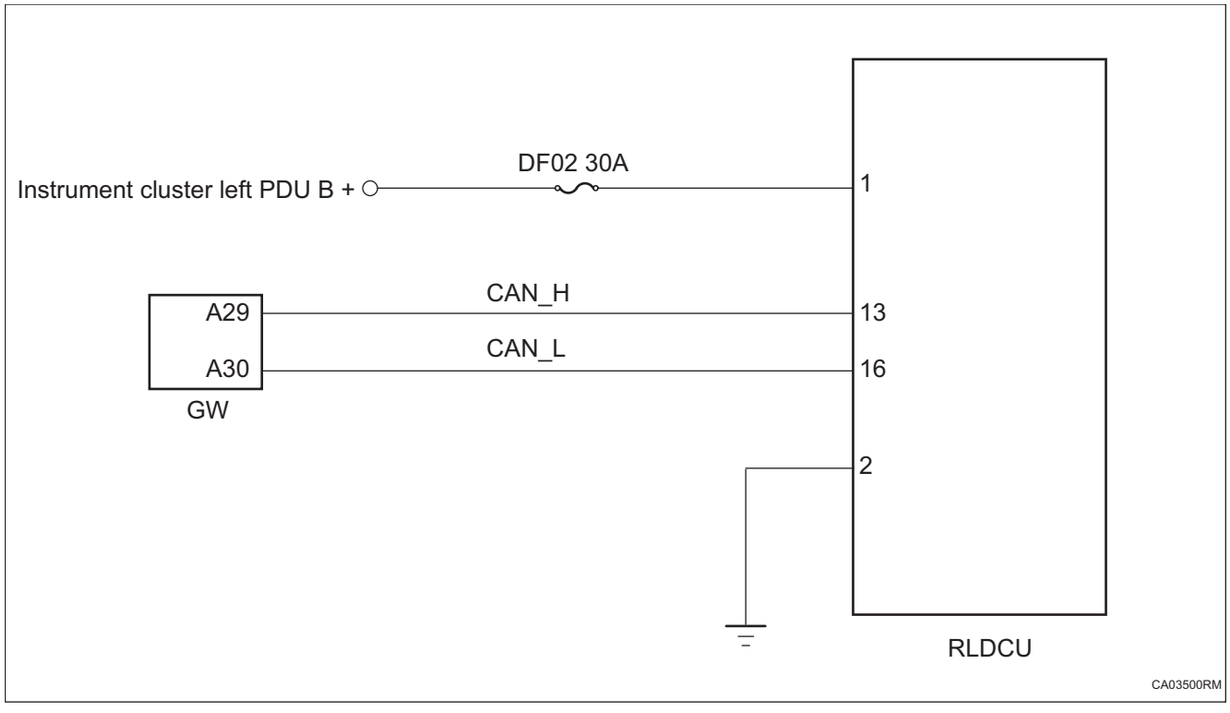
DTC	U020187	Rear left door module node lost

Description

When the communication between the GW and the RLDCU is abnormal or interrupted, the GW will record the DTC.

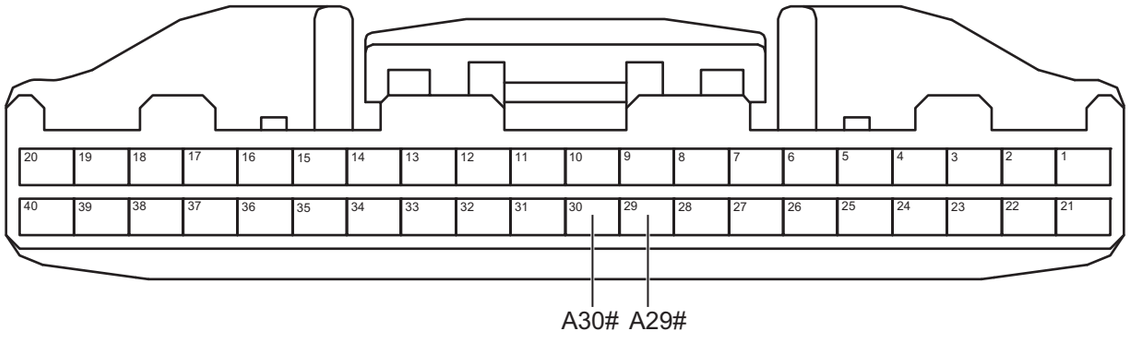
DTC	DTC detection conditions	Faulty location
U020187	(a) Rear left door module node lost.	• RLDCU • CAN line and connector • GW

Circuit diagram



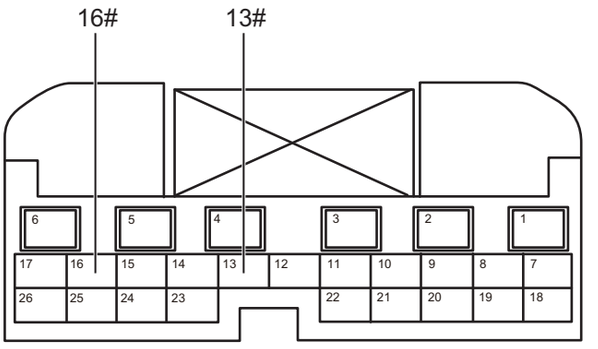
Inspection procedure

1	Check whether comfort CAN bus circuit is open (GW - RLDCU)



GW A connector

CA03111RM



RLDCU connector

CA03511RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the comfort CAN bus.

(d) Measure the resistance according to the values in the table below.

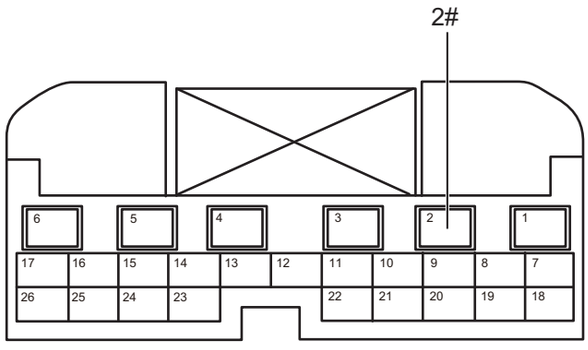
Standard value

Detector connection	Detection conditions	Specified state
RLDCU connector 13# -GW connector A29#	Always connected	Less than 1Ω
RLDCU connector 16# -GW connector A30#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check RLDCU ground



RLDCU connector

ED03010RM

(a) Measure the resistance according to the values in the table below.

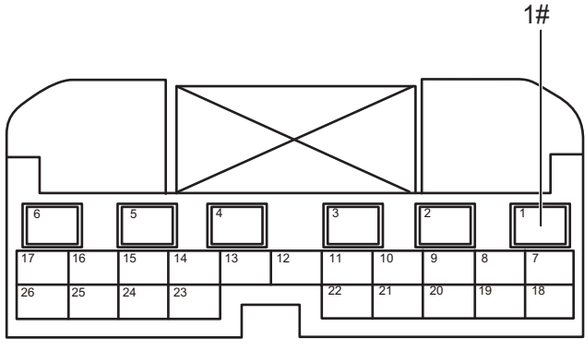
Standard value

Detector connection	Detection conditions	Specified state
RLDCU connector 2# -body GND	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	Check RLDCU power supply



RLDCU connector

ED03021RM

CA

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
RLDCU connector 1# -body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

CA

OK

4	**Replace the RLDCU (See page ED-32)**

(a) Replace the RLDCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

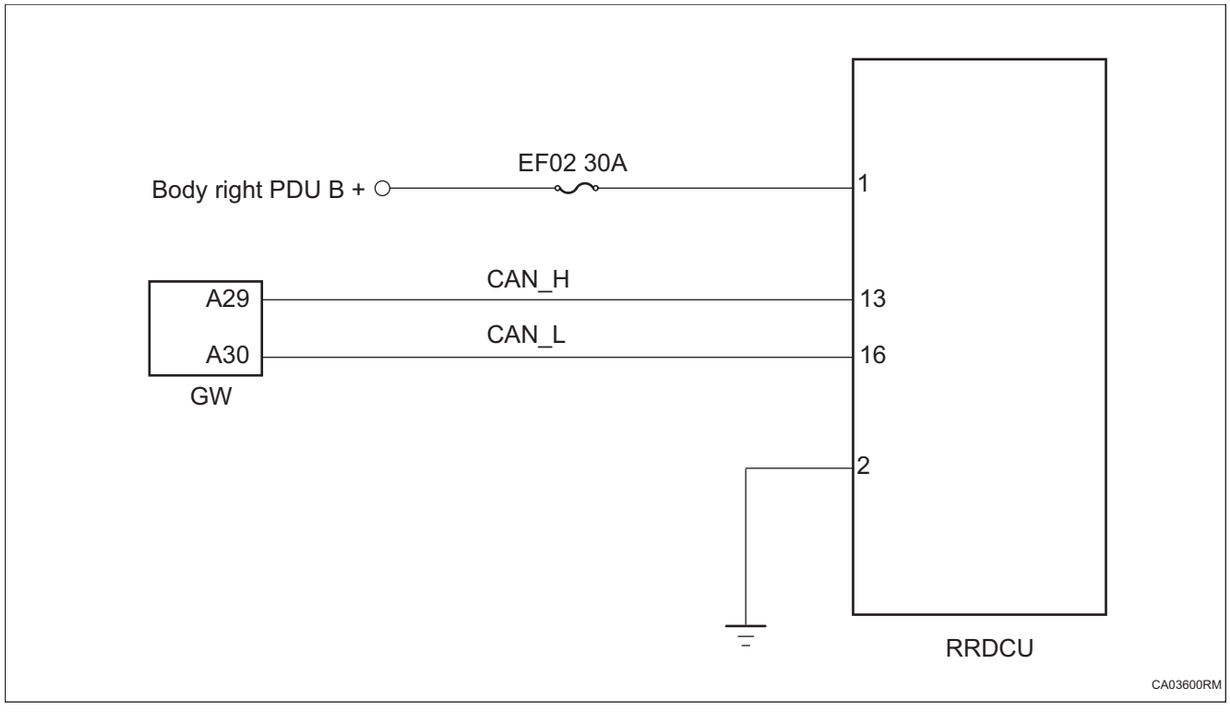
DTC	U020287	Rear right door module node lost

Description

When the communication between the GW and the RRDCU is abnormal or interrupted, the GW will record the DTC.

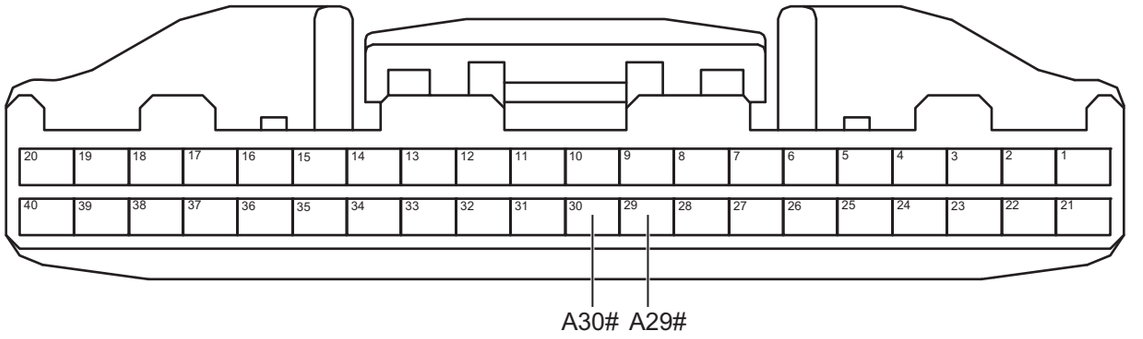
DTC	DTC detection conditions	Faulty location
U020287	(a) Rear right door module node lost.	• RRDCU • CAN line and connector • GW

Circuit diagram



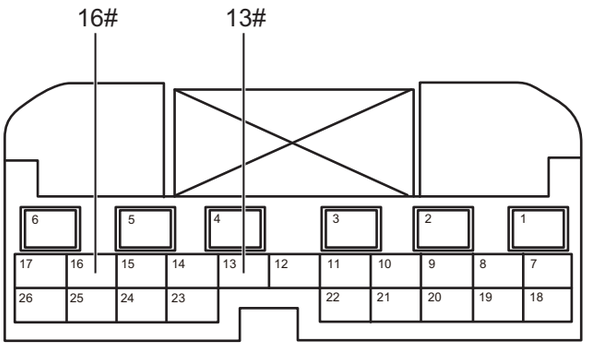
Inspection procedure

1	**Check whether comfort CAN bus circuit is open (GW - RRDCU)**



GW A connector

CA03111RM



RRDCU connector

CA03611RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the comfort CAN bus.

(d) Measure the resistance according to the values in the table below.

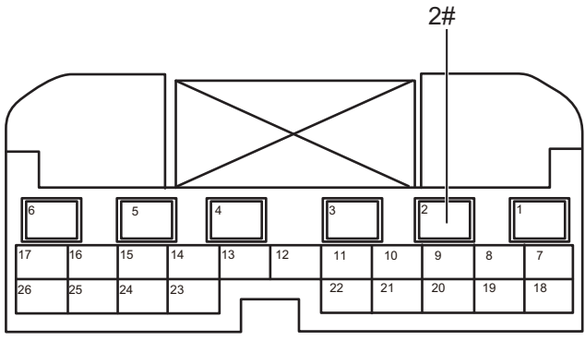
Standard value

Detector connection	Detection conditions	Specified state
RRDCU connector 13# -GW connector A29#	Always connected	Less than 1Ω
RRDCU connector 16# -GW connector A30#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check RRDCU ground



RRDCU connector

ED04010RM

(a) Measure the resistance according to the values in the table below.

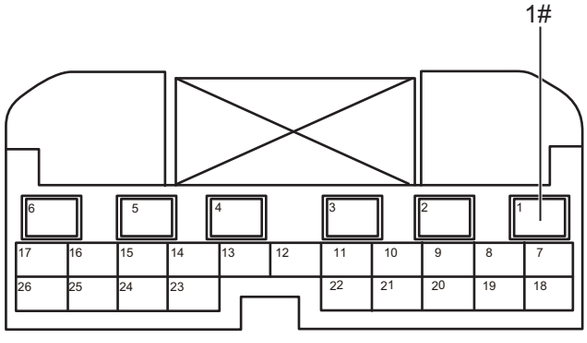
Standard value

Detector connection	Detection conditions	Specified state
RRDCU connector 2# - body GND	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	Check RRDCU power supply



RRDCU connector

ED04021RM

CA

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
RRDCU connector 1# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

CA

OK

4	**Replace the RRDCU (See page ED-32)**

(a) Replace the RRDCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

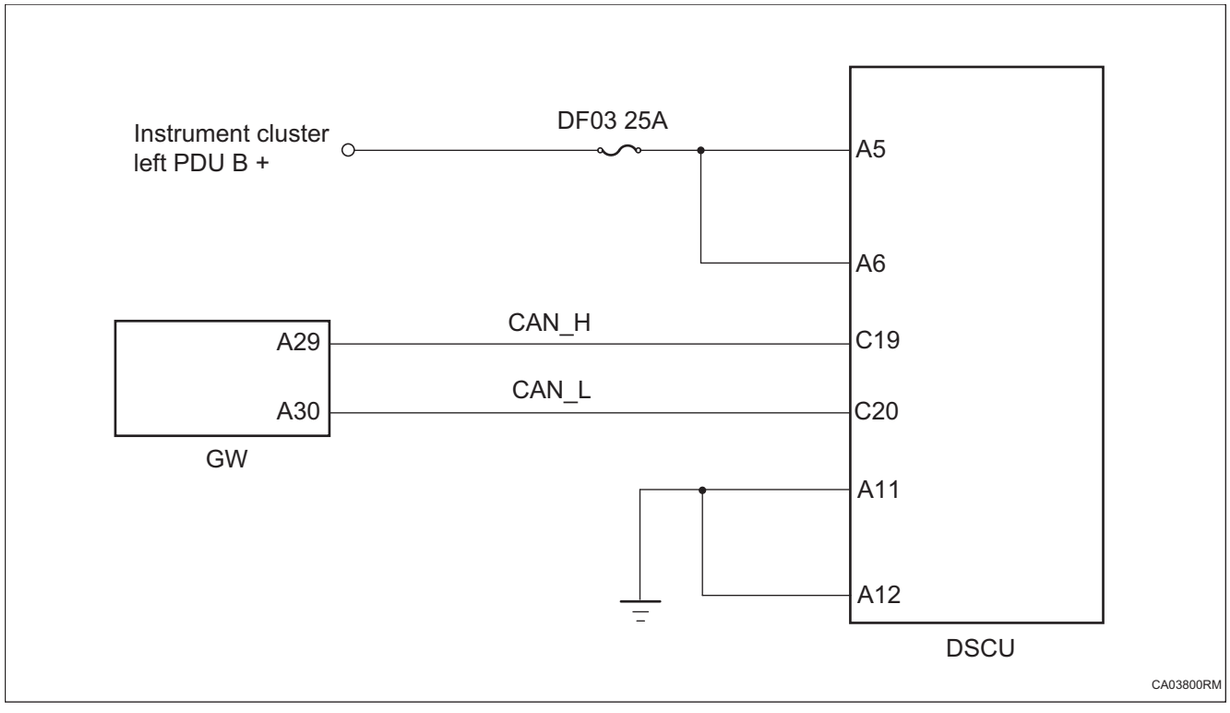
DTC	U020887	Driver seat control unit node lost

Description

When the communication between the DSCU and the GW is abnormal or interrupted, the GW records a DTC.

DTC	DTC detection conditions	Faulty location
U020887	(a) Driver seat control unit node lost.	• DSCU • CAN line and connector • GW

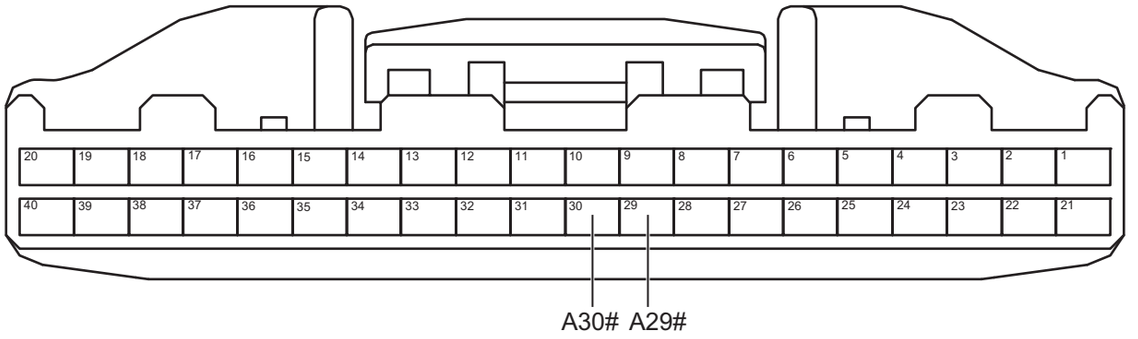
Circuit diagram



Inspection procedure

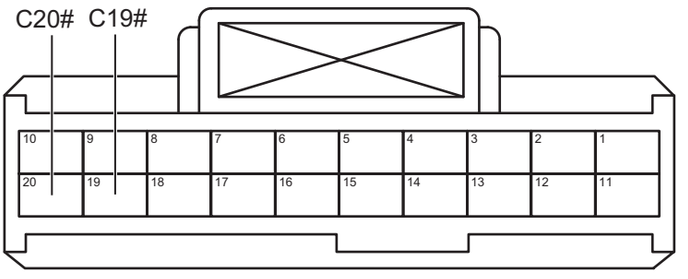
1	Check whether comfort CAN bus circuit is open (GW - DSCU)

CA



GW A connector

CA03111RM



DSCU C connector

CA03811RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the comfort CAN bus.

(d) Measure the resistance according to the values in the table below.

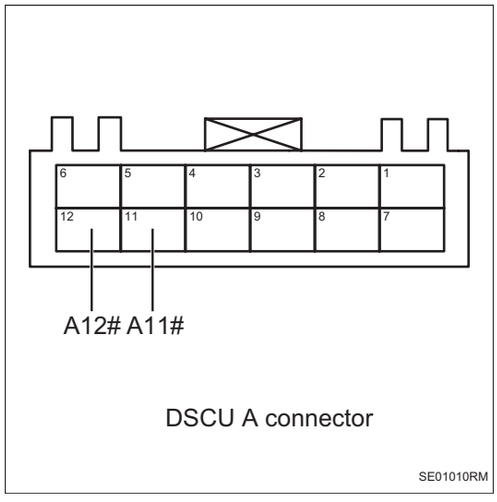
Standard value

Detector connection	Detection conditions	Specified state
DSCU connector C19#-GW connector A29#	Always connected	Less than 1Ω
DSCU connector C20#-GW connector A30#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check the DSCU ground



(a) Measure the resistance according to the values in the table below.

Standard value

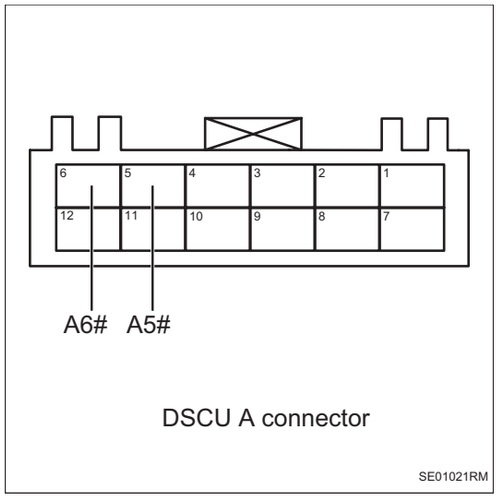
Detector connection	Detection conditions	Specified state
DSCU connector A11-body GND	Always connected	Less than 1Ω
DSCU connector A12-body GND	Always connected	Less than 1Ω

CA

NG → **Repair or replace the harness and connector**

OK

3	Check DSCU power supply



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DSCU connector A5# -body GND	Set the ignition switch to "ON"	Battery voltage
DSCU connector A6# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

4	Replace DSCU (See page SE-91)

(a) Replace the DSCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

5	**End**

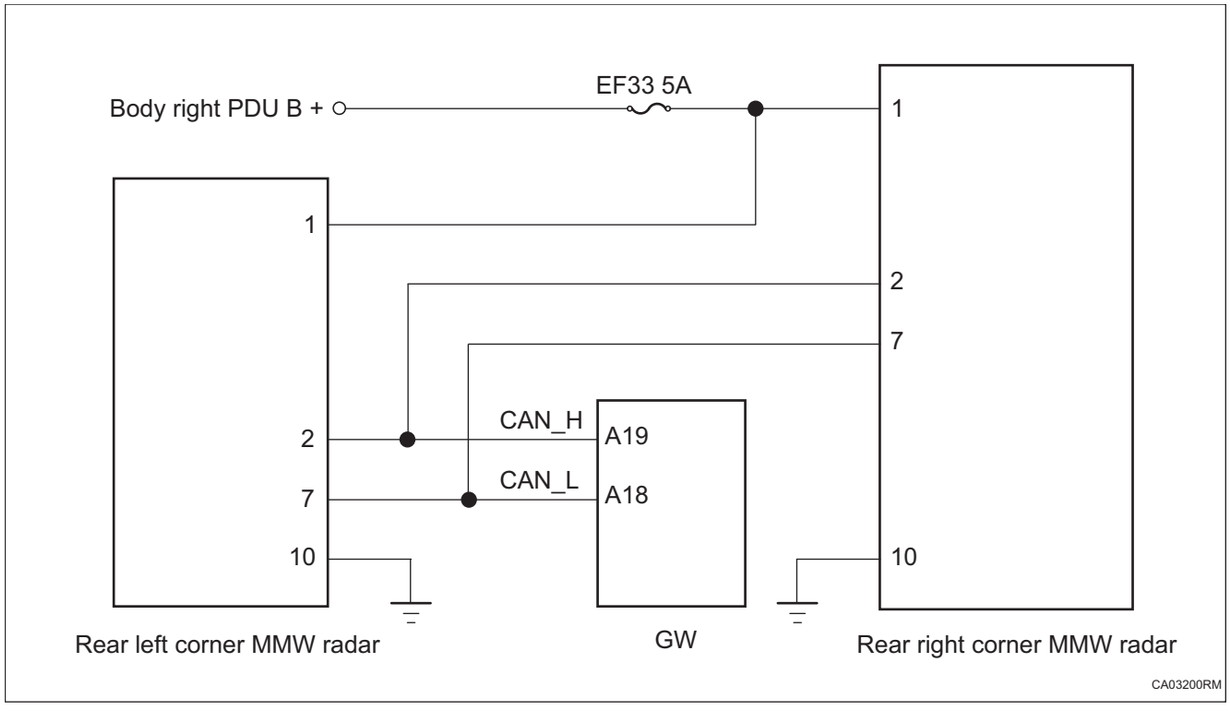
DTC	U023387	LCDA node lost

Description

When the communication between the rear left and right corner MMW radars and the GW is abnormal or interrupted, the GW records a DTC.

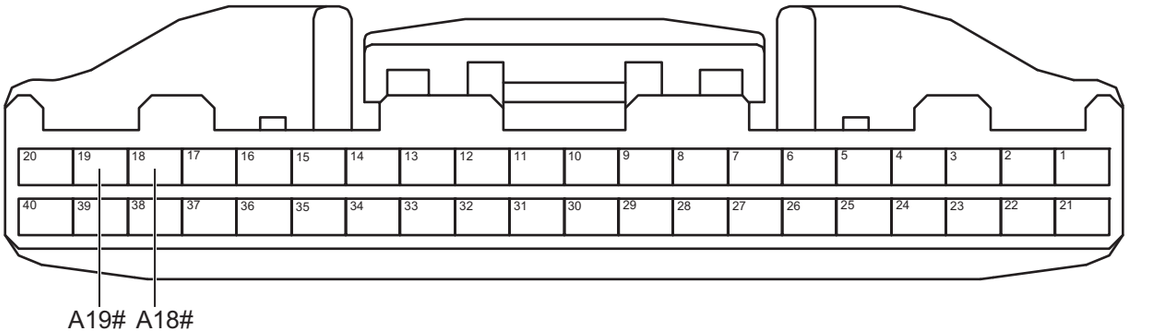
DTC	DTC detection conditions	Faulty location
U023387	(a) LCDA node lost.	• Rear left corner MMW radar • Rear right corner MMW radar • CAN line and connector • GW

Circuit diagram



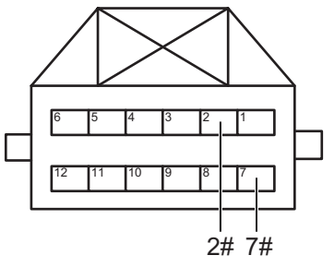
Inspection procedure

1	**Check whether driver assistance CAN bus circuit is open (GW - rear left and right corner MMW radar)**



GW A connector

CA03211RM



Rear left/right MMW radar connector

CA03221RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the driver assistance CAN bus.

(d) Measure the resistance according to the values in the table below.

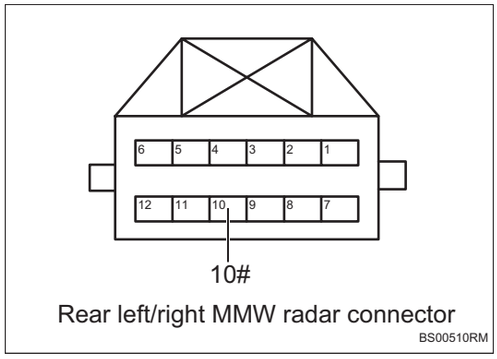
Standard value

Detector connection	Detection conditions	Specified state
Rear left corner MMW radar connector 2# - GW connector A19#	Always connected	Less than 1Ω
Rear left corner MMW radar connector 7# - GW connector A18#	Always connected	Less than 1Ω
Rear right corner MMW radar connector 2# - GW connector A19#	Always connected	Less than 1Ω
Rear right corner MMW radar connector 7# - GW connector A18#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check rear left/right corner MMW radar ground**



Rear left/right MMW radar connector
BS00510RM

(a) Measure the resistance according to the values in the table below.

Standard value

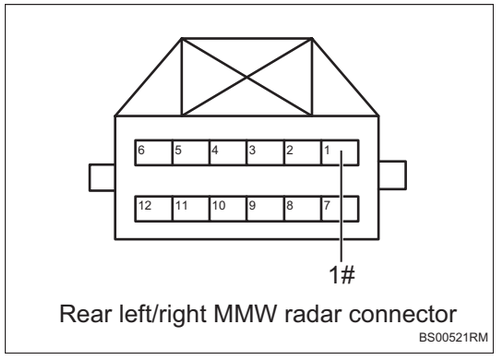
Detector connection	Detection conditions	Specified state
Rear left corner MMW radar connector 10# - body GND	Always connected	Less than 1Ω
Rear right corner MMW radar connector 10# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

CA

3	Check rear left/right corner MMW radar power supply



Rear left/right MMW radar connector
BS00521RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Rear left corner MMW radar connector 1# - body GND	The ignition switch is set to "ON"	Battery voltage
Rear right corner MMW radar connector 1# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

4	Replace rear left/right corner MMW radar (See page BS-19)

(a) Replace the rear left/right corner MMW radar.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

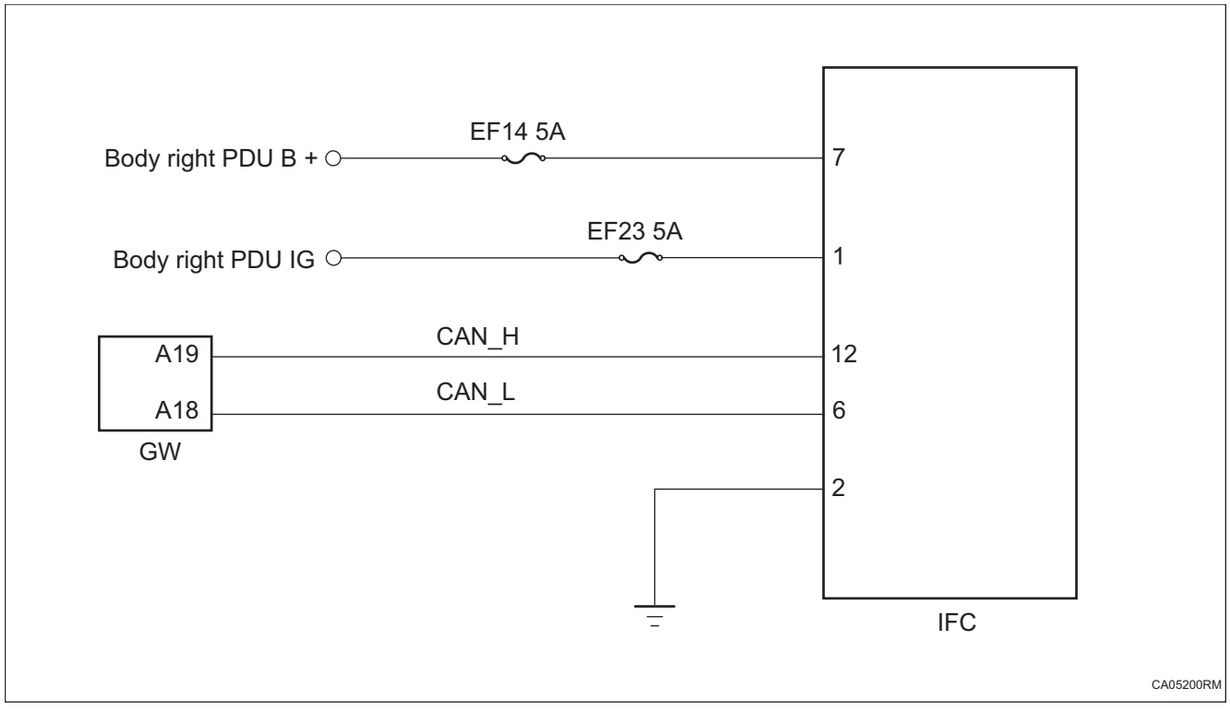
DTC	U023587	IFC node lost

Description

When the communication between the GW and the IFC is abnormal or interrupted, the GW will record the DTC.

DTC	DTC detection conditions	Faulty location
U023587	(a) IFC node lost.	• IFC • CAN line and connector • GW

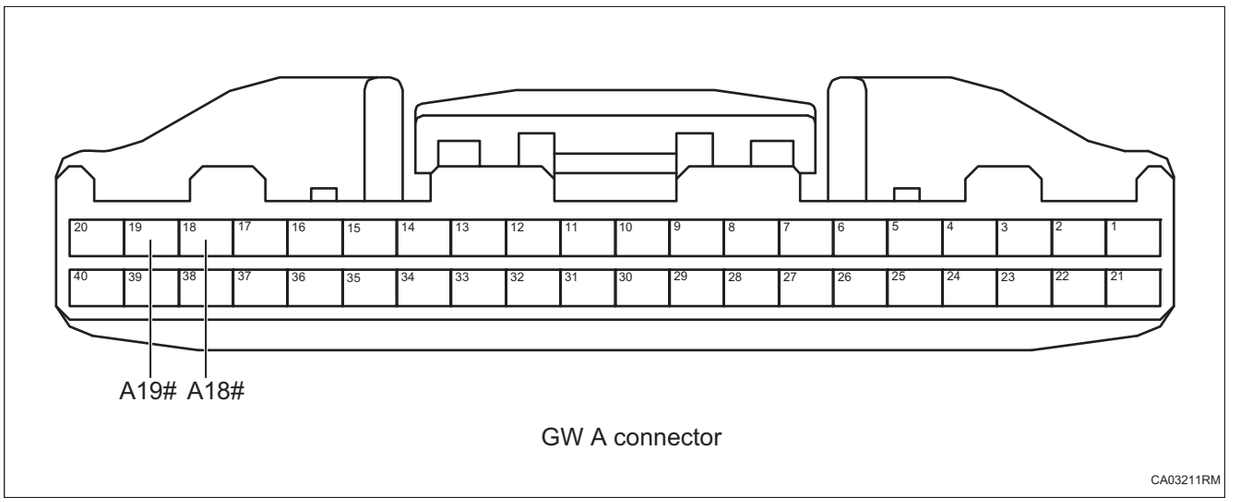
Circuit diagram



Inspection procedure

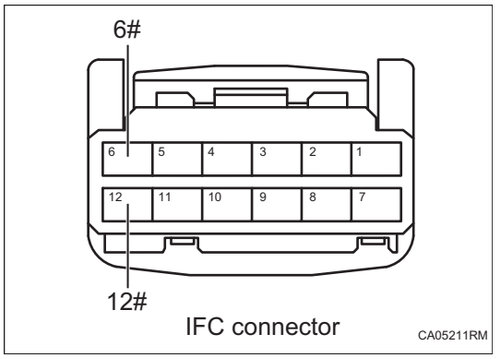
1	Check whether driver assistance CAN bus circuit is open (GW - IFC)

CA



GW A connector

CA03211RM



IFC connector

CA05211RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the driver assistance CAN bus.

(d) Measure the resistance according to the values in the table below.

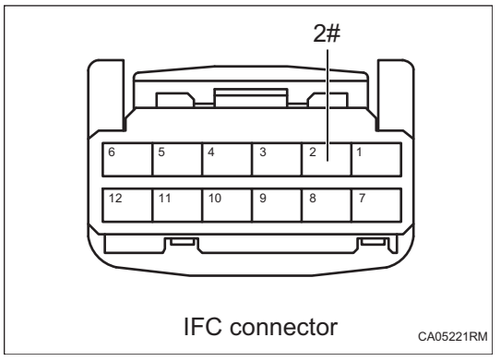
Standard value

Detector connection	Detection conditions	Specified state
IFC connector 12#-GW connector A19#	Always connected	Less than 1Ω
IFC connector 6#-GW connector A18#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2 Check the IFC ground



IFC connector

CA05221RM

(a) Measure the resistance according to the values in the table below.

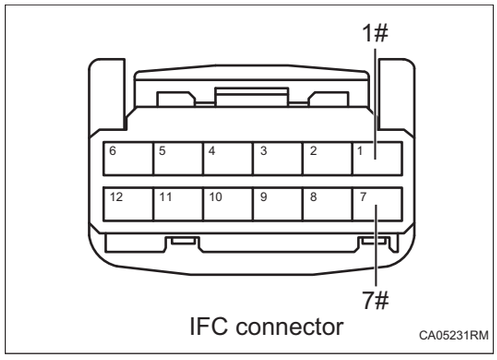
Standard value

Detector connection	Detection conditions	Specified state
IFC connector 2# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check the IFC power supply



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
IFC connector 1# - body GND	Set the ignition switch to "ON"	Battery voltage
IFC connector 7# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

4	Replace the IFC (See page CC-34)

(a) Replace the IFC.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

5	End

CA

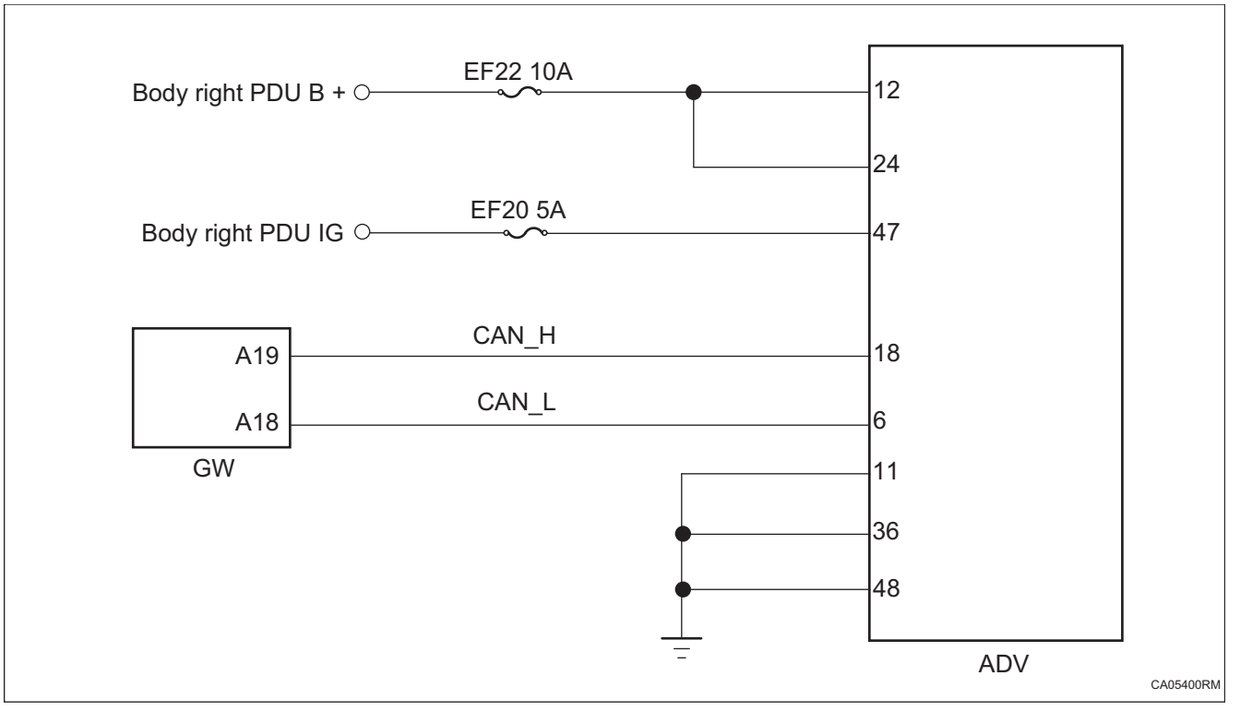
DTC	U024387	ADV node lost

Description

When the communication between the ADV and the GW is abnormal or interrupted, the GW will record the DTC.

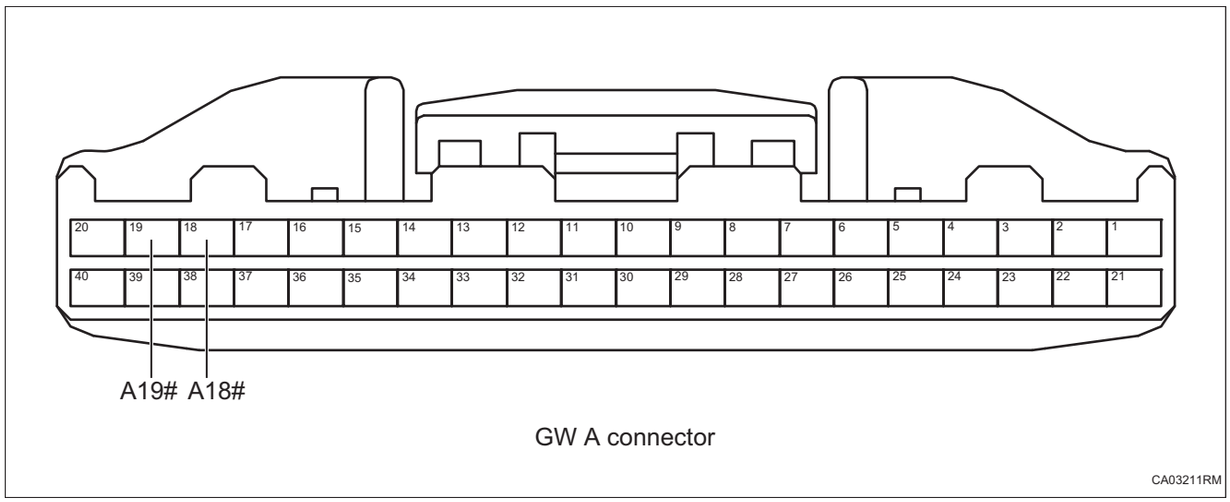
DTC	DTC detection conditions	Faulty location
U024387	(a) ADV node lost.	• ADV • CAN line and connector • GW

Circuit diagram



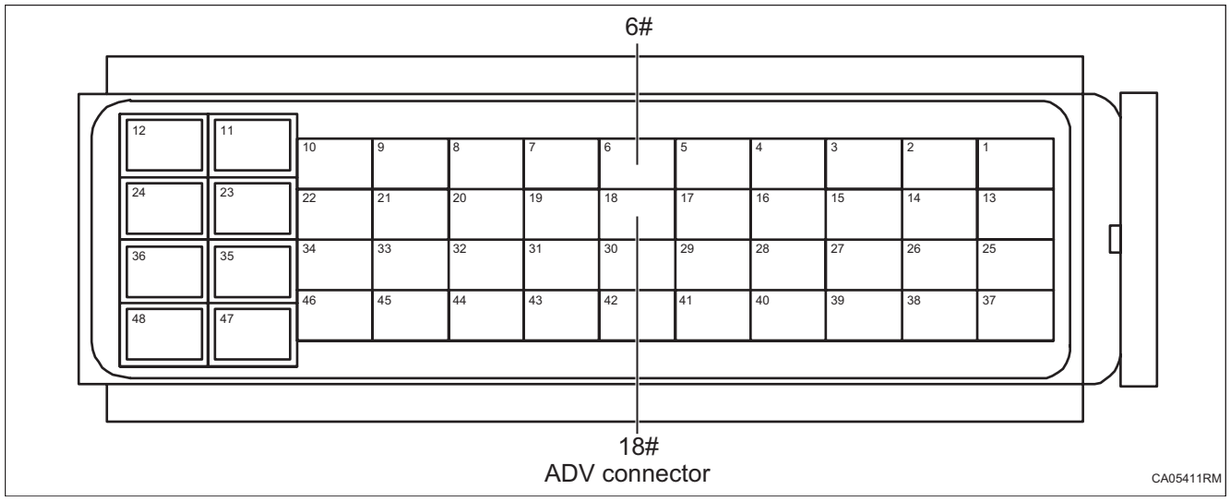
Inspection procedure

1	Check whether driver assistance CAN bus circuit is open (GW - ADV)



GW A connector

CA03211RM



ADV connector

CA05411RM

CA

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the driver assistance CAN bus.

(d) Measure the resistance according to the values in the table below.

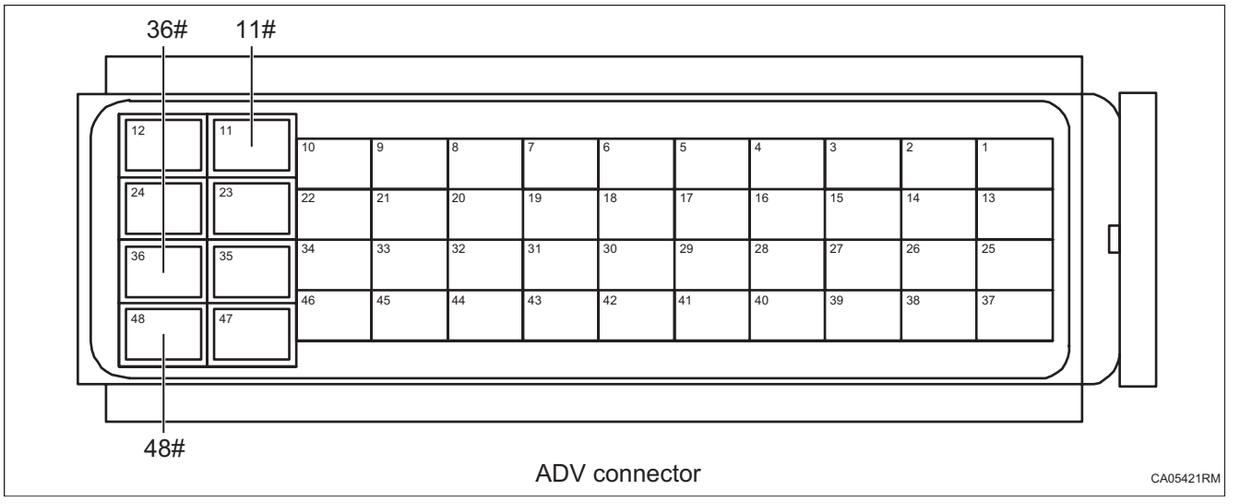
Standard value

Detector connection	Detection conditions	Specified state
ADV connector 18# -GW connector A19#	Always connected	Less than 1Ω
ADV connector 6# -GW connector A18#	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

2	Check ADV ground



ADV connector

(a) Measure the resistance according to the values in the table below.

Standard value

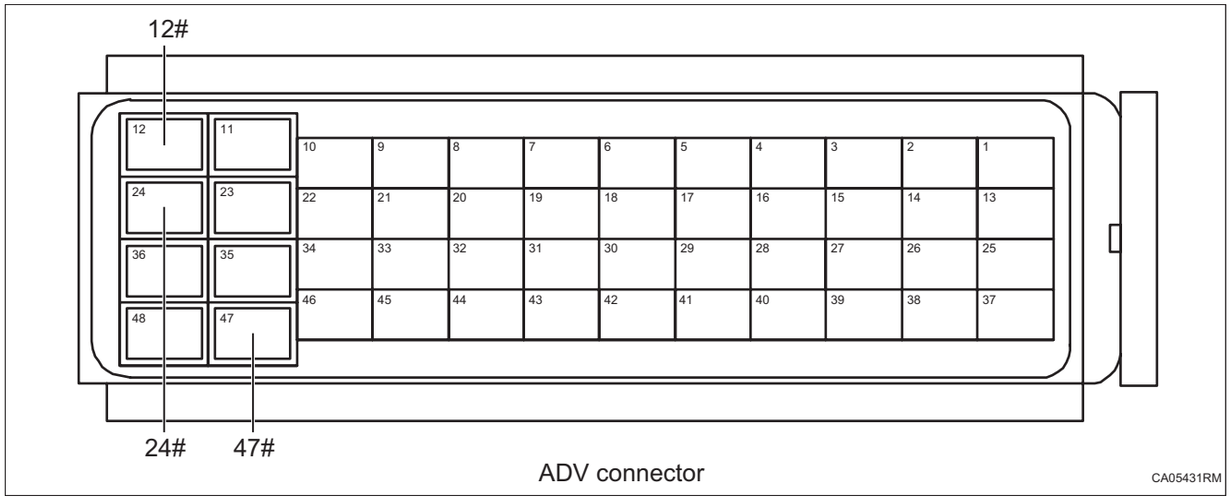
Detector connection	Detection conditions	Specified state
ADV connector 11# - body GND	Always connected	Less than 1Ω
ADV connector 36# - body GND	Always connected	Less than 1Ω
ADV connector 48# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check ADV power supply

CA



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ADV connector 12# - body GND	Set the ignition switch to "ON"	Battery voltage
ADV connector 24# - body GND	Set the ignition switch to "ON"	Battery voltage
ADV connector 47# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

4	**Replace the ADV (See page AD-30)**

(a) Replace the ADV.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

CA

OK

5	End

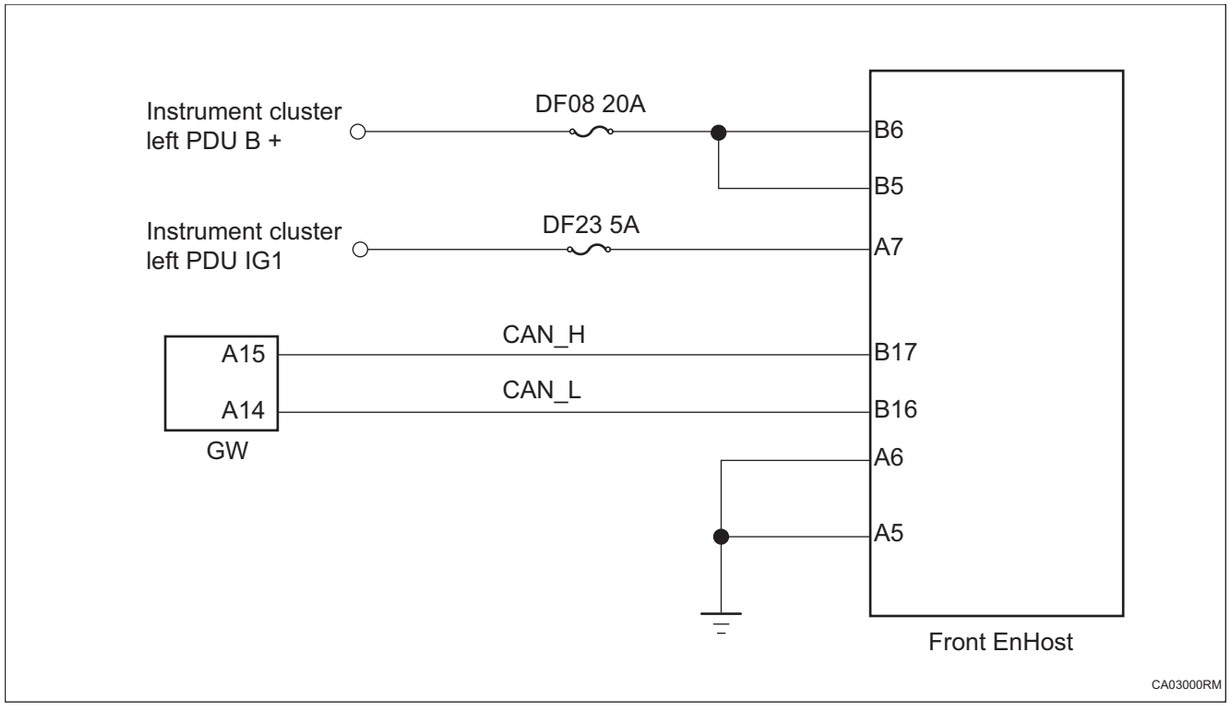
DTC	U024587	EnHost node lost

Description

When the communication between the front EnHost and the GW is abnormal or interrupted, the GW will record the DTC.

DTC	DTC detection conditions	Faulty location
U024587	(a) EnHost node lost.	• Front EnHost • CAN line and connector • GW

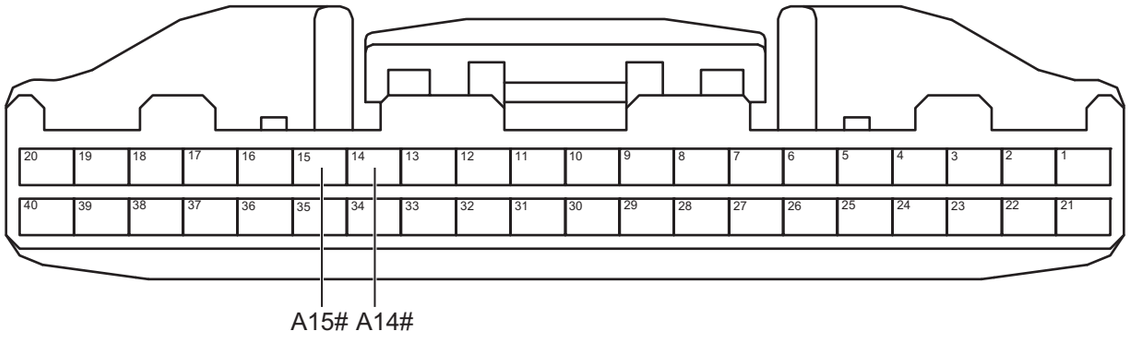
Circuit diagram



Inspection procedure

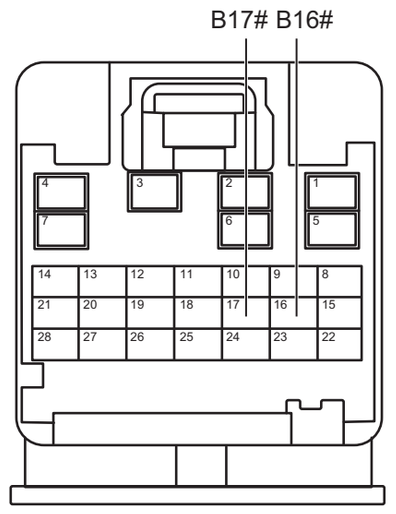
1	Check information CAN bus for open circuit (GW-front EnHost)

CA



GW A connector

CA03011RM



Front EnHost B connector

CA03021RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the information CAN bus.

(d) Measure the resistance according to the values in the table below.

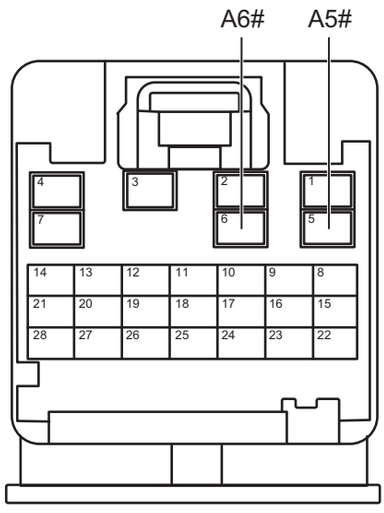
Standard value

Detector connection	Detection conditions	Specified state
Front EnHost connector B17#-GW connector A15#	Always connected	Less than 1Ω
Front EnHost connector B16#-GW connector A14#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check front EnHost ground**



Front EnHost A connector

AV00510RM

(a) Measure the resistance according to the values in the table below.

Standard value

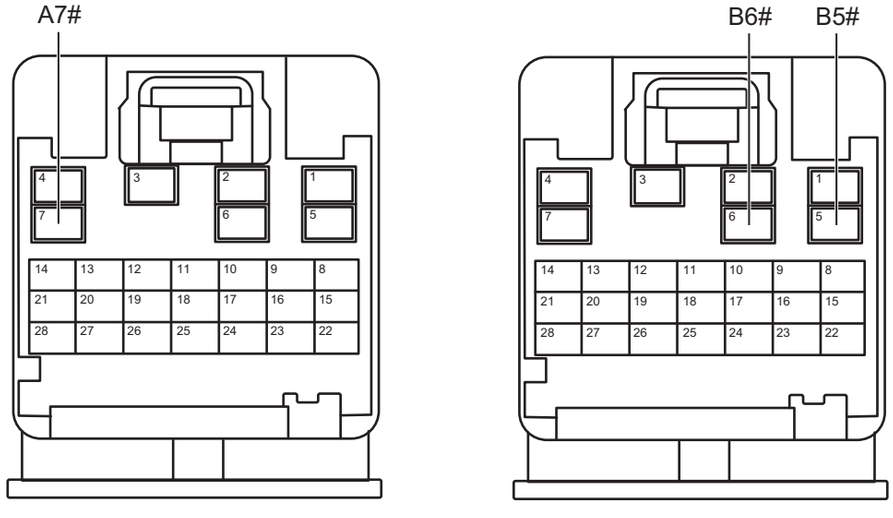
Detector connection	Detection conditions	Specified state
Front EnHost connector A6# -body GND	Always connected	Less than 1Ω
Front EnHost connector A5# -body GND	Always connected	Less than 1Ω

CA

NG → **Repair or replace the harness and connector**

OK

3	Check front EnHost power supply



Front EnHost A connector

Front EnHost B connector

AV00521RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

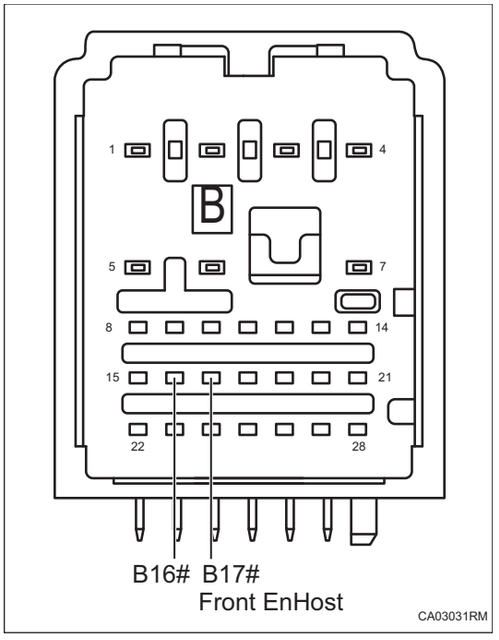
Detector connection	Detection conditions	Specified state
Front EnHost connector B6# -body GND	The ignition switch is set to "ON"	Battery voltage
Front EnHost connector B5# -body GND	The ignition switch is set to "ON"	Battery voltage
Front EnHost connector A7# - body GND	The ignition switch is set to "ON"	Battery voltage

CA

NG → **Repair or replace harness and connector and fuse**

OK

4	Check front EnHost terminal resistor



(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Front EnHost B16#-front EnHost B17#	Always connected	About 120 Ω

NG → **Replace front EnHost (See page AV-48)**

OK

5	Replace GW (See page CA-256)

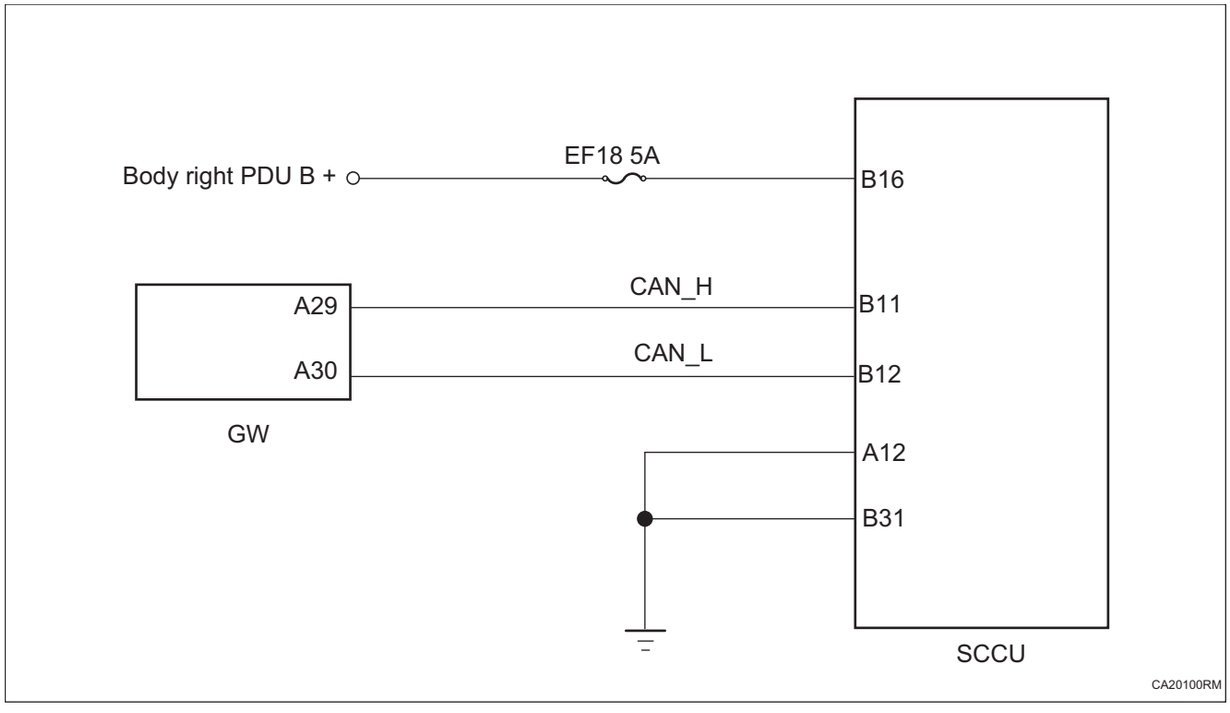
DTC	U024687	SCCU node lost

Description

When the communication between the SCCU and the GW is abnormal or interrupted, the GW will record the DTC.

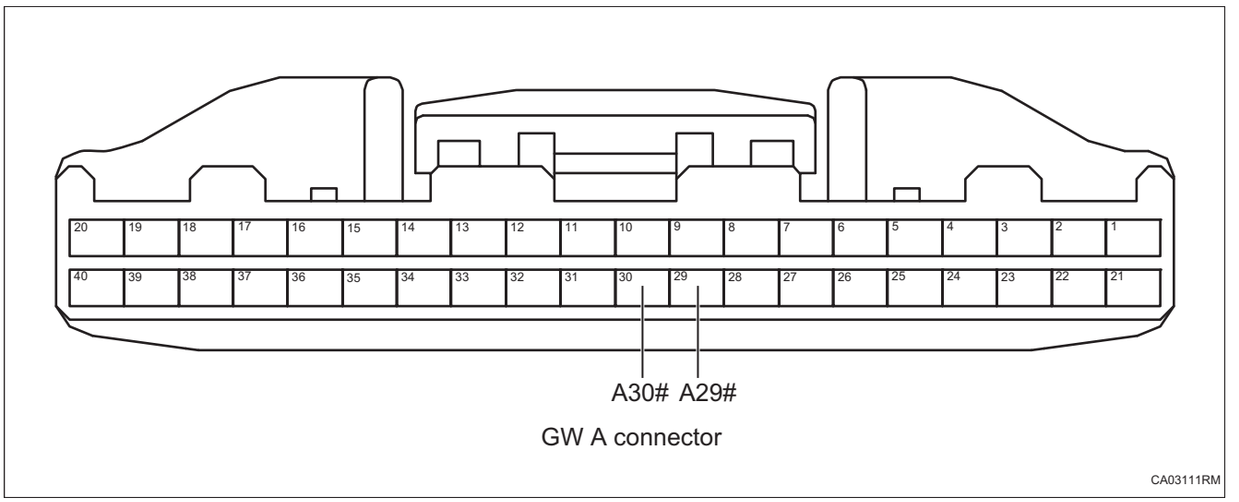
DTC	DTC detection conditions	Faulty location
U024687	(a) SCCU node lost.	• SCCU • CAN line and connector • GW

Circuit diagram



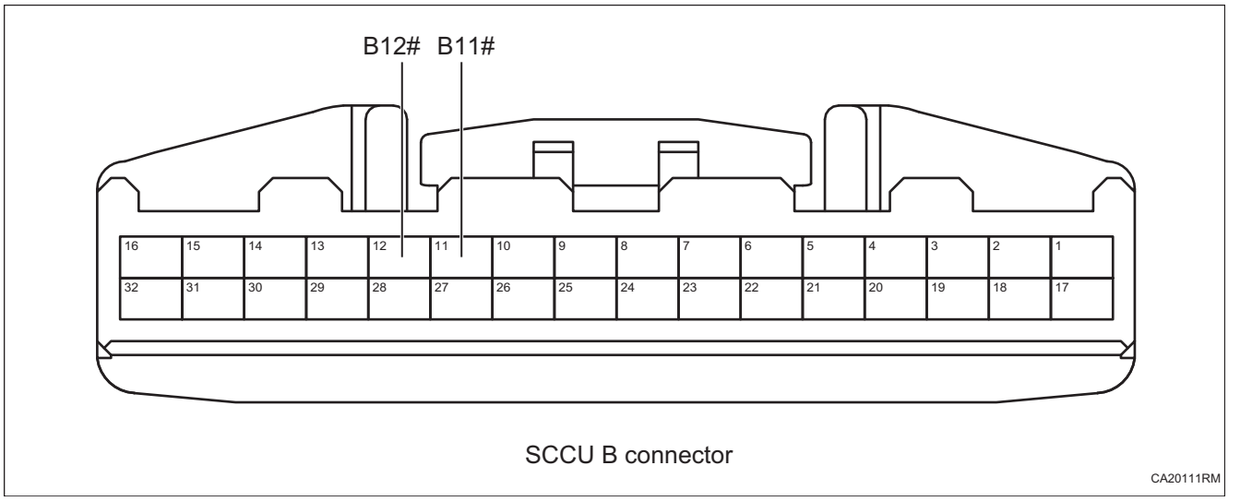
Inspection procedure

1	Check whether comfort CAN bus circuit is open (GW - SCCU)



GW A connector

CA03111RM



SCCU B connector

CA20111RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the comfort CAN bus.

(d) Measure the resistance according to the values in the table below.

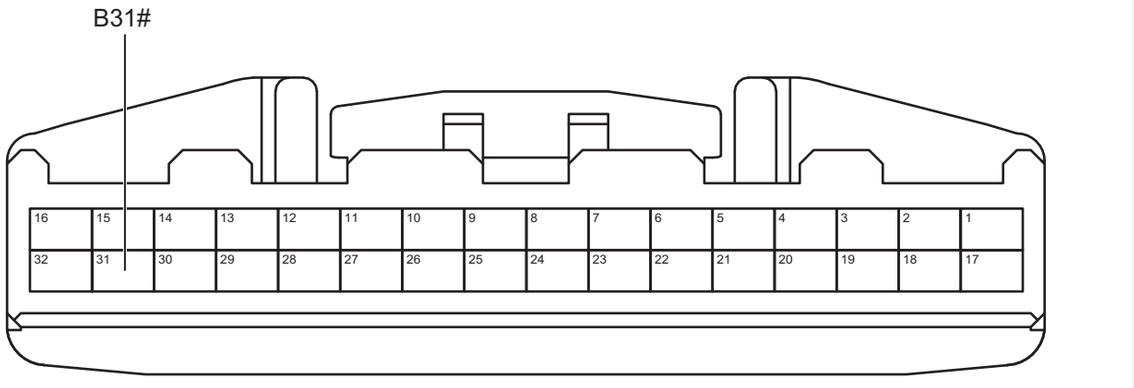
Standard value

Detector connection	Detection conditions	Specified state
SCCU connector B11#-GW connector A29#	Always connected	Less than 1Ω
SCCU connector B12#-GW connector A30#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

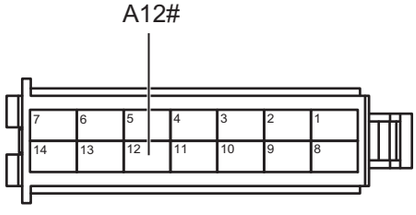
OK

2	Check SCCU ground



SCCU B connector

SE04010RM



SCCU A connector

SE04020RM

(a) Measure the resistance according to the values in the table below.

Standard value

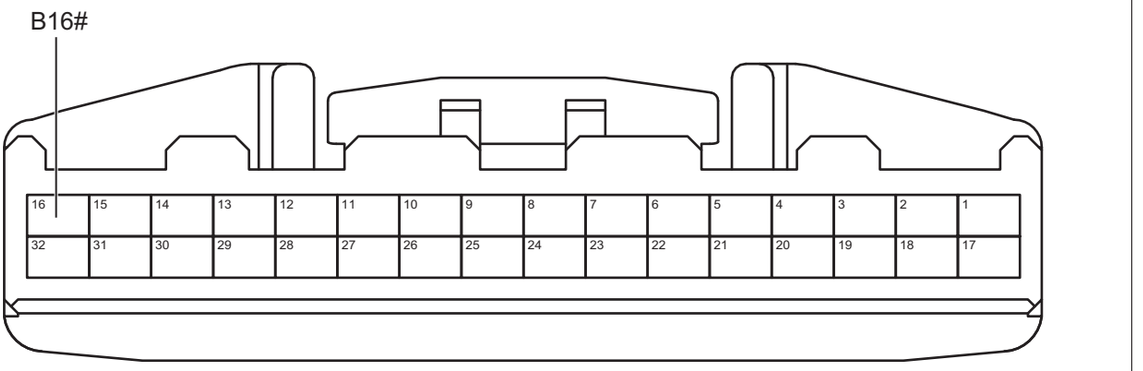
Detector connection	Detection conditions	Specified state
SCCU connector A12-body GND	Always connected	Less than 1Ω
SCCU connector B31-body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check SCCU power supply

CA



SCCU B connector

SE04031RM

CA

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
SCCU connector B16# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

4	**Replace the SCCU (See page SE-91)**

(a) Replace the SCCU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

5	**End**

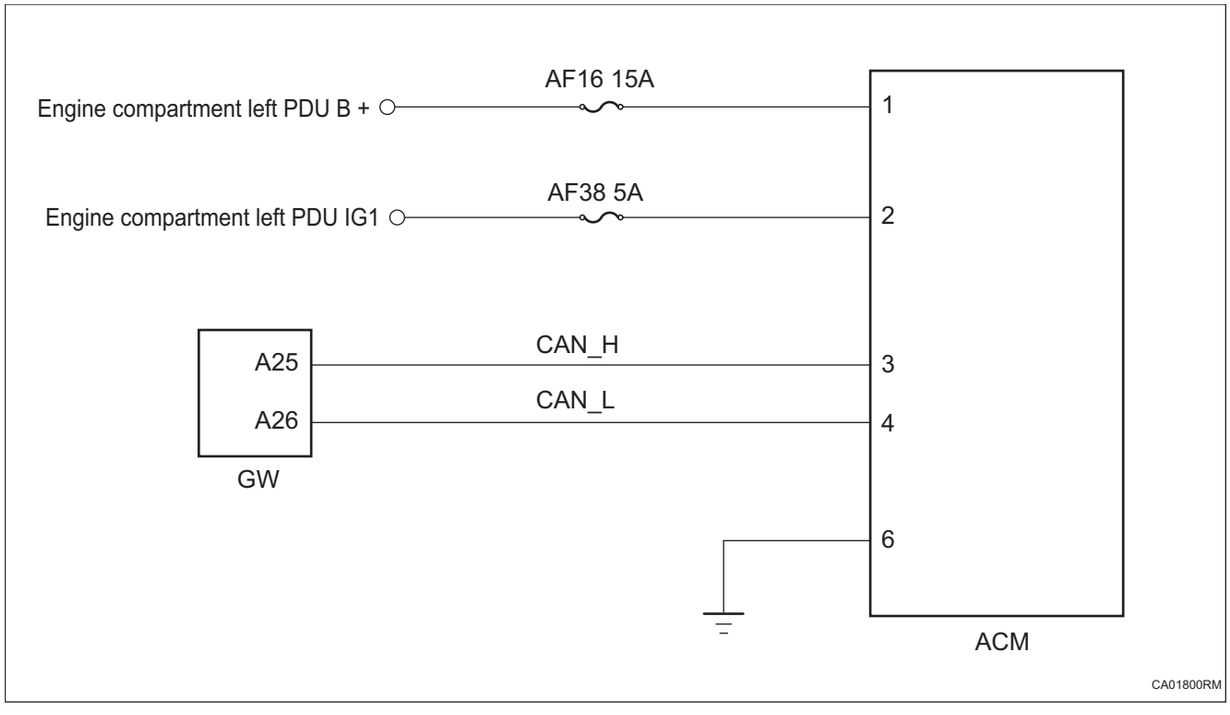
DTC	U029187	ACM node lost

Description

When the communication between the GW and the ACM is abnormal or interrupted, the GW will record the DTC.

DTC	DTC detection conditions	Faulty location
U029187	(a) ACM node lost.	• ACM • CAN line and connector • GW

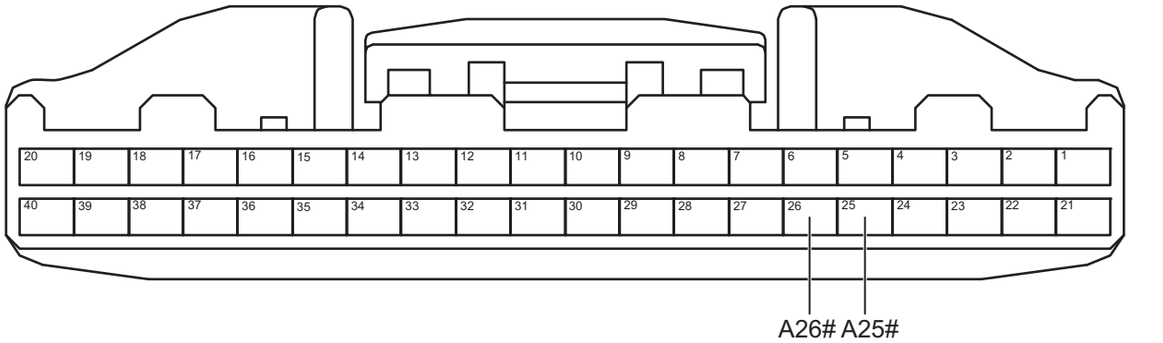
Circuit diagram



Inspection procedure

1	Check whether powertrain CAN bus circuit is open (GW - ACM)

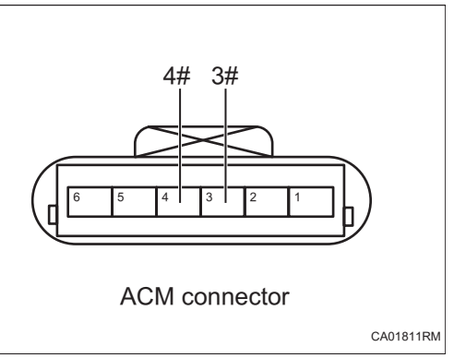
CA



GW A connector

CA00711RM

CA



ACM connector

CA01811RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the power-train CAN bus.

(d) Measure the resistance according to the values in the table below.

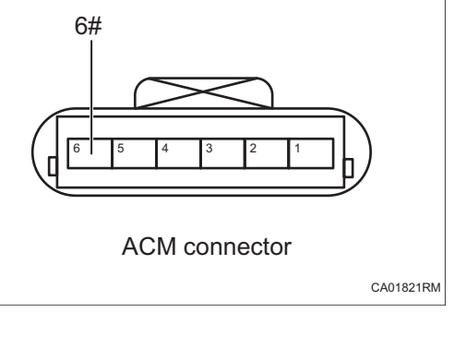
Standard value

Detector connection	Detection conditions	Specified state
ACM connector 3# - GW connector A25#	Always connected	Less than 1Ω
ACM connector 4# - GW connector A26#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2 Check ACM ground



ACM connector

CA01821RM

(a) Measure the resistance according to the values in the table below.

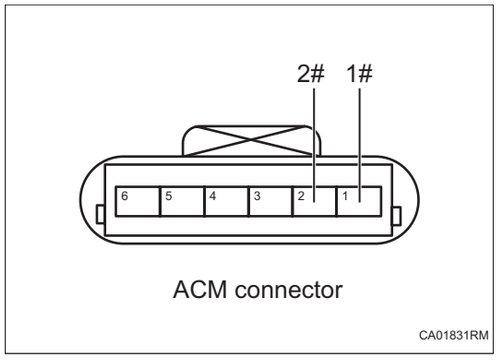
Standard value

Detector connection	Detection conditions	Specified state
ACM connector 6# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check ACM power supply



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ACM connector 1# - body GND	Set the ignition switch to "ON"	Battery voltage
ACM connector 2# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

4	Replace the ACM (See page AM-29)

(a) Replace the ACM.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

5	End

CA

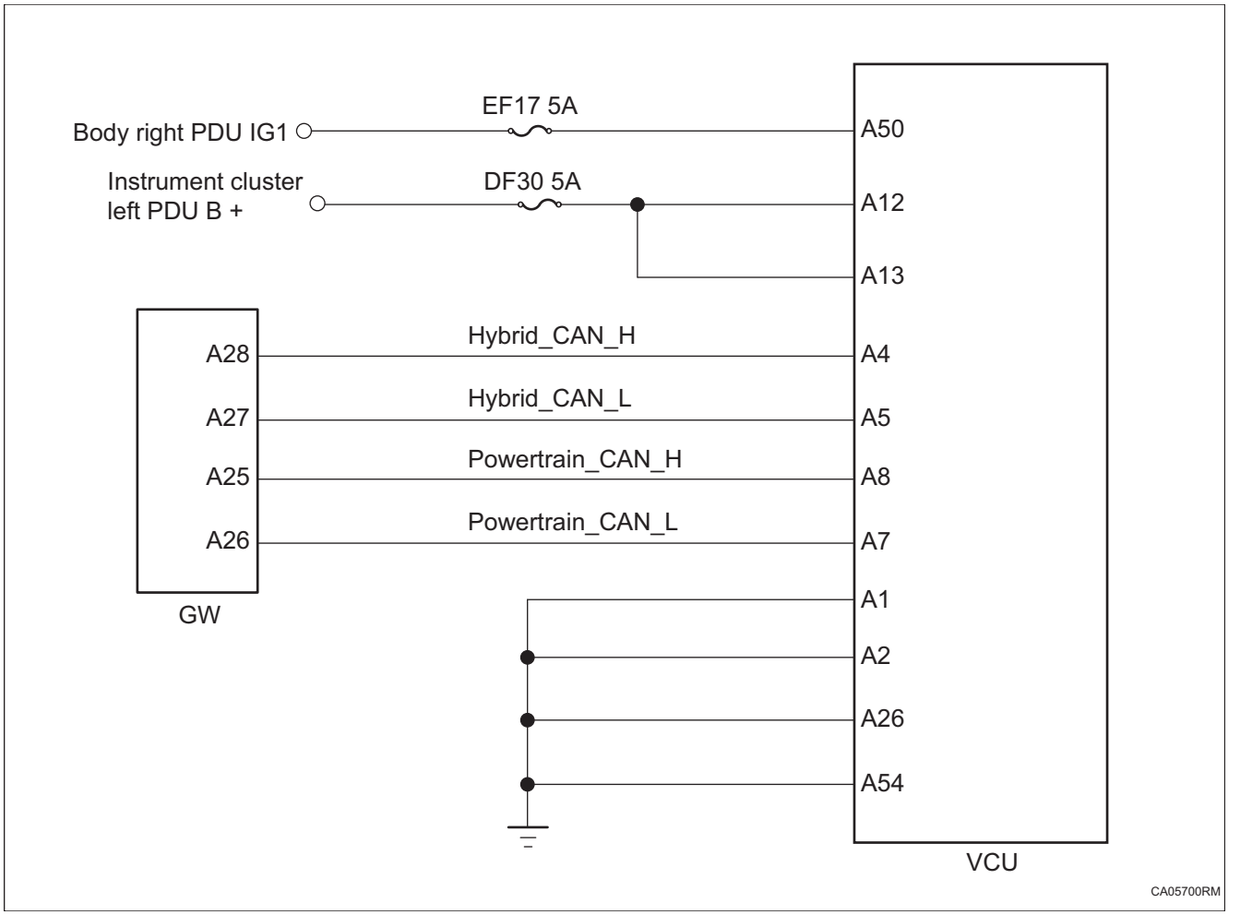
DTC	U029387	HCU node lost

Description

When the communication between the GW and the HCU is abnormal or interrupted, the GW will record the DTC.

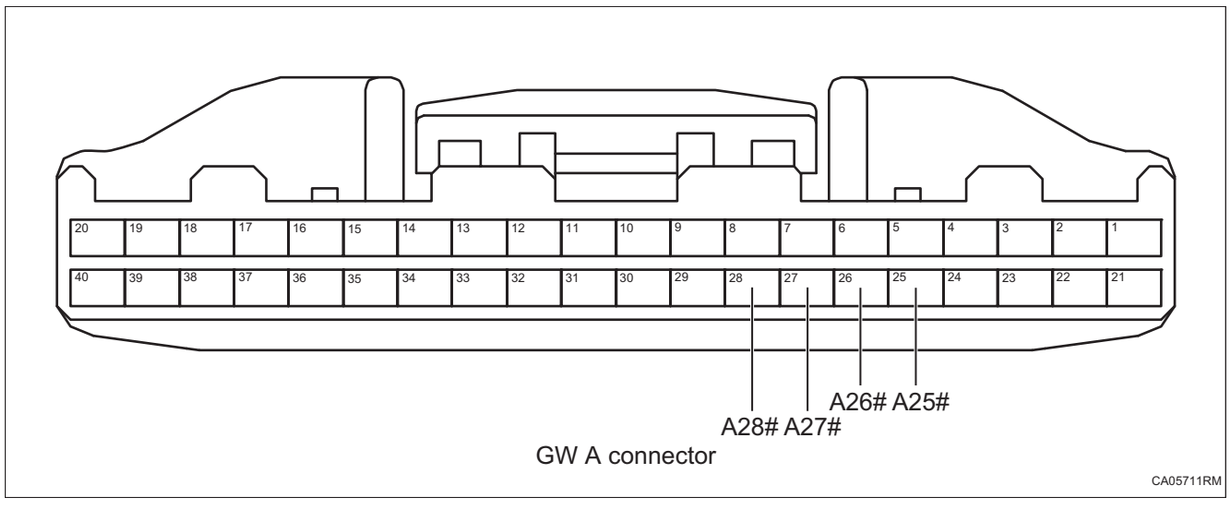
DTC	DTC detection conditions	Faulty location
U029387	(a) HCU node lost.	• HCU • CAN line and connector • GW

Circuit diagram



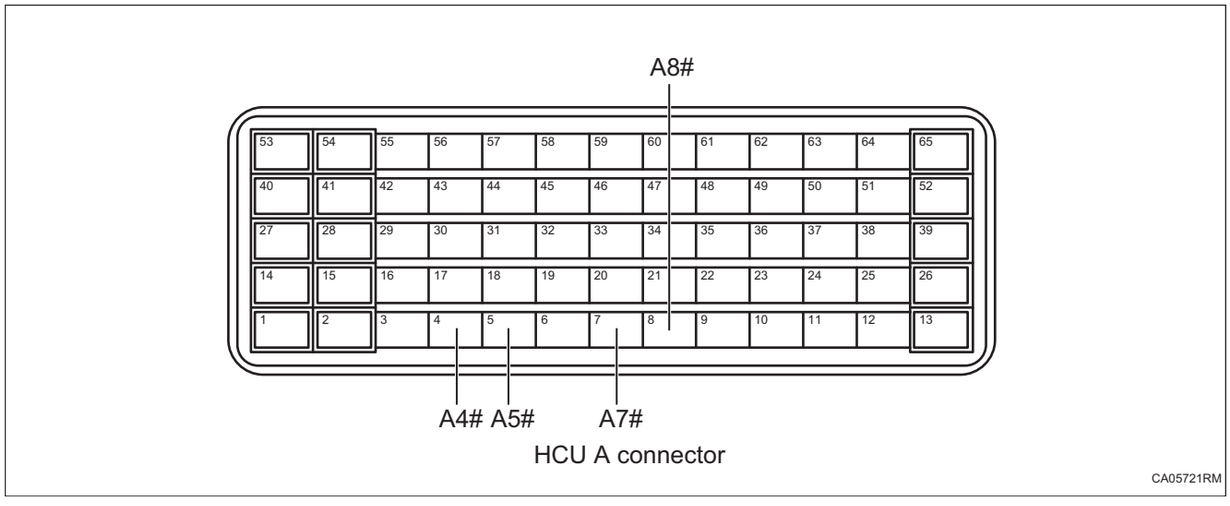
Inspection procedure

1	Check whether powertrain CAN and hybrid CAN bus circuit is open (GW - HCU)



GW A connector

CA05711RM



HCU A connector

CA05721RM

CA

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the power-train CAN bus and hybrid CAN bus.

(d) Measure the resistance according to the values in the table below.

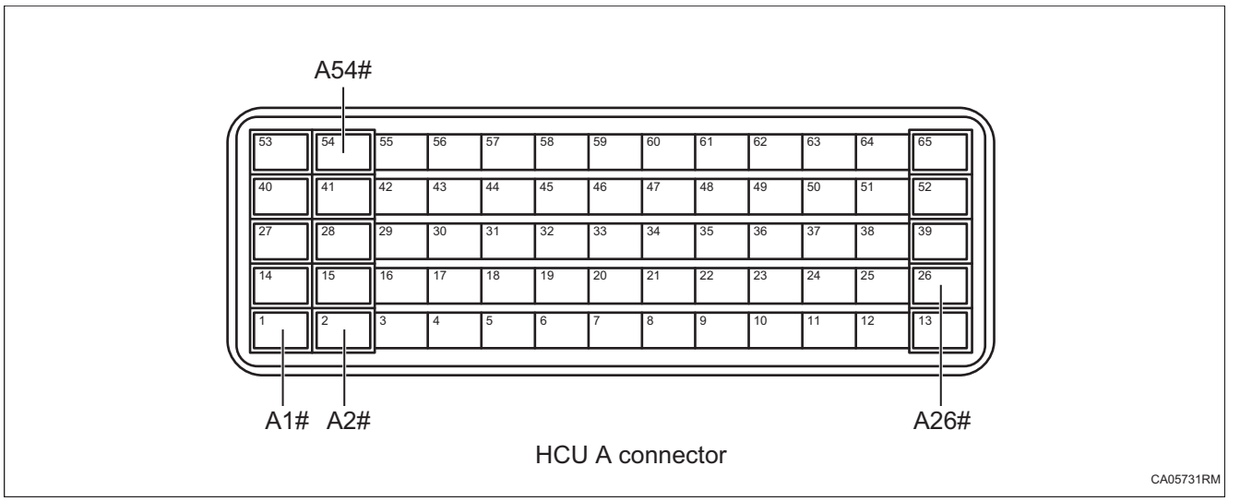
Standard value

Detector connection	Detection conditions	Specified state
HCU connector A4# -GW connector A28#	Always connected	Less than 1Ω
HCU connector A5# -GW connector A27#	Always connected	Less than 1Ω
HCU connector A8# -GW connector A25#	Always connected	Less than 1Ω
HCU connector A7# -GW connector A26#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check HCU ground



HCU A connector

CA05731RM

(a) Measure the resistance according to the values in the table below.

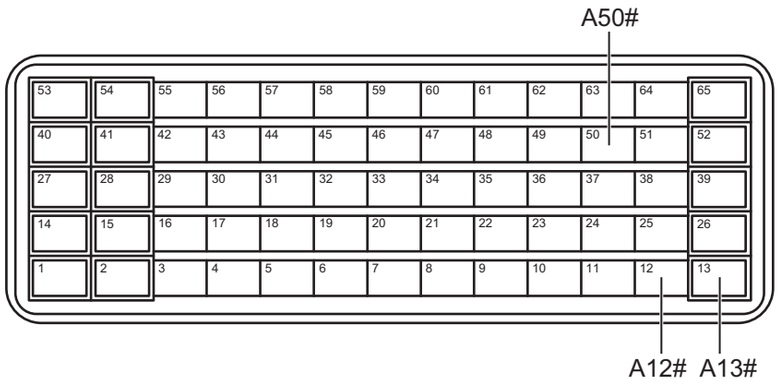
Standard value

Detector connection	Detection conditions	Specified state
HCU connector A1# - body GND	Always connected	Less than 1Ω
HCU connector A2# - body GND	Always connected	Less than 1Ω
HCU connector A26# - body GND	Always connected	Less than 1Ω
HCU connector A54# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check HCU power supply



HCU A connector

CA05741RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

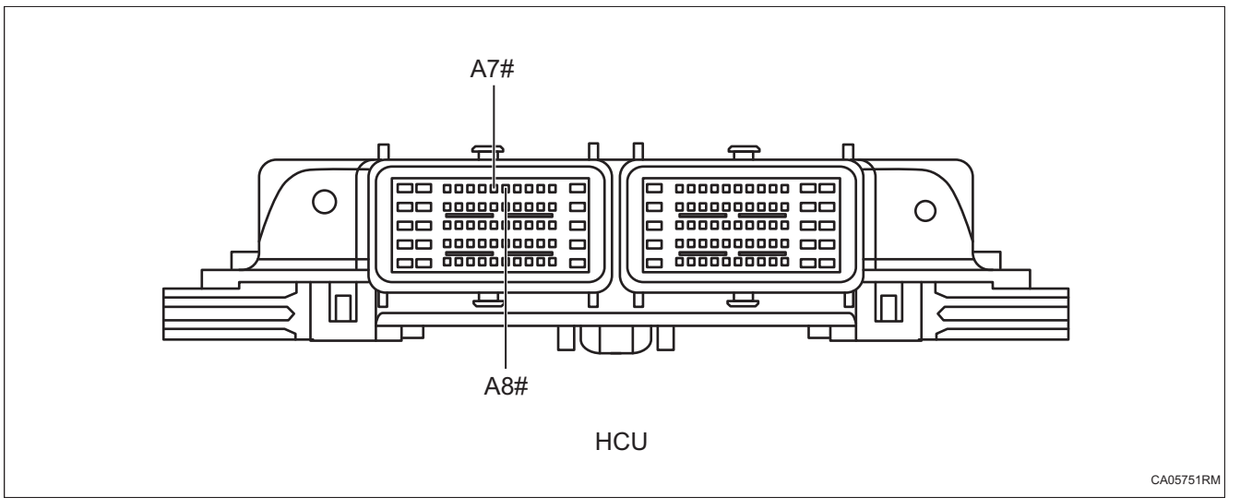
Detector connection	Detection conditions	Specified state
HCU connector A12# - body GND	Set the ignition switch to "ON"	Battery voltage
HCU connector A13# - body GND	Set the ignition switch to "ON"	Battery voltage
HCU connector A50# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

4	**Check HCU terminal resistor**

CA



CA

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
HCU A7#- HCU A8#	Always connected	About 120 Ω

NG → **Replace HCU (See page HC-126)**

OK

5	**Replace GW (See page CA-256)**

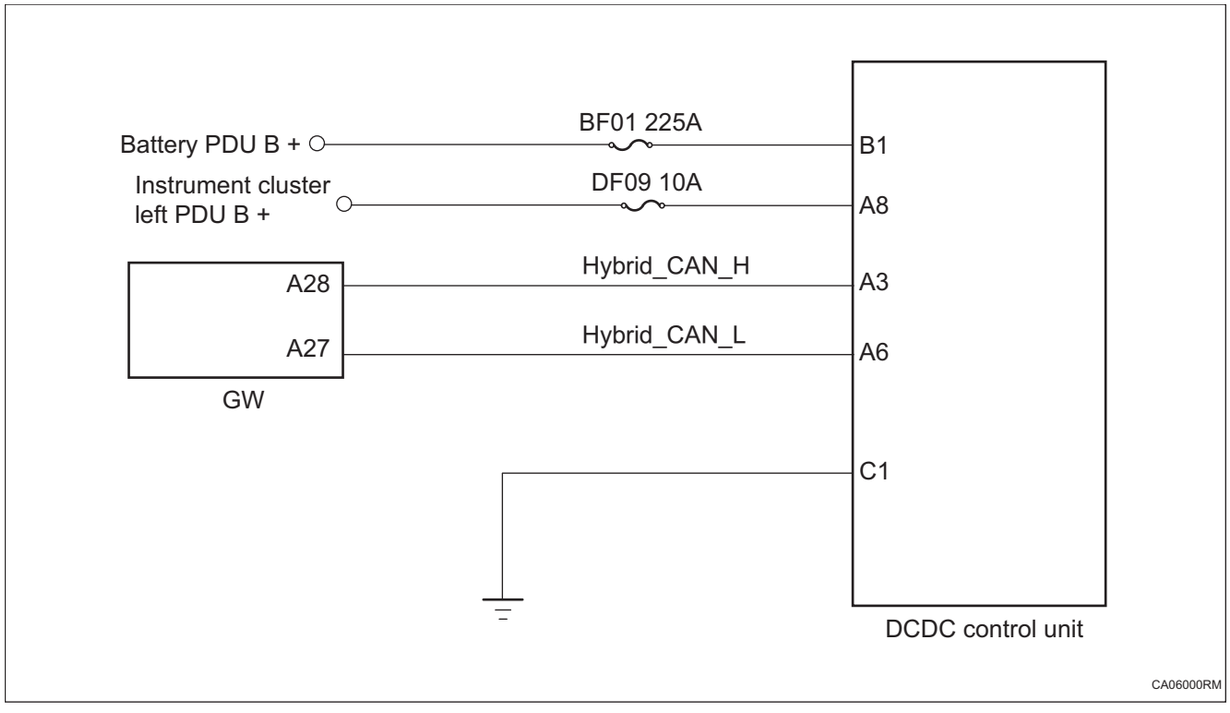
DTC	U029887	DCDC (high voltage) node lost

Description

When the communication between the GW and the DCDC control unit is abnormal or interrupted, the GW will record the DTC.

DTC	DTC detection conditions	Faulty location
U029887	(a) DCDC control unit node lost.	• DCDC control unit • CAN line and connector • GW

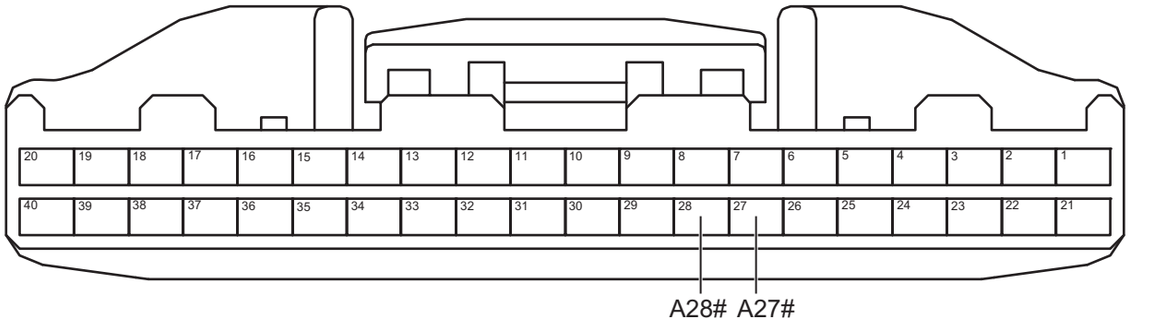
Circuit diagram



Inspection procedure

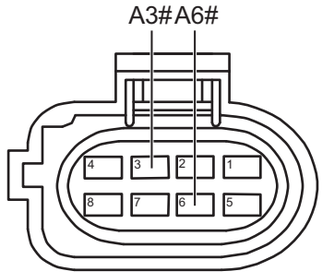
1	Check whether hybrid CAN bus circuit is open (GW - DCDC control unit)

CA



GW A connector

CA01411RM



DCDC control unit A connector

CA06011RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the hybrid CAN bus.

(d) Measure the resistance according to the values in the table below.

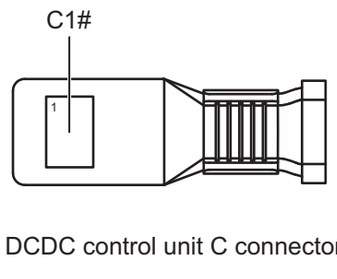
Standard value

Detector connection	Detection conditions	Specified state
DCDC control unit connector A3# -GW connector A28#	Always connected	Less than 1Ω
DCDC control unit connector A6# -GW connector A27#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2 Check DCDC control unit ground



DCDC control unit C connector

CA06021RM

(a) Measure the resistance according to the values in the table below.

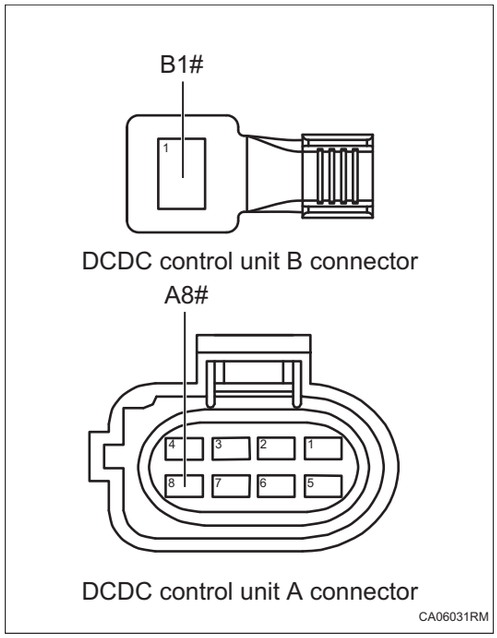
Standard value

Detector connection	Detection conditions	Specified state
DCDC control unit connector C1# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check DCDC control unit power supply



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
DCDC control unit connector B1# - body GND	Set the ignition switch to "ON"	Battery voltage
DCDC control unit connector A8# - body GND	Set the ignition switch to "ON"	Battery voltage

CA

NG → **Repair or replace harness and connector and fuse**

OK

4	Replace the DCDC control unit (See page DC-32)

(a) Replace the DCDC control unit.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

5	End

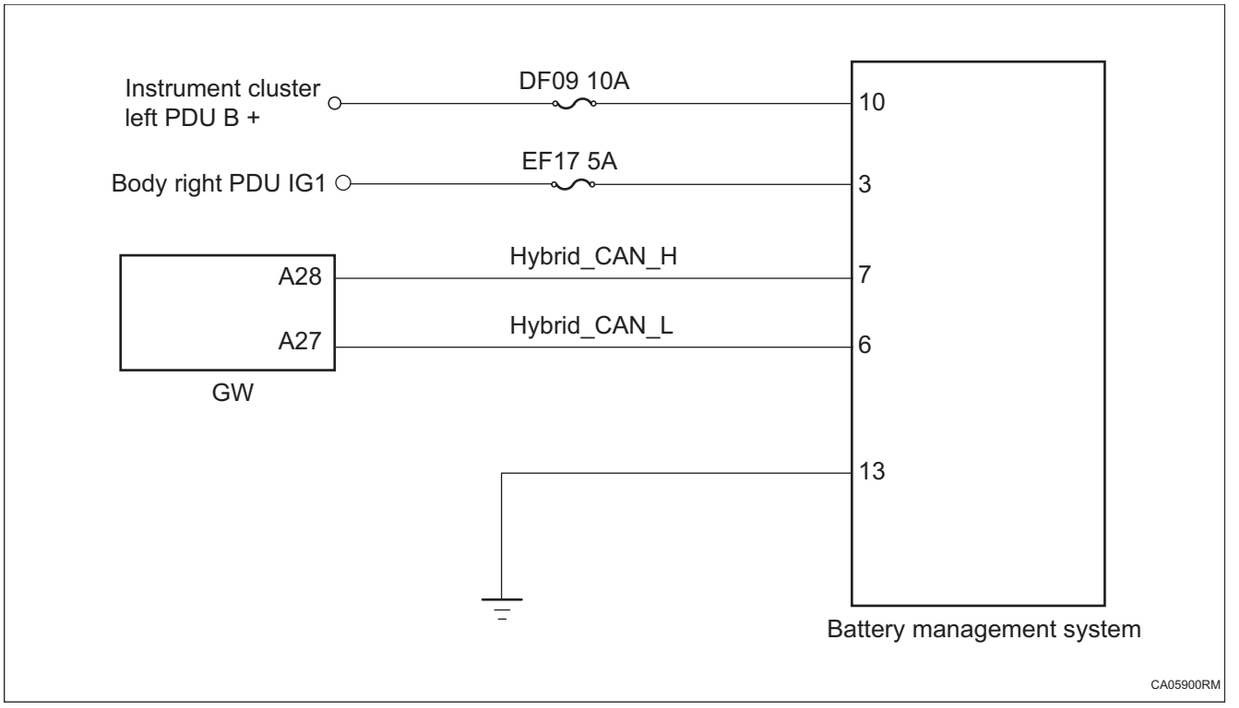
DTC	U029A87	BMS node lost

Description

When the communication between the GW and the BMU is abnormal or interrupted, the GW will record the DTC.

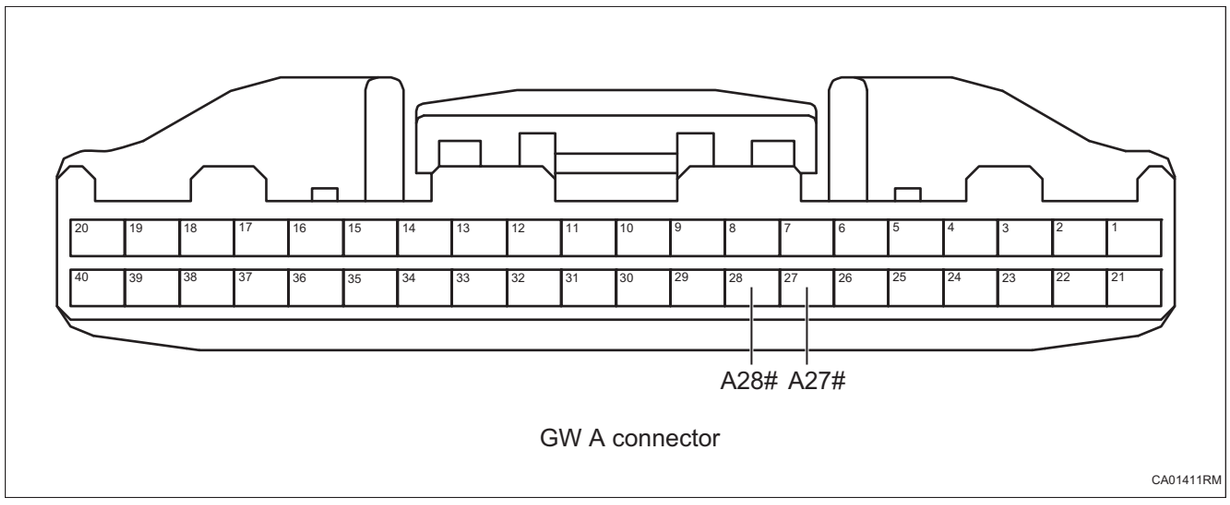
DTC	DTC detection conditions	Faulty location
U029A87	(a) BMU node lost.	• BMU • CAN line and connector • GW

Circuit diagram



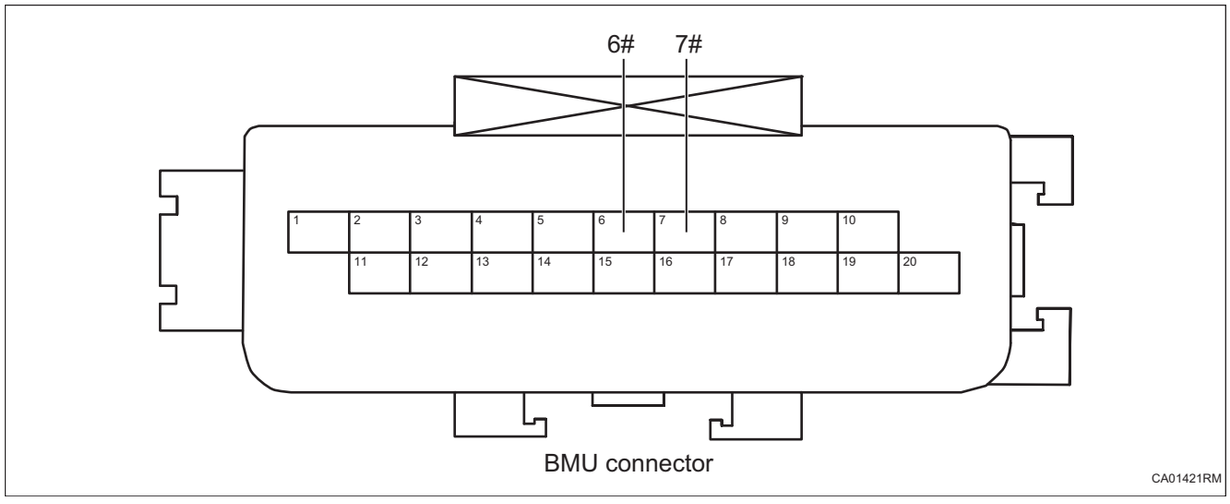
Inspection procedure

1	Check whether hybrid CAN bus circuit is open (GW - BMU)



GW A connector

CA01411RM



BMU connector

CA01421RM

CA

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the hybrid CAN bus.

(d) Measure the resistance according to the values in the table below.

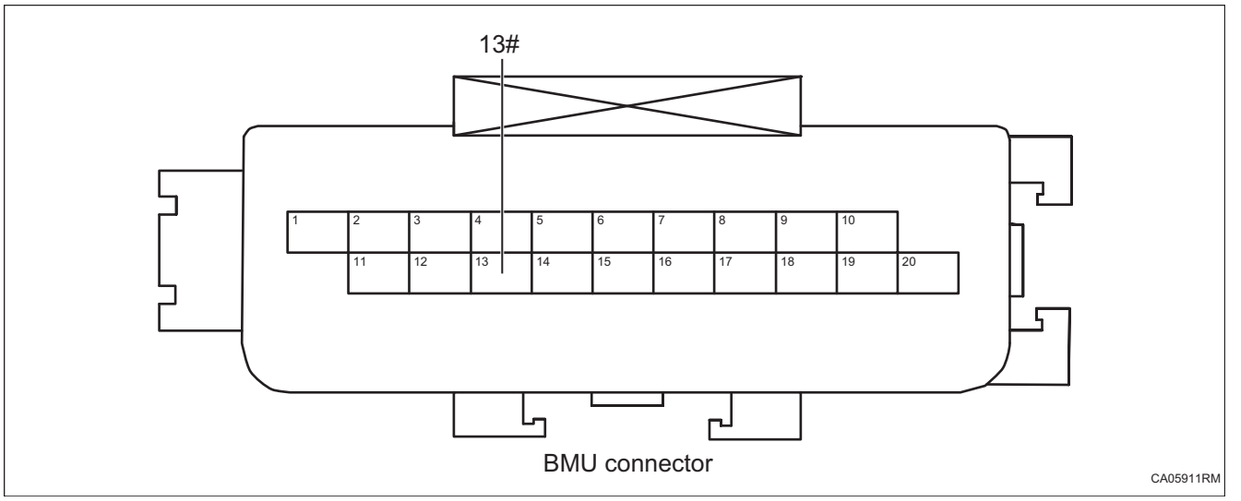
Standard value

Detector connection	Detection conditions	Specified state
BMU connector 7# - GW connector A28#	Always connected	Less than 1Ω
BMU connector 6# -GW connector A27#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check BMU ground



(a) Measure the resistance according to the values in the table below.

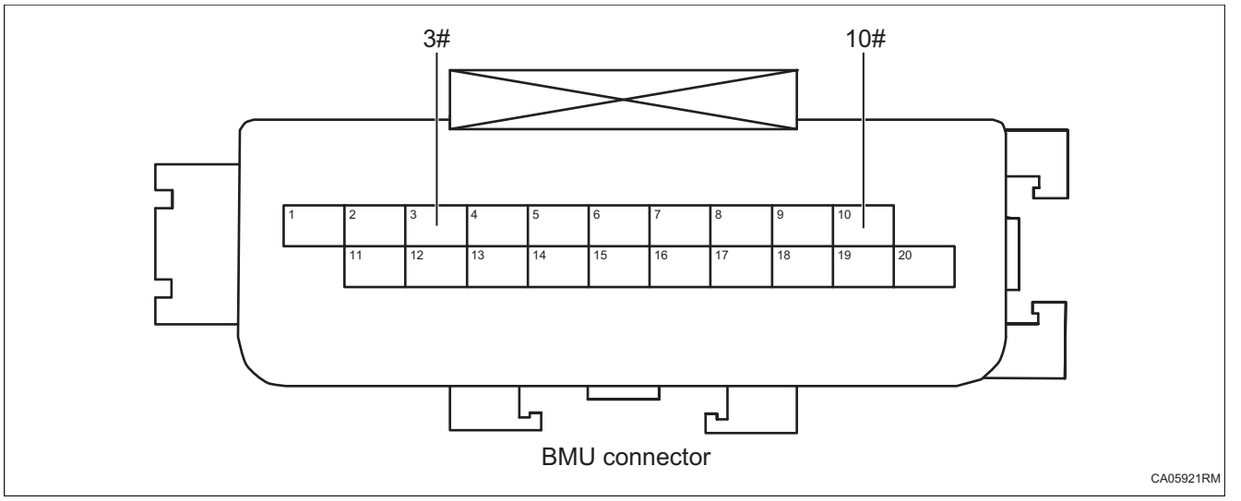
Standard value

Detector connection	Detection conditions	Specified state
BMU connector 13# - body GND	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	Check BMU power supply



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

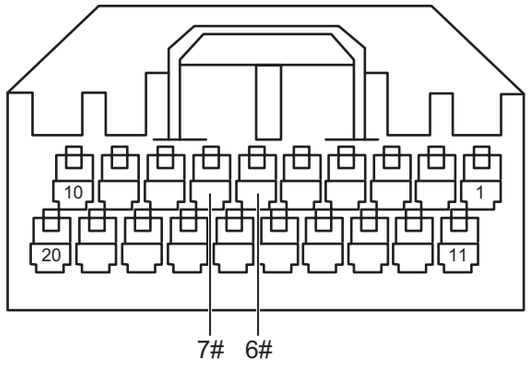
Detector connection	Detection conditions	Specified state
BMU connector 10# - body GND	Set the ignition switch to "ON"	Battery voltage
BMU connector 3# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

CA

OK

4	Check BMU terminal resistor



Battery management system

CA05931RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
BMU 7#- BMU 6#	Always connected	About 120 Ω

NG → **Replace the BMU (See page HB-11)**

OK

5	Replace GW (See page CA-256)

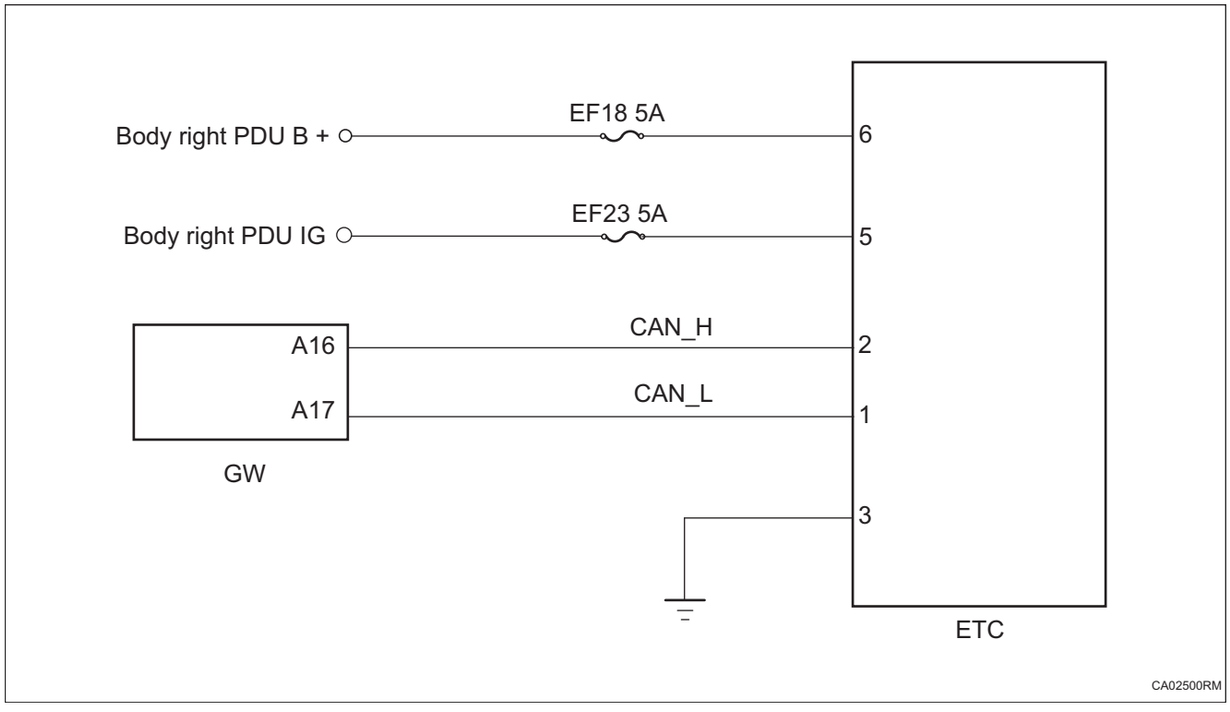
DTC	U02D587	ETC system node lost

Description

When the communication between ETC and GW is abnormal or interrupted, GW records DTC.

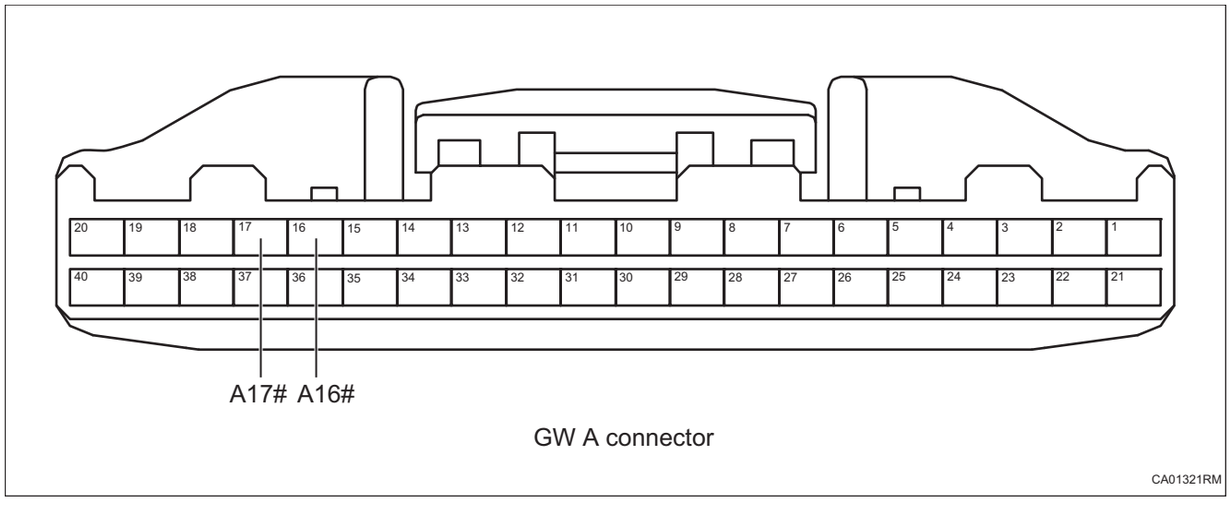
DTC	DTC detection conditions	Faulty location
U02D587	(a) ETC system node lost.	• ETC • CAN line and connection unit • GW

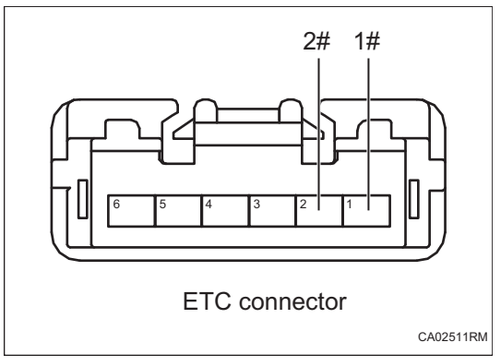
Circuit diagram



Inspection procedure

1	Check whether interconnection CAN bus circuit is open (GW - ETC)





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the interconnection CAN bus.

(d) Measure the resistance according to the values in the table below.

Standard value

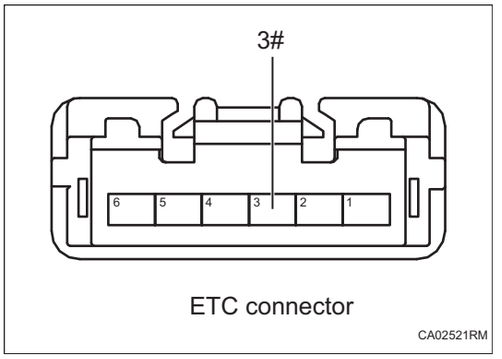
Detector connection	Detection conditions	Specified state
ETC connector 2# - GW connector A16#	Always connected	Less than 1Ω
ETC connector 1# - GW connector A17#	Always connected	Less than 1Ω

CA

NG → **Repair or replace the harness and connector**

OK

2	Check ETC ground



(a) Measure the resistance according to the values in the table below.

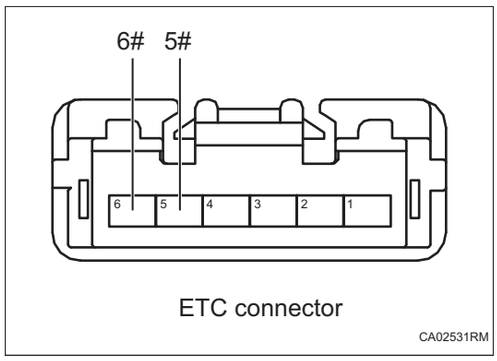
Standard value

Detector connection	Detection conditions	Specified state
ETC connector 3# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check ETC power supply



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
ETC connector 5# -body GND	Set the ignition switch to "ON"	Battery voltage
ETC connector 6# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

CA

OK

4	**Replace ETC (See page TC-16)**

(a) Replace the ETC.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

5	**End**

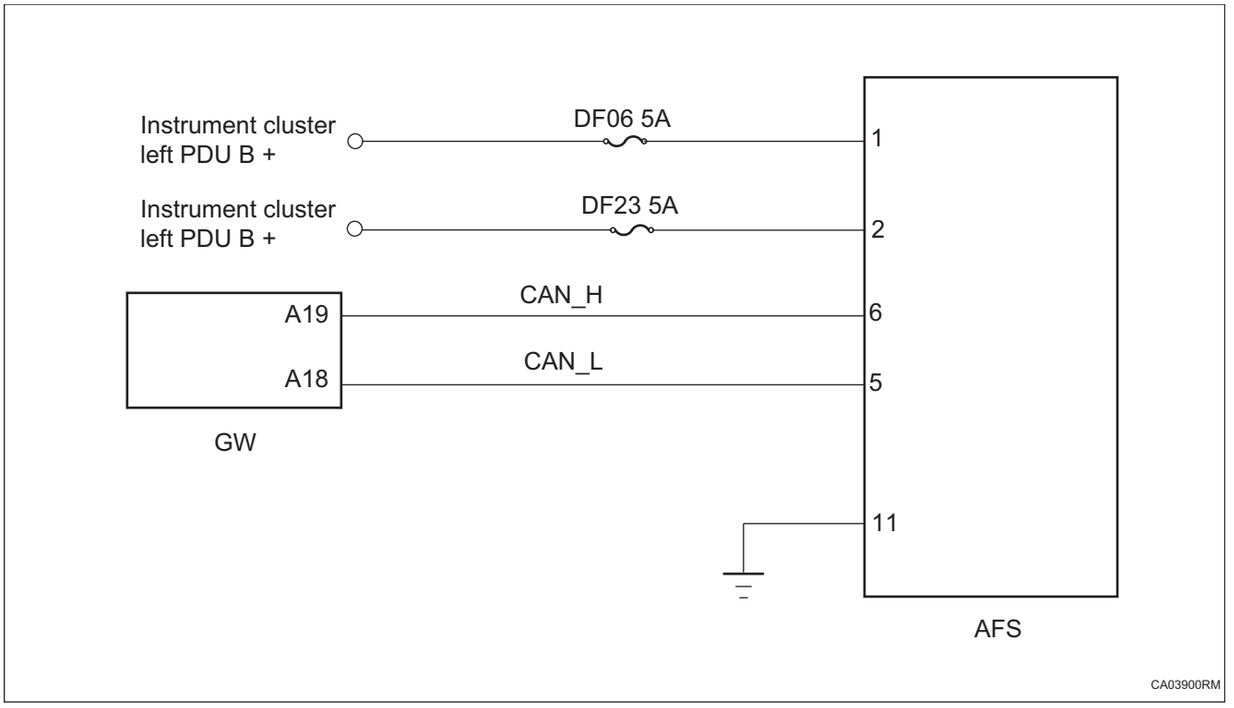
DTC	U02E187	IHC node lost

Description

When the communication between the AFS and the GW is abnormal or interrupted, the GW records a DTC.

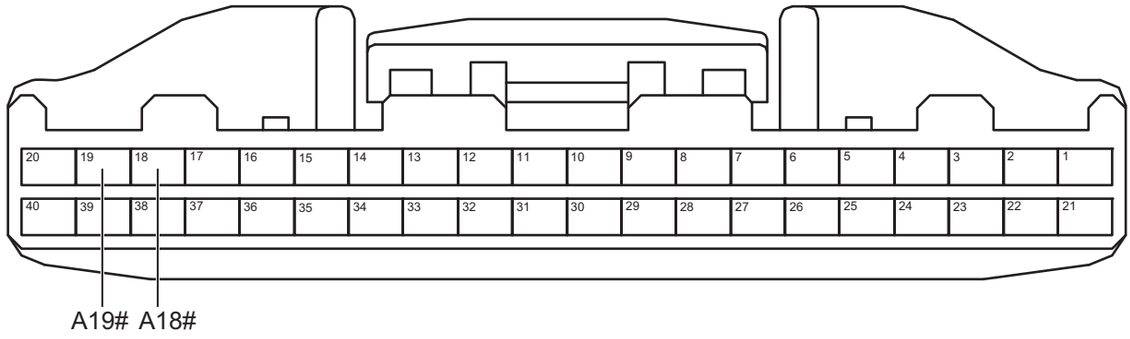
DTC	DTC detection conditions	Faulty location
U02E187	(a) IHC node lost.	• AFS • CAN line and connector • GW

Circuit diagram



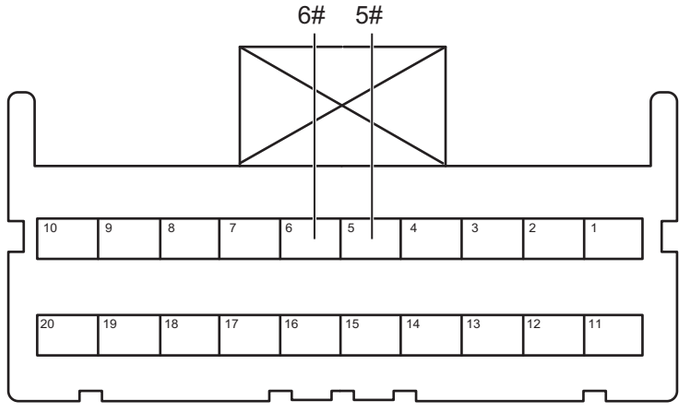
Inspection procedure

1	Check whether driver assistance CAN bus circuit is open (GW - AFS)



GW A connector

CA03211RM



AFS connector

CA03911RM

CA

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the driver assistance CAN bus.

(d) Measure the resistance according to the values in the table below.

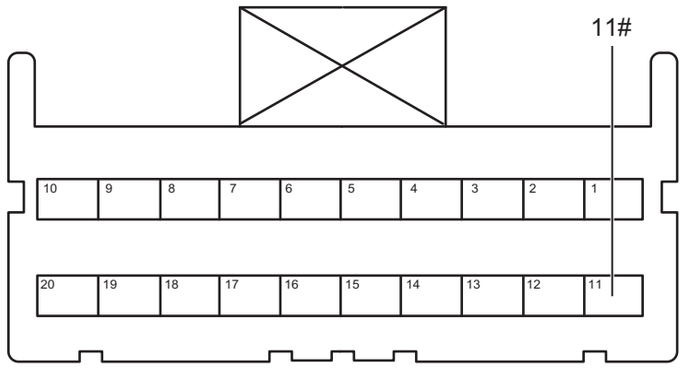
Standard value

Detector connection	Detection conditions	Specified state
AFS connector 6# - GW connector A19#	Always connected	Less than 1Ω
AFS connector 5# - GW connector A18#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check AFS ground



AFS connector

LI03010RM

(a) Measure the resistance according to the values in the table below.

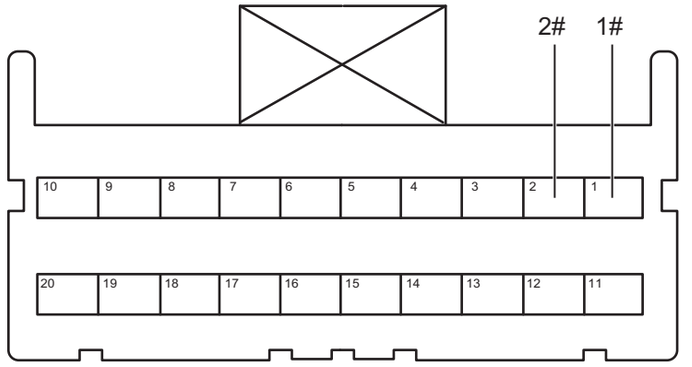
Standard value

Detector connection	Detection conditions	Specified state
AFS connector 11# -body GND	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	Check AFS power supply



AFS connector

LI03021RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
AFS connector 1# -body GND	Set the ignition switch to "ON"	Battery voltage
AFS connector 2# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

OK

4	**Replace AFS (See page LI-109)**

(a) Replace the AFS.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

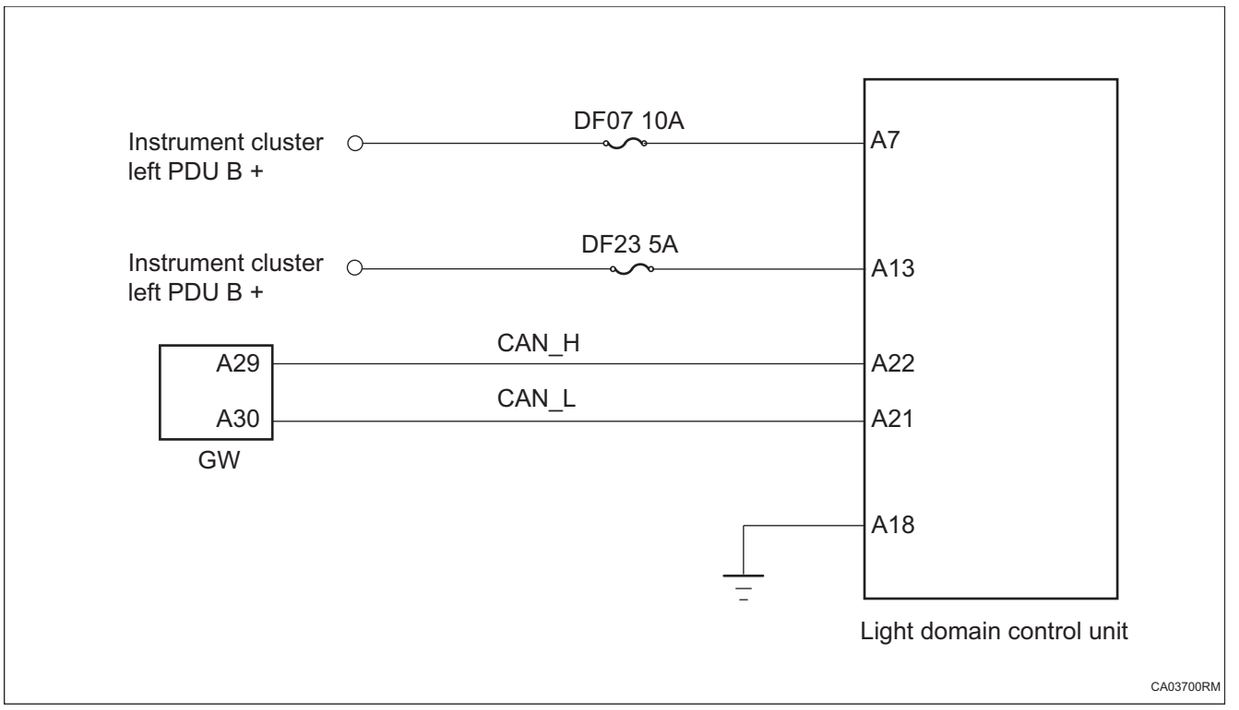
DTC	U02E387	Headlamp control unit node lost

Description

When the communication between the light domain control unit and the GW is abnormal or interrupted, GW records DTC.

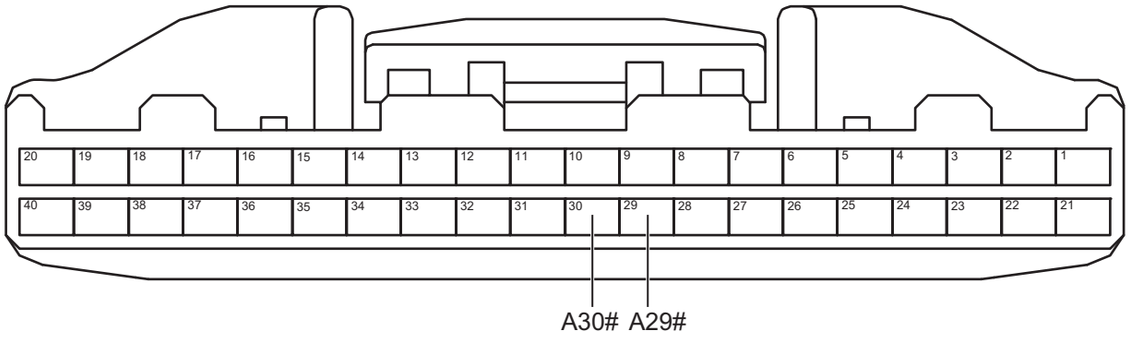
DTC	DTC detection conditions	Faulty location
U02E387	(a) Headlamp control unit node lost.	• Light domain control unit • CAN line and connector • GW

Circuit diagram



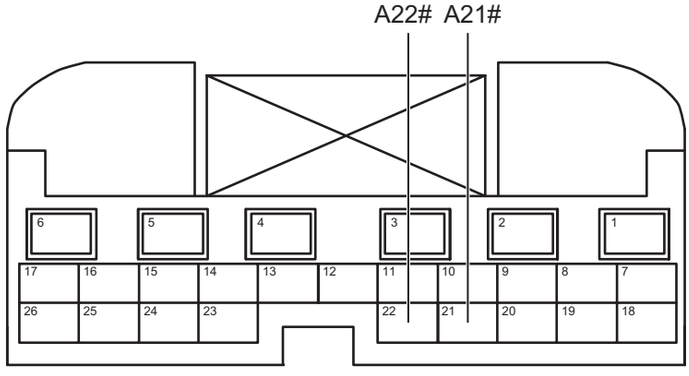
Inspection procedure

1	Check comfort CAN bus for open circuit (GW - light domain control unit)



GW A connector

CA03111RM



Light domain control unit A connector

CA03711RM

CA

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all control unit connectors on the comfort CAN bus.

(d) Measure the resistance according to the values in the table below.

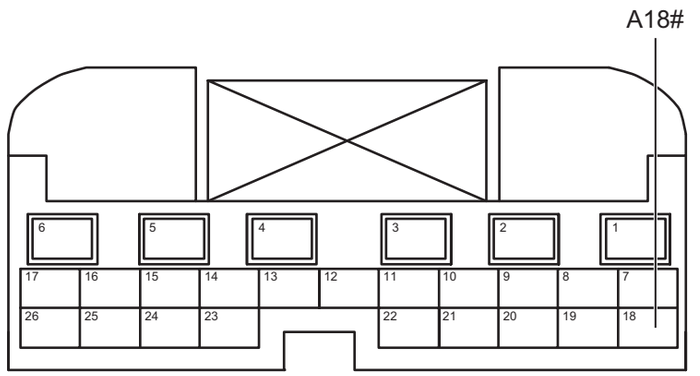
Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector A22# - GW connector A29#	Always connected	Less than 1Ω
Light domain control unit connector A21# - GW connector A30#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check light domain control unit ground



Light domain control unit A connector

LI00510RM

(a) Measure the resistance according to the values in the table below.

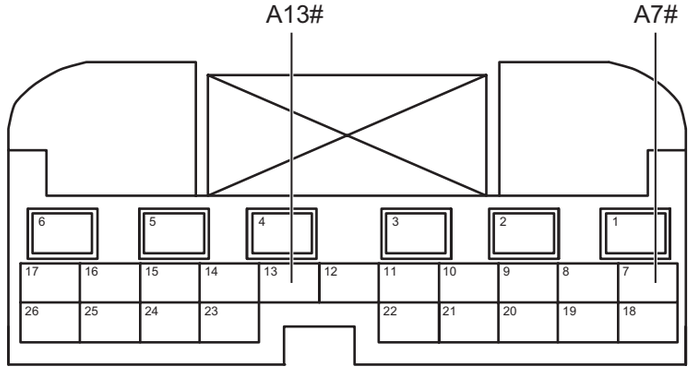
Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector A18# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check the light domain control unit power supply



Light domain control unit A connector

LI00521RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Light domain control unit connector A7# - body GND	The ignition switch is set to "ON"	Battery voltage
Light domain control unit connector A13# - body GND	The ignition switch is set to "ON"	Battery voltage

NG → **Repair or replace harness and connector and fuse**

CA

OK

4	**Replace light domain control unit (See page LI-107)**

(a) Replace the light domain control unit.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

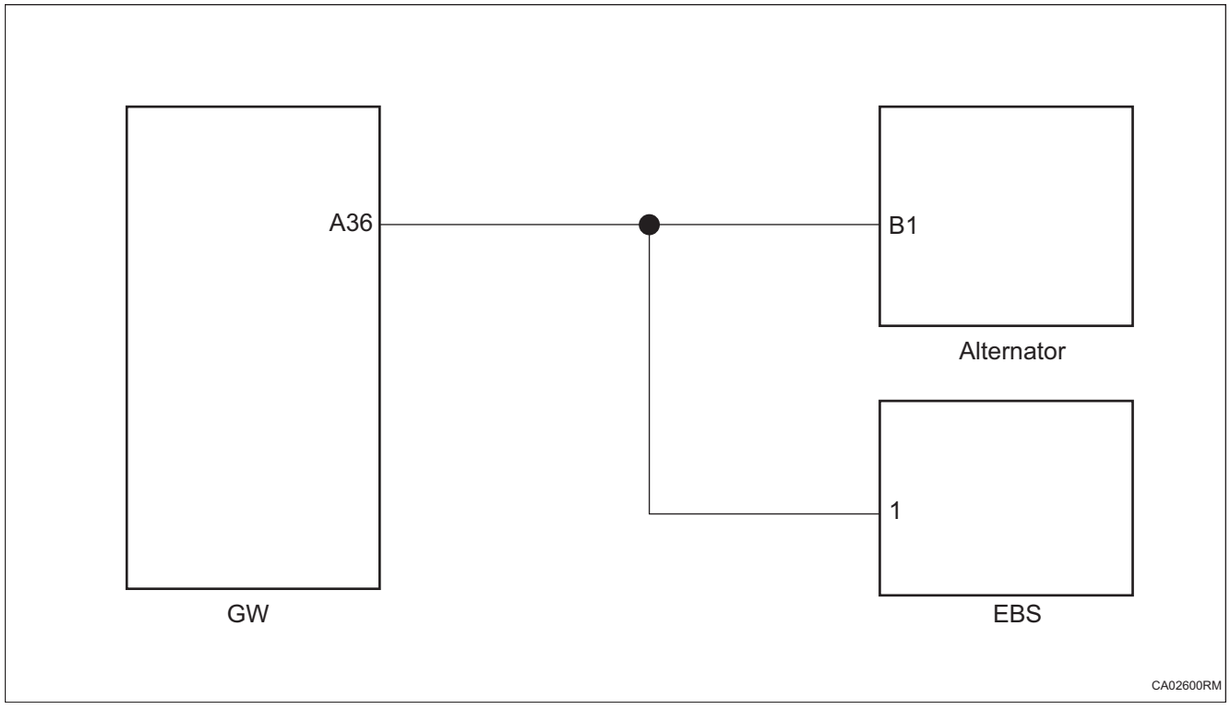
DTC	U100588	GW LIN1 physical bus error
DTC	U130486	EBS LIN communication error
DTC	U130986	Alternator regulator LIN communication error
DTC	U011187	EBS node loss
DTC	U012087	Alternator governor node lost

Description

When the communication between the LIN line and the GW is abnormal or interrupted, GW records DTC.

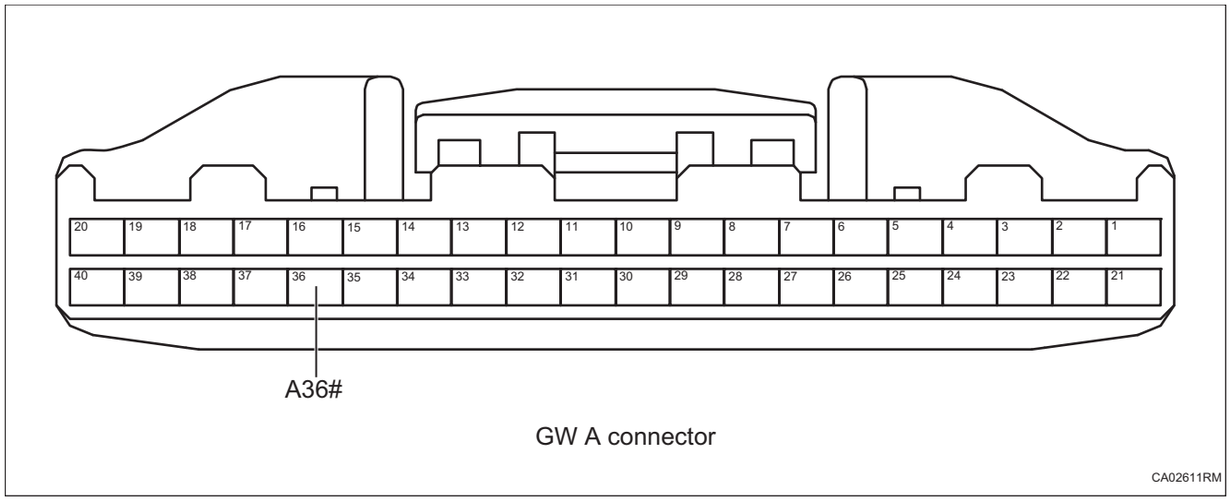
DTC	DTC detection conditions	Faulty location
U100588	(a) GW LIN1 physical bus error.	• EBS • Alternator • LIN line and connector • GW
U130486	(a) EBS LIN communication error.	• EBS • LIN line and connector • GW
U130986	(a) Alternator governor LIN communication error.	• Alternator • LIN line and connector • GW
U011187	(a) EBS node lost.	• EBS • LIN line and connector • GW
U012087	(a) Alternator governor node lost.	• Alternator • LIN line and connector • GW

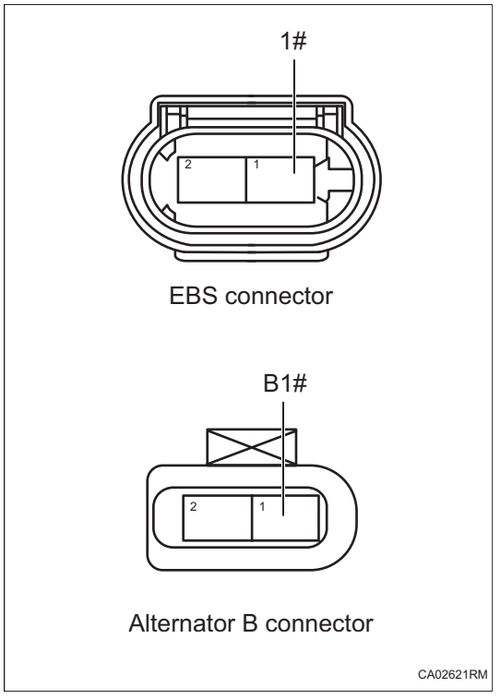
Circuit diagram



Inspection procedure

1	**Check LIN1 bus for open circuit**





(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all connectors on the GW LIN1 bus.

(d) Measure the resistance according to the values in the table below.

Standard value

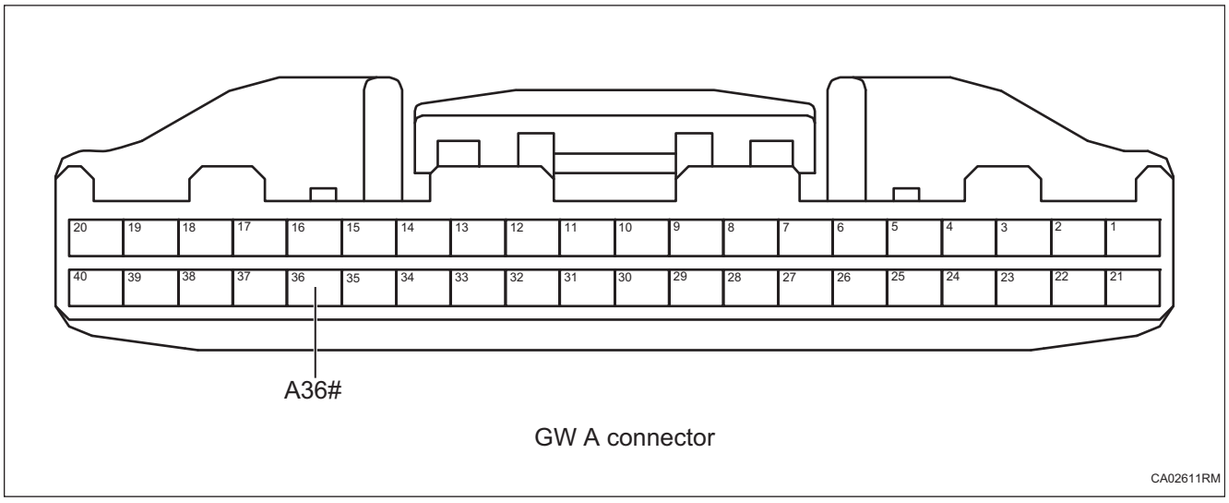
Detector connection	Detection conditions	Specified state
EBS connector 1#-GW connector A36#	Always connected	Less than 1Ω
Alternator connector B1# - GW connector A36#	Always connected	Less than 1Ω

CA

NG → **Repair or replace the harness and connector**

OK

2	Check LIN1 bus for circuit shorted to ground



(a) Measure the resistance according to the values in the table below.

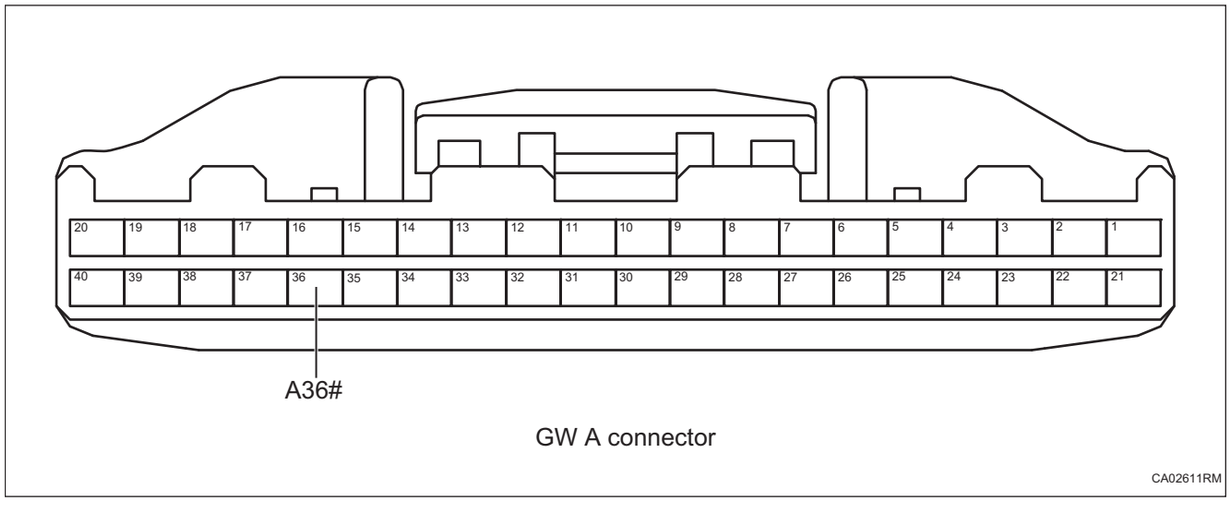
Standard value

Detector connection	Detection conditions	Specified state
GW connector A36# -body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	Check LIN1 bus for circuit shorted to power supply



GW A connector

CA02611RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

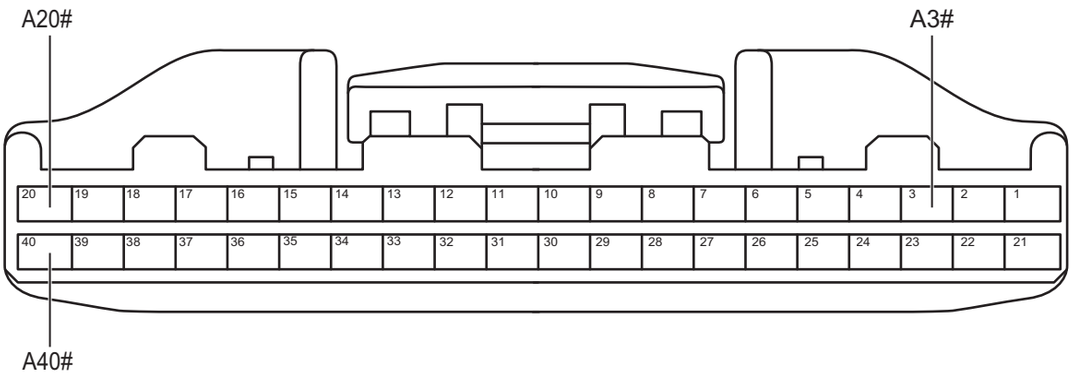
Detector connection	Detection conditions	Specified state
GW connector A36# -body GND	Set the ignition switch to "ON"	Less than 1 V

NG → **Repair or replace the harness and connector**

OK

4	Check GW power supply

CA



GW A connector

CA00521RM

(a) Measure the voltage according to the values in the table below.

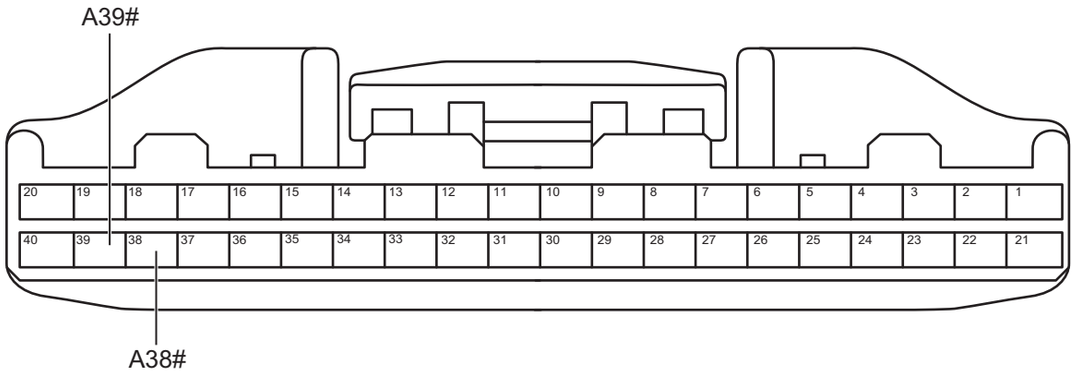
Standard value

Detector connection	Detection conditions	Specified state
GW connector A3# -body GND	Set the ignition switch to "ON"	Battery voltage
GW connector A20# -body GND	Set the ignition switch to "ON"	Battery voltage
GW connector A40# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

5	**Check GW ground**



GW A connector

CA00511RM

(a) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
GW connector A38# -body GND	Always connected	Less than 1Ω
GW connector A39# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

6	**Replace alternator / EBS (See page CH-6) (See page CH-17)**

(a) Replace the alternator/EBS.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

7	**End**

CA

DTC	U100688	GW LIN2 physical bus error
DTC	U133686	Middle passage control panel LIN communication error
DTC	U133786	Front control panel LIN communication error.
DTC	U130F86	Gear position indicator control unit LIN communication error
DTC	U131A86	Left lower guard plate switch panel communication error
DTC	U011F87	Middle passage control panel node lost
DTC	U02D987	Front control panel node lost
DTC	U029087	Gear position indicator control unit node lost
DTC	U028887	Left lower guard plate switch panel node lost

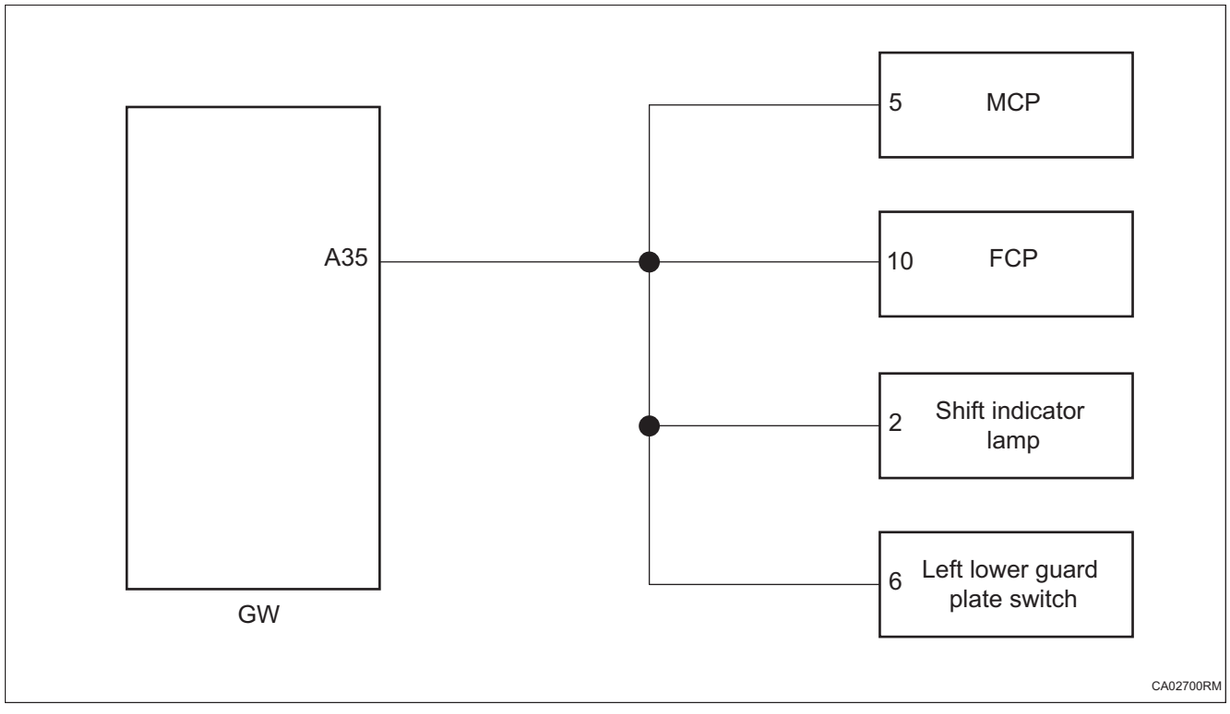
Description

When the communication between LIN2 and GW is abnormal or interrupted, GW records DTC.

DTC	DTC detection conditions	Faulty location
U100688	(a) GW LIN2 physical bus error.	• Shift indicator lamp • MCP • Left lower guard plate switch • FCP • LIN line and connector • GW
U133686	(a) Middle passage control panel LIN communication error.	• MCP • LIN line and connector • GW
U133786	(a) Front control panel LIN communication error.	• FCP • LIN line and connector • GW
U130F86	(a) LIN communication error of gear position indicator control unit.	• Shift indicator lamp • LIN line and connector • GW
U131A86	(a) Left lower guard plate switch panel communication error.	• Left lower guard plate switch • LIN line and connector • GW
U011F87	(a) Middle passage control panel node lost.	• MCP • LIN line and connector • GW

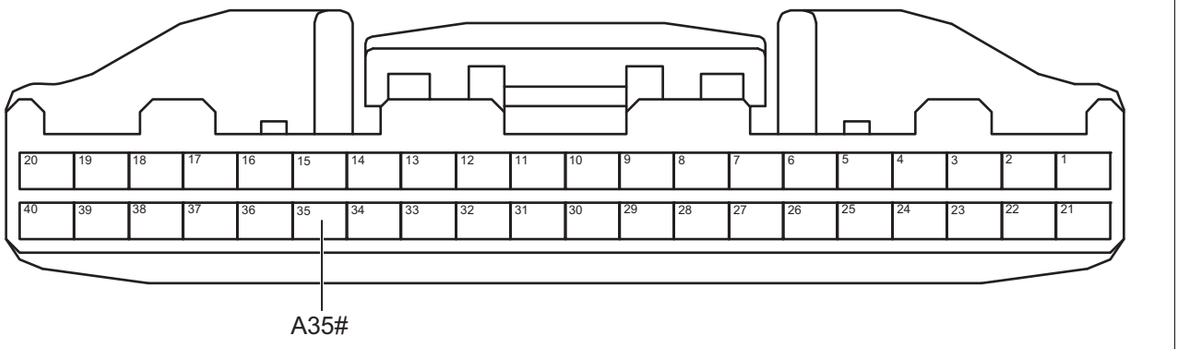
DTC	DTC detection conditions	Faulty location
U02D987	(a) Front control panel node lost.	• FCP • LIN line and connector • GW
U029087	(a) The gear position indicator control unit node is lost.	• Shift indicator lamp • LIN line and connector • GW
U028887	(a) Left lower guard plate switch panel node lost.	• Left lower guard plate switch • LIN line and connector • GW

Circuit diagram



Inspection procedure

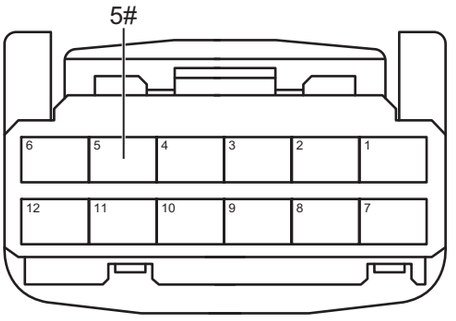
1	**Check LIN2 bus for open circuit**



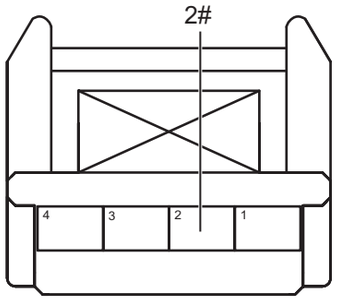
GW A connector

CA02711RM

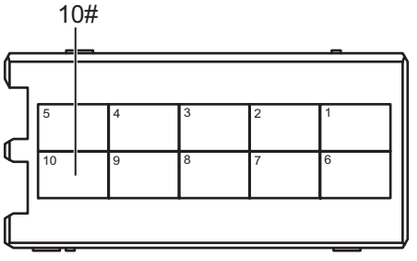
CA



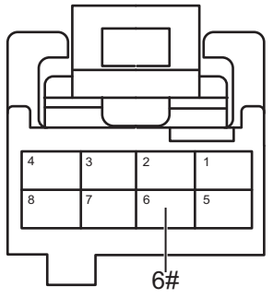
MCP connector



Shift indicator lamp connector



FCP connector



Left lower guard plate switch connector

CA02721RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect all connectors on the GW LIN2 bus.

(d) Measure the resistance according to the values in the table below.

Standard value

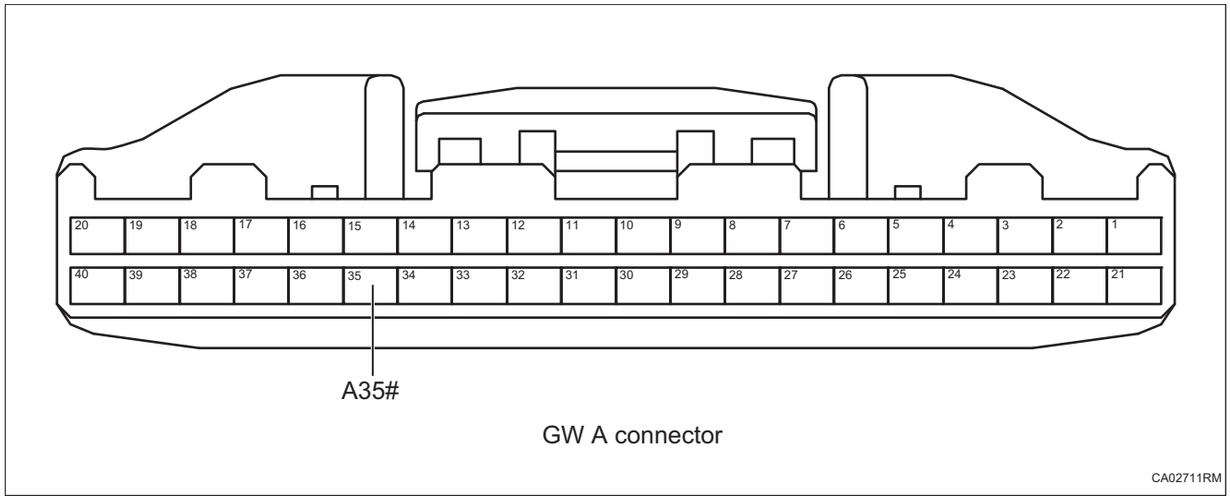
Detector connection	Detection conditions	Specified state
MCP connector 5# - GW connector A35#	Always connected	Less than 1Ω
FCP connector 10# - GW connector A35#	Always connected	Less than 1Ω

Detector connection	Detection conditions	Specified state
Shift indicator lamp connector 2# - GW connector A35#	Always connected	Less than 1Ω
Left lower guard plate switch connector 6# - GW connector A35#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	Check LIN2 bus for circuit shorted to ground



GW A connector

CA02711RM

(a) Measure the resistance according to the values in the table below.

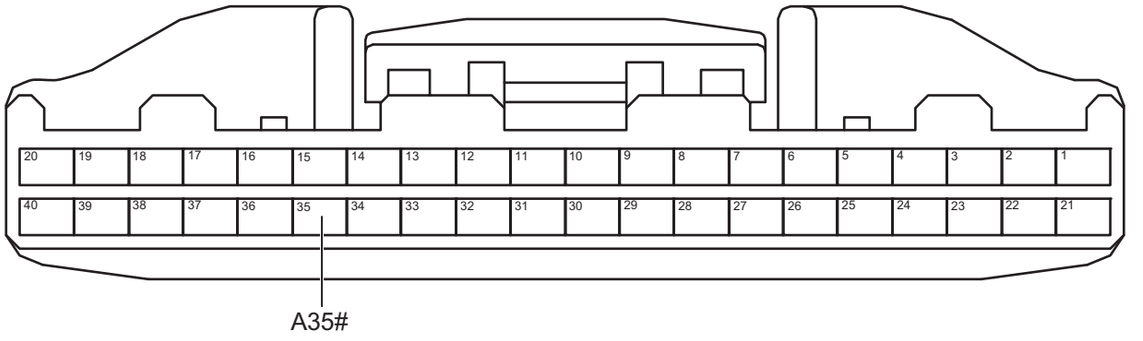
Standard value

Detector connection	Detection conditions	Specified state
GW connector A35# - body GND	Always connected	10 KΩ or greater

NG → **Repair or replace the harness and connector**

OK

3	Check LIN2 bus for circuit shorted to power supply



GW A connector

CA02711RM

CA

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

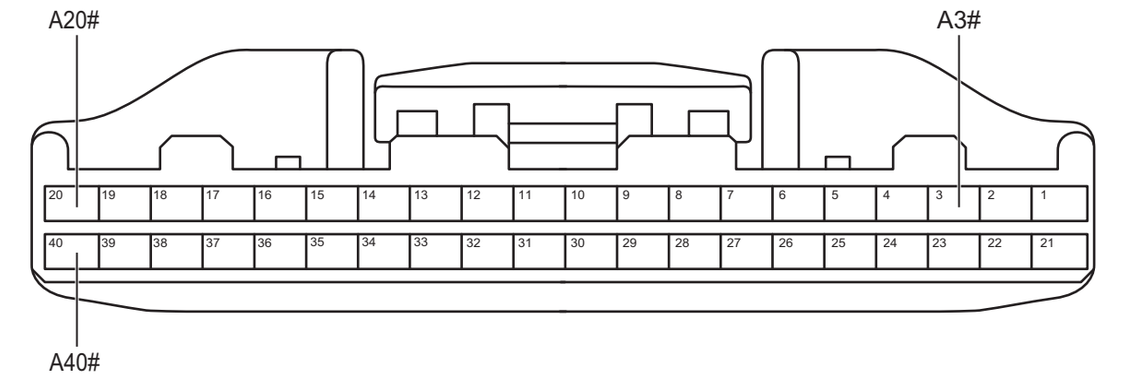
Standard value

Detector connection	Detection conditions	Specified state
GW connector A35# - body GND	Set the ignition switch to "ON"	Less than 1 V

NG **Repair or replace the harness and connector**

OK

4	Check GW power supply



GW A connector

CA00521RM

(a) Measure the voltage according to the values in the table below.

Standard value

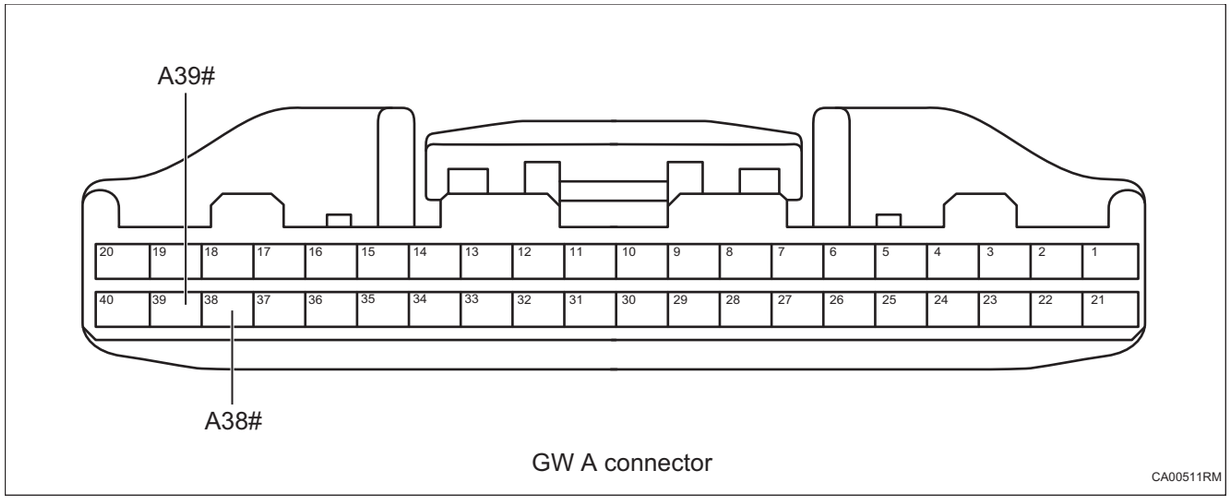
Detector connection	Detection conditions	Specified state
GW connector A3# -body GND	Set the ignition switch to "ON"	Battery voltage
GW connector A20# -body GND	Set the ignition switch to "ON"	Battery voltage
GW connector A40# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

CA

OK

5	Check GW ground



GW A connector

CA00511RM

(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Measure the resistance according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
GW connector A38# -body GND	Always connected	Less than 1Ω
GW connector A39# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

6	**Replace MCP/FCP/shift indicator lamp/left lower guard plate switch (See page IP-15) (See page IP-3)**

(a) Replace MCP/FCP/shift indicator lamp/left lower guard plate switch.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

7	**End**

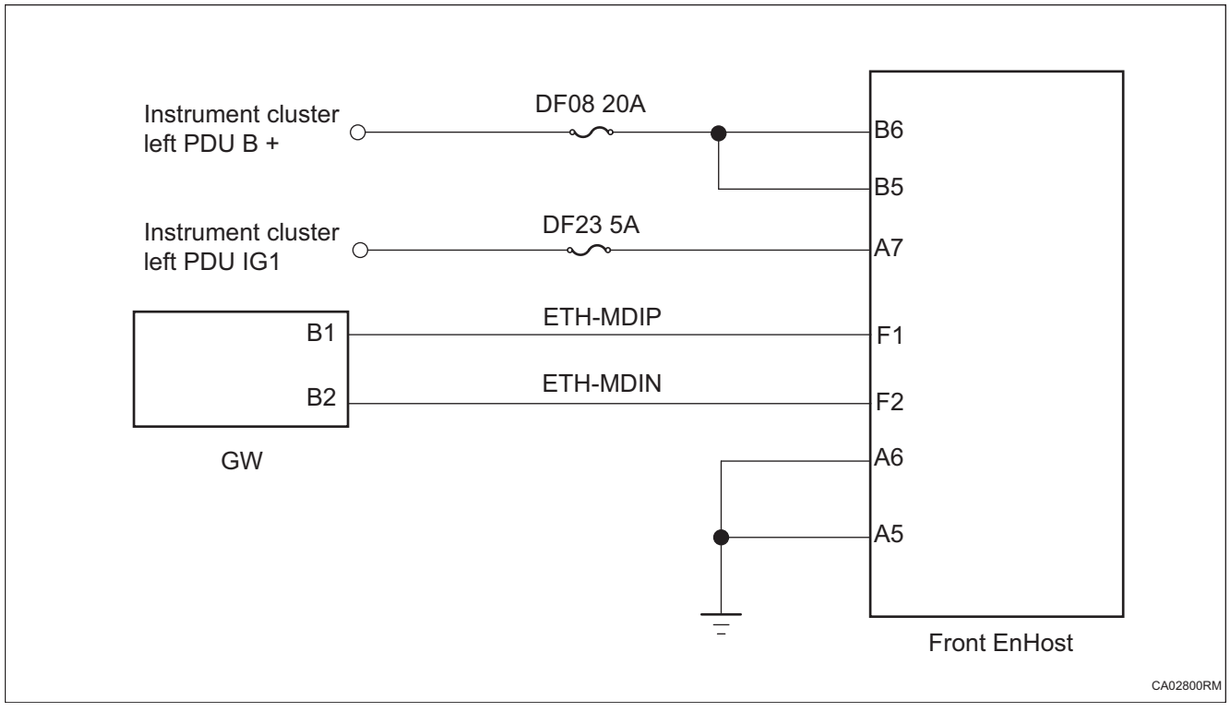
DTC	U14408A	GW Eth1 (Port1.2 IVI1) connection failure
DTC	U14A28E	IVI1 SOMEIP no response

Description

When the communication between the front EnHost and the GW ethernet is abnormal or interrupted, GW records DTC.

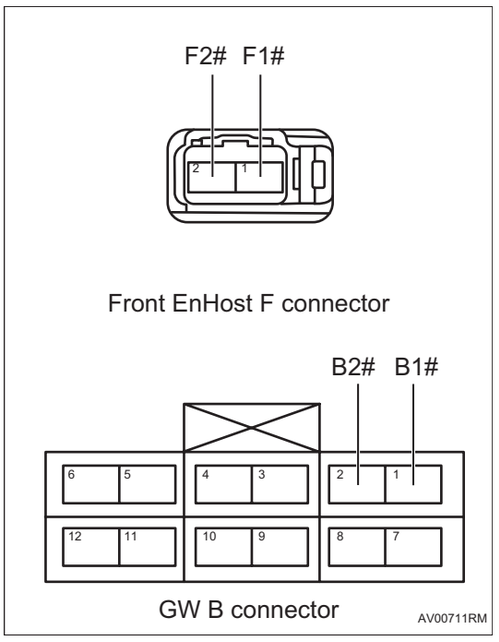
DTC	DTC detection conditions	Faulty location
U14408A	(a) Connection failure.	• Front EnHost • Ethernet cable and connector • GW
U14A28E	(a) SOMEIP no response.	• Front EnHost • Ethernet cable and connector • GW

Circuit diagram



Inspection procedure

1	Check Ethernet cable for open circuit (GW - front EnHost)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the GW connector.

(d) Disconnect the front EnHost connector.

(e) Measure the resistance according to the values in the table below.

Standard value

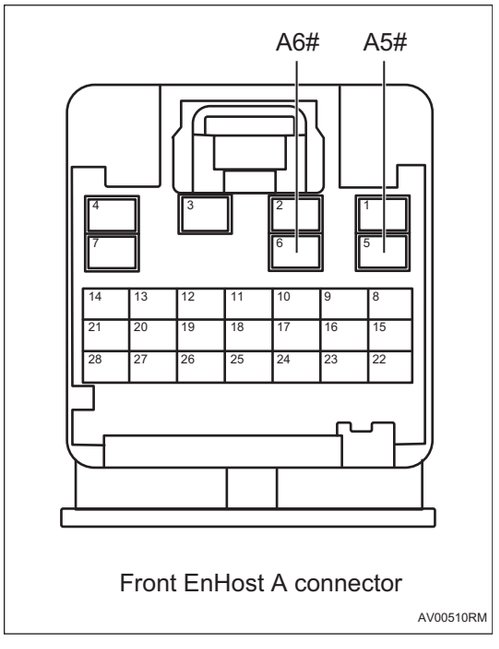
Detector connection	Detection conditions	Specified state
Front EnHost connector F1# -GW connector B1#	Always connected	Less than 1Ω
Front EnHost connector F2# -GW connector B2#	Always connected	Less than 1Ω

CA

NG → **Repair or replace the harness and connector**

OK

2 Check front EnHost ground



(a) Measure the resistance according to the values in the table below.

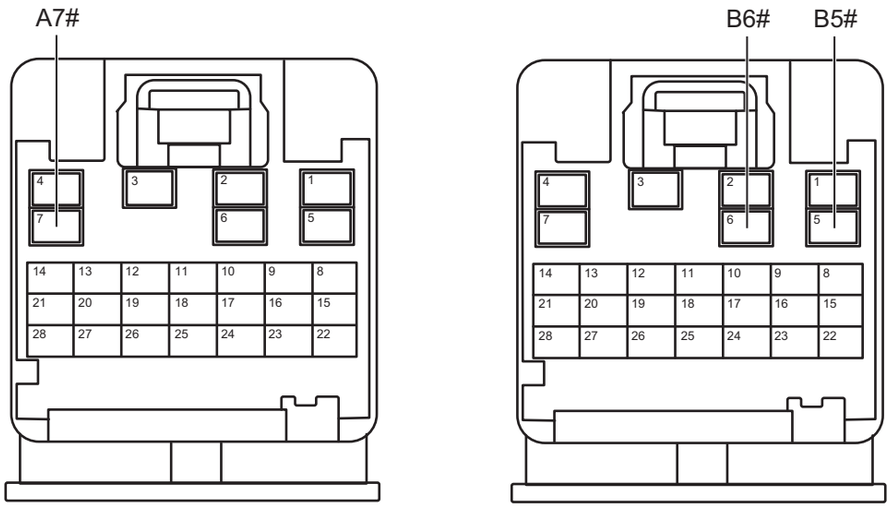
Standard value

Detector connection	Detection conditions	Specified state
Front EnHost connector A6# -body GND	Always connected	Less than 1Ω
Front EnHost connector A5# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check front EnHost power supply



Front EnHost A connector

Front EnHost B connector

AV00521RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Front EnHost connector B6# -body GND	Set the ignition switch to "ON"	Battery voltage
Front EnHost connector B5# -body GND	Set the ignition switch to "ON"	Battery voltage
Front EnHost connector A7# - body GND	Set the ignition switch to "ON"	Battery voltage

NG **Repair or replace the harness and connector**

OK

4	Replace front EnHost (See page AV-48)

CA

(a) Replace the front EnHost.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

5	**End**

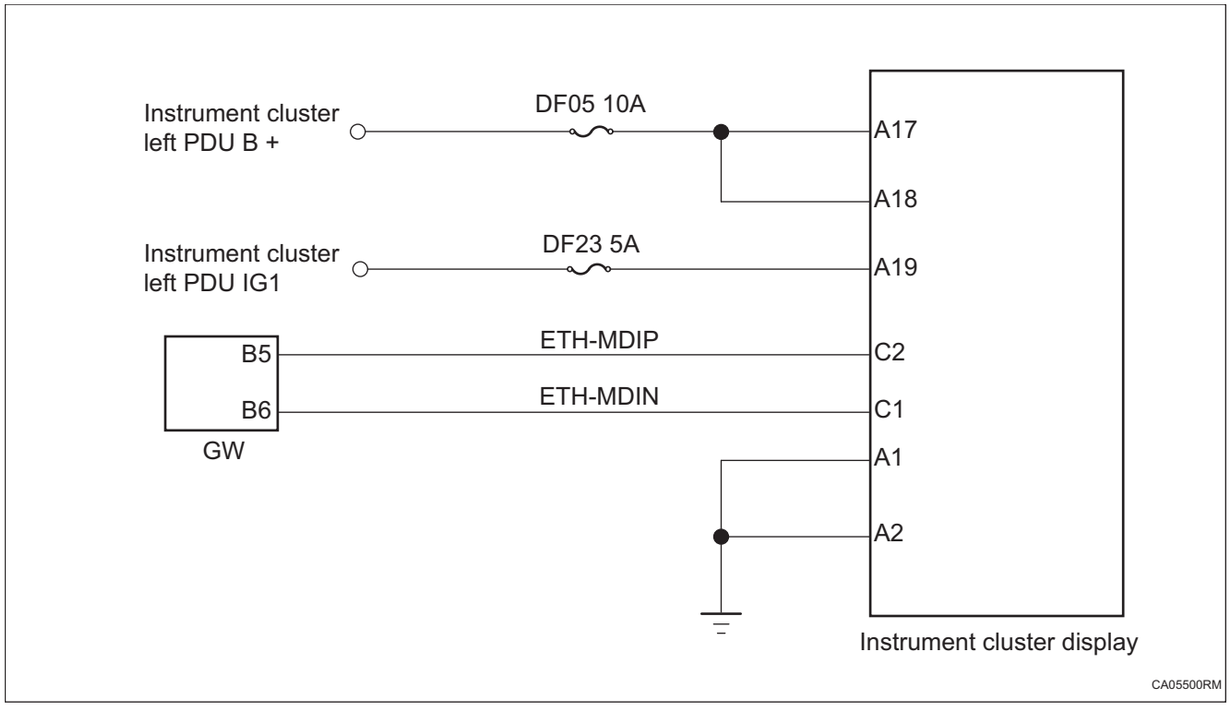
DTC	U14418A	GW Eth2(Port1.2 IC) connection failure

Description

When the communication between the instrument cluster display and the GW ethernet is abnormal or interrupted, GW records DTC.

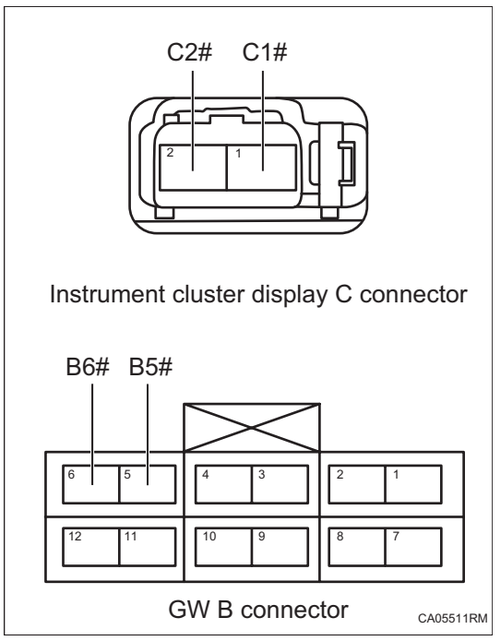
DTC	DTC detection conditions	Faulty location
U14418A	(a) Connection failure.	• Instrument cluster display • Ethernet cable and connector • GW

Circuit diagram



Inspection procedure

1	Check Ethernet cable for open circuit (GW - instrument cluster display)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the GW connector.

(d) Disconnect the instrument cluster display connector.

(e) Measure the resistance according to the values in the table below.

Standard value

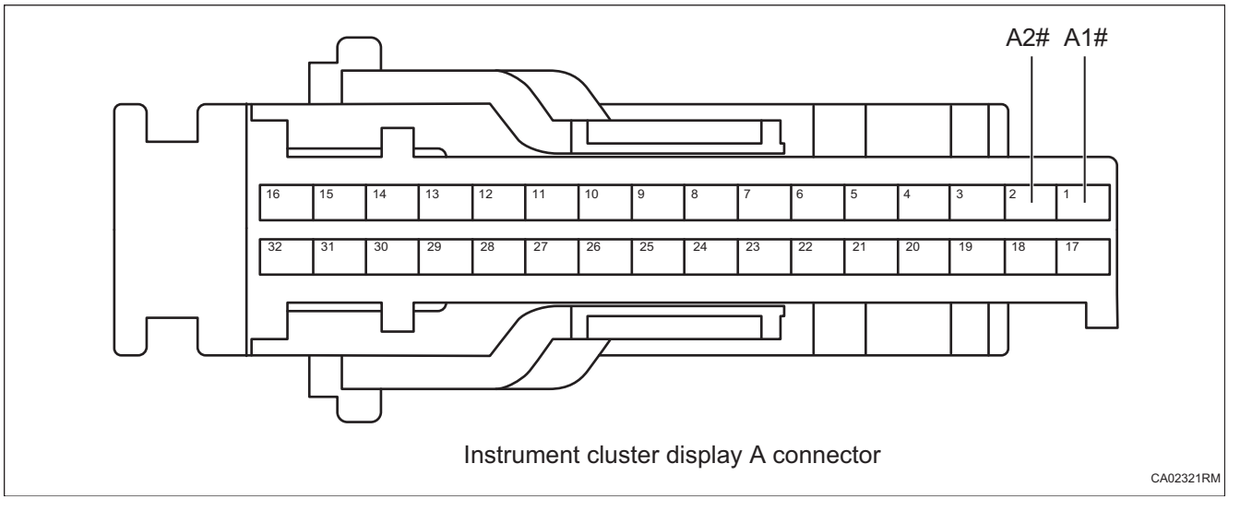
Detector connection	Detection conditions	Specified state
Instrument cluster display connector C2# - GW connector B5#	Always connected	Less than 1Ω
Instrument cluster display connector C1# - GW connector B6#	Always connected	Less than 1Ω

CA

NG → **Repair or replace the harness and connector**

OK

2	**Check the instrument cluster display ground**



(a) Measure the resistance according to the values in the table below.

Standard value

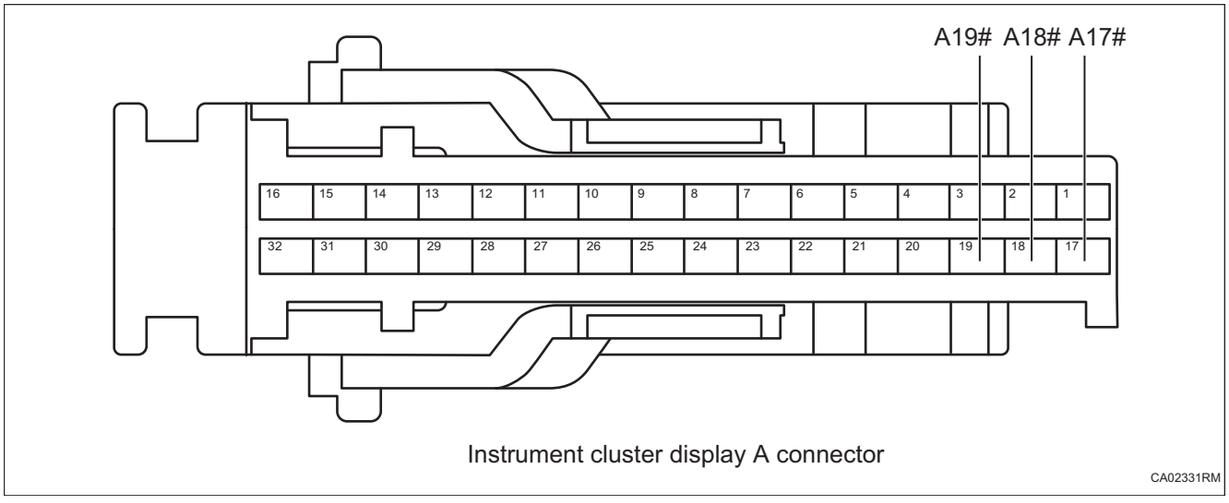
Detector connection	Detection conditions	Specified state
Instrument cluster display connector A1# - body GND	Always connected	Less than 1Ω

Detector connection	Detection conditions	Specified state
Instrument cluster display connector A2# - body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3 Check the instrument cluster display power supply



Instrument cluster display A connector

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
Instrument cluster display connector A17# - body GND	Set the ignition switch to "ON"	Battery voltage
Instrument cluster display connector A18# - body GND	Set the ignition switch to "ON"	Battery voltage
Instrument cluster display connector A19# - body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

CA

OK

4	**Replace instrument cluster display (See page ME-39)**

(a) Replace the instrument cluster display.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

CA

OK

5	**End**

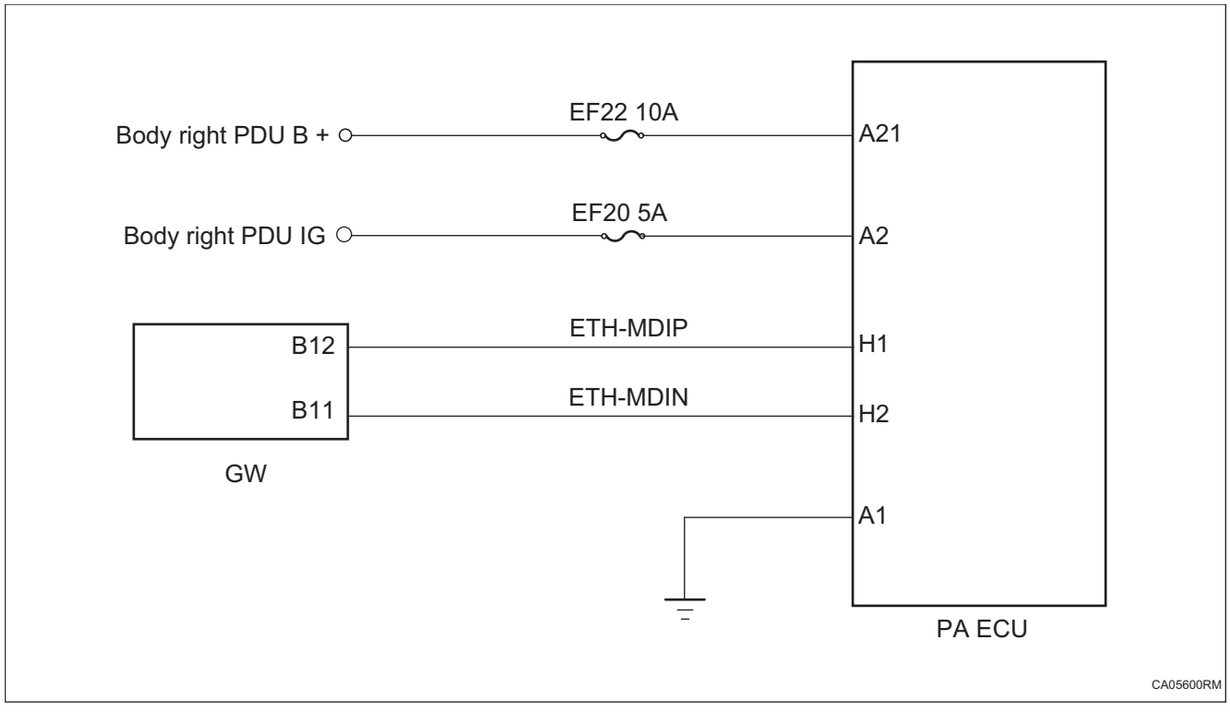
DTC	U14428A	GW Eth3(Port1.4APA) connection failure

Description

When the communication between the PA ECU and the GW ethernet is abnormal or interrupted, GW records DTC.

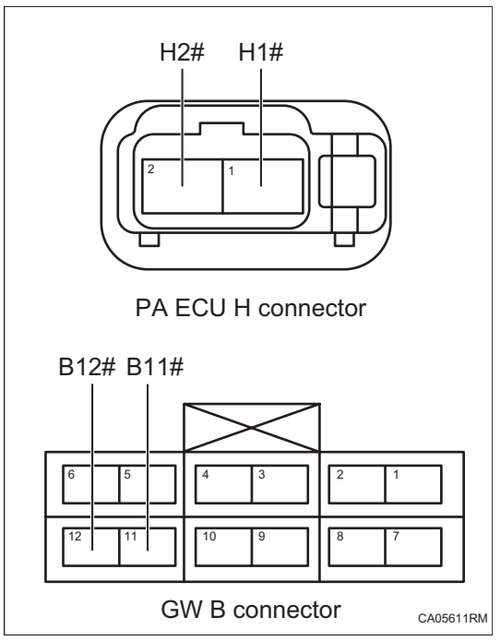
DTC	DTC detection conditions	Faulty location
U14428A	(a) Connection failure.	• PA ECU • Ethernet cable and connector • GW

Circuit diagram



Inspection procedure

1	Check Ethernet cable for open circuit (GW - PA ECU)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the GW connector.

(d) Disconnect the PA ECU connector.

(e) Measure the resistance according to the values in the table below.

Standard value

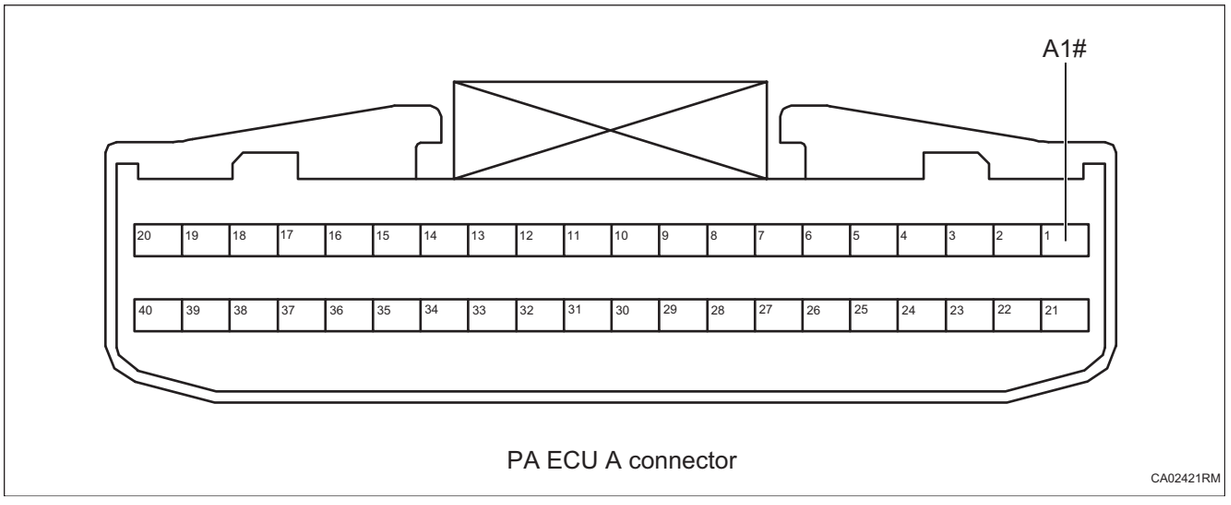
Detector connection	Detection conditions	Specified state
PA ECU connector H1# - GW connector B12#	Always connected	Less than 1Ω
PA ECU connector H2# - GW connector B11#	Always connected	Less than 1Ω

CA

NG → **Repair or replace the harness and connector**

OK

2 Check PA ECU ground



(a) Measure the resistance according to the values in the table below.

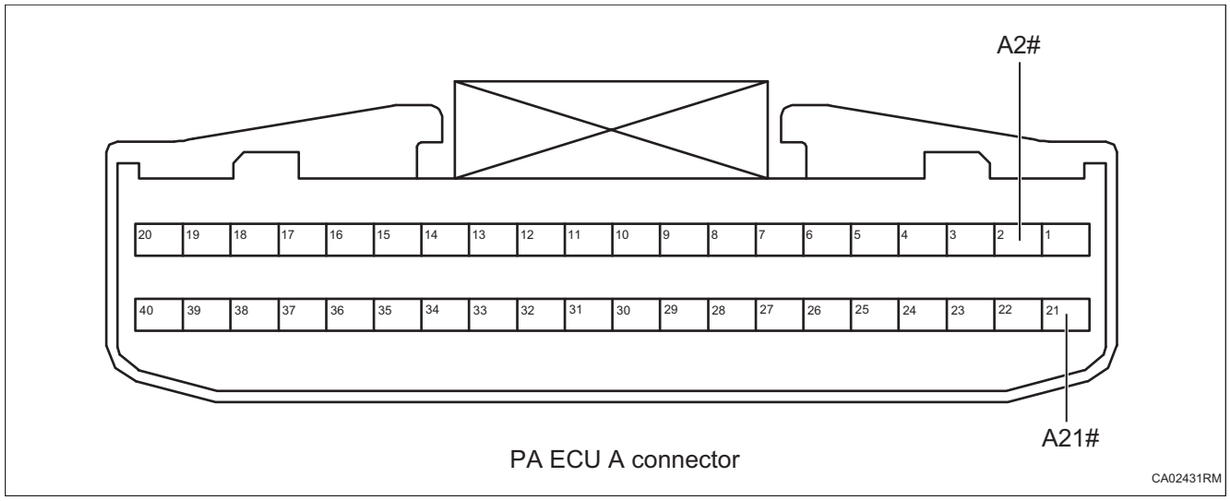
Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A1# -body GND	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

3	Check PA ECU power supply



(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
PA ECU connector A21# -body GND	Set the ignition switch to "ON"	Battery voltage
PA ECU connector A2# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

4	Replace PA ECU (See page PA-79)

(a) Replace the PA ECU.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

CA

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

5	**End**

DTC	U14438A	GW Eth4(Port2.2 TBox) connection failure
DTC	U14928D	TBOX PDU message timeout

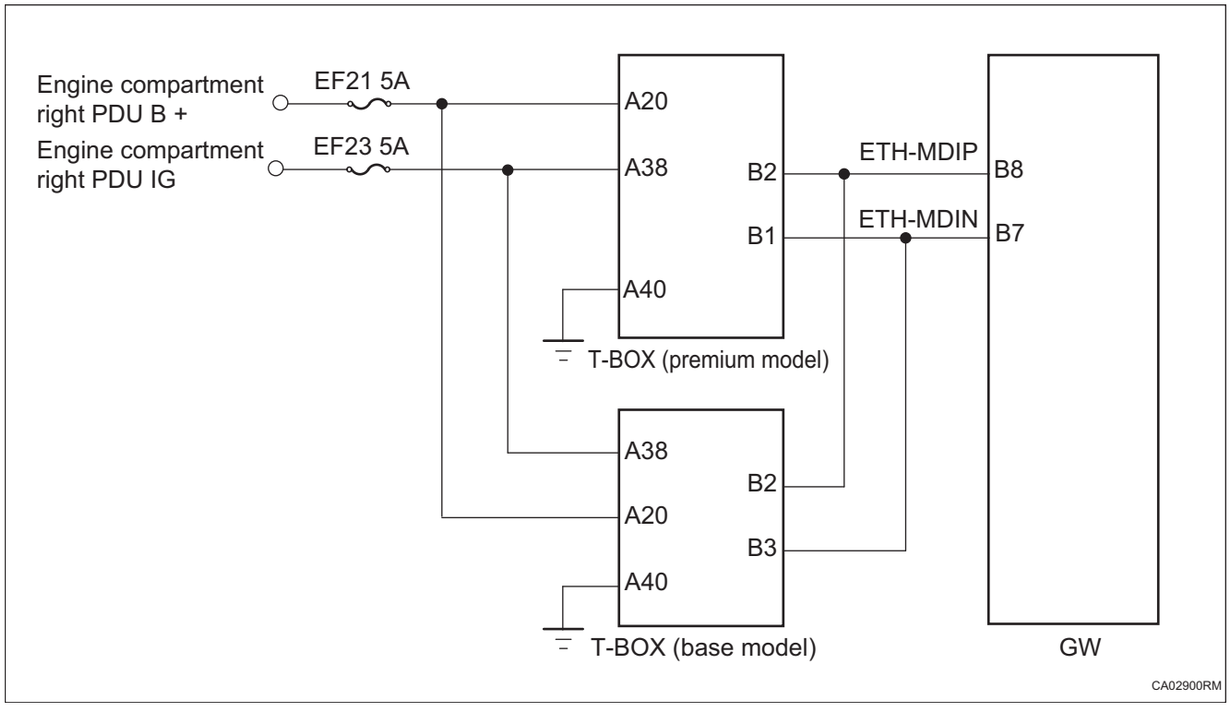
Description

When the communication between the T-BOX and the GW ethernet is abnormal or interrupted, GW records DTC.

DTC	DTC detection conditions	Faulty location
U14438A	(a) Connection failure.	• T-BOX • Ethernet cable and connector • GW
U14928D	(a) Message timeout.	• T-BOX • Ethernet cable and connector • GW

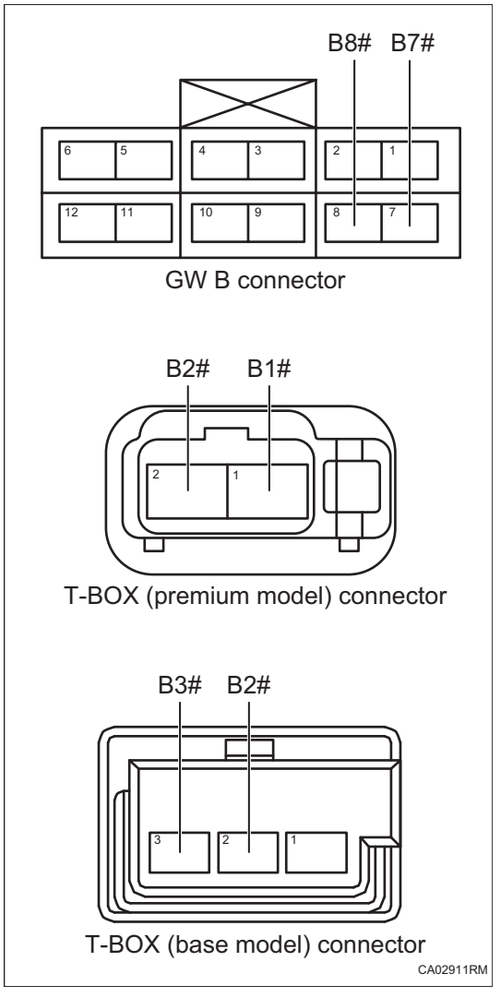
CA

Circuit diagram



Inspection procedure

1	Check Ethernet cable for open circuit (GW - T-BOX)



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the GW connector.

(d) Disconnect the T-BOX control unit connector.

(e) Measure the resistance according to the values in the table below.

Standard value

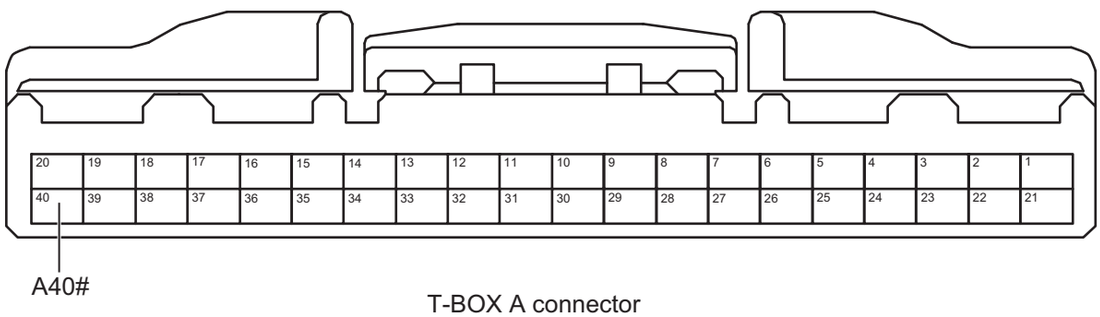
Detector connection	Detection conditions	Specified state
T-BOX (premium model) connector B2# - GW connector B8#	Always connected	Less than 1Ω
T-BOX (premium model) connector B1# - GW connector B7#	Always connected	Less than 1Ω
T-BOX (base model) connector B2# - GW connector B8#	Always connected	Less than 1Ω
T-BOX (base model) connector B3# - GW connector B7#	Always connected	Less than 1Ω

NG → **Repair or replace the harness and connector**

OK

2	**Check T-BOX ground**

CA



T-BOX A connector

CA02921RM

(a) Measure the resistance according to the values in the table below.

CA

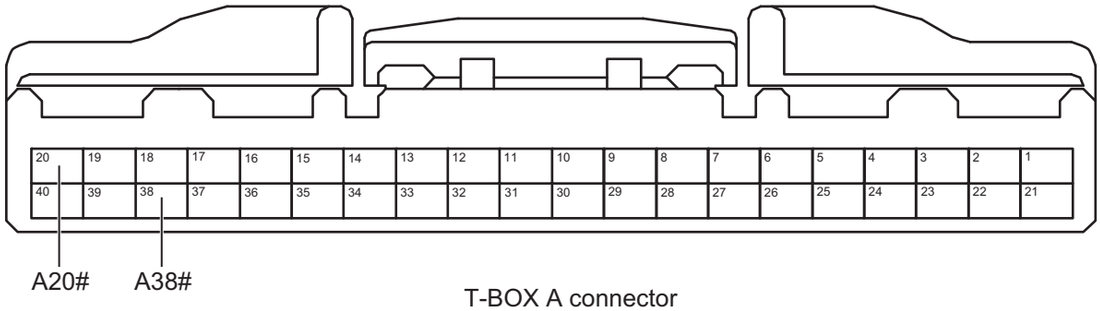
Standard value

Detector connection	Detection conditions	Specified state
T-BOX connector A40# -body GND	Always connected	Less than 1Ω

NG **Repair or replace the harness and connector**

OK

3	Check T-BOX power supply



T-BOX A connector

CA02931RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
T-BOX connector A20# -body GND	Set the ignition switch to "ON"	Battery voltage
T-BOX connector A38# -body GND	Set the ignition switch to "ON"	Battery voltage

NG → **Repair or replace the harness and connector**

OK

CA

4	**Replace T-BOX (See page TB-25)**

(a) Replace T-BOX.

(b) Connect the HQ-VDS.

(c) Clear the DTC.

(d) Re-read the DTC.

Criteria:

No DTC is output.

NG → **Replace GW (See page CA-256)**

OK

5	**End**

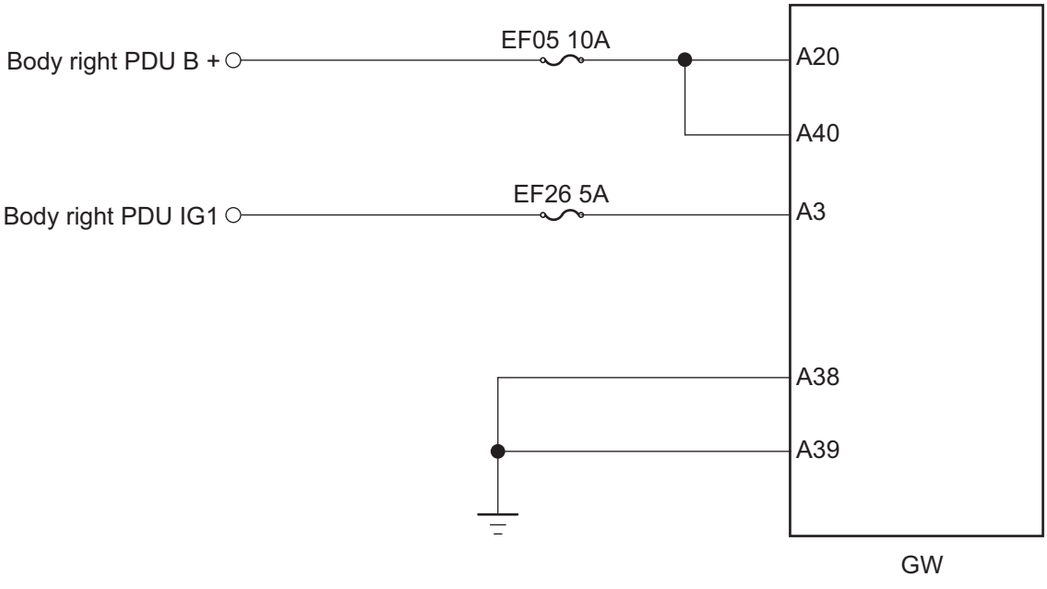
DTC	U160100	CAN firewall message length error

Description

When the GW firewall message frequency error occurs, GW records DTC.

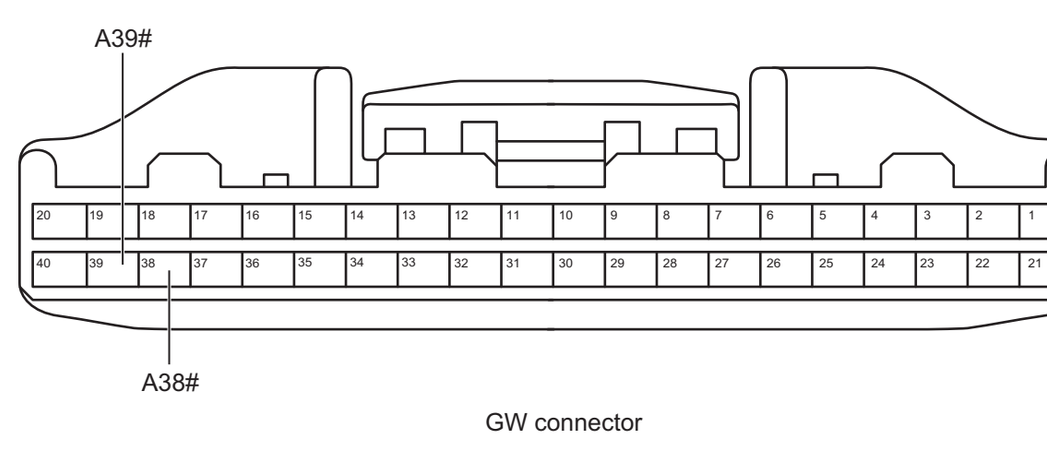
DTC	DTC detection conditions	Faulty location
U160100	(a) CAN firewall message length error.	• GW • Harness and connector

Circuit diagram



Inspection procedure

1	Check GW ground



(a) Set the ignition switch to "OFF".

(b) Disconnect the battery negative terminal.

(c) Disconnect the GW connector.

(d) Measure the resistance according to the values in the table below.

Standard value

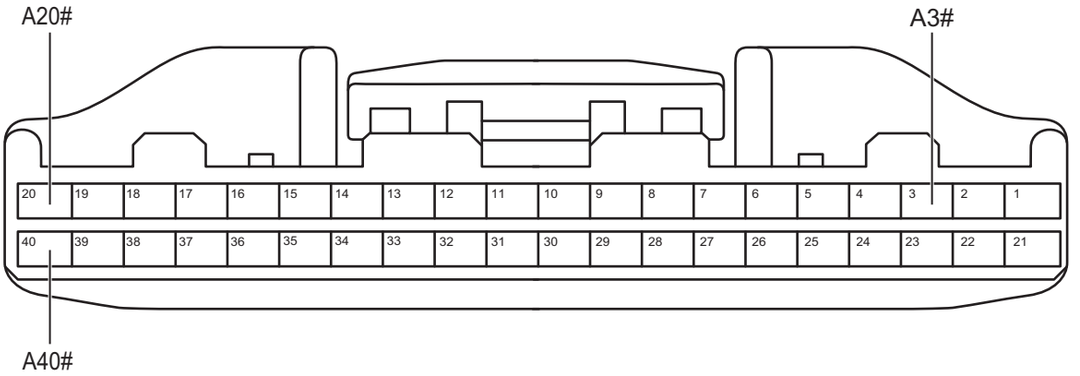
Detector connection	Detection conditions	Specified state
GW connector A38# -body GND	Always connected	Less than 1Ω
GW connector A39# -body GND	Always connected	Less than 1Ω

CA

NG **Repair or replace the harness and connector**

OK

2	Check GW power supply



GW connector

CA00521RM

(a) Connect battery negative terminal.

(b) Set the ignition switch to "ON".

(c) Measure the voltage according to the values in the table below.

Standard value

Detector connection	Detection conditions	Specified state
GW connector A3# -body GND	The ignition switch is set to "ON"	Battery voltage

Detector connection	Detection conditions	Specified state
GW connector A20# -body GND	The ignition switch is set to "ON"	Battery voltage
GW connector A40# -body GND	The ignition switch is set to "ON"	Battery voltage

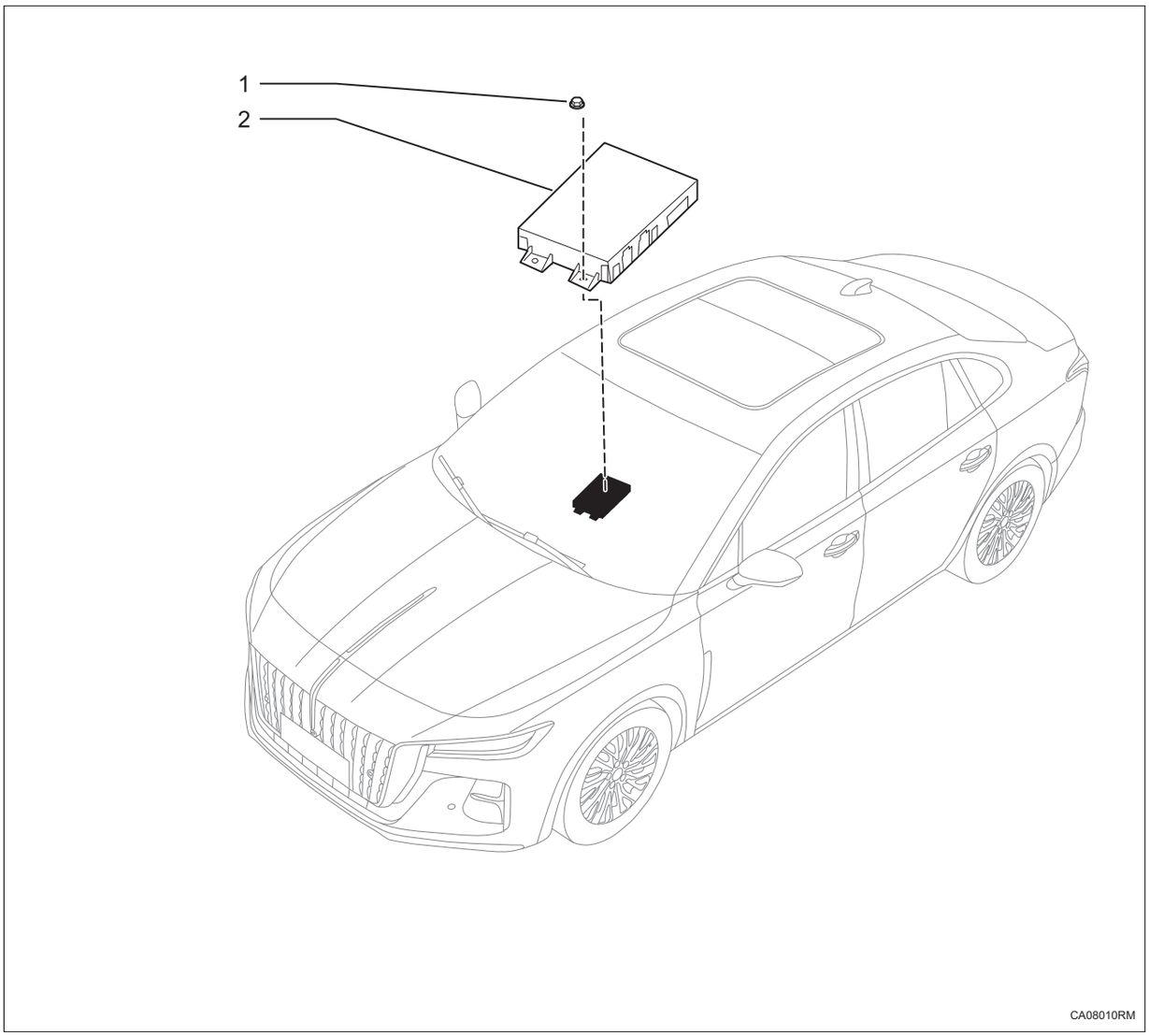
NG → **Repair or replace harness and connector and fuse**

OK

3	**Replace GW (See page CA-256)**

Central GW assembly

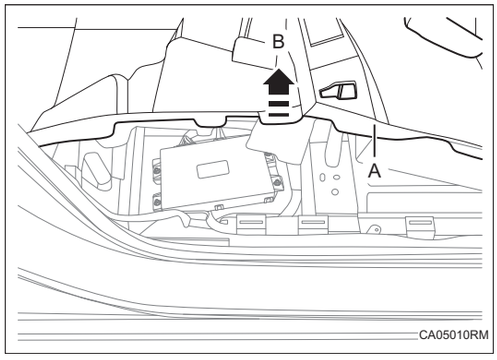
Parts



1. **Hexagon flange nut**
   - X4
   - Torque: 5~7 N · m
2. **Central GW assembly**

Removal

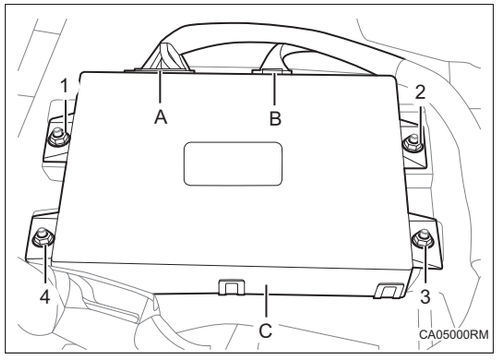
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the front passenger seat (See page SE-93)**
3. **Remove passenger door sill guard plate (See page IR-40)**
4. **Removal Central GW assembly**



(a) Lift the carpet assembly -A- along the direction of -arrow B- .

Hint:

Please do not damage the carpet assembly when lifting it.



(b) Disconnect the harness connectors-A-B- of the central GW assembly-C-.

(c) Remove nut -1-4- and remove central GW assembly-C-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Suspension

Front wheel alignment SP-1
Check SP-1
Adjustment SP-2
Hub bearing unit check SP-4
Check SP-4
Front suspension SP-5
Parts SP-5
Parts SP-7
Removal SP-10
Installation SP-15
Rear wheel alignment SP-16
Check SP-16
Adjustment SP-16
Rear suspension SP-18
Parts SP-18
Removal SP-21
Installation SP-24

SP

Front wheel alignment

Check

1. **Before front wheel alignment adjustment, the following check and overhaul shall be carried out to ensure the correctness of the positioning sampling value and positioning adjustment method.**

   Hint:

   Only use a Hongqi approved wheel aligner for wheel alignment.

   For adjustments, values shall be as accurate as possible to conform to relevant specifications.

   (a) The car must be cooled.

   (b) Check the wheel suspension, steering system and steering linkage for unacceptable gap and damage, and repair them if necessary.

   (c) The tire inflation pressure complies with the regulations.

   (d) Correctly calibrate the vehicle, repeatedly bouncing and shaking.

   (e) For a vehicle running on the axle measuring platform in a tension-free state, it is necessary to pass multiple vehicle front-loading and reset to make the axle parts stress-free.

   (f) In order to return the steering system to the middle position before starting the input measurement and the adjustment work, stop the steering wheel by balanced movement (using special tools)

   (g) The vehicle with coil spring suspension is in the no-load position which means: the weight of the vehicle ready for operation (fuel tank and washer fluid reservoir filled, spare wheel, driver’s tools, jack), excluding the driver.

   (h) The measuring value receiver shall be installed and calibrated as required, and the operating instructions of the locator manufacturer must be followed.

   (i) Rim run-out compensation: due to the allowable axial run-out of the rim, the toe-in tolerance may be exceeded. Therefore, if the rim is not offset compensated, the toe-in adjustment cannot be performed correctly.

(j) The axle test stand and the wheel aligner computer will deviate from their original calibration/ settings after a certain period of time, so they must be calibrated at least once a year within the maintenance range.

(k) The tire inflation pressure complies with the regulations.

2. Necessity of wheel alignment

(a) The vehicle has a driving performance defect.

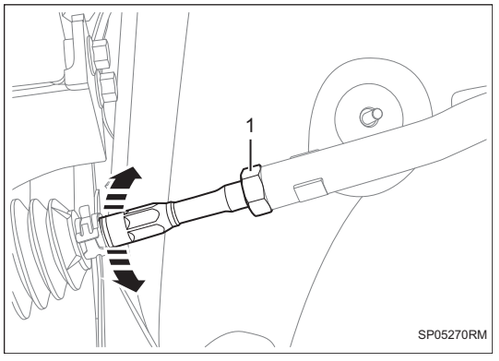
(b) Damage caused by an accident.

(c) The axle components have been removed or replaced.

(d) Unilateral tire wear.

Adjustment

1. Loosen the outer tie rod assembly nut -1-, and rotate it left and right as arrowed to adjust it to the middle value.



2. Rotate the inner tie rod to make its toe-in value reach standard value

Toe-in value (only for 1.5 T models)

Item	Specified state	Difference between left and right wheels
Toe-in of front wheel	β=6′±5′	-
	2β=12′±10′	
Front wheel camber	-18′±30′	±30′
Steering angle difference when the left and right front wheels rotate 20 ° and lock	1°30′±20′	
Kingpin caster angle	7°3′±30′	±30′
Kingpin inclination angle	14°35′±45′	-

Toe-in value (only for HEV models)

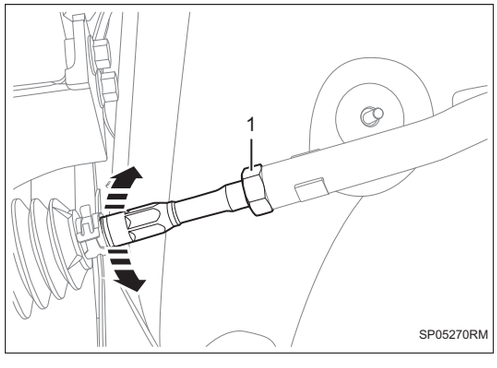
Item	Specified state	Difference between left and right wheels
Toe-in of front wheel	β=5′±5′	-
	2β=10′±10′	
Front wheel camber	-14′±30′	±30′
Steering angle difference when the left and right front wheels rotate 20 ° and lock	1°29′±20′	
Kingpin caster angle	7°5′±30′	±30′
Kingpin inclination angle	14°28′±45′	-

Toe-in value (only for 1.8 and 2.0 T models)

Item	Specified state	Difference between left and right wheels
Toe-in of front wheel	β=5′±5′	-
	2β=10′±10′	
Front wheel camber	-18′±30′	±30′
Steering angle difference when the left and right front wheels rotate 20 ° and lock	1°29′±20′	
Kingpin caster angle	7°8′±30′	±30′
Kingpin inclination angle	14°35′±45′	-

3. **The length difference between the left and right tie rod assemblies shall be less than 3mm.**
4. **Make sure that the corrugated cover is not twisted.**
5. **Tighten the outer tie rod assembly nut -1-.**

   Torque: 68.6 ~ 98 N · m



Hub bearing unit check

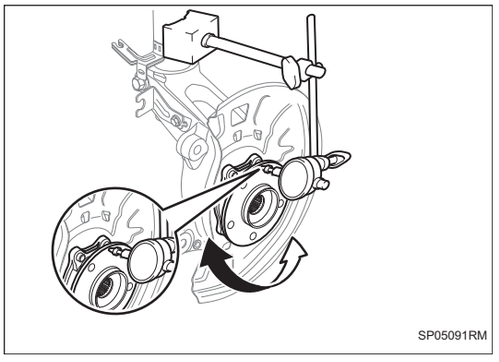
Check

Hint:

The check sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

1. **Remove the wheel**
2. **Remove brake caliper body assembly**
3. **Remove the brake disc**
4. **Check the radial runout of the front hub bearing unit assembly**



(a) Use dial indicator to check the radial runout of the bearing surface of the front hub bearing unit assembly.

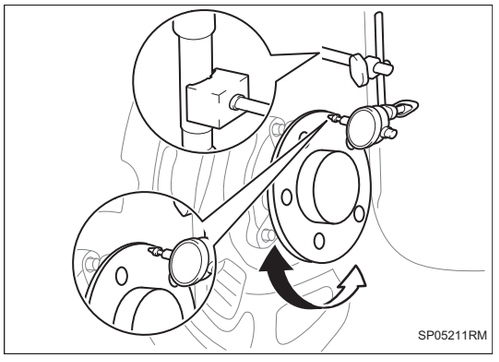
Caution:

Ensure that the dial indicator is positioned vertically on the measuring surface.

If the radial runout exceeds the standard value, replace the front hub bearing unit assembly.

Standard value: 0.05 mm (mm)

5. **Check the radial runout of the rear hub bearing unit assembly**



(a) Use a dial indicator to check the radial runout of the bearing surface of the rear hub bearing unit assembly.

Caution:

Ensure that the dial indicator is positioned vertically on the measuring surface.

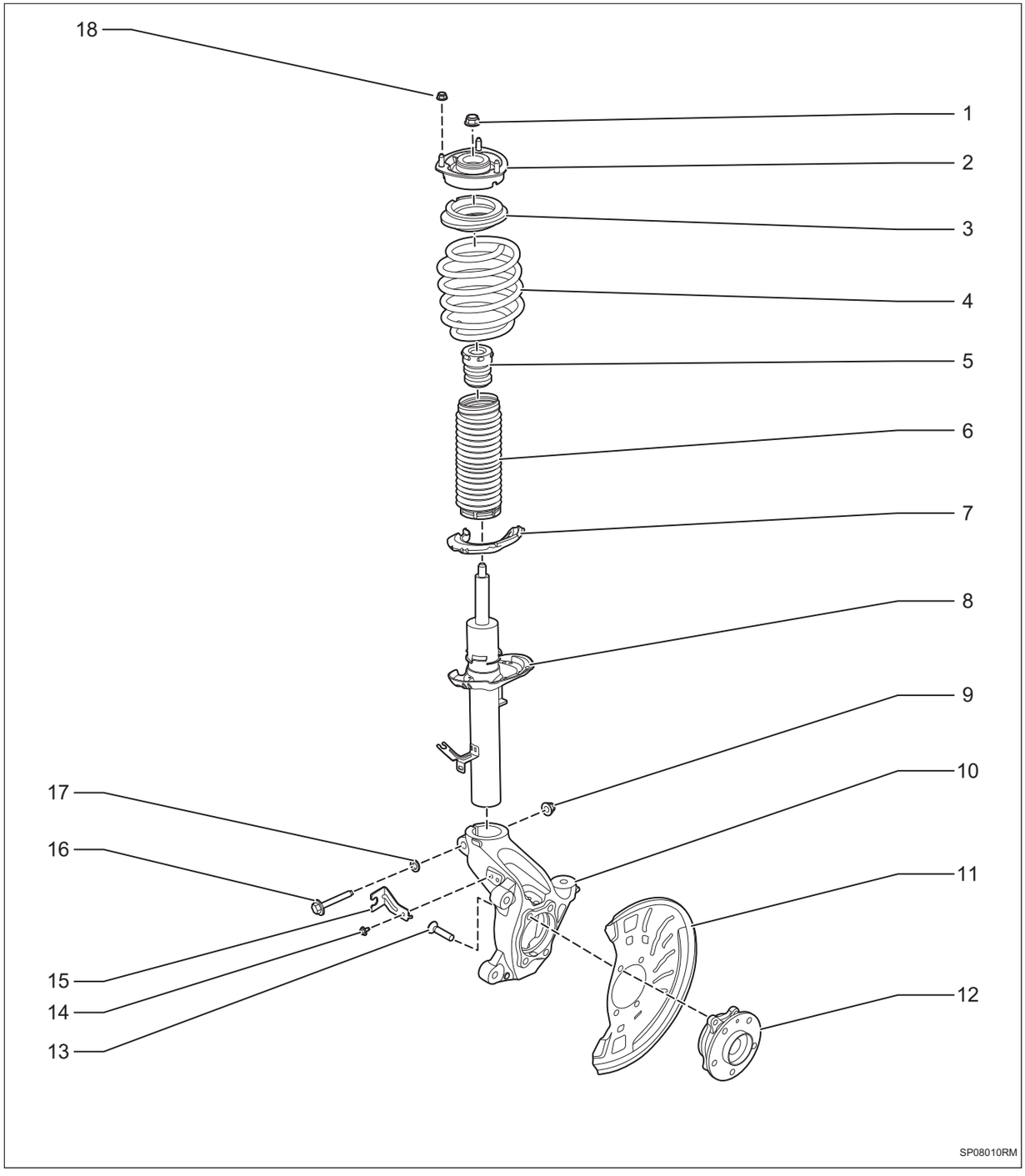
If the radial runout exceeds the standard value, replace the rear hub bearing unit assembly.

Standard value: 0.05 mm (mm)

SP

Front suspension

Parts



1. Prevailing torque type hexagon nut with non-metallic insert

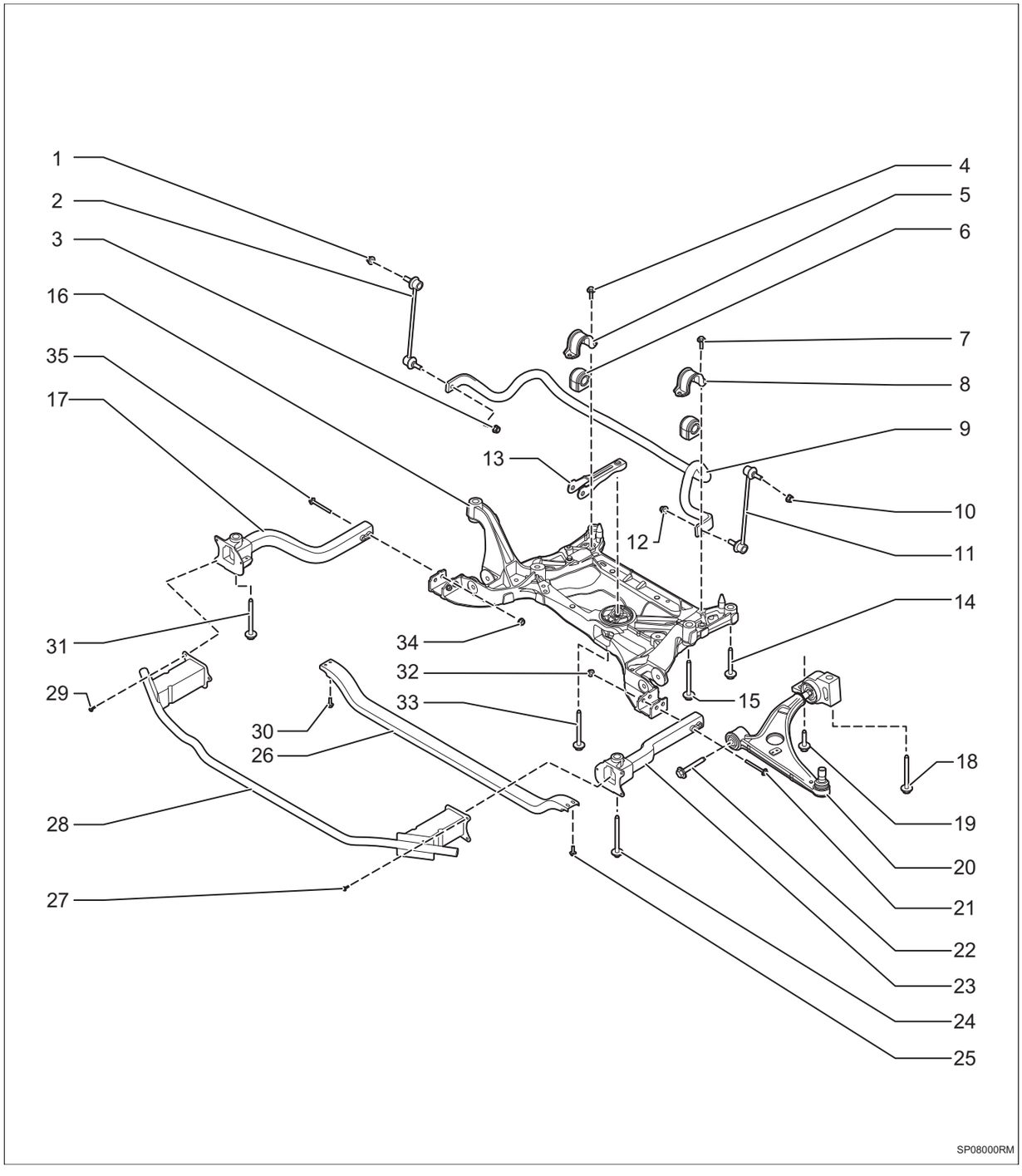
- X2
- Torque: 54.5~64.5 N · m

2. Front upper suspension assembly

- X2

3. **Axial thrust bearing assembly**
   - X2
4. **Front coil spring**
   - X2
5. **Front buffer block**
   - X2
6. **Front dust cover**
   - X2
7. **Front spring lower cushion**
   - X2
8. **Shock absorber assembly**
   - X2
9. **Prevailing torque type hexagon nut with non-metallic insert**
   - X2
   - Torque: 90 ~ 110 N · m
10. **Steering knuckle assembly**
    - X2
11. **Front dust baffle**
12. **Driving wheel hub bearing assembly**
13. **Inner twelve-flower spherical bolt**
    - X4
    - Torque: 52~68 N · m + (rotation angle) 125~145 ° monitoring torque: 140~280 N · m
    - Non-reusable
14. **Hexagon flange bolt**
    - X2
    - Torque: 8.8 ~ 12.8 N·m
15. **Front brake hose bracket**
16. **Hexagon flange bolt**
    - X2
    - Torque: 90 ~ 110 N · m
17. **Shim**
18. **Prevailing torque type hexagon nut with non-metallic insert**
    - X3
    - Torque: 67 ~ 83 N · m
    - Non-reusable

Parts



1. **Prevailing torque type hexagon nut with non-metallic insert**
   - Torque: 80 ~ 100 N·m
   - Non-reusable
2. **Stabilizer bar link assembly**
3. **Prevailing torque type hexagon nut with non-metallic insert**
   - Torque: 90 ~ 105 N·m

- Non-reusable

4. **Hexagon flange bolt**
   - X2
   - Torque: 50 ~ 70 N·m
5. **Front stabilizer bar cover**
6. **Front stabilizer bar bushing**
   - X2
7. **Hexagon flange bolt**
   - X2
   - Torque: 50 ~ 70 N·m
8. **Front stabilizer bar cover**
9. **Front stabilizer bar**
10. **Prevailing torque type hexagon nut with non-metallic insert**
    - Torque: 80 ~ 100 N·m
11. **Stabilizer bar link assembly**
12. **Prevailing torque type hexagon nut with non-metallic insert**
    - Torque: 90 ~ 105 N·m
    - Non-reusable
13. **Powertrain rear mounting tie rod**
14. **Hexagon flange bolt**
    - X2
    - Torque: 160 ~ 200N·m
15. **Hexagon flange bolt**
    - X2
    - Torque: 100~120 N · m + rotation angle (80 ° ~ 100 °) monitoring torque: 120~200 N · m
    - Non-reusable
16. **Front subframe**
17. **Subframe right front side member assembly**
18. **Hexagon flange nut**
    - X2
    - Torque: 160 ~ 200N·m
19. **Hexagon flange bolt**
    - X2
    - Torque: 138.7 ~ 169.5N·m
20. **Left front lower control arm subassembly**
21. **Hexagon flange bolt**
    - X2
    - Torque: 70 ~ 90 N·m

22. Hexagon flange bolt

- X2
- Torque: 54 ~ 66 N·m + rotation angle （170° ~ 190°） monitoring torque: 180 ~ 240 N·m
- Non-reusable

23. Subframe left front side member assembly

24. Hexagon flange bolt

- Torque: 100 ~ 120 N·m + rotation angle （80° ~ 100°）monitoring torque: 120 ~ 200 N·m

25. Hexagon flange bolt

- X2
- Torque: 20 ~ 30 N·m

26. Front subframe front cross member assembly

27. Hexagon flange bolt

- X3
- Torque: 8 ~ 12 N·m

28. Front subframe buffer beam & energy absorption box weldment

29. Hexagon flange bolt

- X3
- Torque: 8 ~ 12 N·m

30. Hexagon flange bolt

- X2
- Torque: 20 ~ 30 N·m

31. Hexagon flange bolt

- Torque: 100 ~ 120 N·m + rotation angle （80° ~ 100°）monitoring torque: 120 ~ 200 N·m

32. Hexagon flange nut

- x2
- Torque: 70 ~ 90 N·m

33. Hexagon flange nut

- Torque: 171 ~ 209 N·m

34. Hexagon flange nut

- x2
- Torque: 70 ~ 90 N·m

35. Hexagon flange bolt

- X2
- Torque: 70 ~ 90 N·m

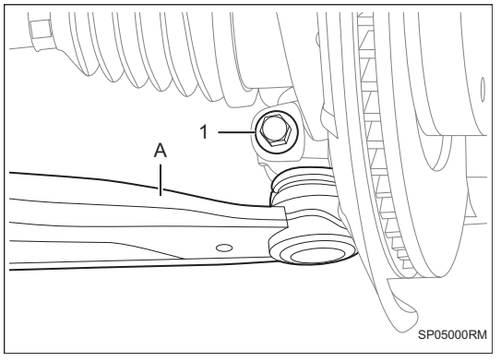
Removal

Hint:

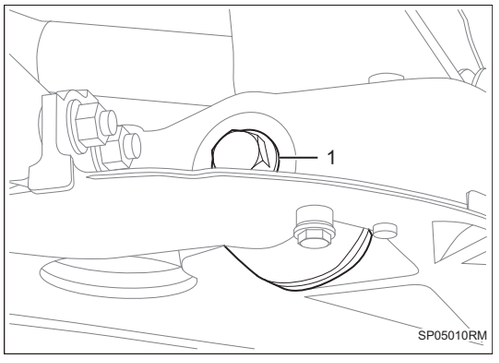
The removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

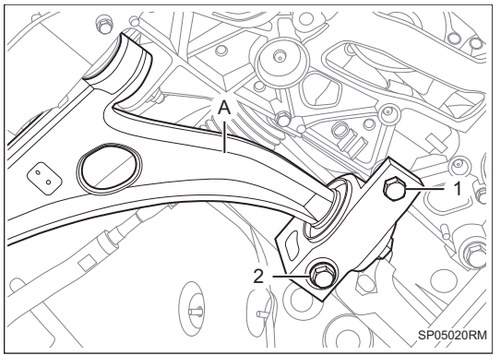
1. **Remove front wheel (See page TW-3)**
2. **Remove front lower control arm assembly**



(a) Remove the bolt -1- and detach the ball joint of the front lower control arm assembly -A-.



(b) Remove the fixing bolt -1- of the front lower control arm assembly.

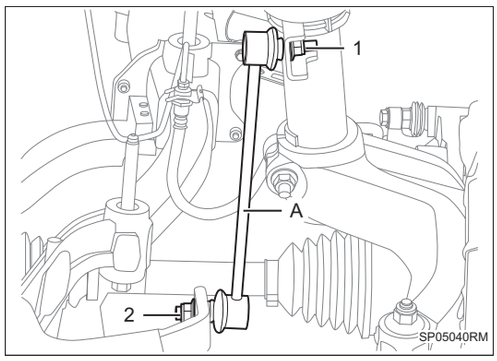


(c) Remove the bolt -1-2- and the front lower control arm assembly-A-.

3. **Remove front stabilizer bar link**

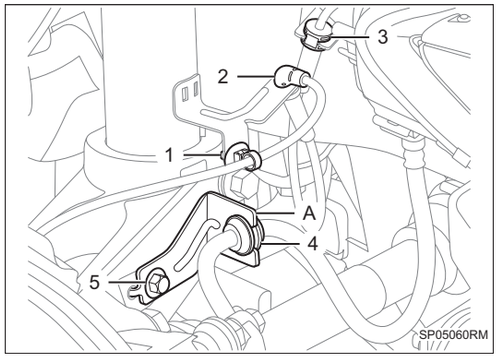
Hint:

During the removal of the front stabilizer bar connecting rod, use the inner stop and outer moving tool for removal.



(a) Remove the nut -1-2- and the left front stabilizer bar connecting rod-A-.

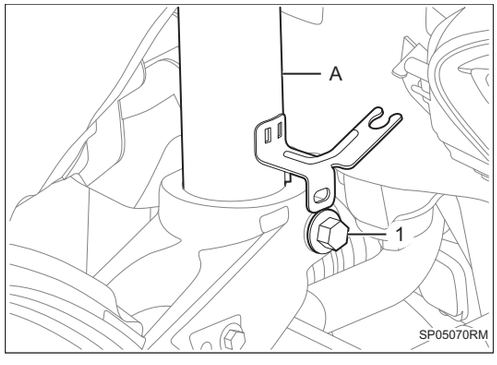
4. Remove front shock absorber assembly



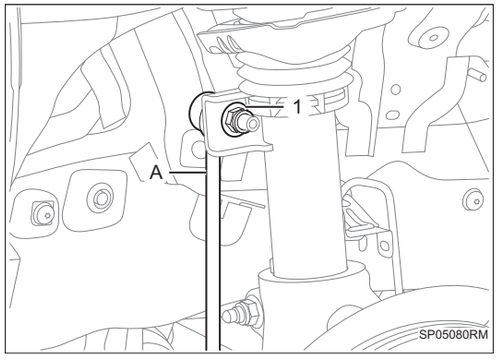
(a) Detach the harness fixing clip -1- and brackets -2-3-.

(b) Detach fuel pipe -4-.

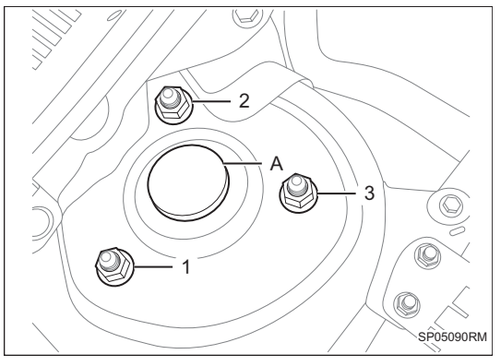
(c) Remove the bolt -5- and the brake pipe bracket-A-.



(d) Remove the bolt -1-, and detach the connection between the front shock absorber -A- and the steering knuckle.

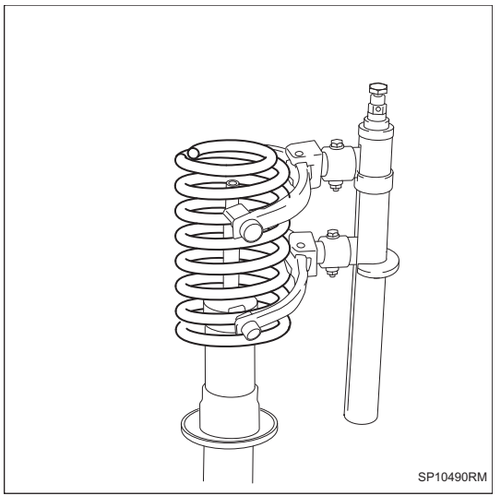


(e) Remove the nut -1- and the front stabilizer bar connecting rod-A-.



(f) Remove the front shock absorber assembly dust cap -A-, and nut -1-3-.

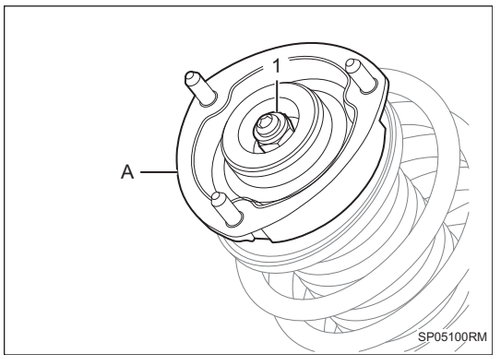
5. Remove front shock absorber assembly for disassembly



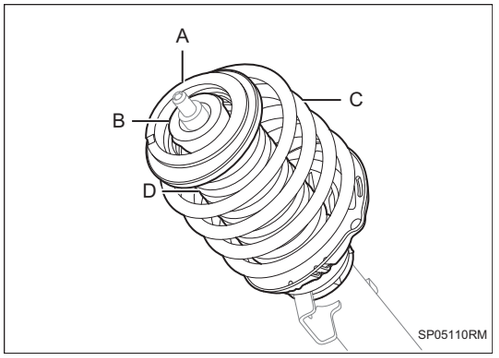
(a) Use SST (39 H7029020 B) to compress the front coil spring.

Warning:

- ***Do not use impact wrench to compress the coil spring, which will damage the special tool.***
- ***Ensure that the bottom end of the front coil spring is positioned under compression of the seat cushion under the coil spring.***



(b) Use SST (9503410HF01) to remove the nut -1-, and lower the front upper suspension assembly-A-.



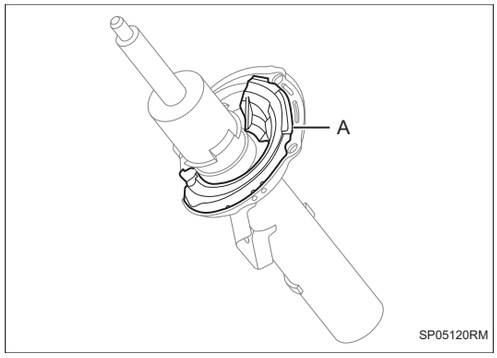
(c) Remove the front spring upper cushion-A-.

(d) Remove the front buffer block -B-.

(e) Remove the coil spring -C-.

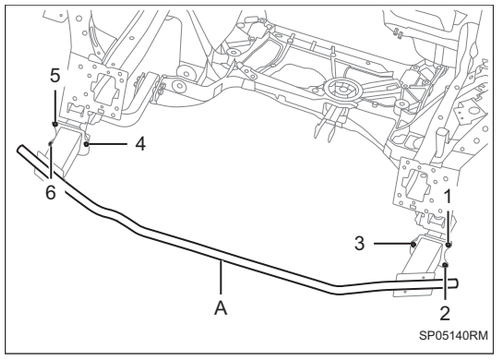
(f) Remove the dust cover -D-.

(g) Remove the front spring lower cushion-A-.



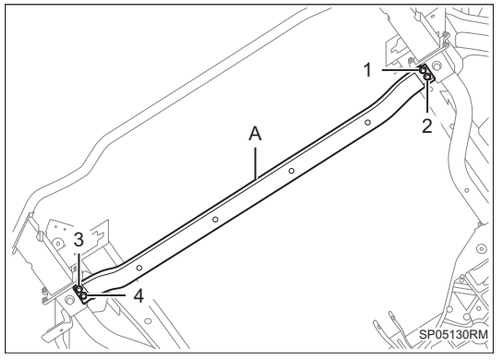
6. **Remove left front wheel guard I (See page ET-34)**
7. **Remove the right front wheel guard I (See page ET-34)**
8. **Remove front bumper pedestrian guard (See page ET-7)**
9. **Remove front bumper cover (See page ET-7)**
10. **Front subframe buffer beam & energy absorption box weldment**

(a) Remove the bolt -1-6-, and the front subframe buffer beam & energy absorption box weldment -A-.



11. **Remove front subframe front cross member assembly**

(a) Remove the bolt -1-4- and the front subframe front crossmember assembly-A-.

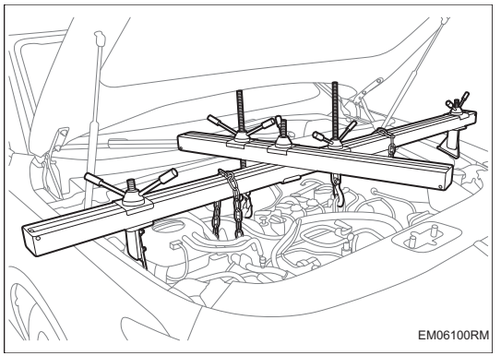


12. **Remove powertrain rear mounting tie rod (See page EM-8)**
13. **Powertrain rear suspension assembly (only for HEV models) (See page EM-8)**
14. **Remove front subframe assembly**

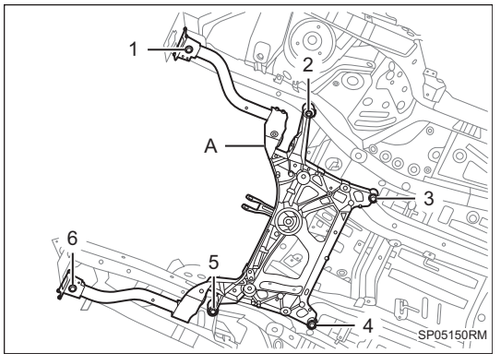
SP

Hint:

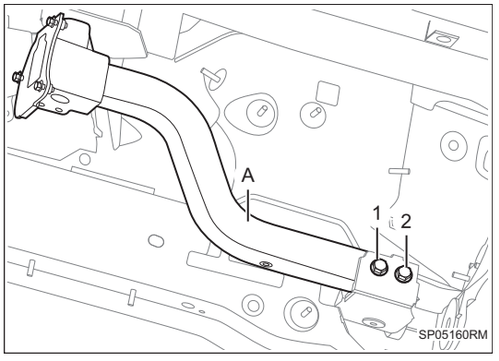
Removal of the front subframe assembly requires two people.



(a) After installation, adjust the support SST (9503025 HF01) to a stressed state.



(b) Remove the bolt -1-6- and the front subframe assembly-A-.

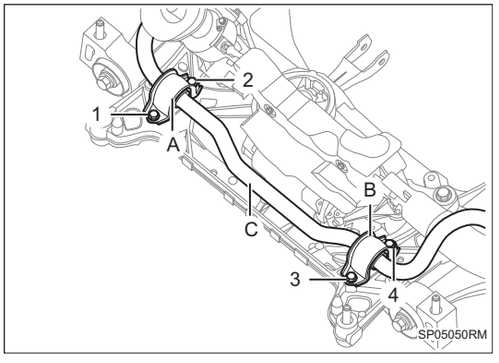


(c) Remove the bolt -1-2- and the subframe left front side member assembly-A-.

Hint:

The removal sequence on the right side is the same as that on the left side.

15. Remove front stabilizer bar assembly



(a) Remove the bolt -1-4- and the front stabilizer bar cover-A-B-.

(b) Remove the front stabilizer bar assembly-C-.

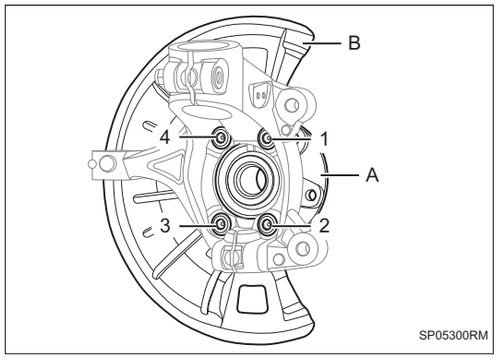
16. Remove front brake caliper assembly (See page BR-13)

17. Remove front brake disc (See page BR-10)

18. Remove front wheel speed sensor assembly (See page BC-91)

19. Remove the front hub bearing assembly

(a) Remove the bolt -1-4-, the front hub bearing assembly-A- and the front dust baffle-B-.



Installation

1. The installation procedure is the reverse of removal procedure.

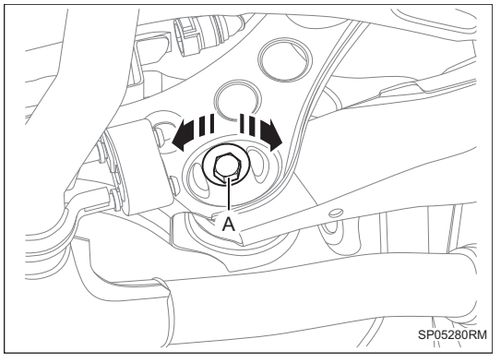
Rear wheel alignment

Check

1. **Before the rear wheel alignment adjustment, the following check and maintenance shall be carried out to ensure the correctness of the positioning sampling value and the positioning adjustment method.**
   (a) Check whether the rear wheel inflation pressure is within the specified range and whether the wear of the tire surface is approximately the same.
   (b) Ensure that the vehicle is unloaded.
   (c) Press the vehicle suspension system up and down to the normal position.
   (d) Check the wheels and tires for radial runout.
   (e) Check the balance height of the vehicle.
   (f) Check whether any part of the suspension is loose or damaged.

Adjustment

1. **Loosen the fixing nut -A- of the eccentric bolt of the rear lower control arm assembly, and rotate it left and right in the direction of the arrow to adjust it to the middle value.**



2. **Rotate the eccentric bolt to make its toe-in value reach the standard value**

Toe-in value (only for 1.5 T models)

Item	Specified state	Difference between left and right wheels
Toe-in of rear wheel	β=5′±5′	-
	2β=10′±10′	
Rear wheel camber	-54′±30′	Within ±45 ′

Toe-in value (only for HEV models)

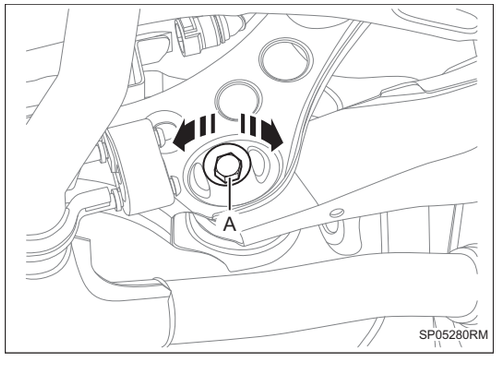
Item	Specified state	Difference between left and right wheels
Toe-in of rear wheel	β=5′±5′	-
	2β=10′±10′	
Rear wheel camber	—1°1′±30′	Within ±45 ′

Toe-in value (only for 1.8 T and 2.0 T models)

Item	Specified state	Difference between left and right wheels
Toe-in of rear wheel	β=5′±5′	-
	2β=10′±10′	
Rear wheel camber	—1°2′±30′	Within ±45 ′

3. Tighten the fixing nut -A- of the eccentric bolt of the rear lower control arm assembly.

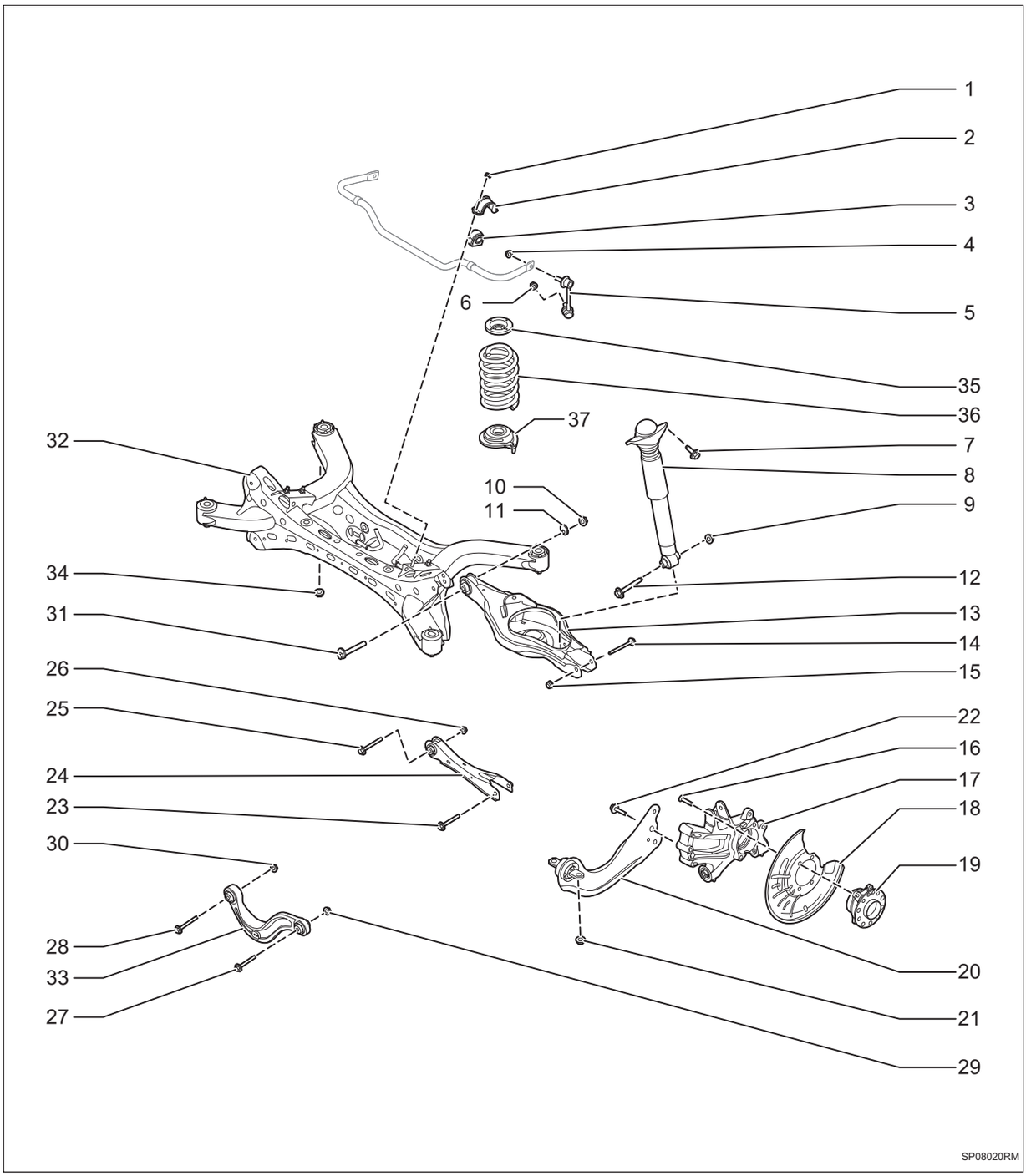
Torque: 123 ~ 150 N · m



SP

Rear suspension

Parts



1. **Hexagon flange nut**
   - X4
   - Torque: 28 ~ 38 N·m
2. **Clamp plate - rear stabilizer bar**
3. **Rear stabilizer bar bushing**

4. **Hexagon flange nut**
   - X2
   - Torque: 90 ~ 105 N·m
   - Non-reusable
5. **Left rear stabilizer bar link assembly**
6. **Hexagon flange nut**
   - X2
   - Torque: 90 ~ 105 N·m
   - Non-reusable
7. **Hexagon flange bolt**
   - X4
   - Torque: 65 ~ 85 N·m
8. **Rear strut assembly**
9. **Hexagon flange nut**
   - X2
   - Torque: 150 ~ 180 N·m
10. **Hexagon flange nut**
    - X2
    - Torque: 123 ~ 150 N·m
11. **Adjust the cam**
    - X2
12. **Hexagon flange bolt**
    - X2
    - Torque: 150 ~ 180 N·m
13. **Rear lower control arm assembly**
14. **Hexagon flange bolt**
    - X2
    - Torque: 150 ~ 180 N·m
15. **Hexagon flange nut**
    - X2
    - Torque: 150 ~ 180 N·m
16. **Inner dodecahedron bolt**
    - X8
    - Torque: 52~68 N · m + (rotation angle) 125~145 ° monitoring torque: 140~280 N · m
    - Non-reusable
17. **Rear steering knuckle**
18. **Rear dust baffle**
19. **Non-driving wheel hub bearing assembly**

20. **Lower trailing arm assembly**
21. **Hexagon flange nut**
    - X4
    - Torque: 150 ~ 180 N·m
22. **Hexagon flange bolt**
    - X6
    - Torque: 160 ~ 200 N·m
23. **Hexagon flange bolt**
    - X2
    - Torque: 103 ~ 133N·m
24. **Left toe-in control arm subassembly**
25. **Hexagon flange bolt**
    - X2
    - Torque: 103 ~ 133N·m
26. **Hexagon flange nut**
    - X2
    - Torque: 103 ~ 133N·m
27. **Hexagon flange bolt**
    - X2
    - Torque: 103 ~ 133N·m
28. **Hexagon flange bolt**
    - X2
    - Torque: 103 ~ 133N·m
29. **Hexagon flange nut**
    - X2
    - Torque: 103 ~ 133N·m
30. **Hexagon flange nut**
    - X2
    - Torque: 103 ~ 133N·m
31. **Rear adjusting cam assembly**
32. **Rear subframe subassembly**
33. **Rear upper control arm outer bushing**
34. **Hexagon flange nut**
    - X4
    - Torque: 96 ~ 120 N·m
35. **Rear coil spring upper gasket**
36. **Rear coil spring**
37. **Rear coil spring lower gasket**

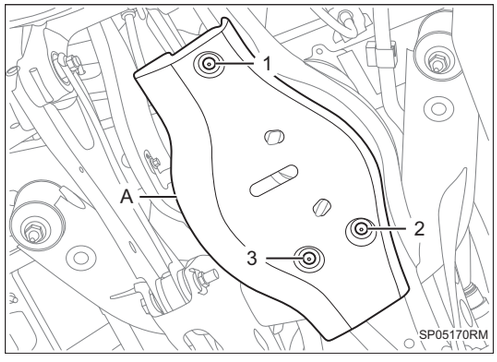
Removal

Hint:

The removal sequence on the right side is the same as that on the left side.

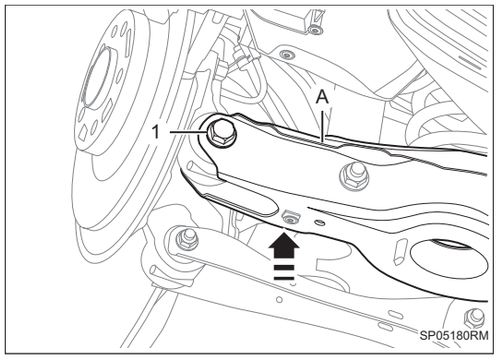
The order listed below applies to the left side.

1. **Remove rear wheel (See page TW-3)**
2. **Left suspension bottom guard plate**

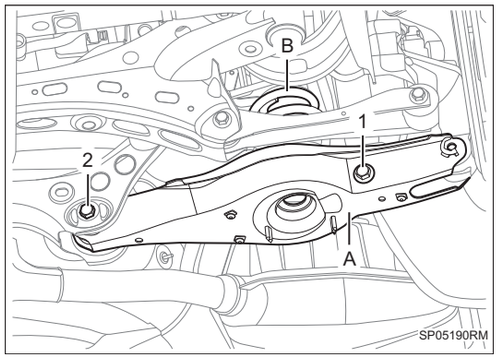


(a) Remove the screw -1-3- and the left suspension bottom guard plate-A-.

3. **Remove left rear lower control arm assembly**



(a) Use the jack to support in the direction of the arrow, and remove the fixing bolt -1- of the left rear lower control arm assembly -A-.

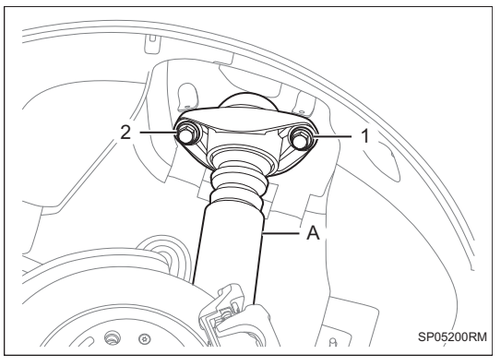


(b) Remove the bolt -1-, slowly lower the jack and release the pressure of spring -B-.

(c) Remove the bolt -2- and the left rear lower control arm assembly-A-.

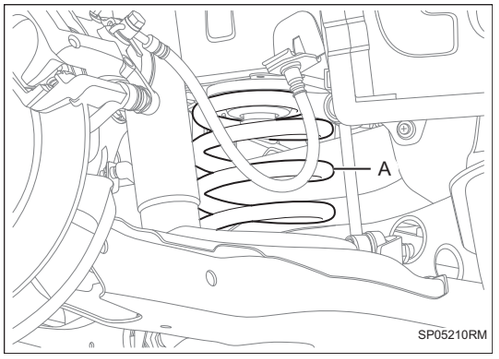
4. **Remove rear shock absorber assembly**

SP



(a) Remove the bolt -1-2- and the rear shock absorber assembly-A-.

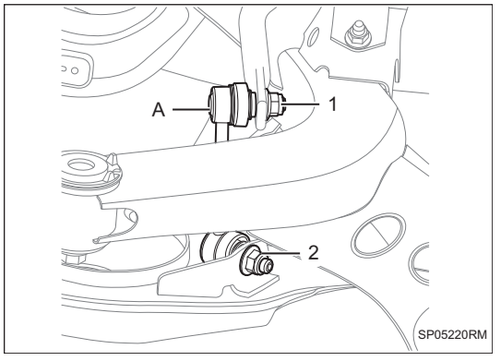
5. Remove coil spring -A-.



6. Remove rear stabilizer bar link assembly

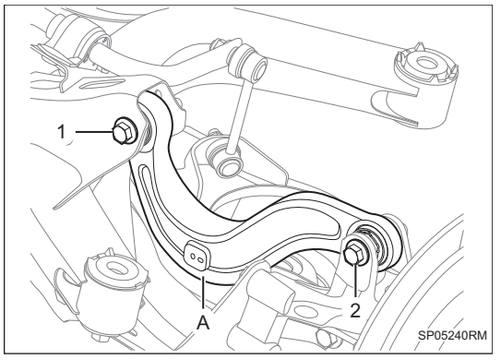
Hint:

During the removal of the rear stabilizer bar connecting rod, use the inner stop and outer moving tool for removal.



(a) Remove the nut -1-2-, and remove the rear stabilizer bar link assembly-A-.

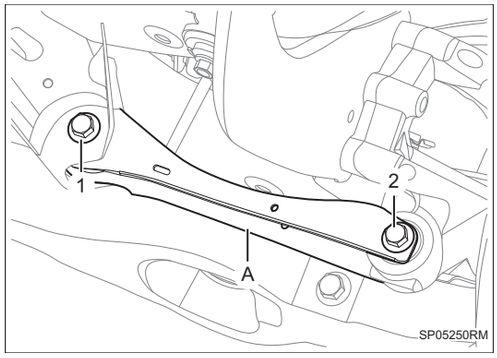
7. Remove rear upper control arm assembly



(a) Remove the nut -1-2- and the rear upper control arm assembly-A-.

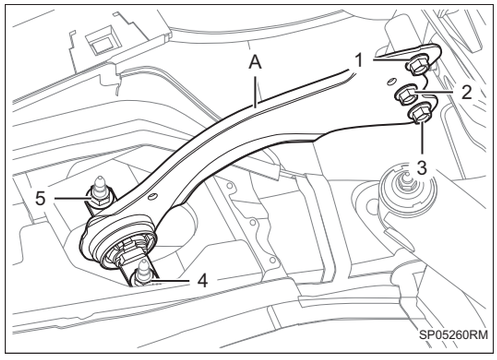
8. Remove left toe-in control arm subassembly

(a) Remove the nut -1-2-, and remove the left toe-in control arm subassembly-A-.



9. Remove left lower trailing arm

(a) Remove bolt -1-3-and nut -4-5-, and remove the left lower trailing arm-A-.



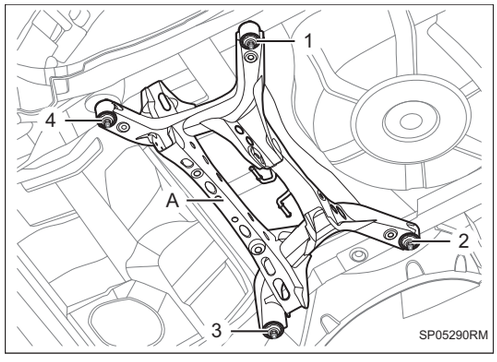
10. Remove muffler weldment (See page EX-8)

11. Remove rear subframe assembly

Hint:

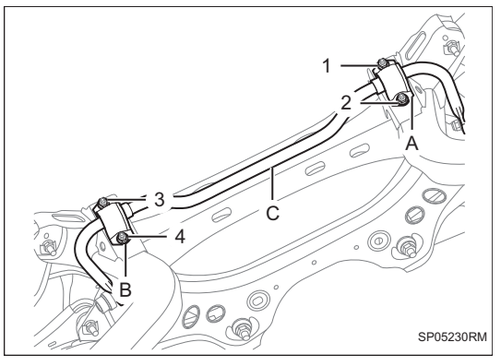
Removal of the front subframe assembly requires two people.

(a) Remove the nut -1-4- and the rear subframe assembly-A-.



12. Remove rear stabilizer bar assembly

SP



(a) Remove the bolt -1-4- and the rear stabilizer bar cover-A-B-.

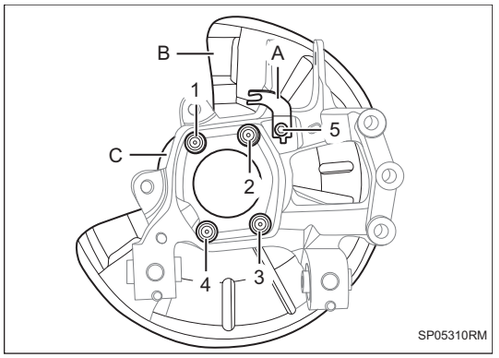
(b) Remove the rear stabilizer bar assembly-C-.

13. **Remove rear brake caliper assembly (See page BR-19)**

14. **Remove the rear brake disc (See page BR-17)**

15. **Remove rear wheel speed sensor assembly (See page BC-93)**

16. **Remove the rear hub bearing assembly**



(a) Remove the bolt -1-4-, the rear hub bearing assembly-C- and the left rear dust baffle-B-.

(b) Remove the bolt -5- and the harness metal bracket-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

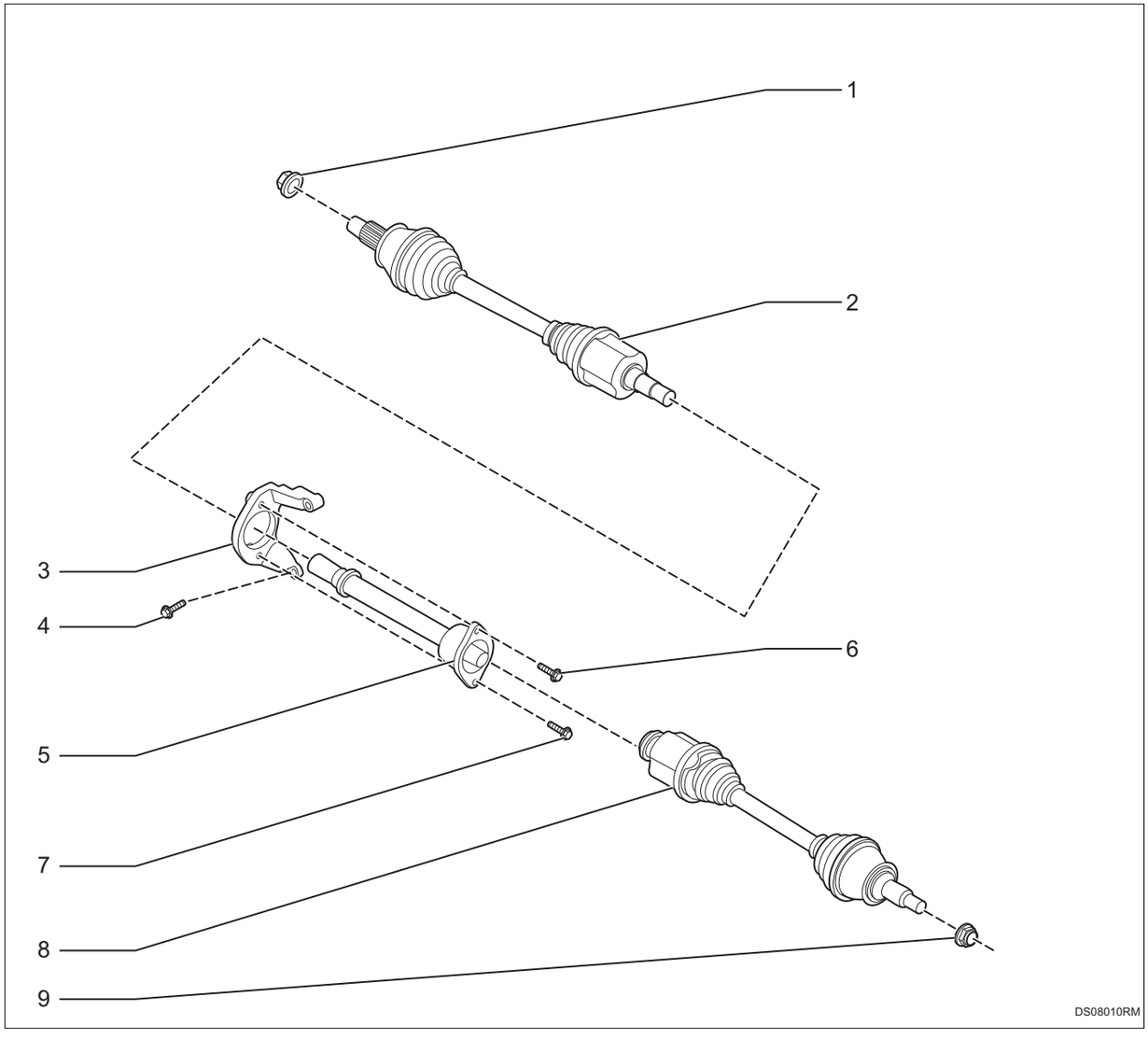
SP

Driving shaft

Front driving axle **DS-1**
Part (only for models with DCT) DS-1
Part (only for models with AT) DS-3
Part (only for HEV models) DS-4
Removal **DS-6**
Check **DS-9**
Installation **DS-10**

Front driving axle

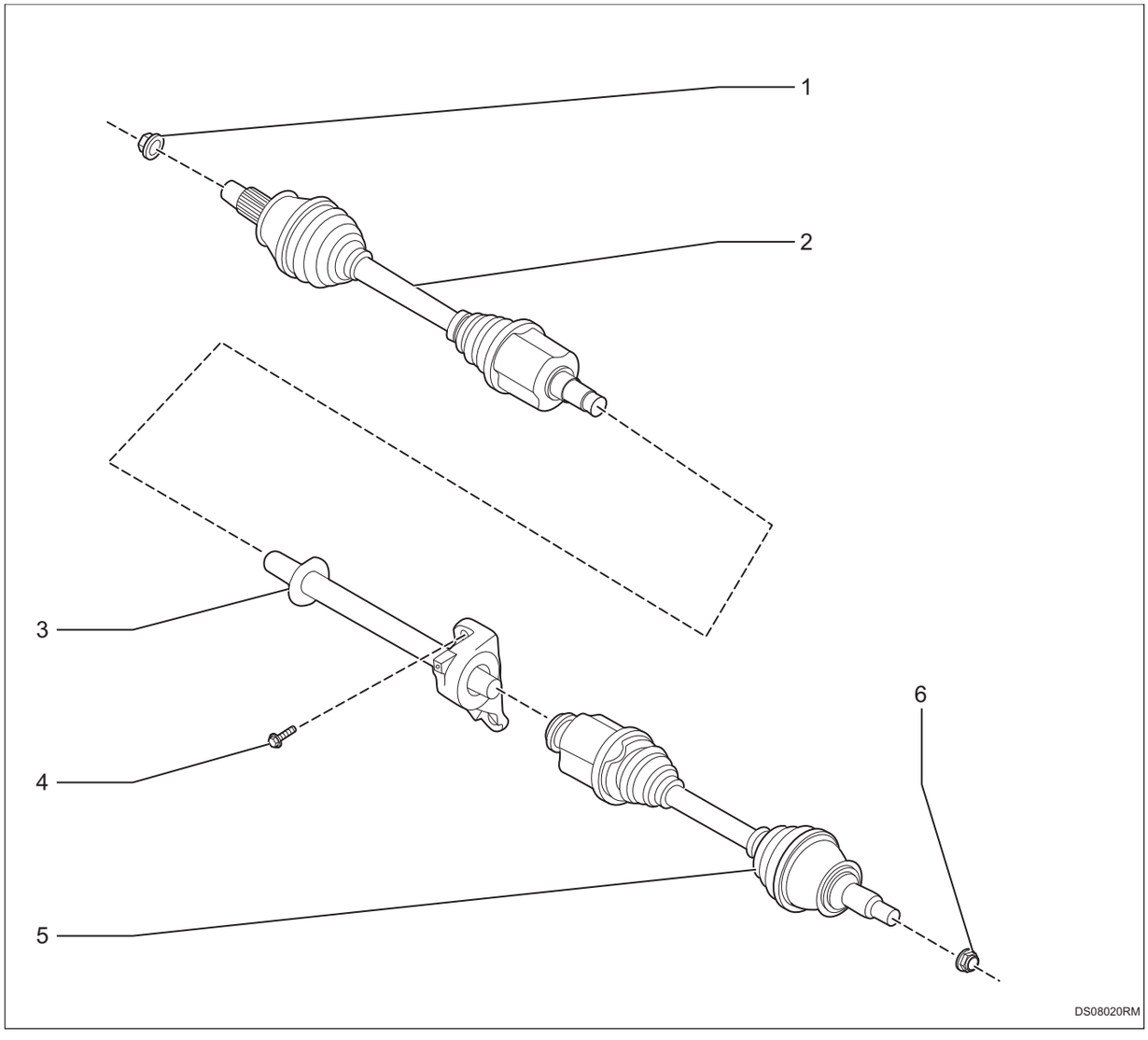
Part (only for models with DCT)



1. **Right front driving axle nut**
   - Pretighten to a torque: 135~165 N·m, and then loosen by 180°
   - Finally tighten to a torque: 300~320 N·m
2. **Right front driving axle assembly**
3. **Countershaft bracket I**
4. **Hexagon flange bolt**
   - X3
   - Torque: 42 ~ 62N·m
5. **Countershaft with bracket assembly**
6. **Hexagon flange bolt**
   - Torque: 42 ~ 62N·m

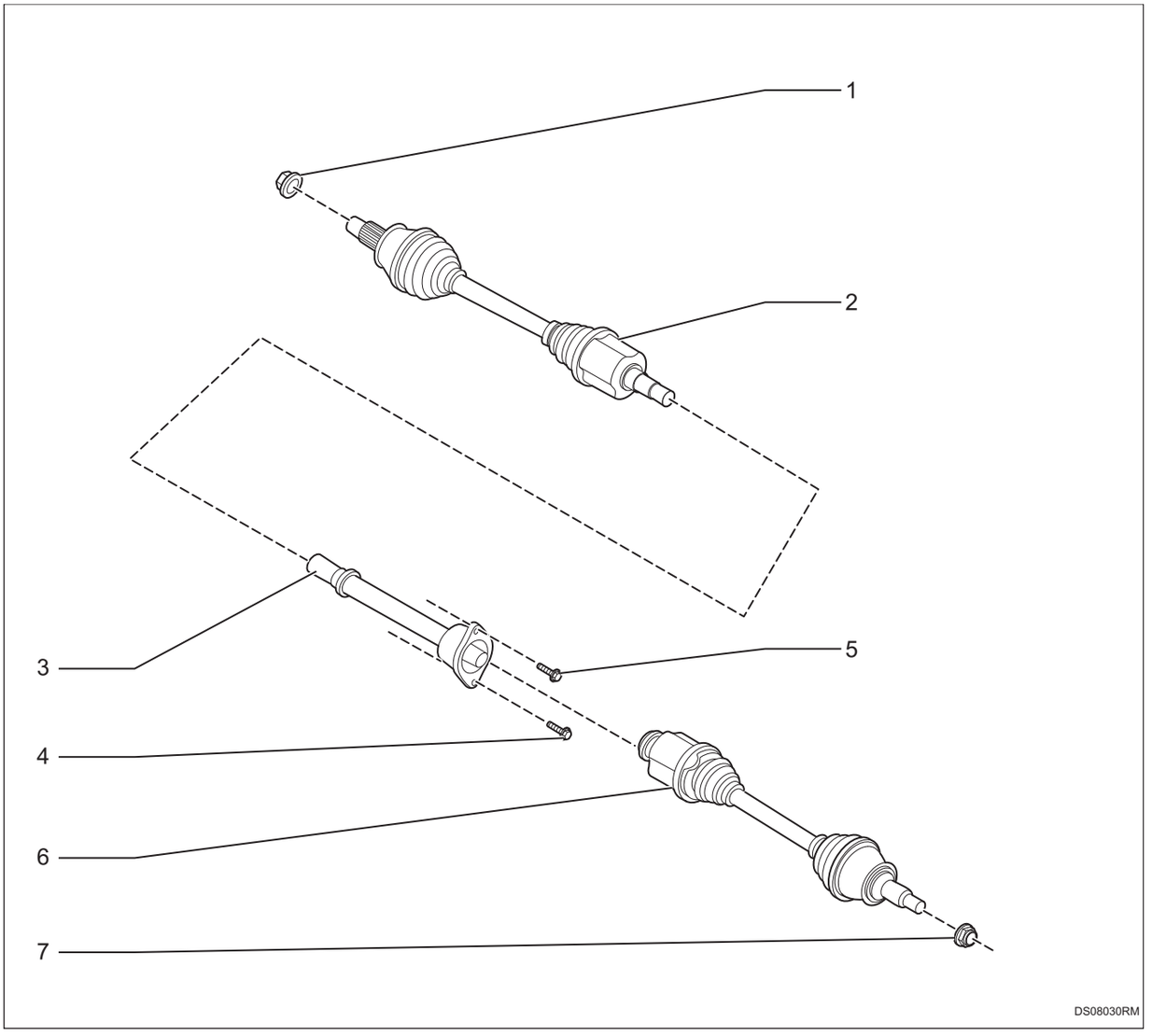
7. **Hexagon flange bolt**
   - Torque: 42 ~ 62N·m
8. **Left front driving axle assembly**
9. **Left front driving axle nut**
   - Pretighten to a torque: 135~165 N·m, and then loosen by 180°
   - Finally tighten to a torque: 300~320 N·m

Part (only for models with AT)



1. **Right front driving axle nut**
   - Pretighten to a torque: 100~150 N·m, and then loosen by 180°
   - Finally tighten to a torque: 300~350 N·m
2. **Right front driving axle assembly**
3. **Countershaft with bracket assembly**
4. **Hexagon flange bolt**
   - X3
   - Torque: 42 ~ 62N·m
5. **Left front driving axle assembly**
6. **Left front driving axle nut**
   - Pretighten to a torque: 100~150 N·m, and then loosen by 180°
   - Finally tighten to a torque: 300~350 N·m

Part (only for HEV models)



1. **Right front driving axle nut**
   - Pretighten to a torque: 100~150 N·m, and then loosen by 180°
   - Finally tighten to a torque: 300~350 N·m
2. **Right front driving axle assembly**
3. **Countershaft with bracket assembly**
4. **Hexagon flange bolt**
   - Torque: 42 ~ 62N·m
5. **Hexagon flange bolt**
   - Torque: 42 ~ 62N·m
6. **Left front driving axle assembly**

7. Left front driving axle nut

- Pretighten to a torque: 100~150 N·m, and then loosen by 180°
- Finally tighten to a torque: 300~350 N·m

Removal

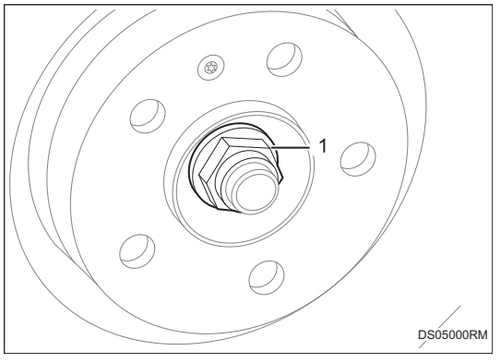
1. Remove driving axle nut

Hint:

The removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

(a) Remove driving axle nut -1-.



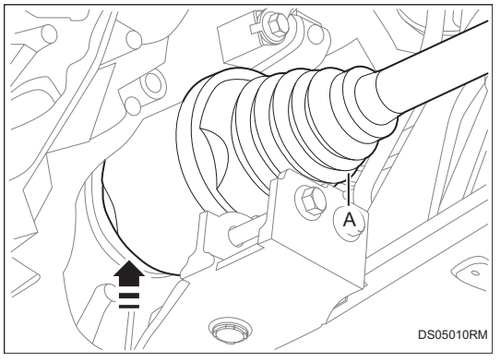
2. Remove control arm assembly (See page SP-10)

3. Remove left front driving axle assembly

(a) Pry the left front driving axle assembly in the -arrow- position, and remove the left front driving axle assembly -A-.

Notice:

Be careful not to damage the dust boot, the dust cover and the speed sensor rotor.

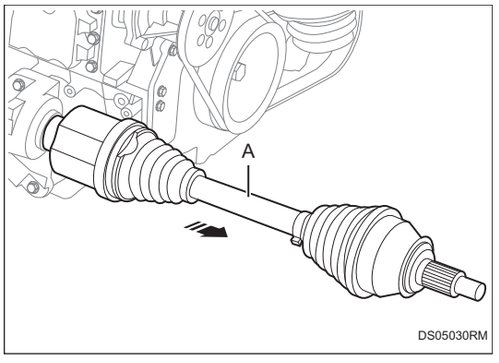


4. Remove the right front driving axle assembly

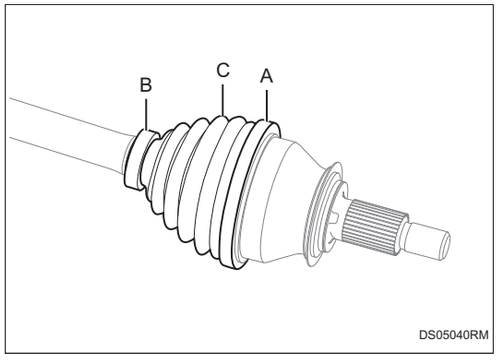
(a) Remove right front driving axle assembly-A- as arrowed by force.

Notice:

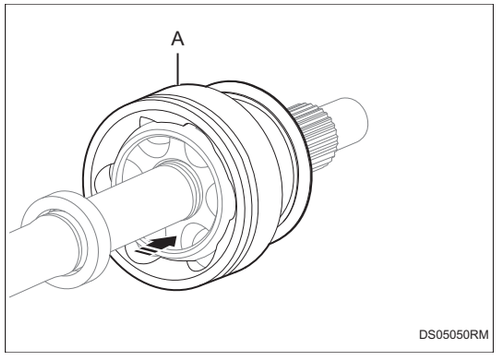
Be careful not to damage the dust boot, the dust cover and the speed sensor rotor.



5. Remove wheel end universal joint

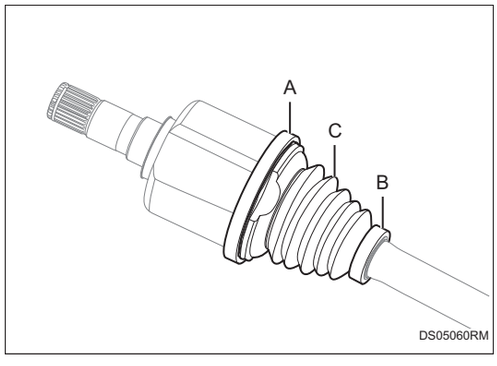


(a) Remove the single-lug stepless clamp -A-B- and detach the dust cover -C-.

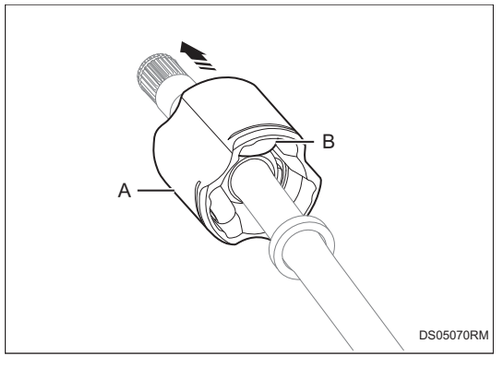


(b) Use a rubber hammer to tap the outer edge of the universal joint -A- in the direction of -arrow-.

6. Remove movable ball cage universal joint



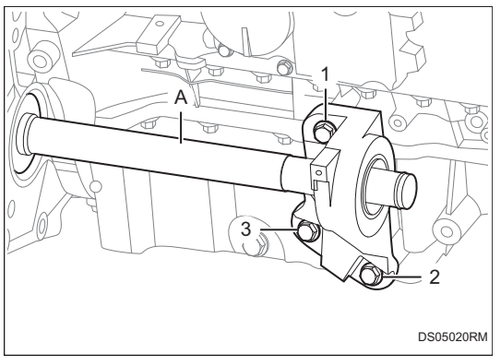
(a) Remove the single-lug stepless clamp -A-B- and detach the dust cover -C-.



(b) Remove the movable ball cage universal joint housing -A- as arrowed.

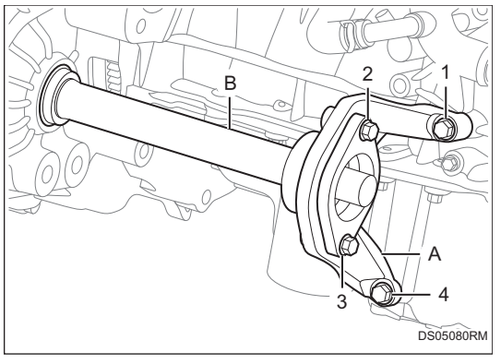
(c) Detach the snap spring and remove the bearing-B-.

7. Remove countershaft with bracket assembly (only for models with AT)



(a) Remove the bolt -1-3- and the countershaft with bracket assembly-A-.

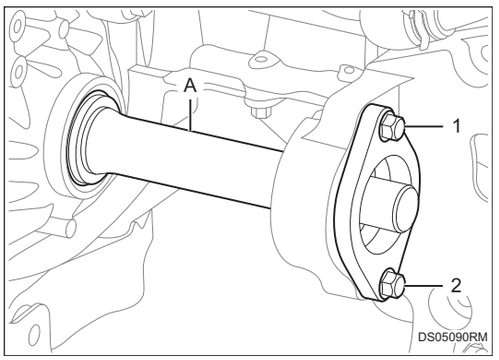
8. Remove countershaft with bracket assembly (only for assembly of DCT)



(a) Remove the bolt -2-3- and the countershaft assembly-B-.

(b) Remove the bolts -1- and -4-, and remove the propeller shaft mount -A-.

9. Remove countershaft with bracket assembly (only for HEV models)



(a) Remove the bolt -1-2- and the countershaft with bracket assembly-A-.

Check

1. Check driving axle

(a) Check and confirm that the outer universal joint is free from excessive gap in the radial direction.

(b) Check and confirm that the inner universal joint slides smoothly in the thrust direction.

(c) Check and confirm that the inner universal joint is free from excessive gap in the radial direction.

(d) Check 2 universal joint dust covers for damage.

Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

   Notice:

   Add enough cage oil during installation.

   Do not damage the oil seal during insertion.

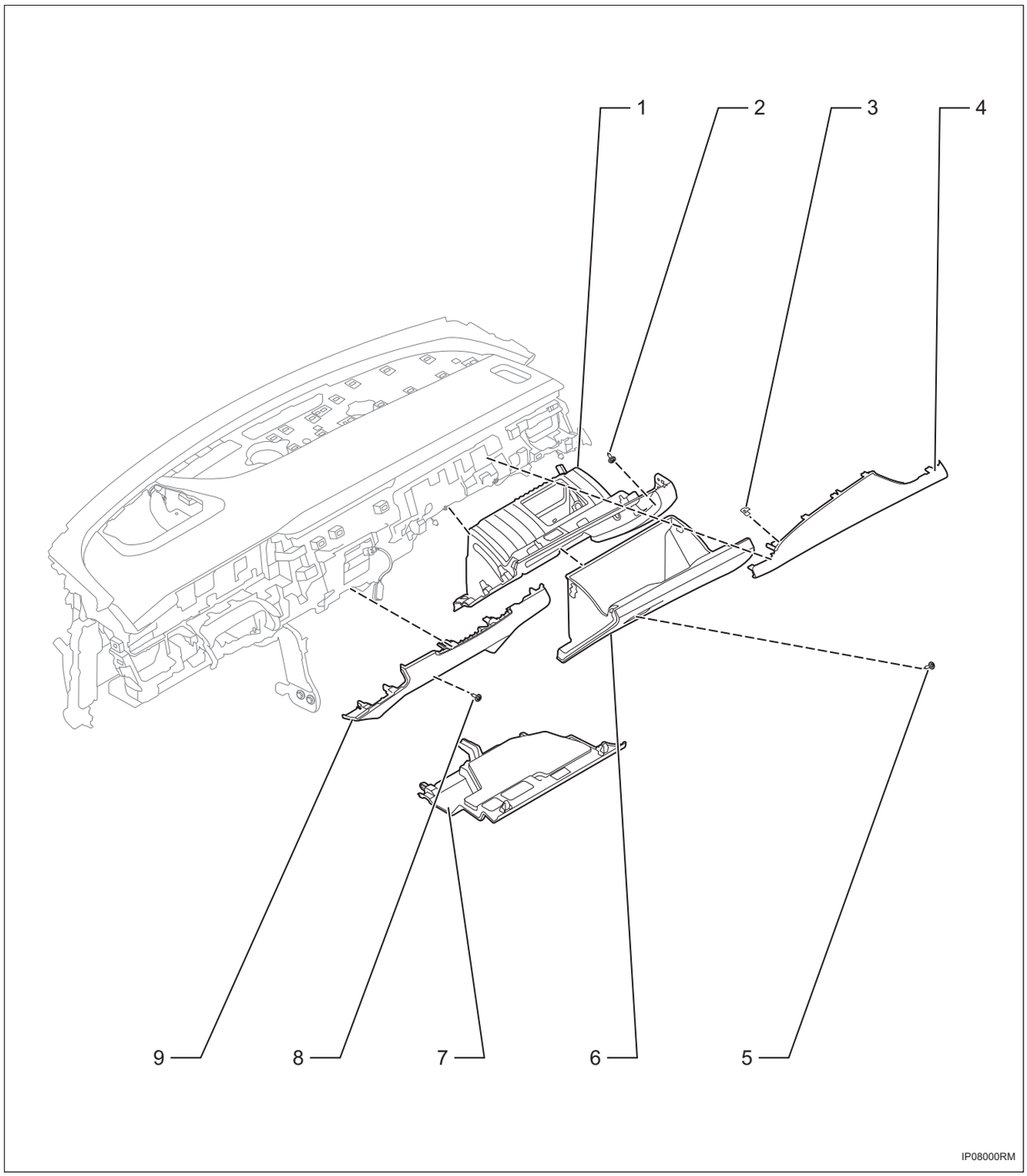
   Use a hammer to hit the top of the outer universal joint.

Instrument panel

Instrument panel assembly IP-1
Parts IP-1
Parts IP-3
Removal IP-5
Installation IP-14
Console assembly IP-15
Parts IP-15
Removal IP-17
Installation IP-22

Instrument panel assembly

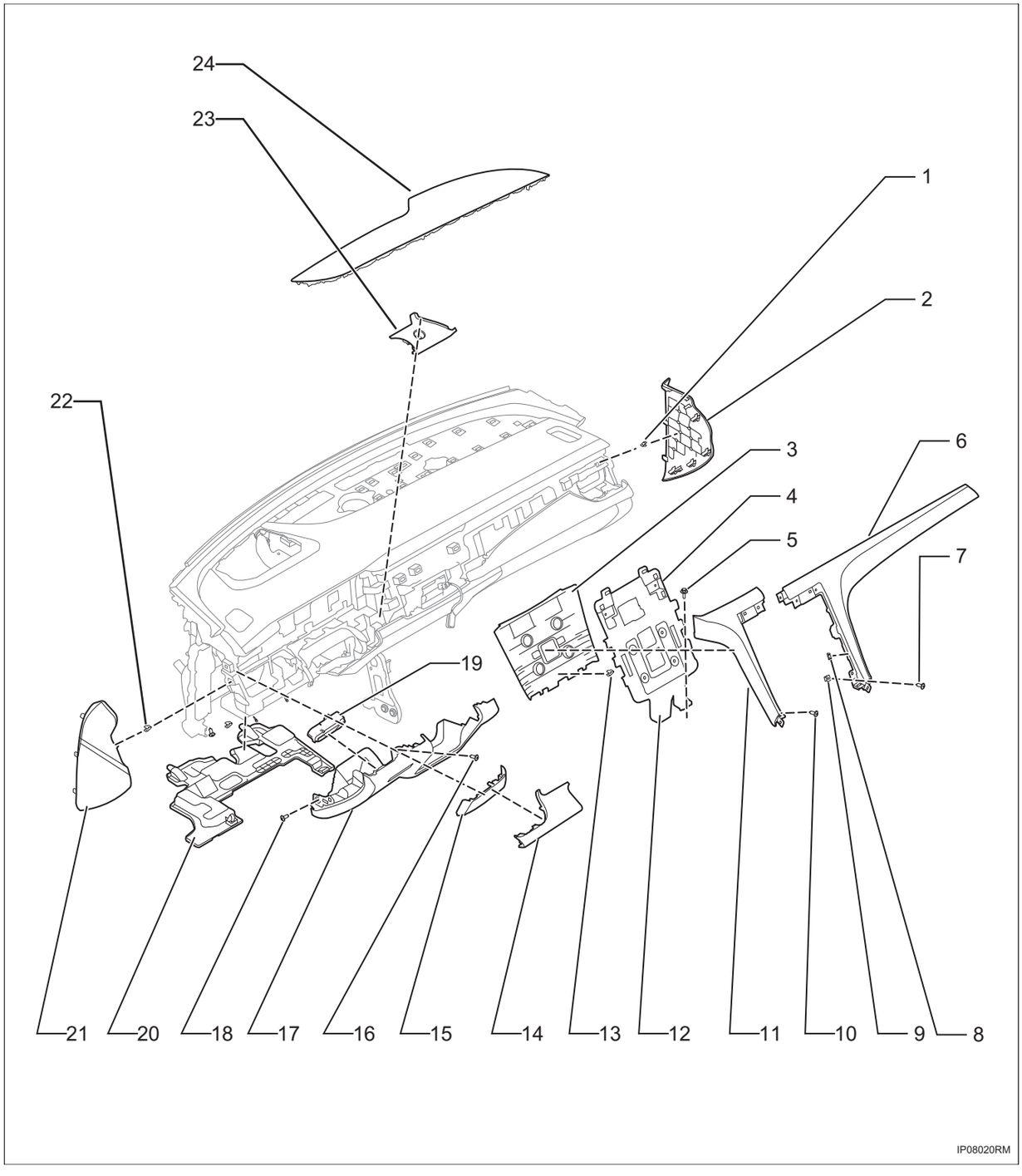
Parts



1. **Storage box trim strip**
2. **Screw**
   - X5
3. **Spring clip**
   - X10

4. **Instrument panel right trim strip**
5. **Screw**
   - X2
6. **Glove box cover assembly**
7. **Left lower bottom guard plate**
8. **Screw**
   - X2
9. **Central guard plate**

Parts



1. **Spring clip**
   - X4
2. **Right end cover**
3. **Instrument panel lower right trim panel**
4. **Instrument panel right trim panel skeleton**
5. **Hexagon flange bolt**

- X2
- Torque: 8 ~ 12 N·m

6. **Instrument panel right trim panel**
7. **Screw**
   - X4
8. **Spring clip**
   - X4
9. **Reed nut**
   - X5
10. **Screw**
    - X4
11. **Instrument panel right middle trim panel**
12. **Spring clip**
    - X17
13. **Spring clip**
    - X9
14. **Instrument panel left trim strip**
15. **Instrument panel upper left trim strip**
16. **Screw**
    - X2
17. **Left lower guard plate assembly**
18. **Cross recessed pan head screw and flat washer assembly**
19. **Left lower guard plate switch assembly**
20. **Left lower bottom guard plate X**
21. **Left end cover**
22. **Clip**
    - X4
23. **Instrument panel middle trim strip assembly**
24. **Center speaker cover assembly**

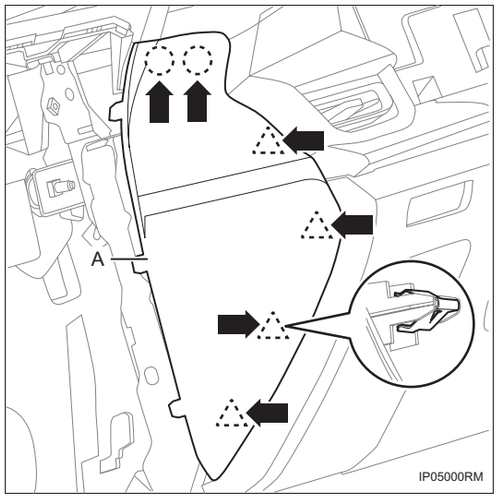
Removal

1. Remove left end cover assembly

Hint:

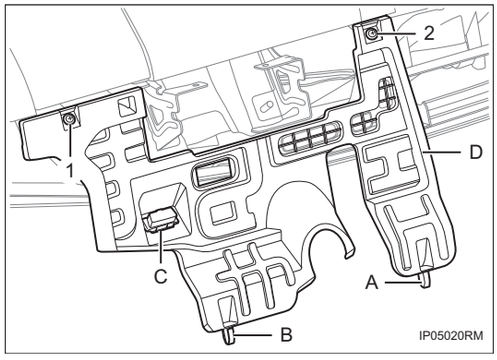
The removal sequence on the right side is the same as that on the left side.

(a) Remove the spring clip -arrow-, and remove the left end cover assembly -A-.



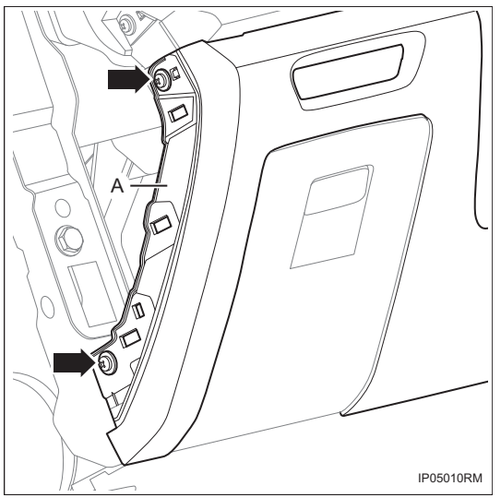
2. Remove the left lower bottom guard plate

(a) Remove screws -1-2- and detach DLC -C-.

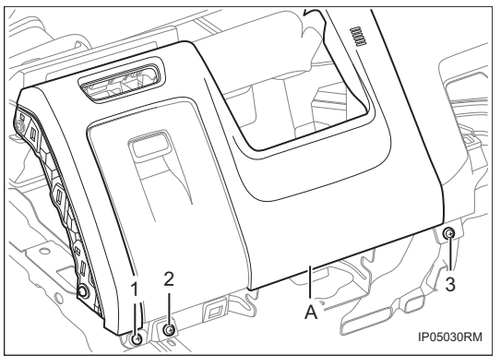


(b) Detach claw -A-B-, and remove left lower bottom guard plate -D-.

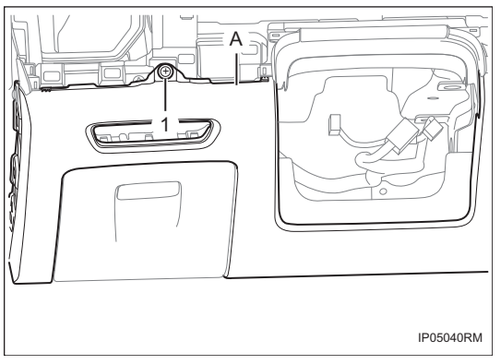
3. Remove left lower guard plate assembly



(a) Remove the fixing screw -arrow- of left lower guard plate assembly -A-.

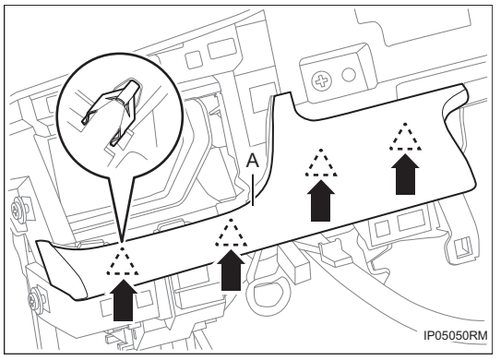


(b) Remove the fixing screws -1-3- of the left lower guard plate assembly -A-.

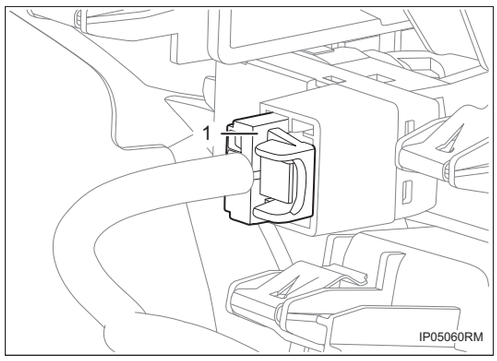


(c) Remove screw -1-, and remove left lower guard plate assembly-A-.

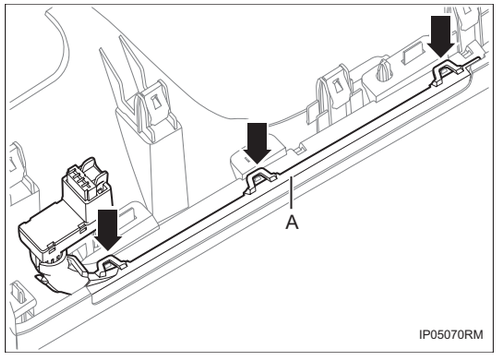
4. Remove instrument panel left trim strip



(a) Remove the spring clip -arrow- and detach the instrument panel left trim strip -A-.

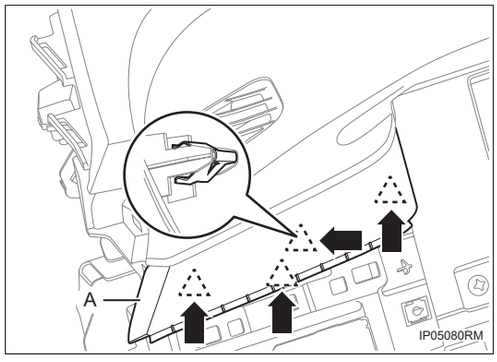


(b) Disconnect the harness connector -A-, and remove the instrument panel left trim strip.



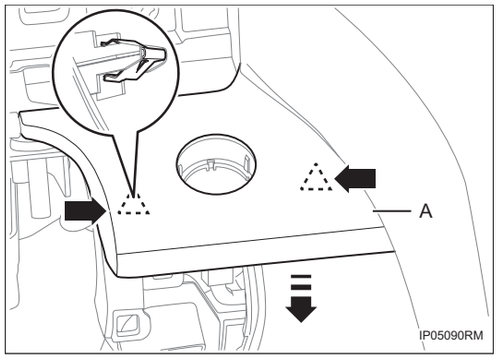
(c) Detach the claw-arrow- and remove the ambient lamp on instrument panel I assembly-A-.

5. Remove instrument panel left upper trim strip



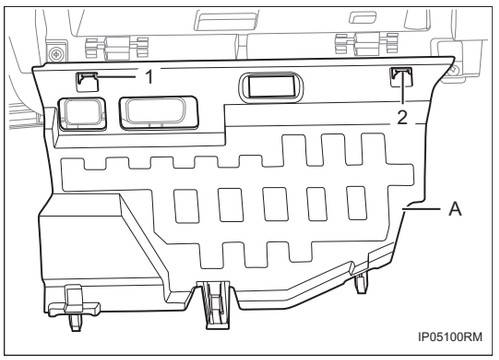
(a) Detach the claw-arrow- and remove the instrument panel upper left trim strip-A-.

6. Remove instrument panel middle trim strip assembly



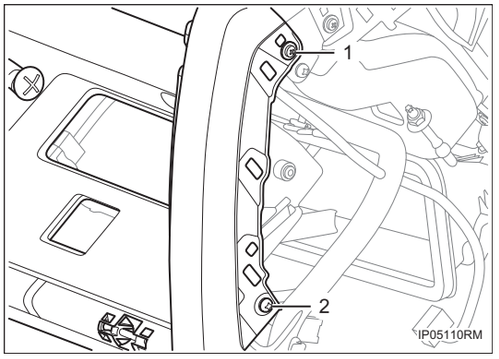
(a) Detach the claw -arrow-, and remove the trim strip assembly -A- in the instrument panel in the direction of the movement arrow.

7. Remove the right lower bottom guard plate

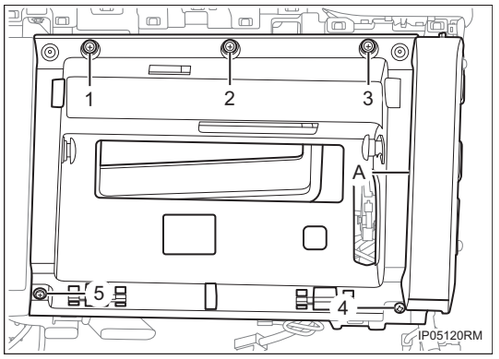


(a) Detach claw -1-2-, and remove right lower bottom guard plate -A-.

8. Remove glove box body

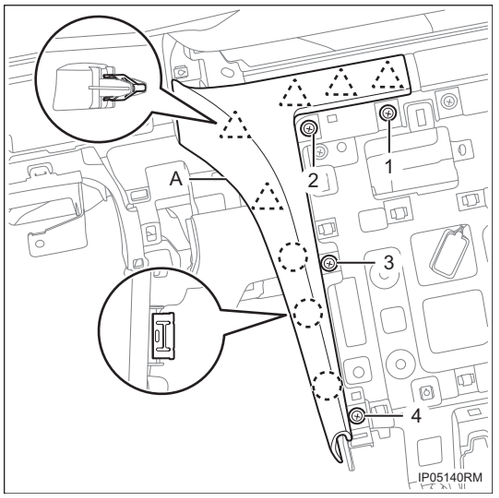


(a) Remove the screw -1-2-.



(b) Remove the screws -1-5-, and remove the glove box body-A-.

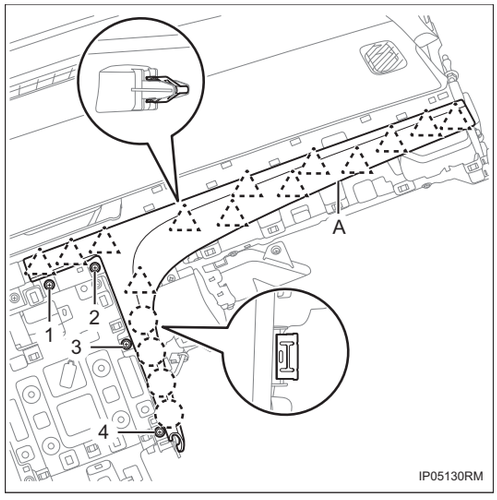
9. Remove instrument panel left trim panel



(a) Remove the screw -1-4-.

(b) As shown in the figure, detach the claw and remove the left instrument panel trim panel -A-.

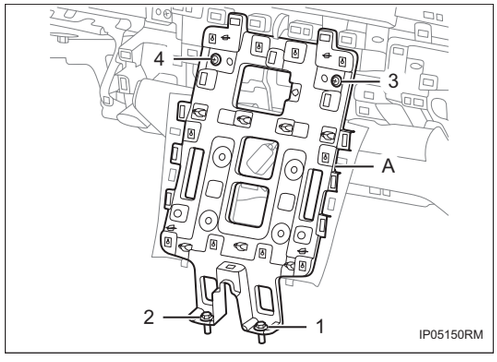
10. Remove instrument panel right trim panel



(a) Remove the screw -1-4-.

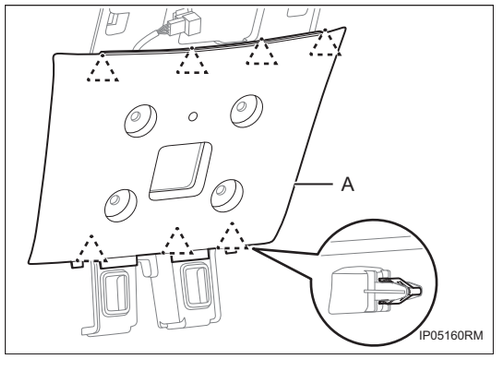
(b) As shown in the figure, detach the claw and remove the the instrument panel right trim panel -A-.

11. Remove instrument panel right trim panel skeleton



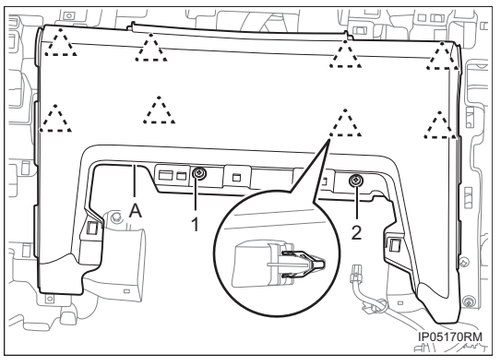
(a) Remove bolts -1-2- and screws -3-4- and remove the instrument panel right trim panel skeleton -A-.

12. Remove instrument panel right lower trim panel



(a) As shown in the figure, detach the claw and remove the right instrument panel trim panel-A-.

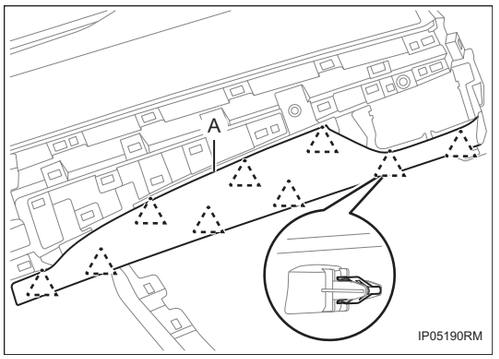
13. Remove the middle guard plate



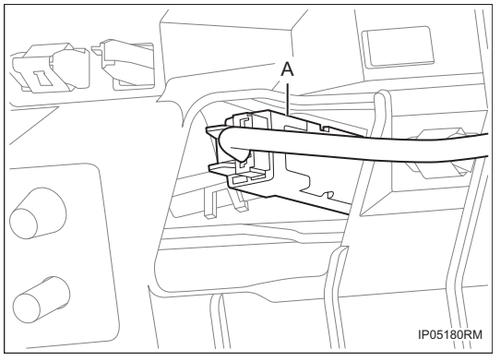
(a) Remove the screw -1-2-.

(b) As shown in the figure, detach the claw and remove the middle guard plate -A-.

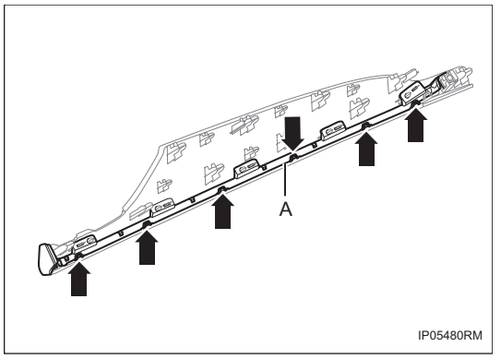
14. Remove instrument panel right trim strip



(a) Detach the claw as shown and detach the instrument panel right trim strip -A-.



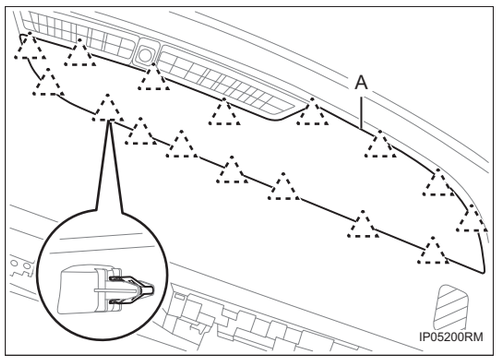
(b) Disconnect the harness connector -A-, and remove the instrument panel right trim strip.



(c) Detach the claw-arrow- and remove the ambient lamp on instrument panel I assembly-A-.

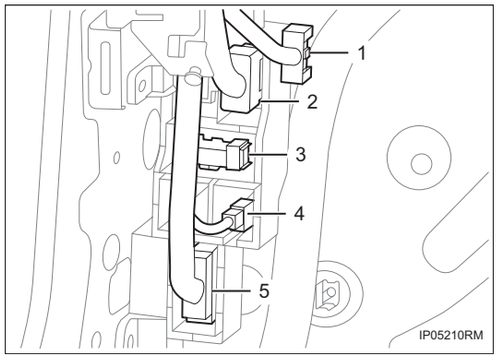
15. Remove center speaker cover

IP

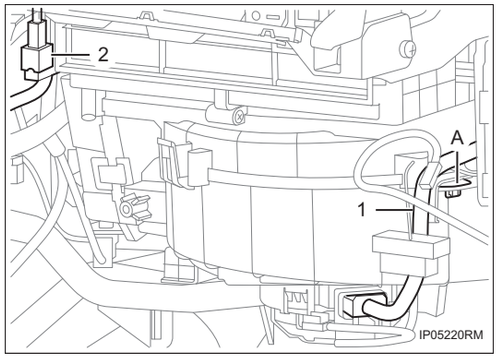


(a) As shown in the figure, detach the claw and the center speaker cover -A-.

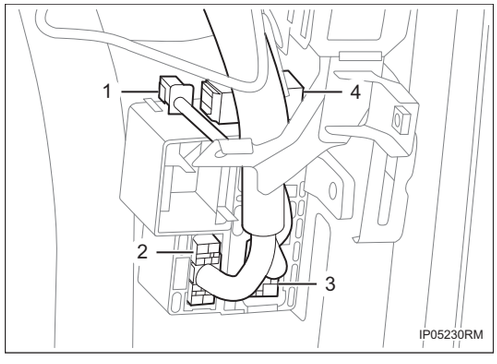
16. **Remove left drip channel cover assembly (See page WW-8)**
17. **Remove front wiper motor linkage assembly (See page WW-8)**
18. **Remove instrument panel assembly**



(a) Disconnect the harness connector -1-5- at the lower left corner of the instrument panel assembly.

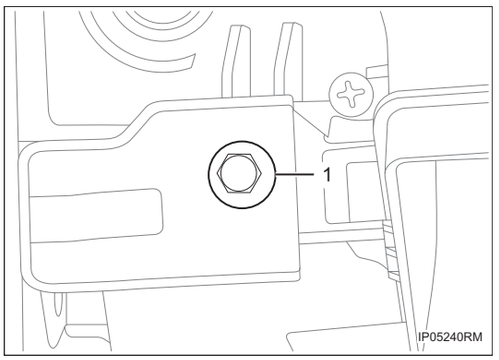


(b) Disconnect A/C harness connectors -1-2-and detach harness fixing clip-A

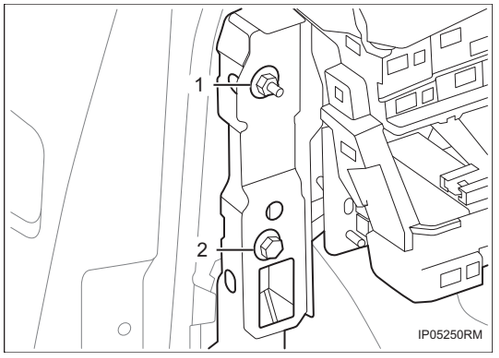


(c) Disconnect connector 1-4- at the lower right corner of the instrument panel assembly-.

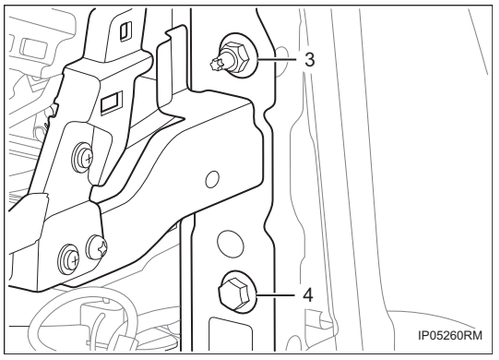
IP



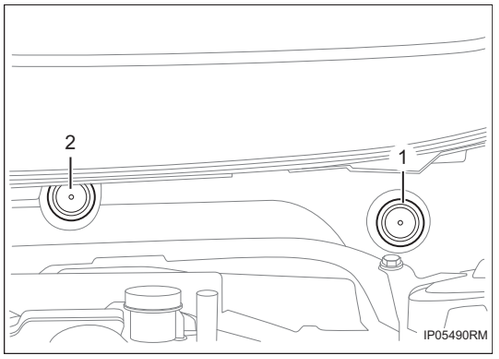
(d) Remove the screw -1-.



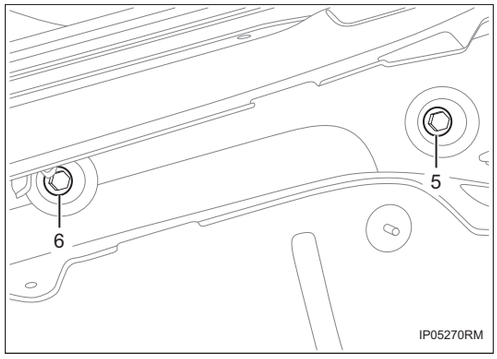
(e) Remove the left fixing nut -1- and bolt -2- of the instrument panel crossmember assembly.



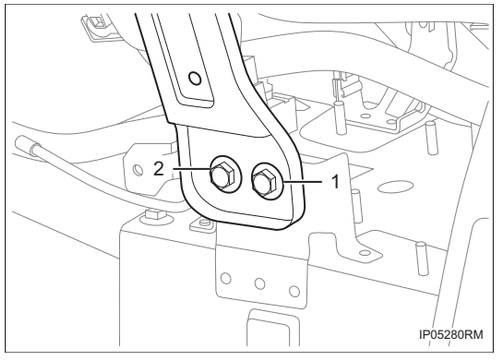
(f) Remove the right fixing nut -3- and bolt -4- of the instrument panel crossmember assembly.



(g) Remove the blanking caps -1-2- of front fixing bolts of instrument panel crossmember assembly.

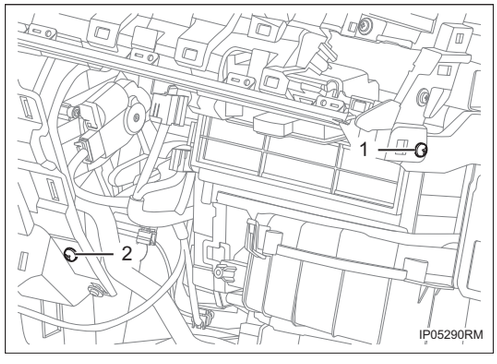


(h) Remove the front fixing bolts -5-6- of instrument panel crossmember assembly.

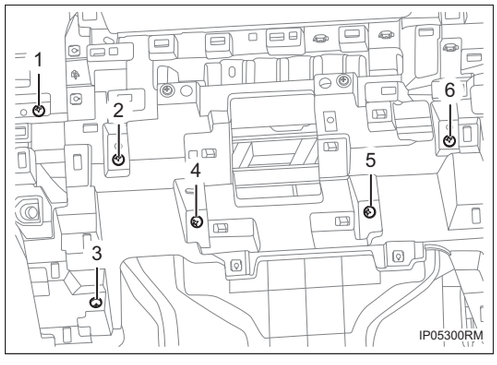


(i) Remove the lower fixing bolts -1-2- of instrument panel crossmember assembly.

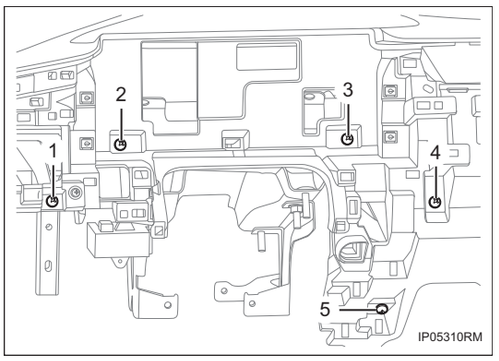
(j) Remove the instrument panel and the crossmember assembly.



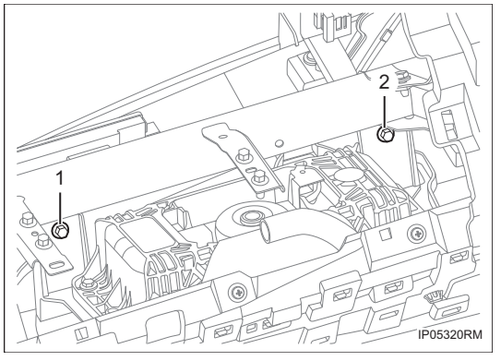
(k) Remove the fixing bolt -1-2- on the right side of the instrument panel.



(l) Remove the middle fixing bolt -1-2- of the instrument panel.



(m) Remove the fixing bolt -1-6- on the left side of the instrument panel.



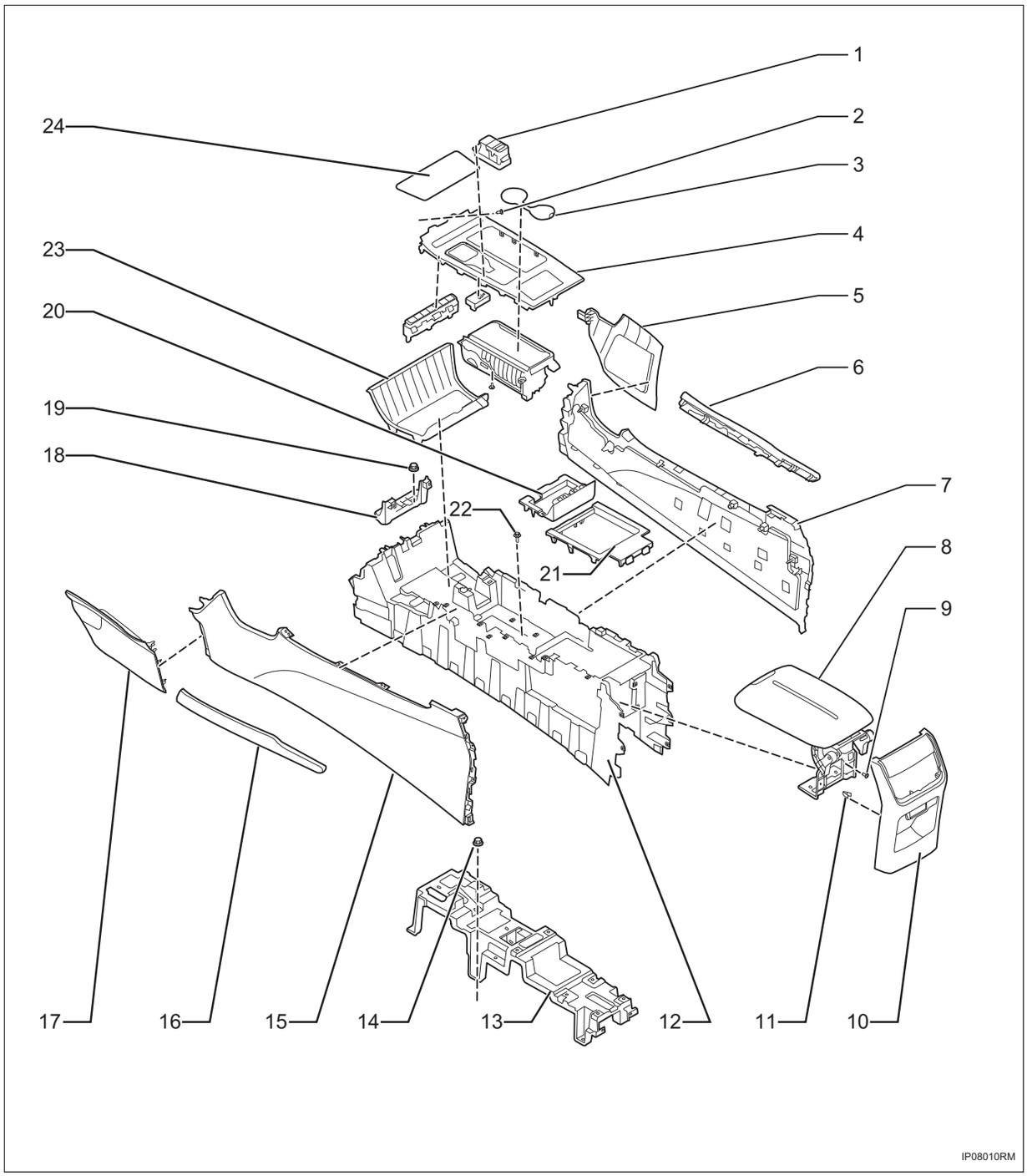
(n) Remove the screws -1-2-, the instrument panel and crossmember assembly.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Console assembly

Parts

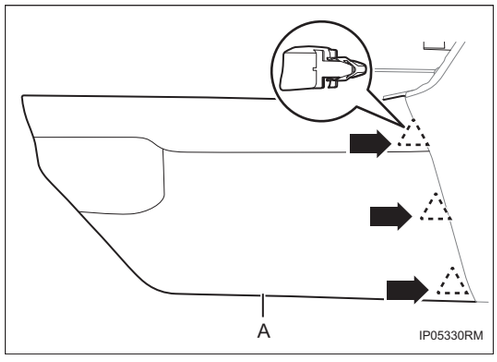


1. **MCP assembly**
2. **Screw**
   - X2
3. **Cup mat**
4. **Upper cover plate**

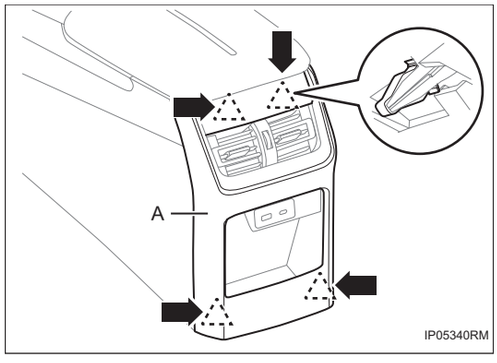
5. **Right front extension plate**
6. **Right trim panel**
7. **Right guard plate of console**
8. **Armrest assembly**
9. **Screw**
   - X5
10. **Rear end plate**
11. **Spring clip**
    - X2
12. **Console skeleton**
13. **Central fixing bracket**
14. **Hexagon flange nut**
    - X6
    - Torque: 8 ~ 12 N·m
15. **Console left guard plate**
16. **Left trim panel**
17. **Left front extension plate**
18. **Fixing bracket**
19. **Hexagon flange nut**
    - X2
    - Torque: 8 ~ 12 N·m
20. **Middle trim panel**
21. **Trim panel**
22. **Hexagon flange bolt**
    - X8
    - Torque: 8 ~ 12 N·m
23. **Glove box**
24. **Glove box pad**

Removal

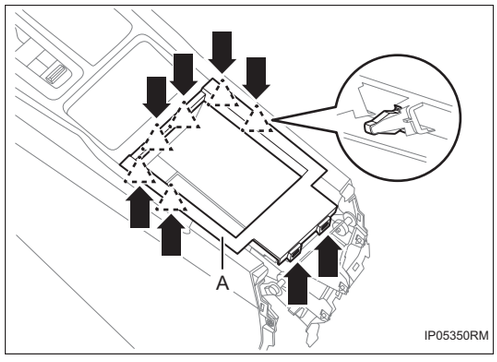
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove left front extension plate**
   (a) Detach claw -arrow- and remove left front extension plate -A-.



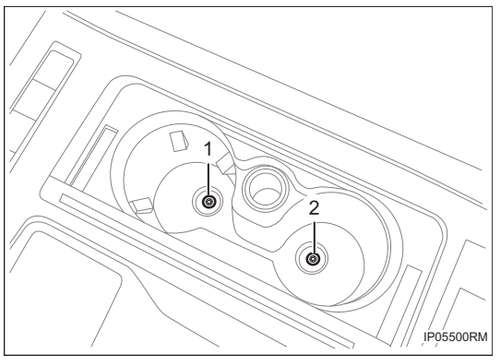
3. **Remove rear end plate**
   (a) Detach the claw -arrow-, and remove the rear end panel -A-.



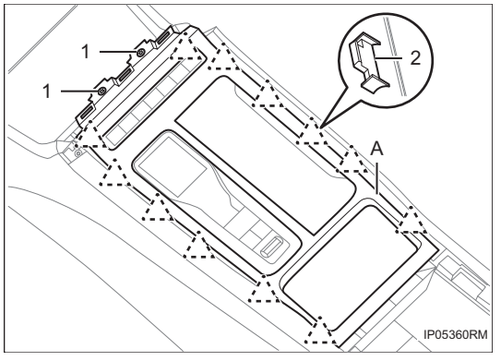
4. **Remove dual USB charging port assembly (See page CH-5)**
5. **Remove console air outlet assembly (See page AC-138)**
6. **Remove trim panel**
   (a) Detach claw -arrow- and remove trim panel -A-.



7. **Remove gearshift lever assembly (See page EG-33)**
8. **Remove main display assembly (See page AV-47)**
9. **Remove upper cover plate assembly**

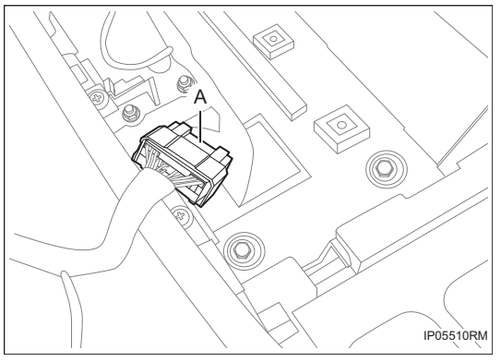


(a) Take out the cup holder pad and remove the screw -1-2-.



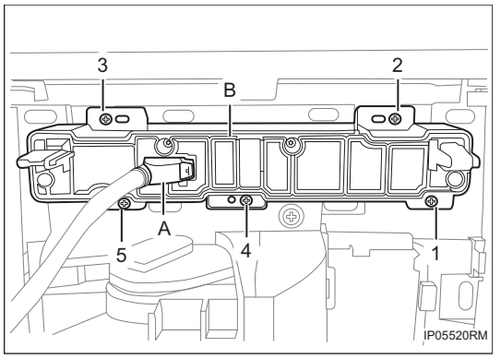
(b) Remove the screw -1-2-.

(c) Detach claw -2-and detach trim panel upper cover plate assembly-A-.



(d) Disconnect the harness connector -A-, and remove the upper cover plate assembly.

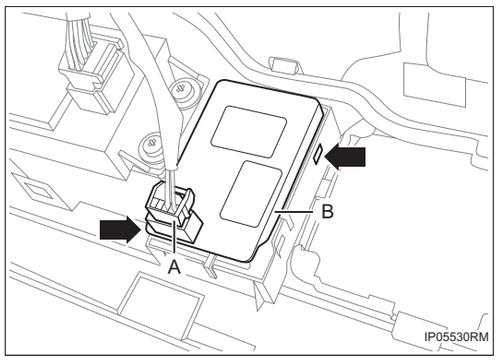
10. Remove FCP assembly



(a) Disconnect the harness connector-A-.

(b) Remove the screws -1-5-, and remove the plate switch assembly-B-.

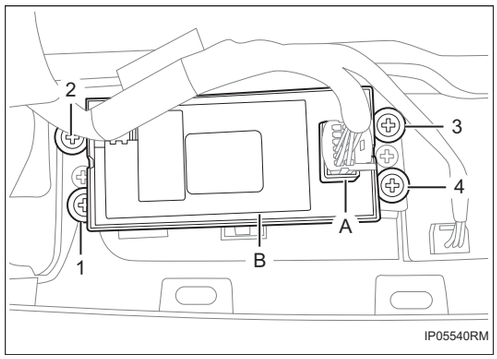
11. Remove gear position indicator lamp assembly



(a) Disconnect the harness connector-A-.

(b) Detach the claw-arrow- and remove the gear position indicator lamp assembly-B-.

12. Remove MCP assembly



(a) Disconnect the harness connector-A-.

(b) Remove screws -1-4-, and remove MCP assembly-B-.

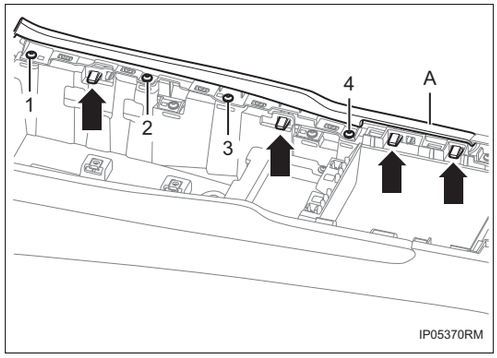
13. Remove cigarette lighter (See page CH-11)

14. Remove on-board wireless charger assembly (See page CH-16)

15. Remove right trim panel

Hint:

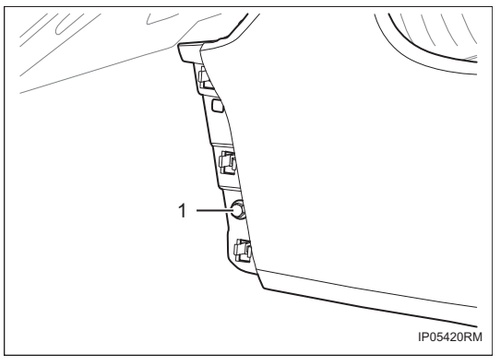
The removal sequence on the right side is the same as that on the left side.



(a) Remove the screw -1-4-.

(b) Detach claw -arrow- and remove right trim panel -B-.

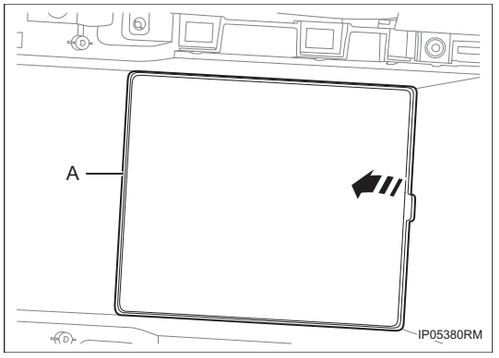
16. Remove console assembly



(a) Remove the front fixing bolt -1- of console assembly.

Hint:

The removal sequence on the right side is the same as that on the left side.



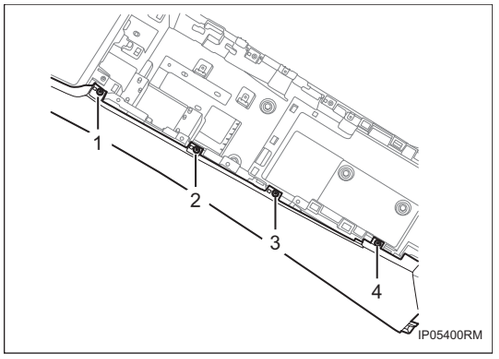
(b) Take out the armrest box bottom plate - A - in the direction of arrow.

(c) Remove bolts -1-6-, and remove console assembly-A-.

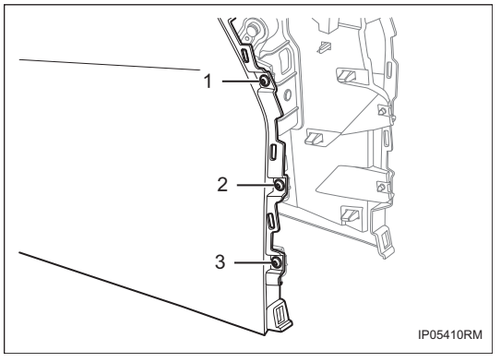
17. Remove console side guard plate

Hint:

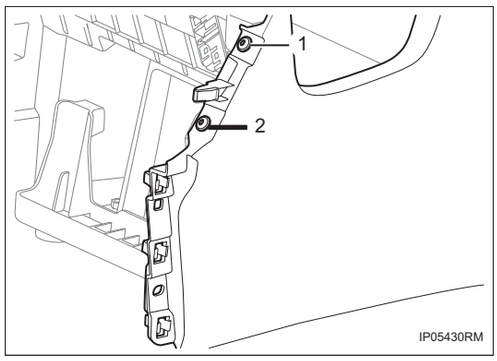
The removal sequence on the right side is the same as that on the left side.



(a) Remove the console side guard plate upper fixing screws -1-4-.

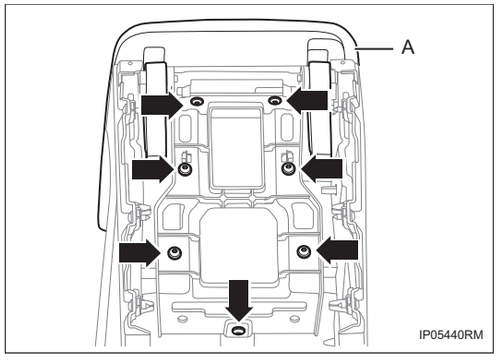


(b) Remove the console side guard plate rear fixing screws -1-3-.



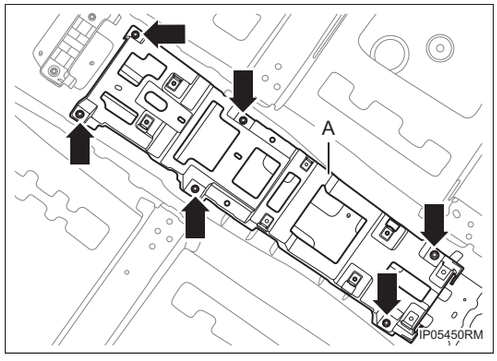
(c) Remove the console side guard plate front fixing screws -1-2-.

18. Remove rear armrest assembly and reinforcement bracket



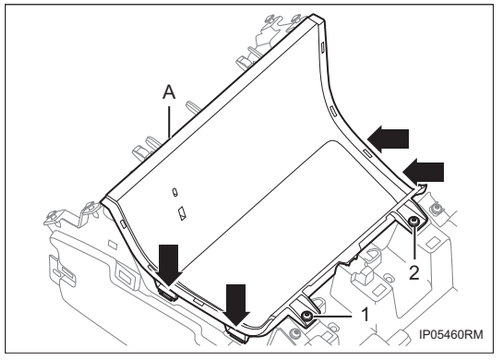
(a) Remove the screw as arrowed and remove the rear armrest assembly and reinforcement bracket-A-.

19. Remove console assembly bracket



(a) Remove the nut as arrowed and remove the console assembly bracket-A-.

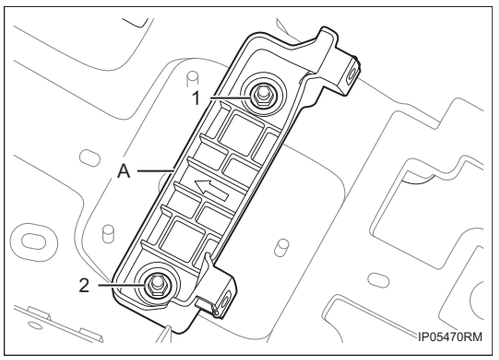
20. Remove glove box



(a) Detach the claw -arrow- and remove the screws -1-2-.

(b) Remove the glove box -A-.

21. Remove fixing bracket



(a) Remove nuts -1-2-, and remove fixing bracket-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

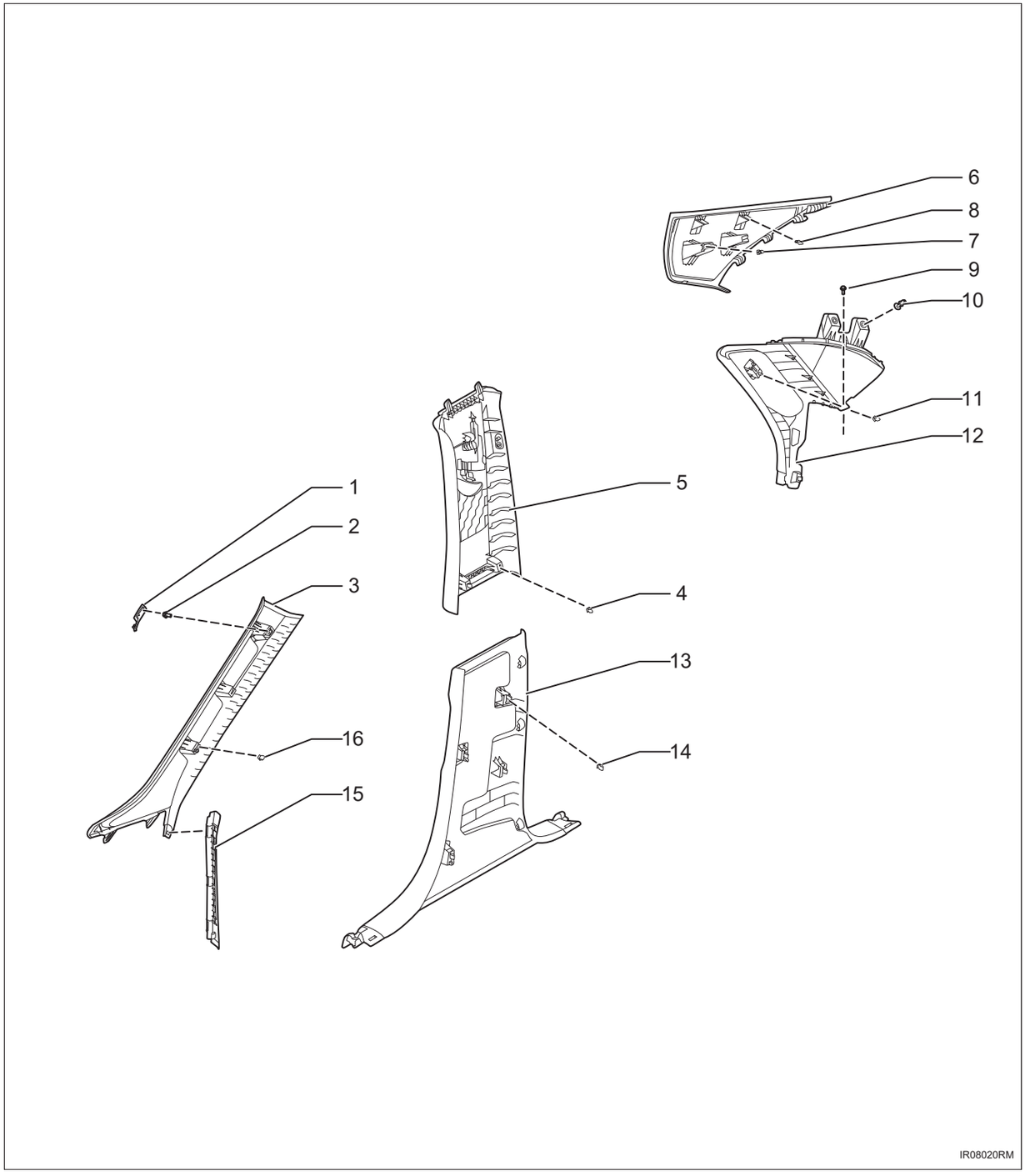
Interiors

A, B, C, D pillar guard plates IR-1
Parts IR-1
Removal IR-3
Installation IR-5
Front door guard plate IR-6
Parts IR-6
Removal IR-8
Installation IR-13
Parcel shelf guard plate assembly IR-14
Parts IR-14
Removal IR-16
Installation IR-16
Rear door guard plate IR-18
Parts IR-18
Removal IR-20
Installation IR-23
Carpet and heat insulation pad IR-24
Parts IR-24
Part (only for HEV models) IR-25
Removal IR-26
Installation IR-28
Trunk side covering IR-29
Parts IR-29
Parts IR-31
Removal IR-33
Installation IR-34
Sun visor assembly IR-35
Parts IR-35
Removal IR-36
Installation IR-37
Sill trim panel IR-38
Parts IR-38
Removal IR-40
Installation IR-41
Roof IR-42
Parts IR-42
Removal IR-44
Installation IR-45

Roof grab handle IR-46
Parts IR-46
Removal IR-47
Installation IR-47

A, B, C, D pillar guard plates

Parts



1. **A pillar right trim cover**
2. **Screw**
3. **A pillar left upper guard plate**
4. **Clip**
   - X2

5. **B pillar left upper guard plate**
6. **D pillar left upper guard plate sound-absorbing felt**
7. **Clip**
   - X2
8. **Clip**
   - X2
9. **Hexagon flange bolt**
   - Torque:8 ~ 10 N·m
10. **Clip**
    - X2
11. **Clip**
    - X2
12. **C pillar left upper guard plate assembly**
13. **B pillar left lower guard plate**
14. **Clip**
    - X4
15. **A pillar left lower guard plate**
16. **Clip**
    - X3

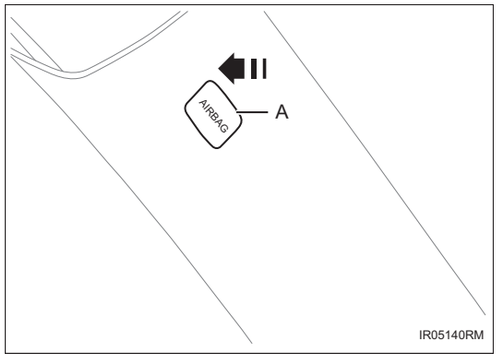
Removal

Hint:

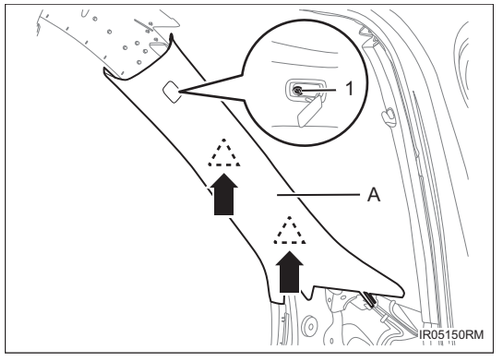
The removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove front door sill trim panel (See page IR-40)**
3. **Remove rear door sill trim panel**
4. **Remove A pillar upper guard plate**



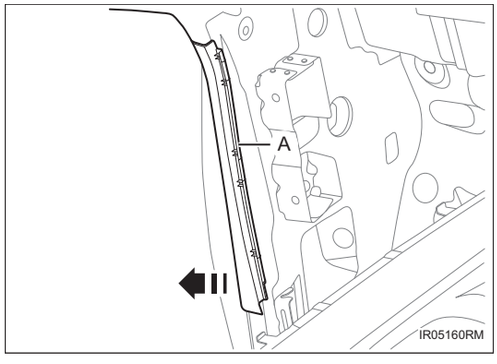
(a) Pry the - arrow - position and remove the side curtain airbag identification trim cover -A-.



(b) Remove the bolt -1- and detach the spring clip - arrow-.

(c) Remove the pillar upper guard plate -A-.

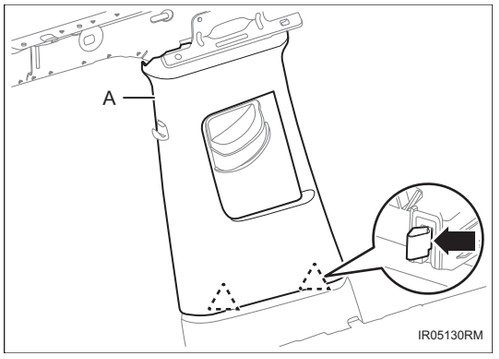
5. **Remove instrument panel end cover assembly (See page IP-5)**
6. **Remove A pillar lower guard plate**



(a) Pry in the direction of -arrow- and remove the lower guard plate -A- of A pillar.

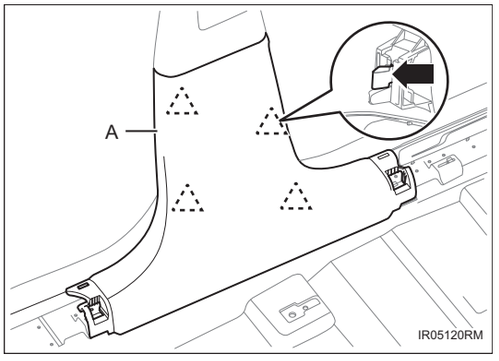
7. Remove seat side seat belt fixing bolt (See page SB-3)

8. Remove B pillar upper guard plate



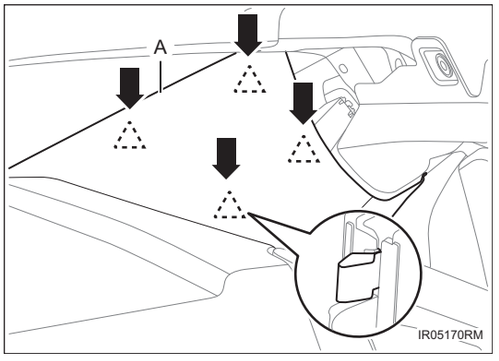
(a) Detach the spring clip -arrow-, and remove the B pillar upper guard plate -A-.

9. Remove B- pillar lower guard plate



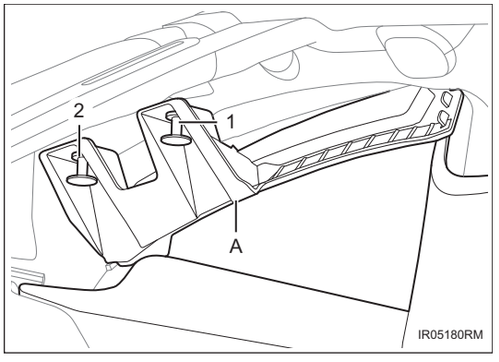
(a) Detach the spring clip -arrow-, and remove the B pillar lower guard plate -A-.

10. Remove D pillar upper guard plate

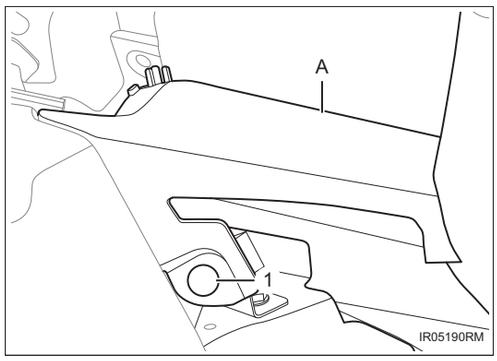


(a) Detach spring clip -arrow- and remove D pillar upper guard plate -A-.

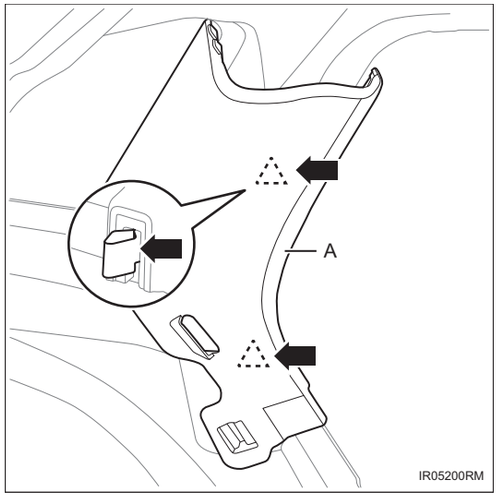
11. Remove C pillar upper guard plate



(a) Detach the retaining clip -1-2- of C pillar upper guard plate -A-.



(b) Detach the lower retaining clip -1- of C pillar upper guard plate -A-.



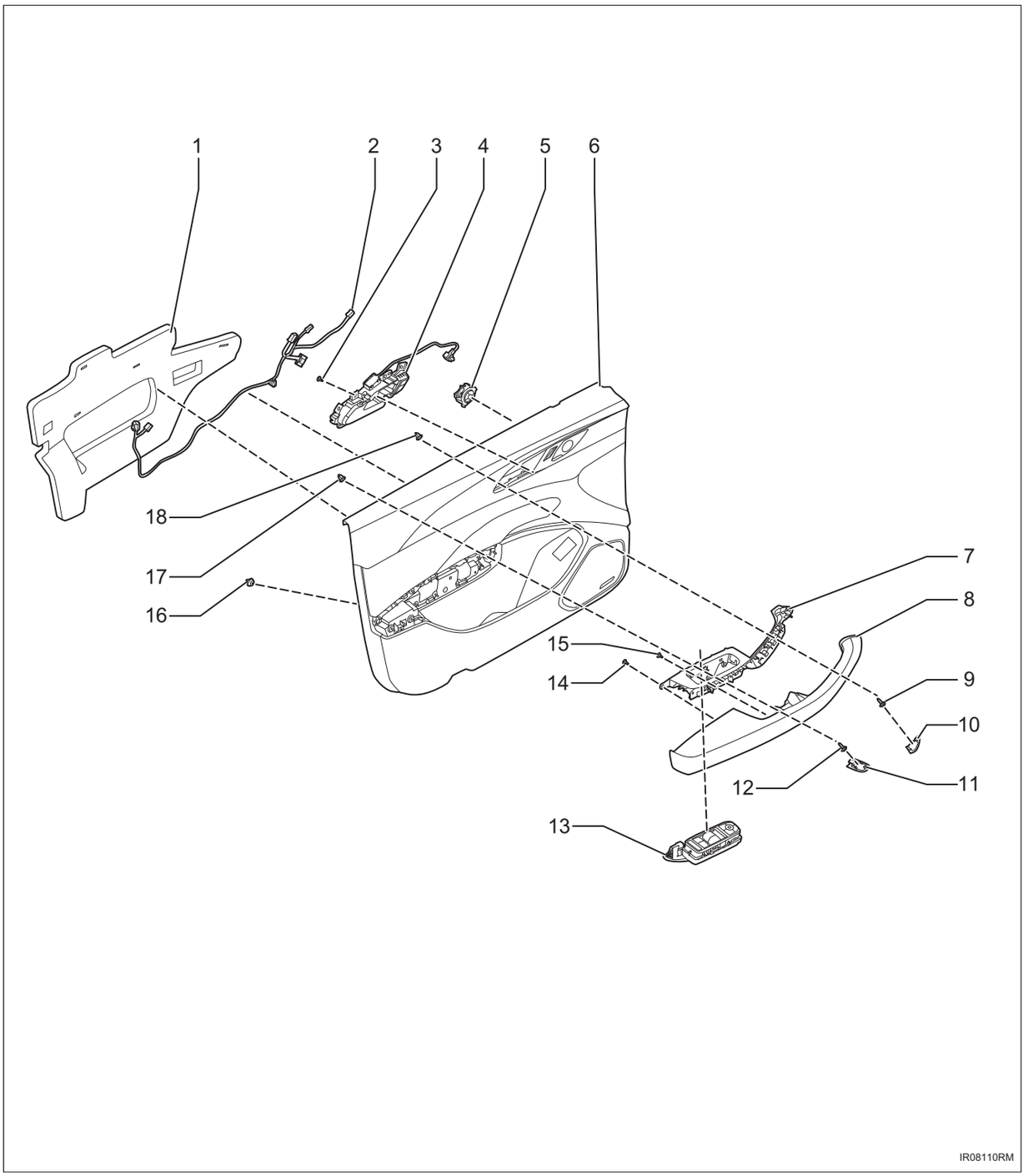
(c) Detach spring clip -arrow- and remove C pillar upper guard plate -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Front door guard plate

Parts



1. **Driver door sound-absorbing felt I**
2. **Driver door transition harness assembly**
3. **Tapping screw**
   - X9
4. **Driver door inside handle assembly**

5. **Tweeter assembly**
6. **Driver door upper guard plate**
7. **Driver door switch panel**
8. **Driver door armrest**
9. **Tapping screw**
   - X9
10. **Driver door screw trim cover II**
11. **Driver door screw trim cover**
12. **Tapping screw**
    - X9
13. **Driver window regulator switch assembly**
14. **Tapping screw**
15. **Tapping screw**
    - X20
16. **Clip**
    - X10
17. **Insert nut**
18. **Insert nut**

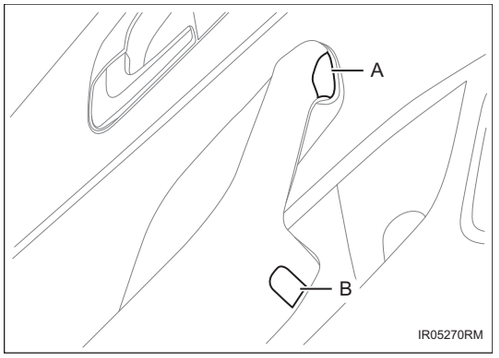
Removal

Hint:

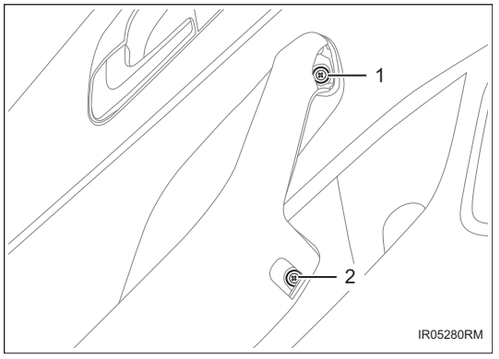
The removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

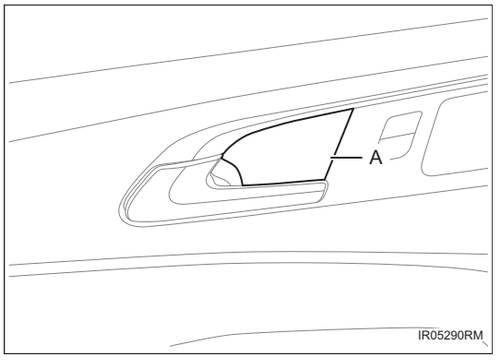
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove front door guard plate**



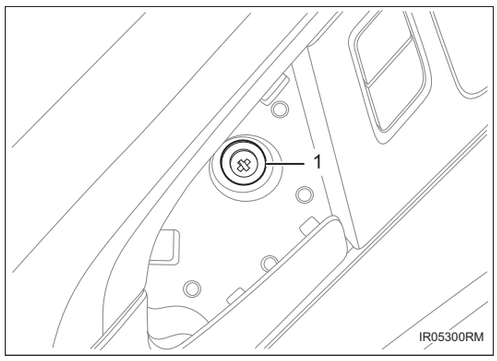
(a) Remove the front door screw trim cover-A-B-.



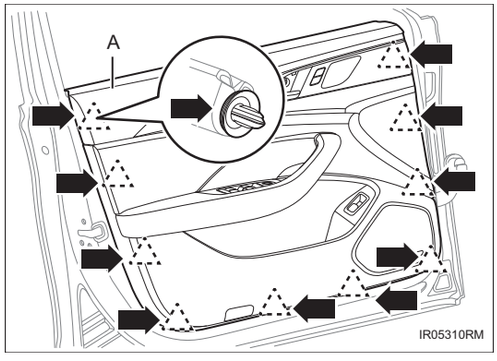
(b) Remove the fixing screw of the front door guard plate -1-2-.



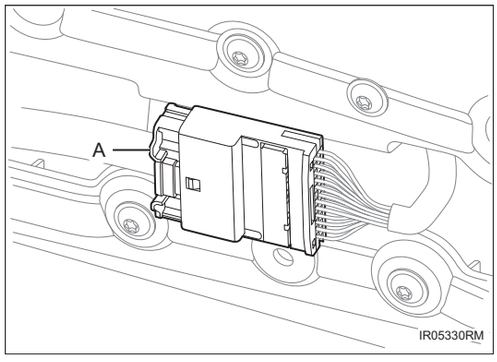
(c) Remove the front door handle inner trim cover-A-.



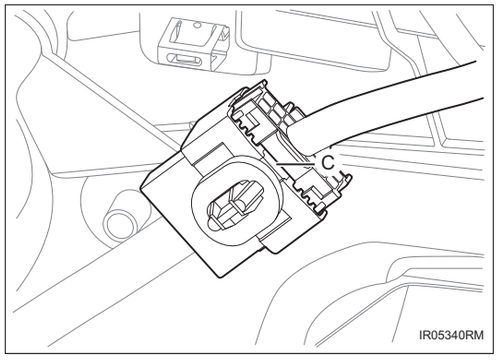
(d) Remove the front door handle inner screw -1-.



(e) Detach clip -arrow- and detach front door guard plate -A-.

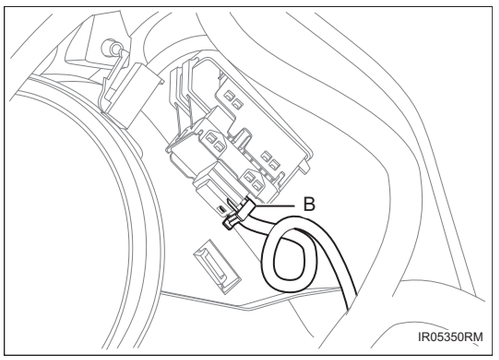


(f) Disconnect the regulator switch harness connector-A-.

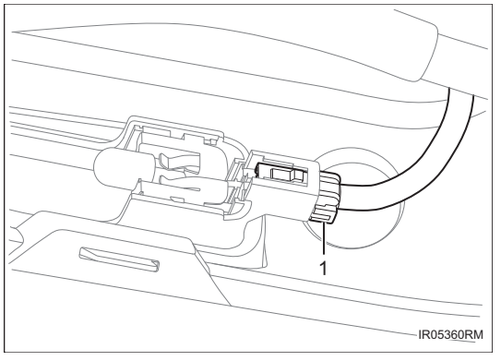


(g) Disconnect the front door guard plate harness connector-C-.

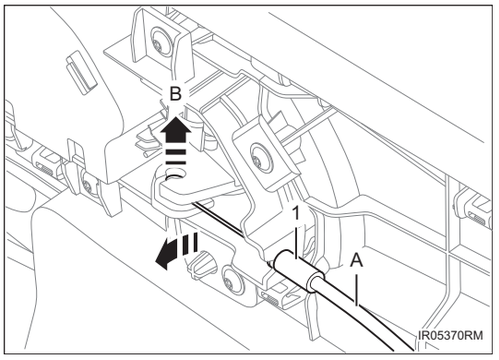
IR



(h) Disconnect the trunk unlocking harness connector-B-.



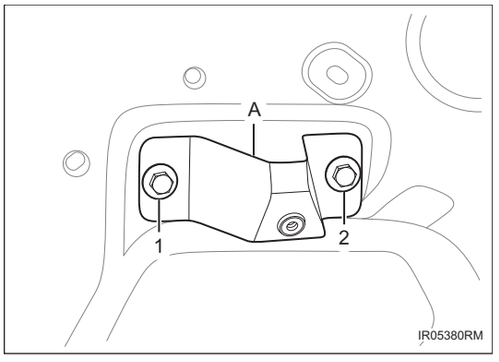
(i) Disconnect the door lamp assembly harness connector -1-.



(j) Detach the cable -1-, and rotate the cable -A- in the direction of -arrow-.

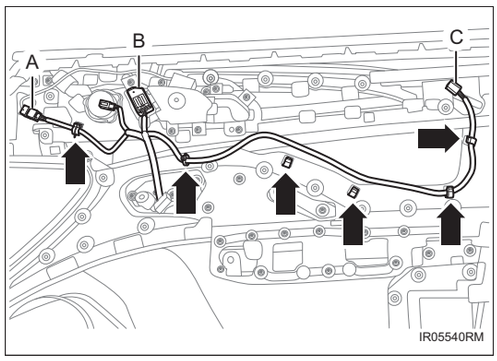
(k) Rotate the cable -A- to the gap and take out the cable in the direction of arrow B.

3. Remove front door armrest bracket



(a) Remove bolts -1-2-, and remove front door armrest bracket-A-.

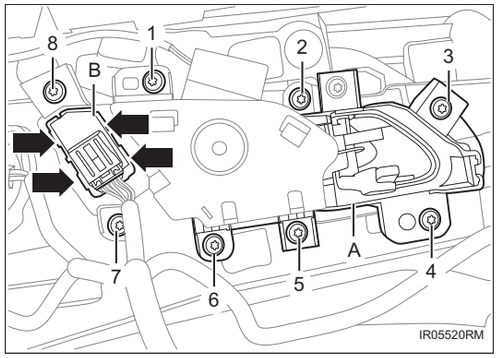
4. Remove front door guard plate harness



(a) Disconnect the harness connector-A-C-.

(b) Detach the harness fixing claw -arrow-.

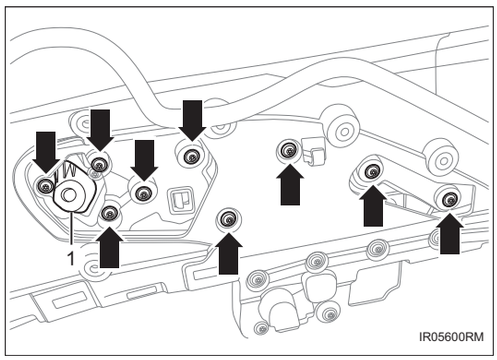
5. Remove the front door inside handle assembly



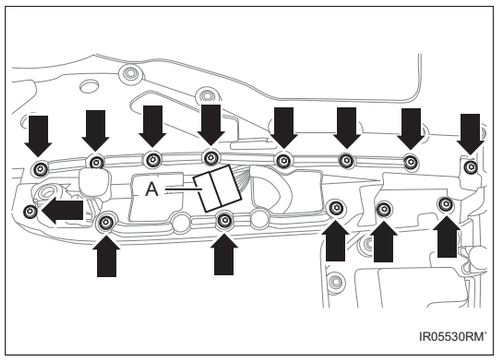
(a) Remove the bolts -1-8-, and remove the front door inner handle assembly-A-.

(b) Detach the claw-arrow- and remove the central locking switch assembly-B-.

6. Remove front door armrest



(a) Remove the fixing screw -arrow- of front door armrest -A-.



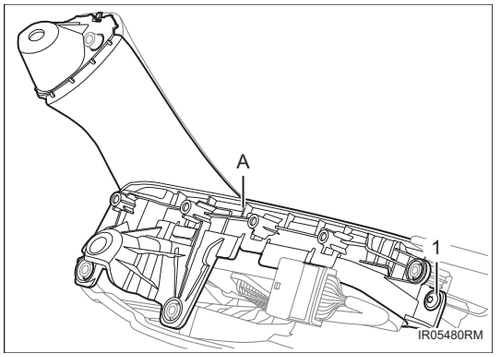
(b) Disconnect the harness connector retaining clip.

(c) Remove the fixing screw -arrow- of front door armrest .

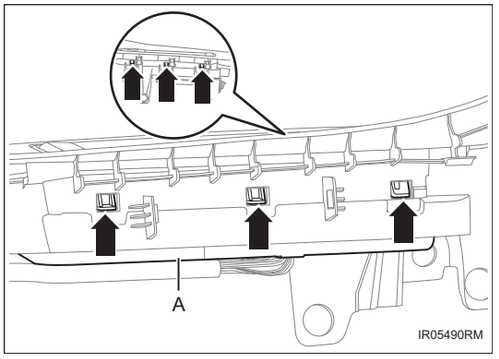
IR

7. Remove driver window regulator switch assembly

(a) Remove screw -1-, and remove driver door switch panel-A-.

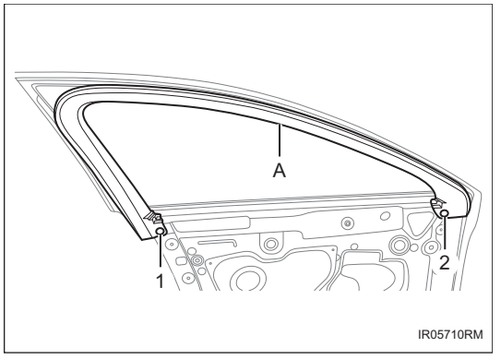


(b) Detach the claw-arrow- and remove the driver window regulator switch assembly-A-.



8. Remove front door frame trim panel assembly

(a) Detach clips -1-2- and remove front door frame trim panel assembly -A-.

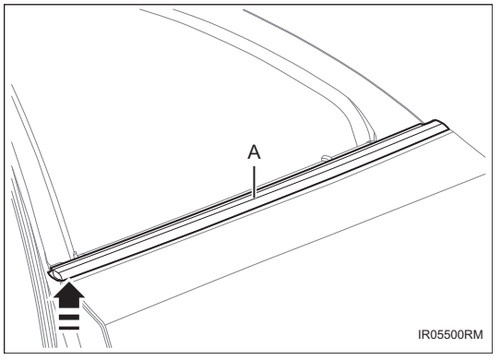


9. Remove front door outer weatherstrip assembly

Hint:

All door weatherstrips are removed in the same order.

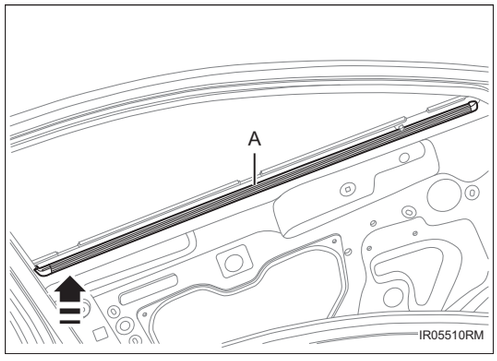
(a) Tilt the front door outer weatherstrip assembly-A- as arrowed.



10. Remove the front door inner weatherstrip assembly

Hint:

All door weatherstrips are removed in the same order.



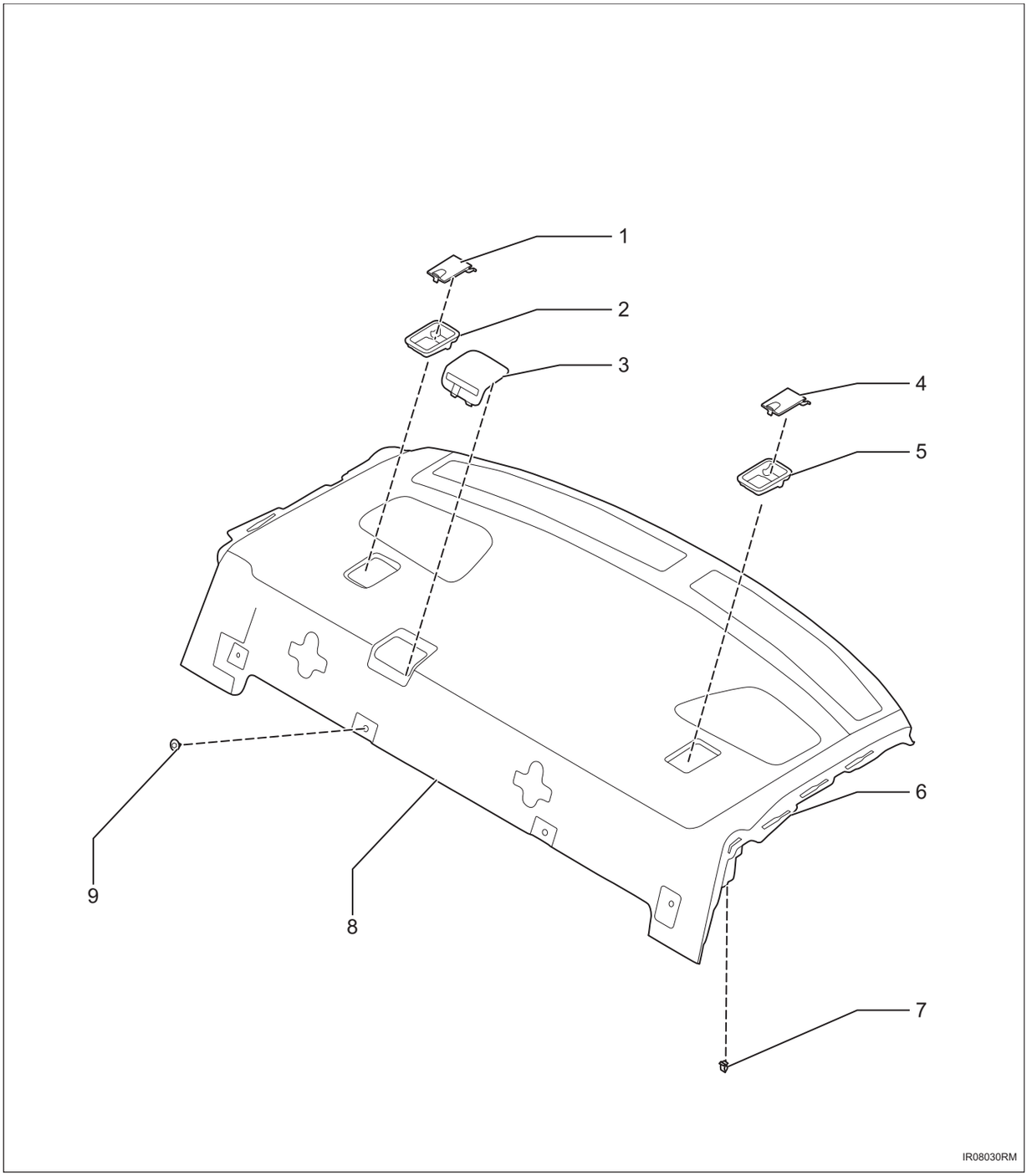
(a) Tilt the front door inner weatherstrip assembly-A as arrowed.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Parcel shelf guard plate assembly

Parts

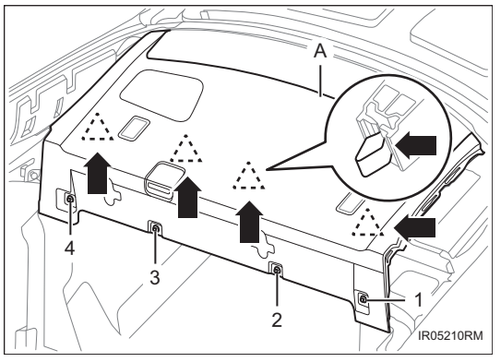


1. **Child safety seat locking hook trim cover**
2. **Child safety seat latch hook trim seat**
3. **Rear seat belt middle guide cover**

4. **Child safety seat locking hook trim cover**
5. **Child safety seat latch hook trim seat**
6. **Parcel shelf guard plate body**
7. **Spring clip**
   - X4
8. **Clip**
   - X2
9. **Clip**
   - X2

Removal

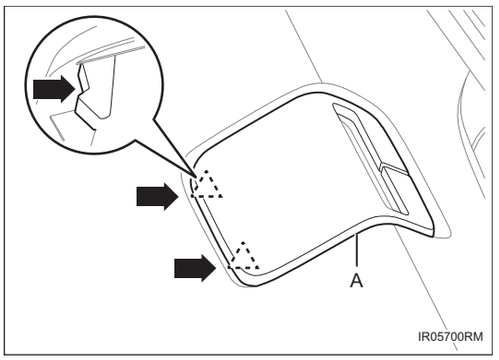
1. **Remove the upper left guard plate of D-pillar (See page IR-3)**
2. **Remove rear seat right seat belt buckle assembly (See page SB-7)**
3. **Remove parcel shelf guard plate assembly**



(a) Remove the retaining clips -1-4- of the parcel shelf guard plate assembly -A-.

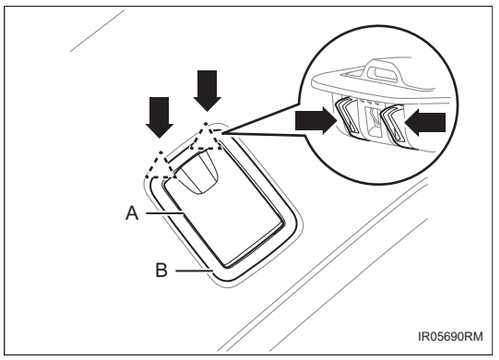
(b) Detach spring clip -arrow- and remove parcel shelf guard plate assembly -A-.

4. **Remove rear seat belt middle guide cover**



(a) Detach the spring clip -arrow-, and remove the rear seat belt middle guide cover -A-.

5. **Remove child safety seat latch hook trim**



(a) Remove the child safety seat locking hook trim cover-A-.

(b) Detach the spring clip-arrow- and remove the child safety seat latch hook trim-B-.

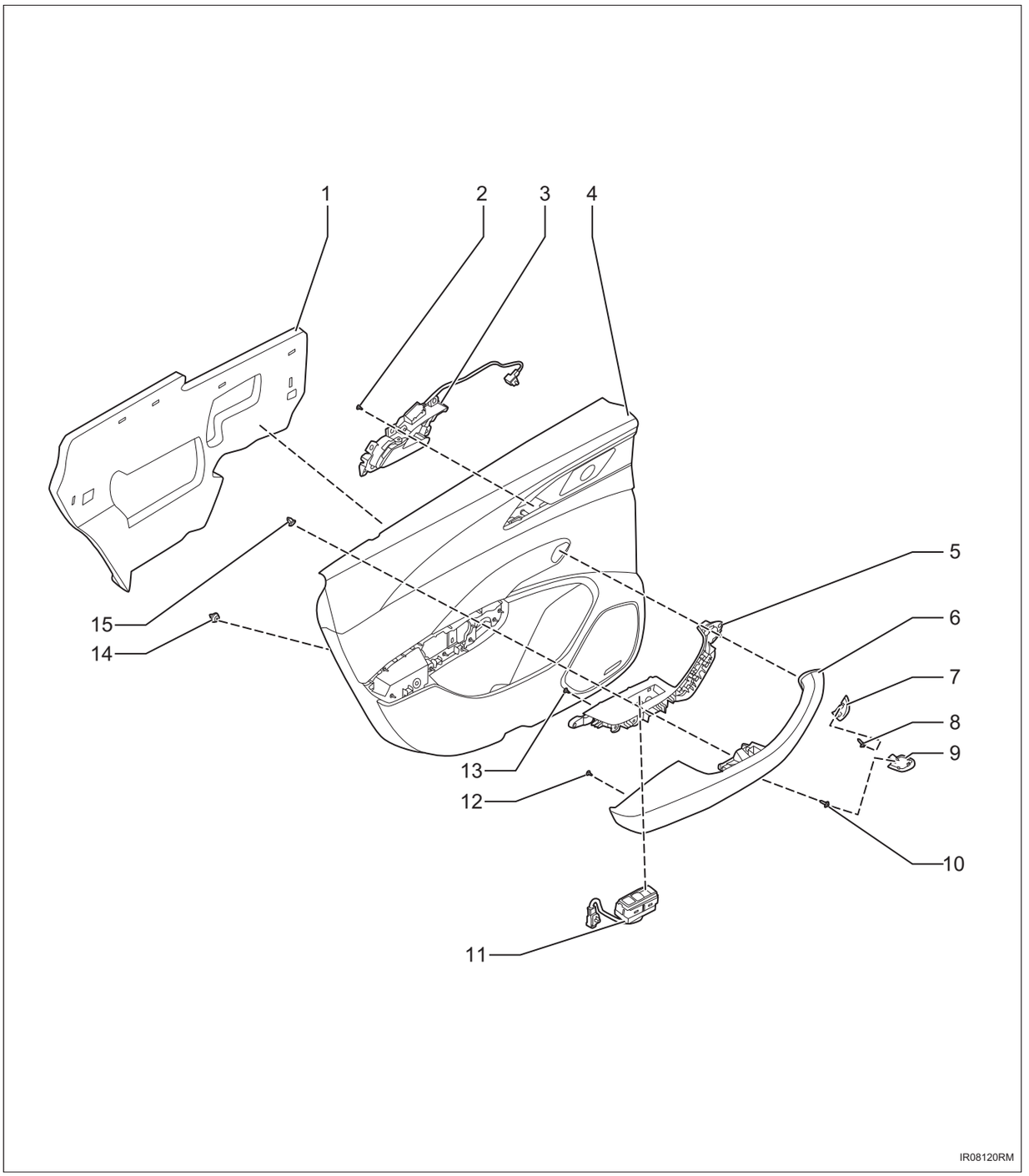
IR

Installation

1. **The installation procedure is the reverse of removal procedure.**

Rear door guard plate

Parts



1. **Rear left door sound-absorbing felt I**
2. **Tapping screw**
   - X6
3. **Rear left door inside handle assembly**
4. **Rear left door guard plate body**

5. **Rear left door switch panel**
6. **Rear left door armrest**
7. **Rear left door screw trim cover II**
8. **Tapping screw**
9. **Rear left door screw trim cover**
10. **Tapping screw**
11. **Left rear window regulator switch assembly**
12. **Tapping screw**
    - X15
13. **Tapping screw**
    - X2
14. **Clip**
    - X10
15. **Insert nut**
    - X2

Removal

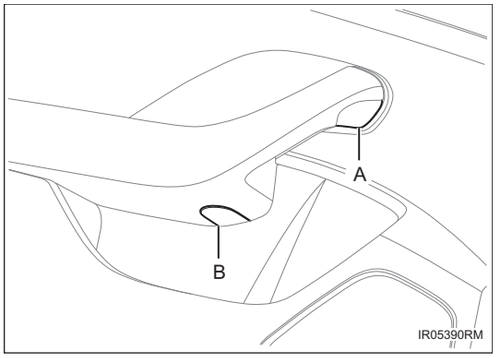
Hint:

The removal sequence on the right side is the same as that on the left side.

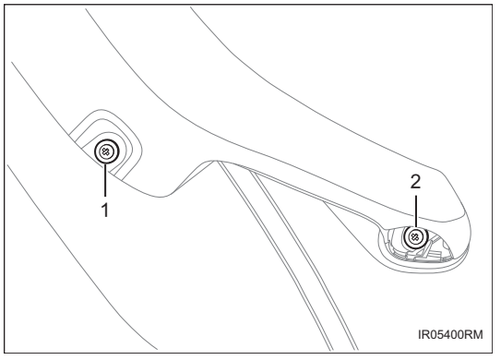
The order listed below applies to the left side.

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove rear door guard plate**

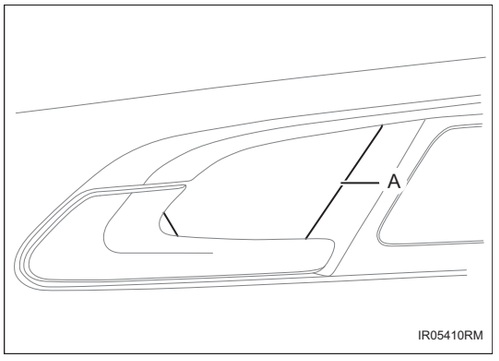
(a) Remove the rear door screw trim cover-A-B-.

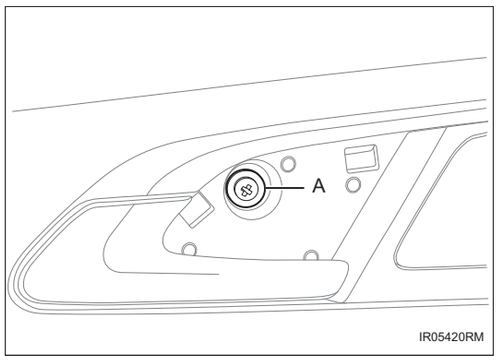


(b) Remove the fixing screw -1-2- of rear door guard plate.

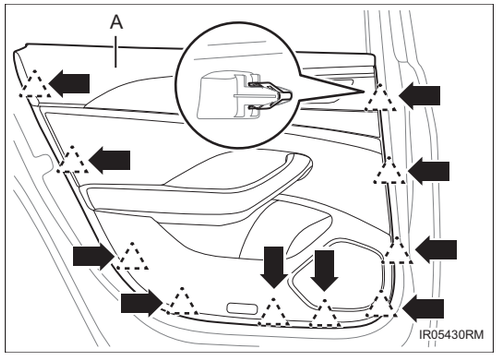


(c) Remove the rear door handle inner trim cover-A-.

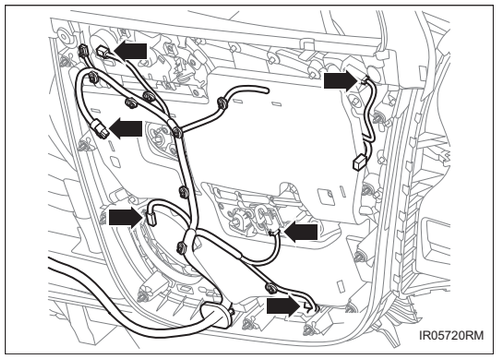




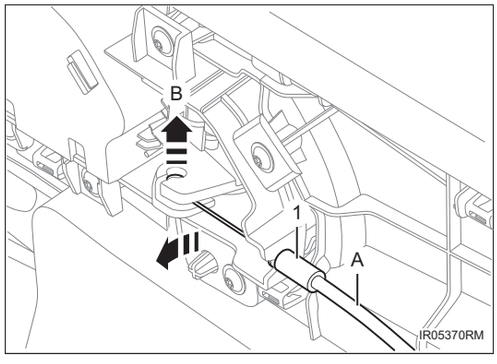
(d) Remove the inner screw -1- of rear door handle.



(e) Detach clip -arrow- and detach rear door guard plate -A-.



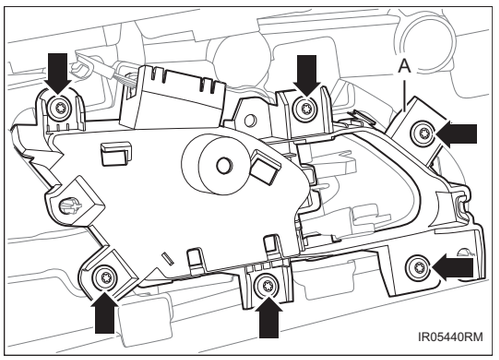
(f) Disconnect the harness connector as arrowed.



(g) Detach the cable -1-, and rotate the cable -A- in the direction of -arrow-.

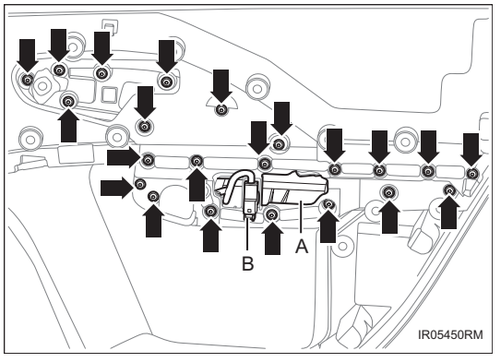
(h) Rotate the cable -A- to the gap and take out the cable in the direction of arrow B.

3. Remove the rear door inside handle assembly



(a) Remove the bolt-arrow-, and remove the rear door inside handle assembly-A-.

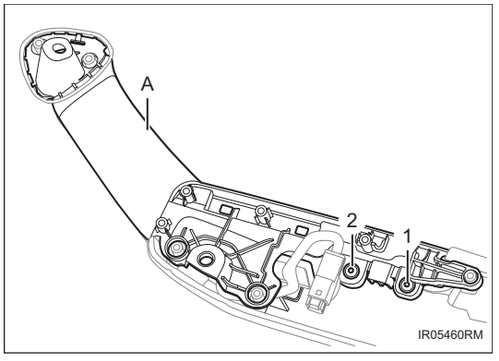
4. Remove rear door armrest



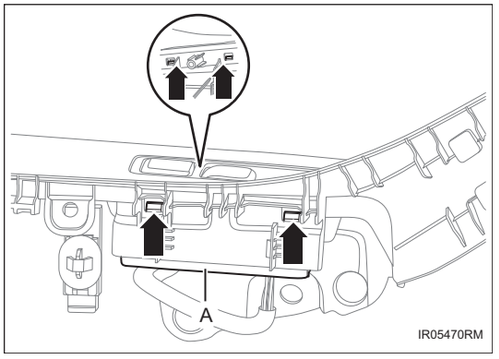
(a) Remove the fixing screw -arrow- of rear door armrest -A-.

(b) Disconnect the harness connector retaining clip -B-.

5. Remove driver window regulator switch assembly



(a) Remove screws -1-2-, and remove rear left door switch panel-A-.



(b) Detach the claw-arrow- and remove the rear window regulator switch assembly-A-.

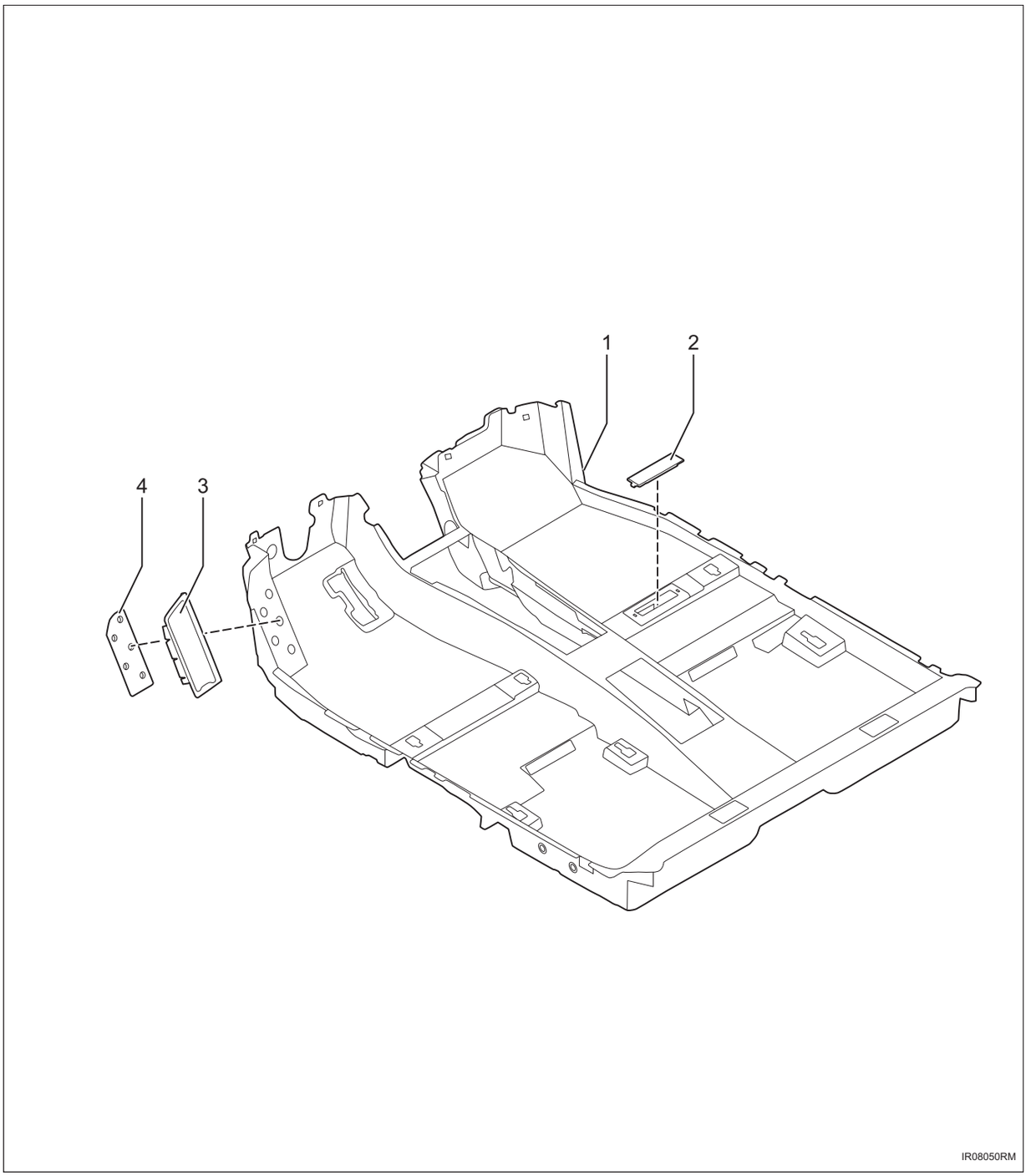
IR

Installation

1. **The installation procedure is the reverse of removal procedure.**

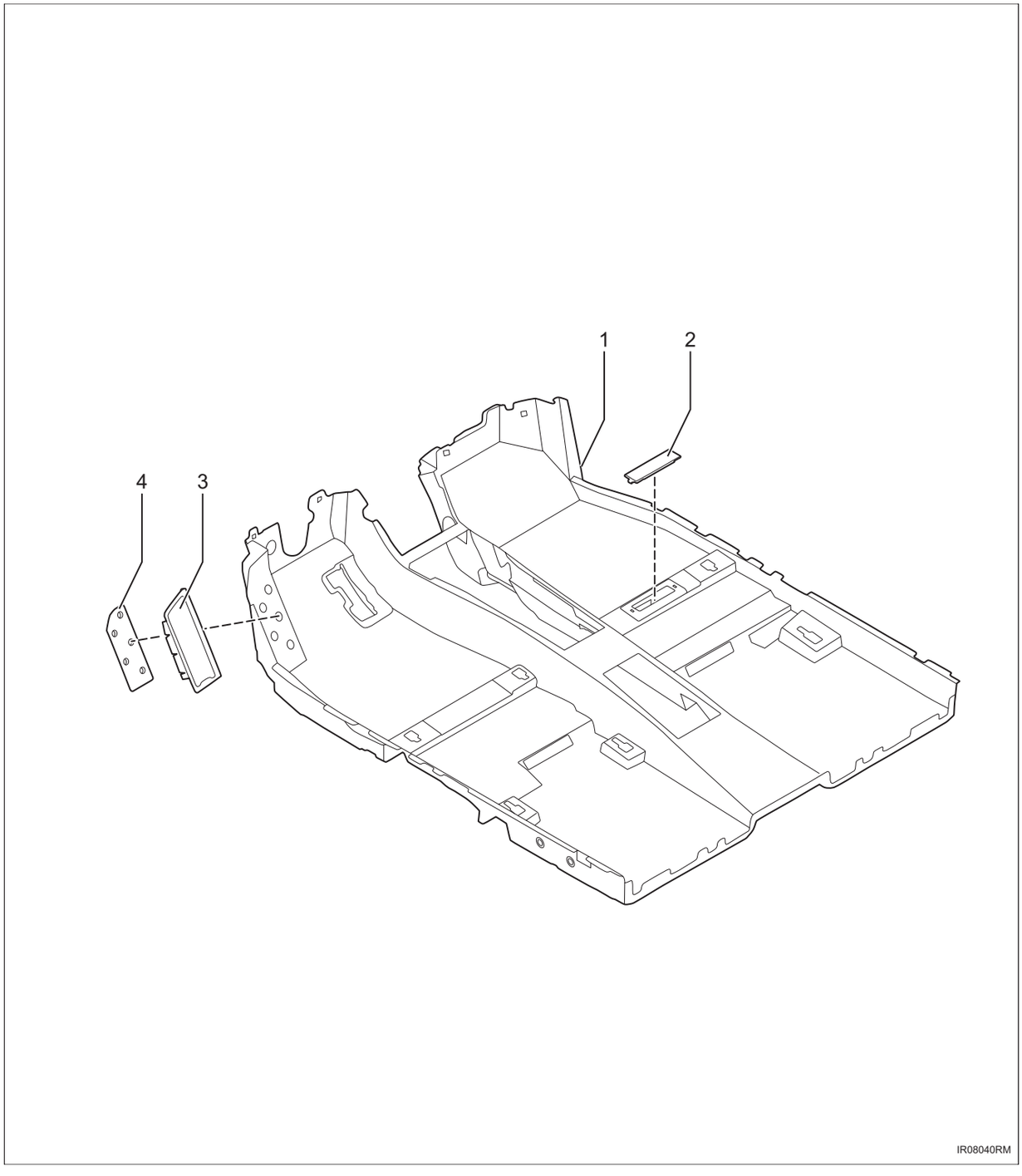
Carpet and heat insulation pad

Parts



1. **Carpet assembly**
2. **VIN trim cover**
3. **Floor mat**
4. **Floor mat mounting plate**

Part (only for HEV models)



1. **Carpet assembly**
2. **VIN trim cover**
3. **Floor mat**
4. **Floor mat mounting plate**

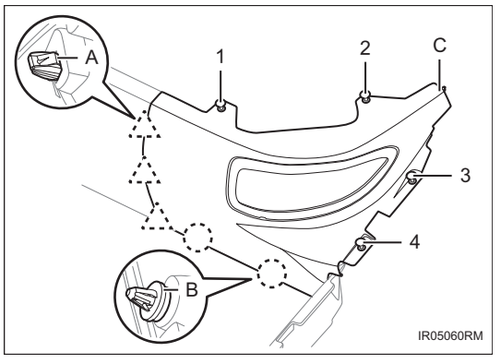
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the sill trim panel (See page IR-40)**
3. **Remove B-pillar guard plate (See page IR-3)**
4. **Remove electronic accelerator pedal assembly (See page ES-460)**
5. **Remove driver seat assembly (See page SE-93)**
6. **Remove front passenger seat assembly (See page SE-93)**
7. **Remove rear seat cushion assembly (See page SE-98)**
8. **Remove console assembly (See page IP-5)**
9. **Rear left guard plate assembly (only for HEV models)**

   Hint:

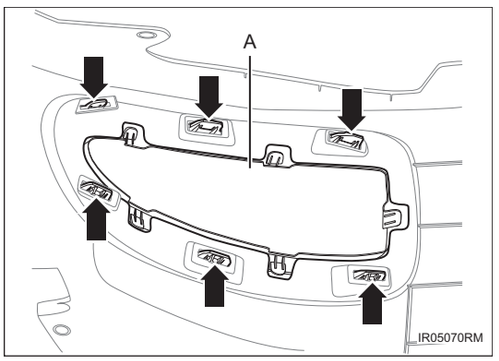
   The removal sequence on the right side is the same as that on the left side.

   (a) Detach clip -1-4-.

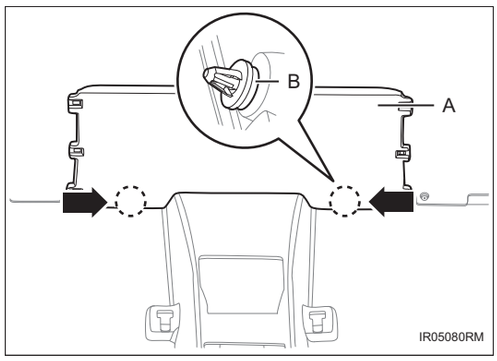


   (b) Detach spring clip -A- and clip -B-, and remove the rear left guard plate assembly -C-.

   (c) Detach the claw-arrow- and remove the rear seat left air inlet grille-A-.

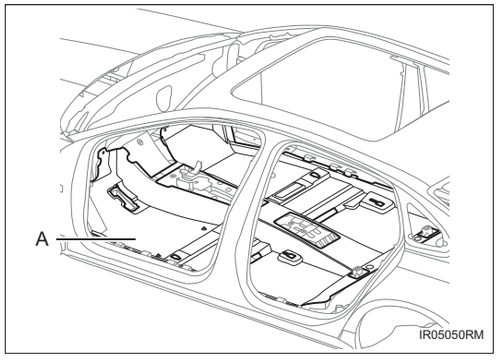


10. **Rear middle guard plate assembly (only for HEV models)**



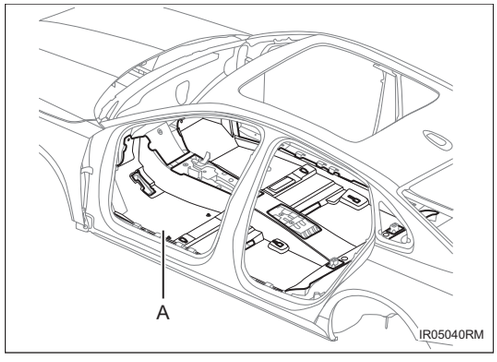
(a) Detach clip -arrow- and remove rear middle guard plate assembly -A-.

11. Remove carpet assembly (only for HEV models)



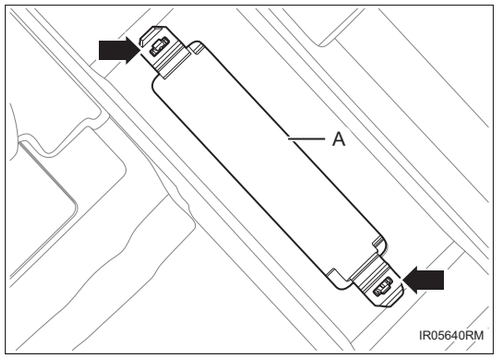
(a) Take the carpet -A- out of the vehicle at an appropriate angle.

12. Remove carpet assembly



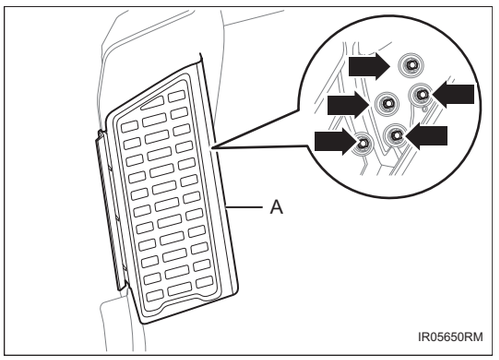
(a) Take the carpet -A- out of the vehicle at an appropriate angle.

13. Remove VIN cover



(a) Detach the claw-arrow- and remove the VIN cover-A-.

14. Remove floor mat



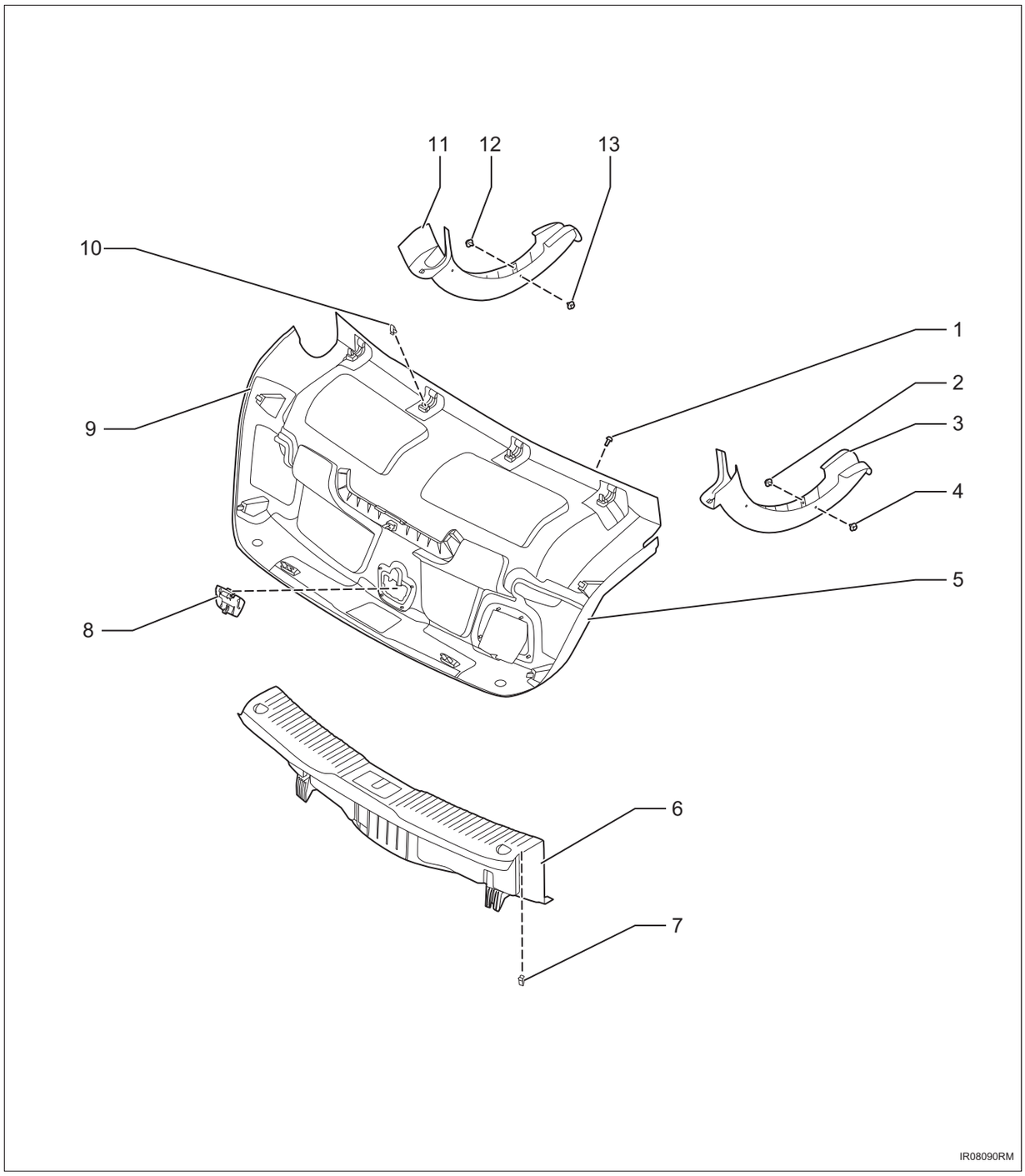
(a) Detach claw -arrow- and remove floor mat -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Trunk side covering

Parts

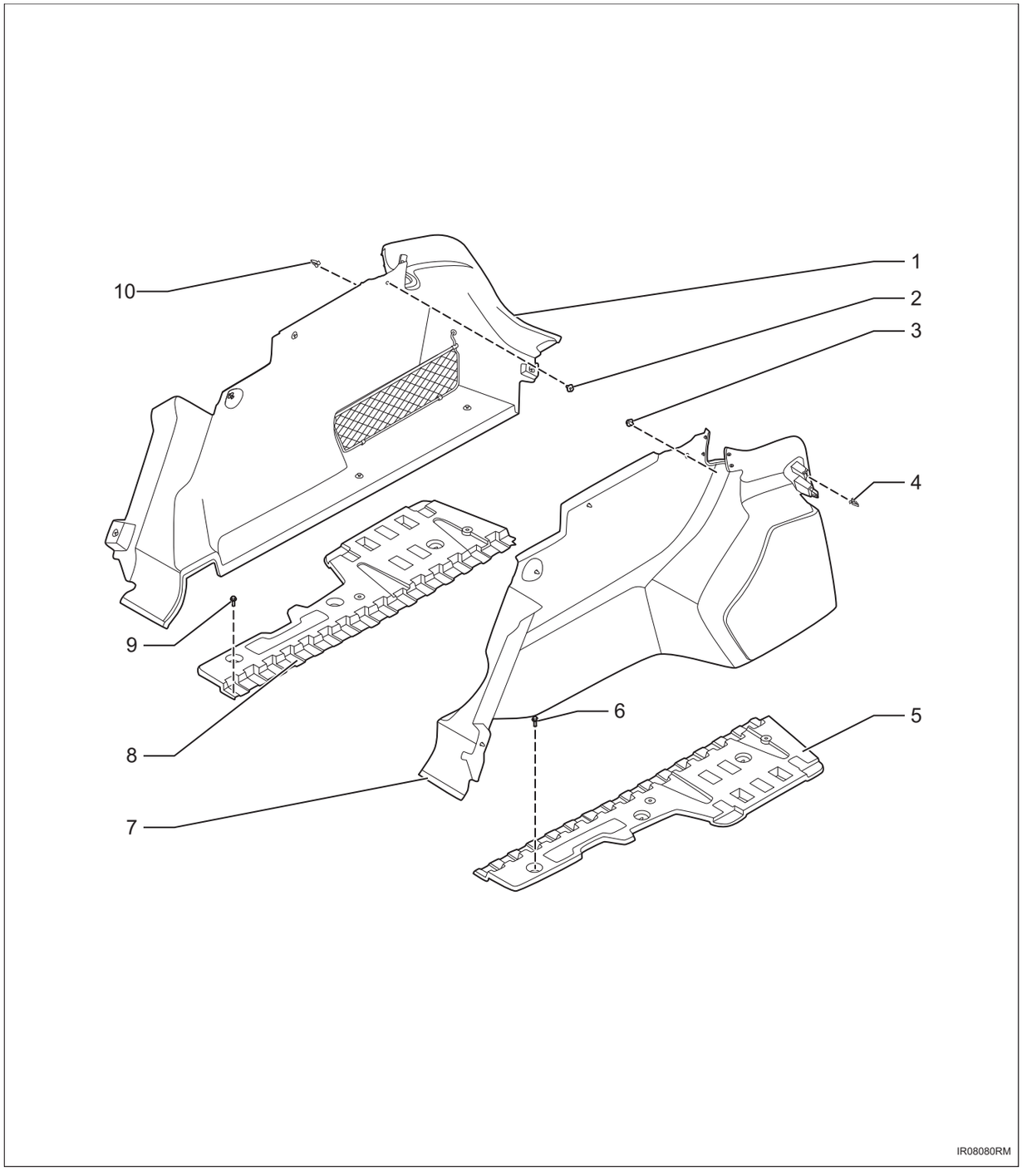


1. **Screw**
2. **Clip**
   - X2
3. **Left hinge trim cover**
4. **Clip**

- X2

5. **Trunk lid covering**
6. **Trunk rear wall guard plate**
7. **Spring clip**
   - X4
8. **Trunk lid emergency unlocking trim cover**
9. **Trunk lid covering**
10. **Spring clip**
    - X10
11. **Right hinge trim cover**
12. **Clip**
    - X2
13. **Clip**
    - X2

Parts



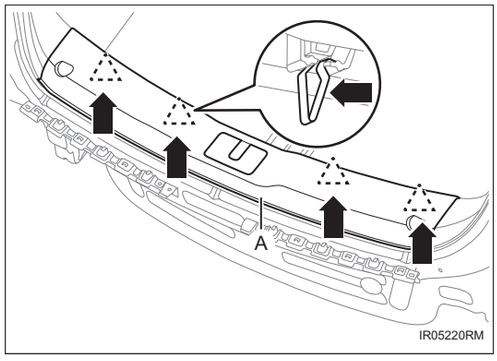
1. **Trunk right covering**
2. **Clip**
   - X6
3. **Clip**
   - X6
4. **Spring clip**

- X2

5. **Trunk left bracket**
6. **Hexagon flange bolt**
   - X3
   - Torque: 8~12 N · m
7. **Trunk left covering**
8. **Trunk right bracket**
9. **Hexagon flange bolt**
   - X3
   - Torque: 8~12 N · m
10. **Spring clip**
    - X2

Removal

1. **Remove trunk carpet assembly.**
2. **Remove trunk rear wall guard plate**

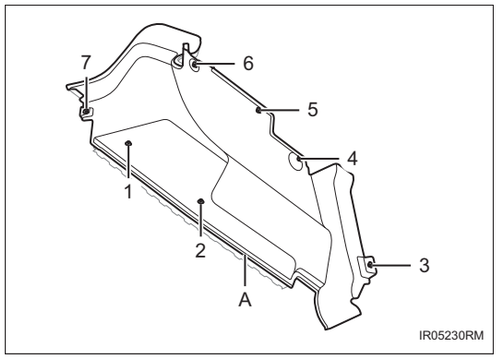


(a) Detach spring clip -arrow- and remove trunk rear wall guard plate -A-.

3. **Remove trunk side covering**

Hint:

The removal sequence on the right side is the same as that on the left side.

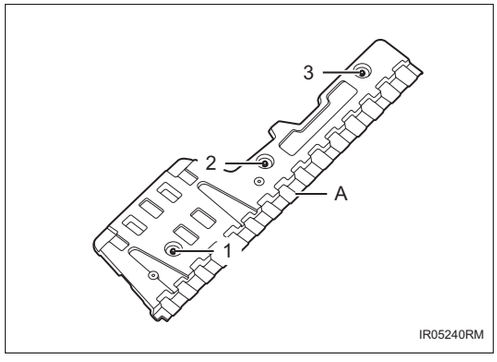


(a) Detach clip -1-7- and remove trunk side covering -A-.

4. **Remove trunk side bracket**

Hint:

The removal sequence on the right side is the same as that on the left side.



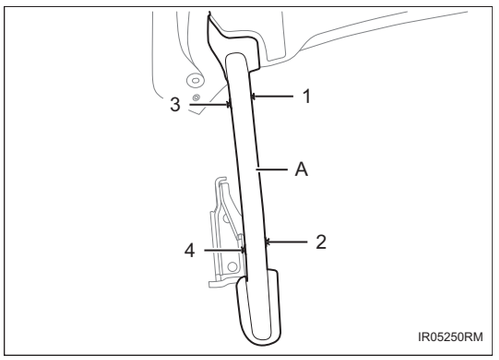
(a) Remove bolts -1-3-, and remove trunk side bracket-A-.

5. **Remove left hinge trim cover**

Hint:

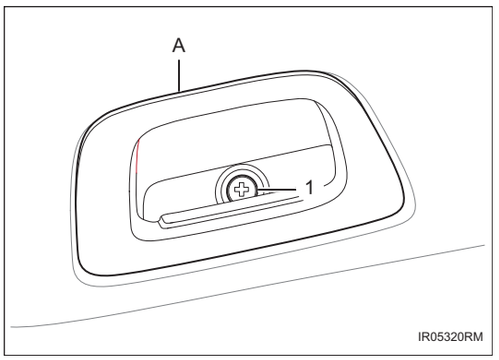
The removal sequence on the right side is the same as that on the left side.

IR

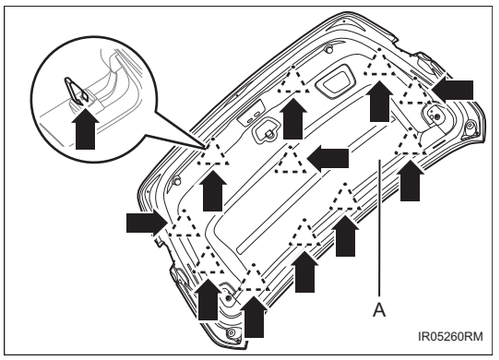


(a) Detach the clip -1-4- and remove the left hinge trim cover-A-

6. Remove trunk lid covering

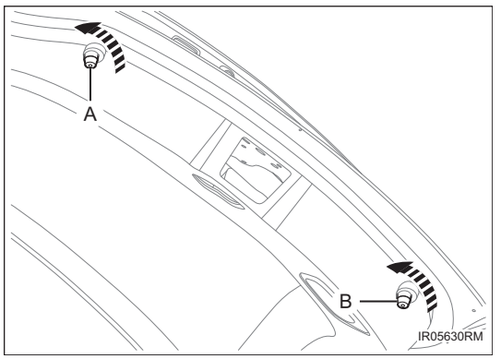


(a) Remove the screw -1-, and remove the trunk lid buckle -A-.



(b) Detach the spring clip -arrow- and remove the trunk lid covering -A-.

7. Remove adjustable limit block assembly



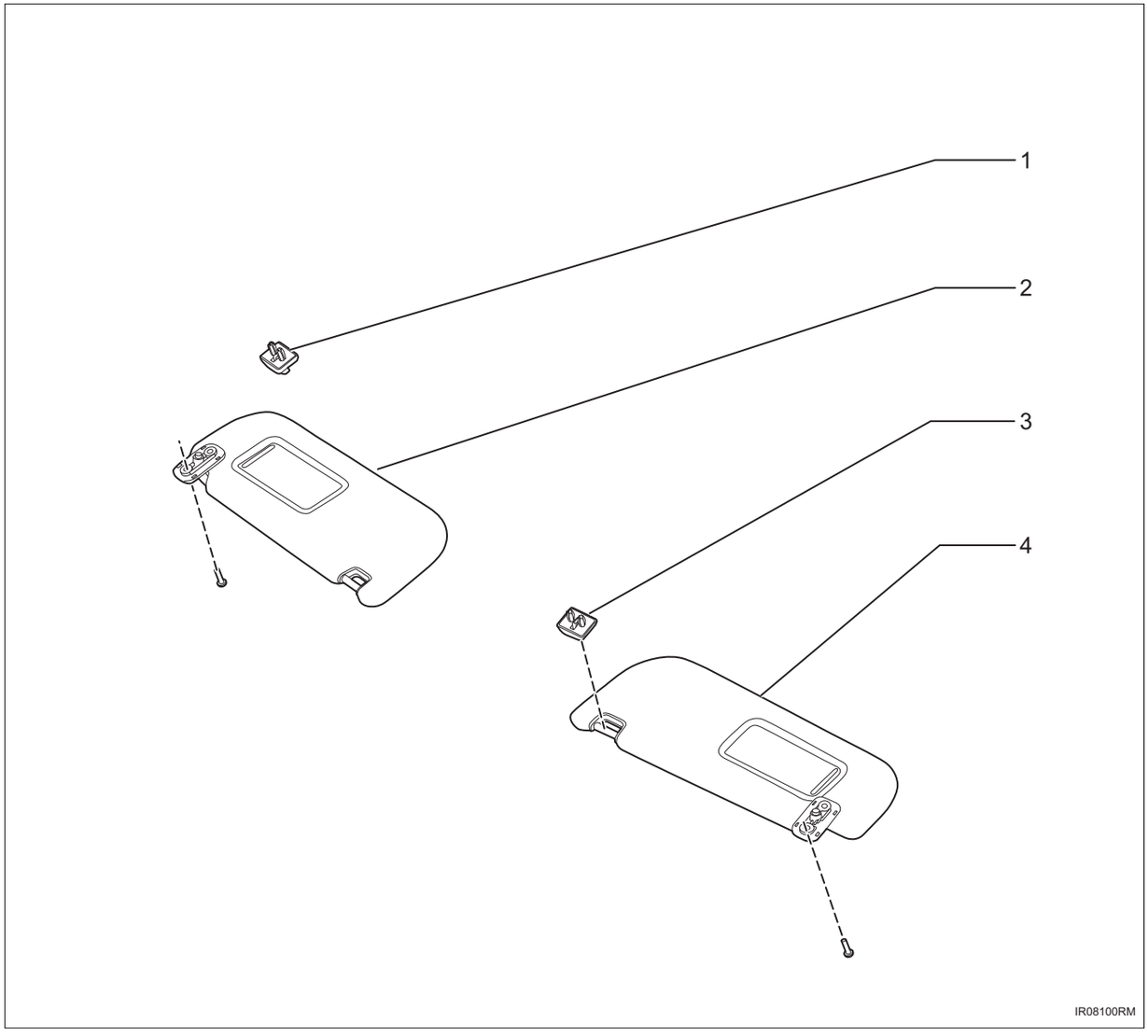
(a) Rotate in the direction of -arrow- and remove the adjustable limit block assemblies -A-B-.

Installation

1. The installation procedure is the reverse of removal procedure.

Sun visor assembly

Parts



1. **Sun visor mount**
2. **Right sun visor assembly**
3. **Sun visor mount**
4. **Left sun visor assembly**
5. **Cross recessed pan head screw**
   - X2
6. **Cross recessed pan head screw**
   - X2

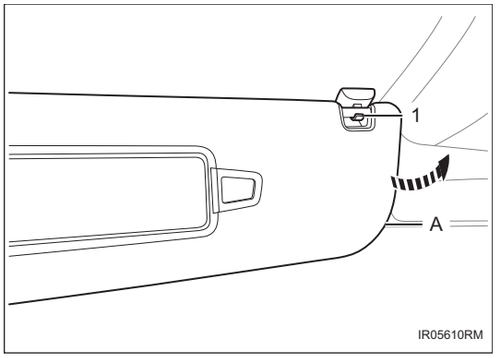
Removal

Hint:

The removal sequence on the right side is the same as that on the left side.

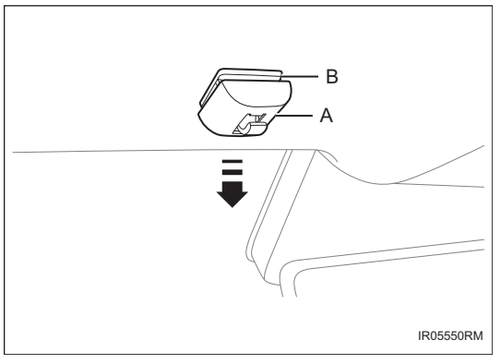
The order listed below applies to the left side.

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the sun visor mount**



(a) Detach sun visor fixing shaft -1-.

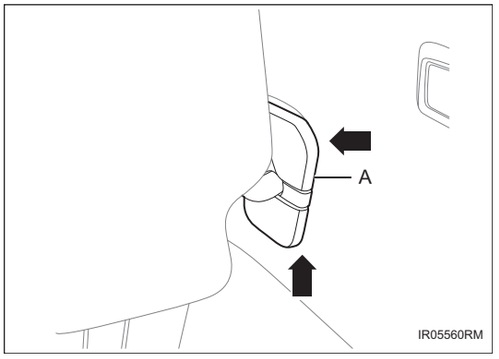
(b) Rotate and detach the sun visor assembly-A- as arrowed.



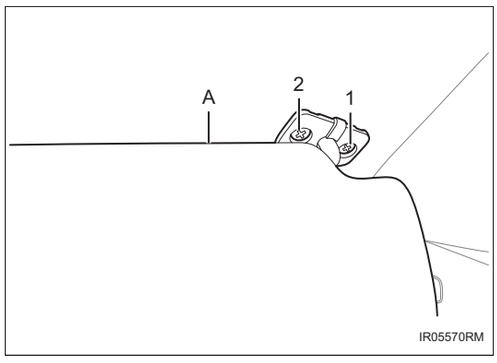
(c) Use a tool to pry the sun visor mount cover-A as arrowed.

(d) Remove sun visor mount -B-.

3. **Remove sun visor assembly**



(a) Pry trim cover -A- in the direction of -arrow-.



(b) Remove the screws -1-2- and detach the sun visor assembly.

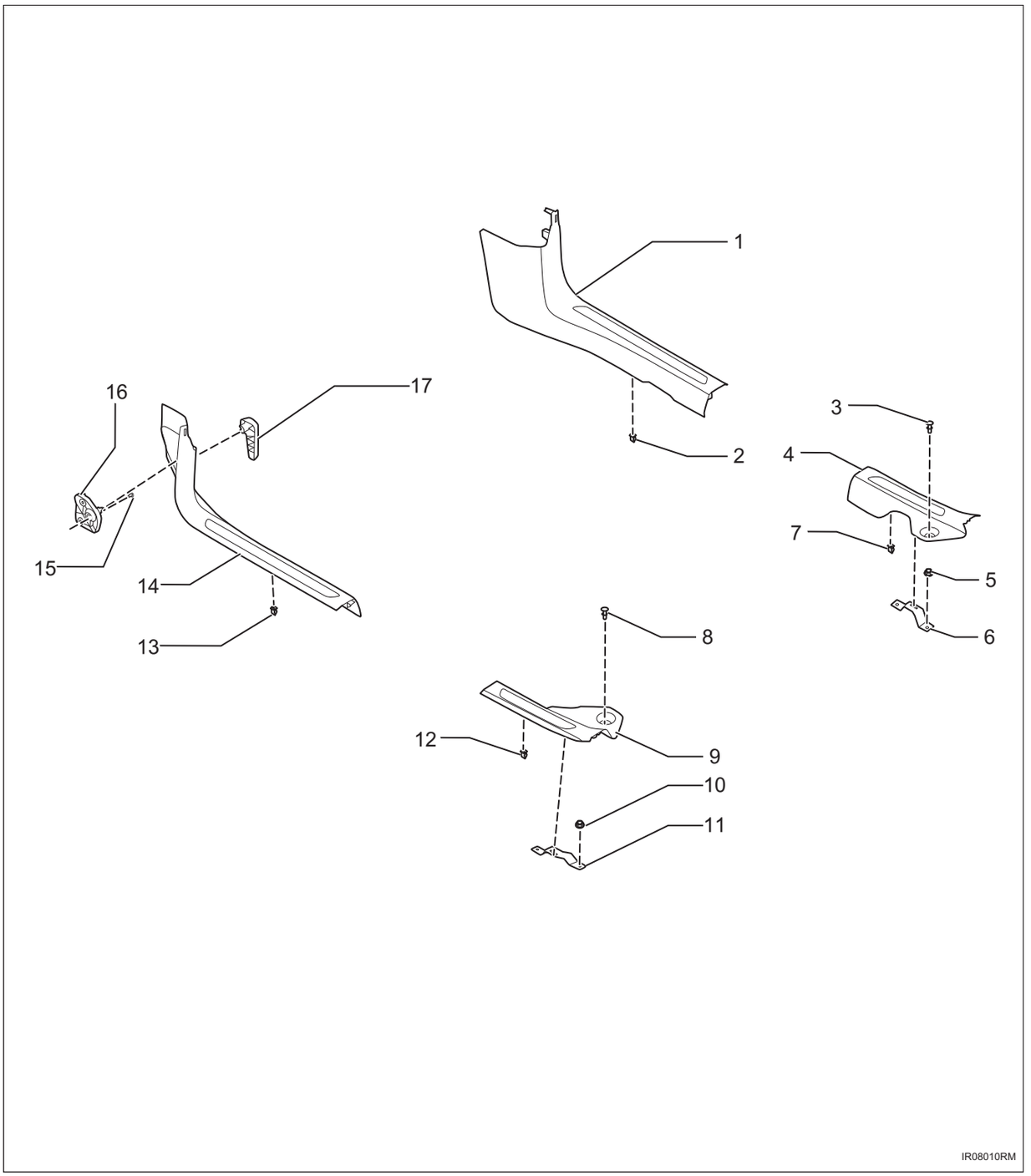
(c) Disconnect the sun visor assembly harness connector, and remove the sun visor assembly.

Installation

1. The installation procedure is the reverse of removal procedure.

Sill trim panel

Parts

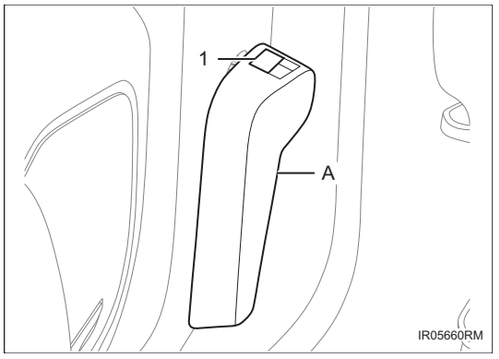


1. **Passenger door sill guard plate**
2. **Clip**
   - X4
3. **Clip**
4. **Rear right door sill guard plate**

5. **Hexagon flange nut**
   - X2
   - Torque: 8~10 N · m
6. **Rear right door sill guard bracket I**
7. **Clip**
   - X2
8. **Clip**
9. **Rear left door sill guard plate**
10. **Hexagon flange nut**
    - X2
    - Torque: 8~10 N · m
11. **Rear left door sill guard plate bracket I**
12. **Clip**
    - X2
13. **Clip**
    - X4
14. **Driver door sill guard plate**
15. **Screw**
    - X2
16. **Engine hood inside release handle base assembly**
17. **Engine hood inside release handle assembly**

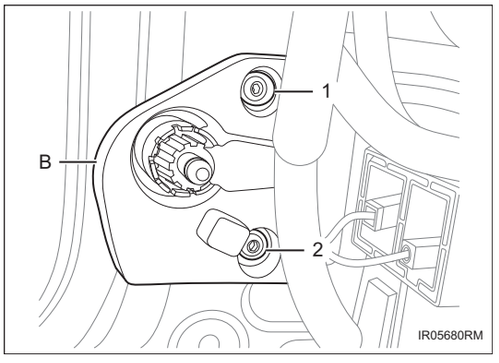
Removal

1. Remove engine hood inside release handle assembly

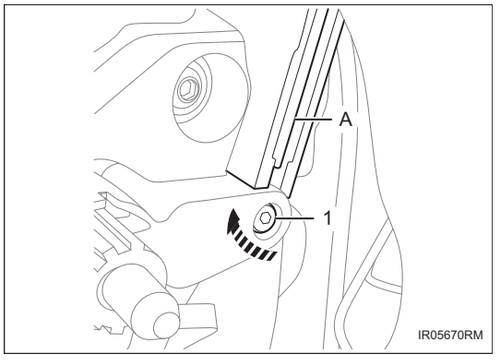


(a) Detach the clip -1-, and remove the engine hood inner release handle assembly-A-.

2. Remove engine hood inside release handle base assembly



(a) Remove the screws -1-2-, and remove the engine hood inside release handle base assembly -B-.



(b) Detach the cable -A-, and rotate the cable -A- in the direction of -arrow-.

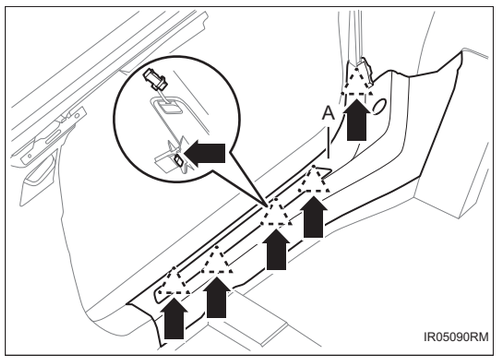
(c) Rotate the cable-A- to the gap and take out the cable.

3. Disconnect the battery negative terminal (See page CH-20)

4. Remove front door sill trim panel

Hint:

The removal sequence on the right side is the same as that on the left side.



(a) Detach spring clip -arrow- and disconnect the harness connector -B-.

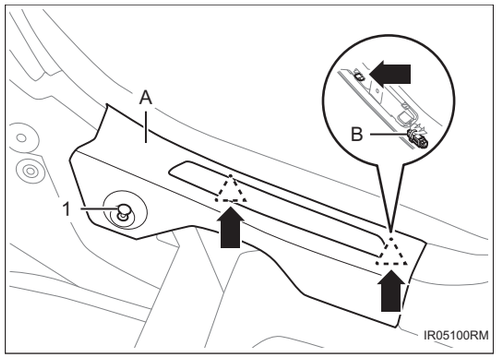
(b) Remove the front door sill trim panel-A-.

5. Remove rear seat cushion assembly (See page SE-98)

6. Remove rear door sill trim panel

Hint:

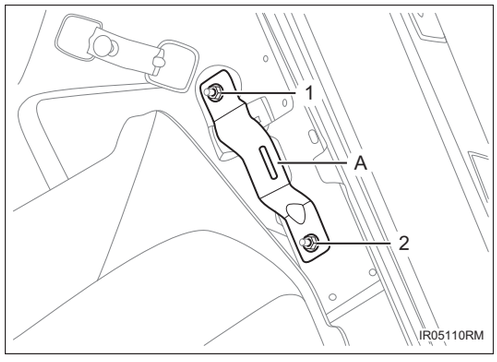
The removal sequence on the right side is the same as that on the left side.



(a) Detach the spring clip -arrow-, and remove the clip -1-.

(b) Disconnect the harness connector -B-, and remove the rear door sill trim panel -A-.

7. Remove rear sill guard plate bracket l



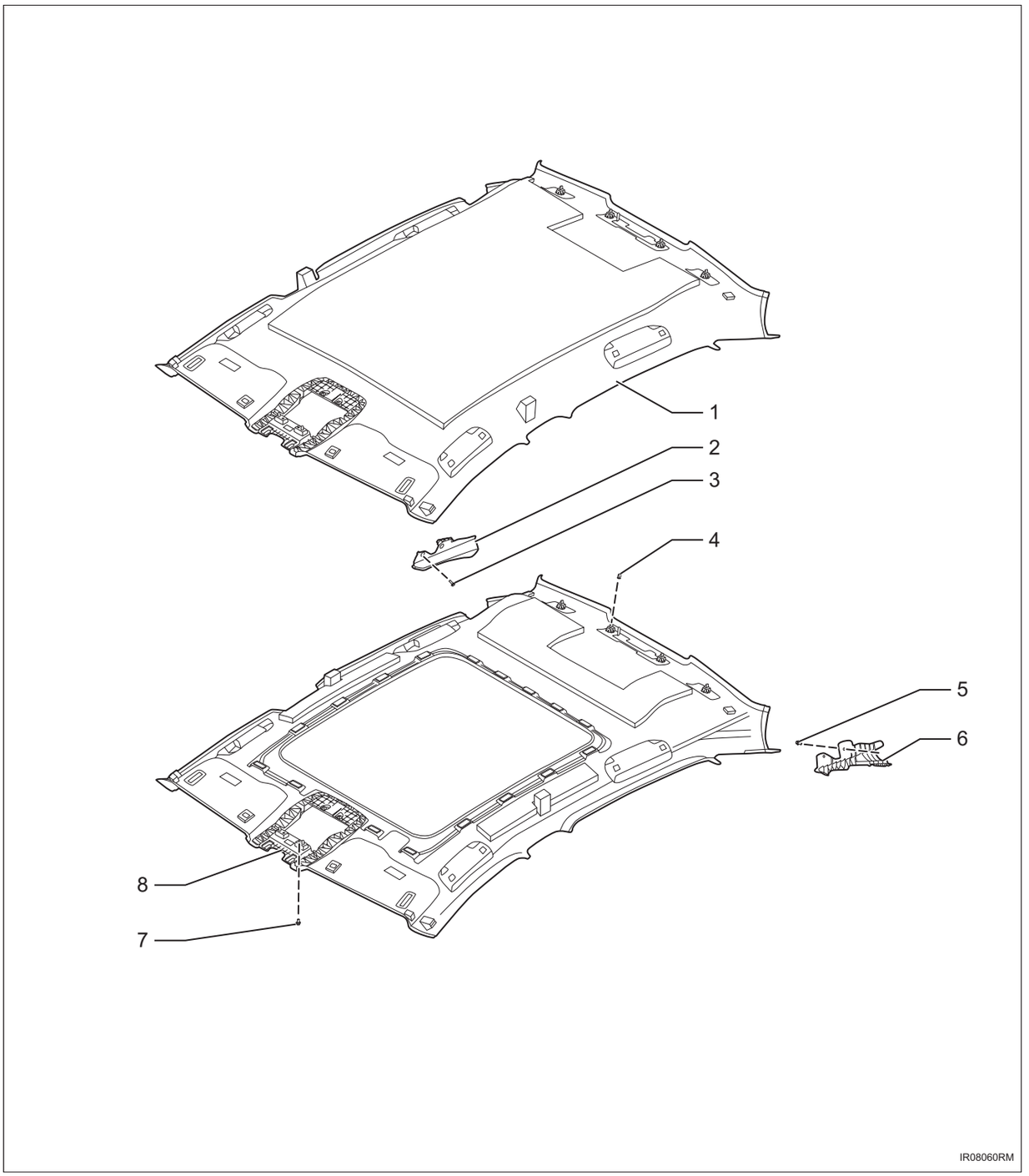
(a) Remove the nuts -1-2-, and remove the sill guard plate bracket l-A-.

Installation

1. The installation procedure is the reverse of removal procedure.

Roof

Parts

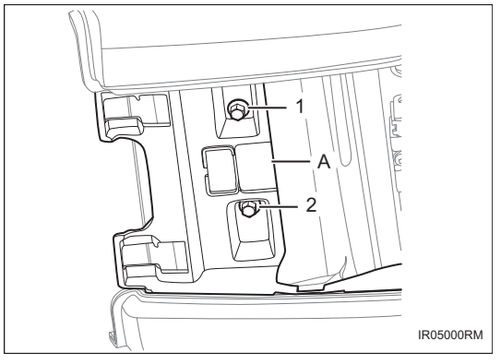


1. **Roof**
2. **Right rear reinforcement bracket**
3. **Hexagon flange bolt**
   - X2
   - Torque: 8~12 N · m

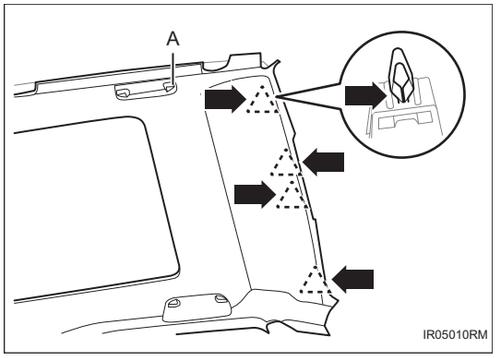
4. **Clip**
   - X4
5. **Hexagon flange bolt**
   - X2
   - Torque: 8~12 N · m
6. **Left rear reinforcement bracket**
7. **Hexagon flange bolt**
   - X2
   - Torque: 8~12 N · m
8. **Roof (only applicable to vehicles with sunroof)**

Removal

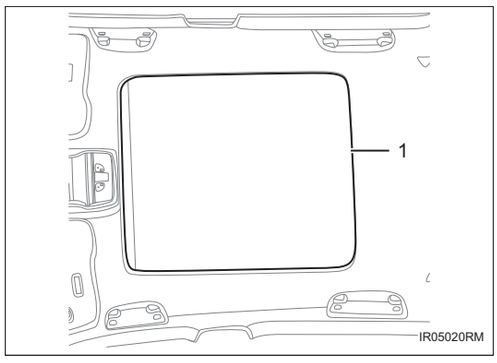
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove A pillar guard plate assembly (See page IR-3)**
3. **Remove the B-pillar upper guard plate assembly (See page IR-3)**
4. **Remove the C-pillar upper guard plate assembly (See page IR-3)**
5. **Remove the upper left guard plate of D-pillar (See page IR-3)**
6. **Remove the sun visor assembly (See page IR-36)**
7. **Remove the sun visor mount assembly (See page IR-36)**
8. **Remove the interior lamp assembly (See page LI-112)**
9. **Remove the roof grab handle assembly (See page IR-47)**
10. **Remove roof assembly**



(a) Remove the fixing bolt -1-2- on the front of the roof assembly -A-.



(b) Remove the rear clip -arrow- of roof assembly -A-.

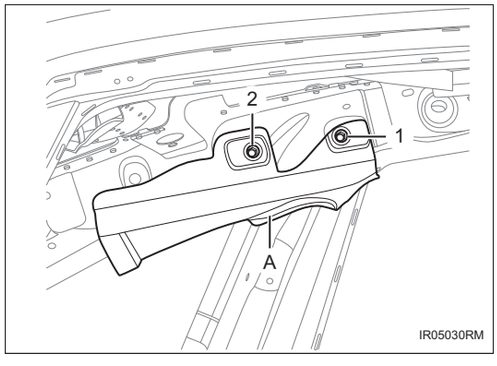


(c) Pull down the inner ring of the sunroof to detach the sunroof frame - 1 - and remove the roof assembly. (Only for vehicles with sunroof)

11. Remove left rear reinforcement bracket

Hint:

The removal sequence on the right side is the same as that on the left side.



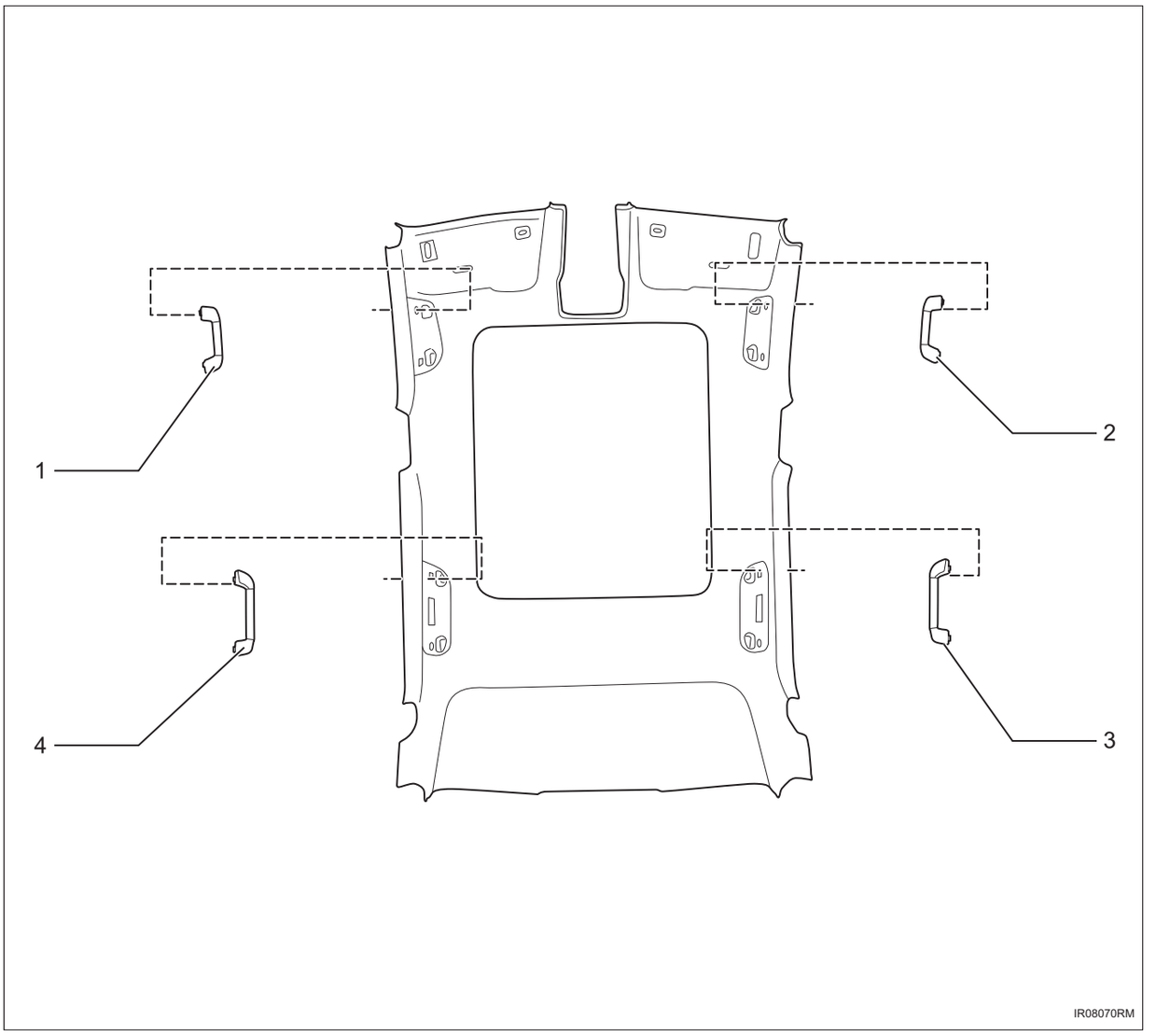
(a) Remove the bolts -1-2-, and remove the left rear reinforcing bracket-A-.

Installation

1. The installation procedure is the reverse of removal procedure.

Roof grab handle

Parts



1. **Right front grab handle assembly**
2. **Left front handle assembly**
3. **Left rear handle assembly**
4. **Right rear handle assembly**

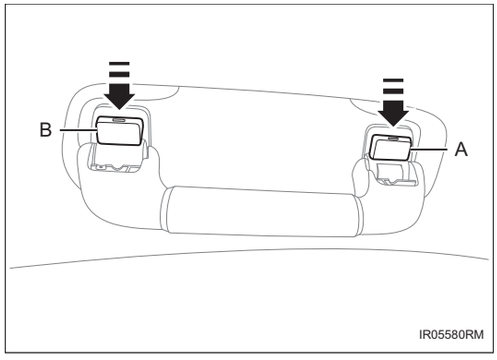
Removal

Hint:

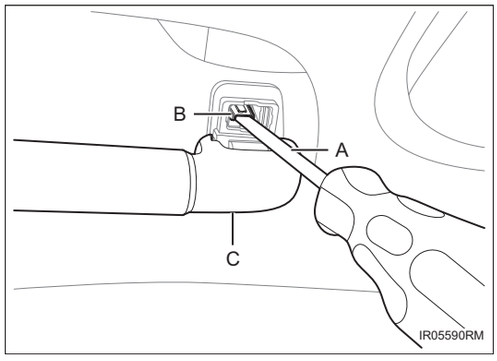
The removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

1. Remove roof grab handle



(a) Pry at the -arrow- and remove the roof grab handle fixing cover -A-B-.



(b) Use a screwdriver -A- to detach the clip -B-, and remove the roof grab handle -C-.

IR

Installation

1. The installation procedure is the reverse of removal procedure.

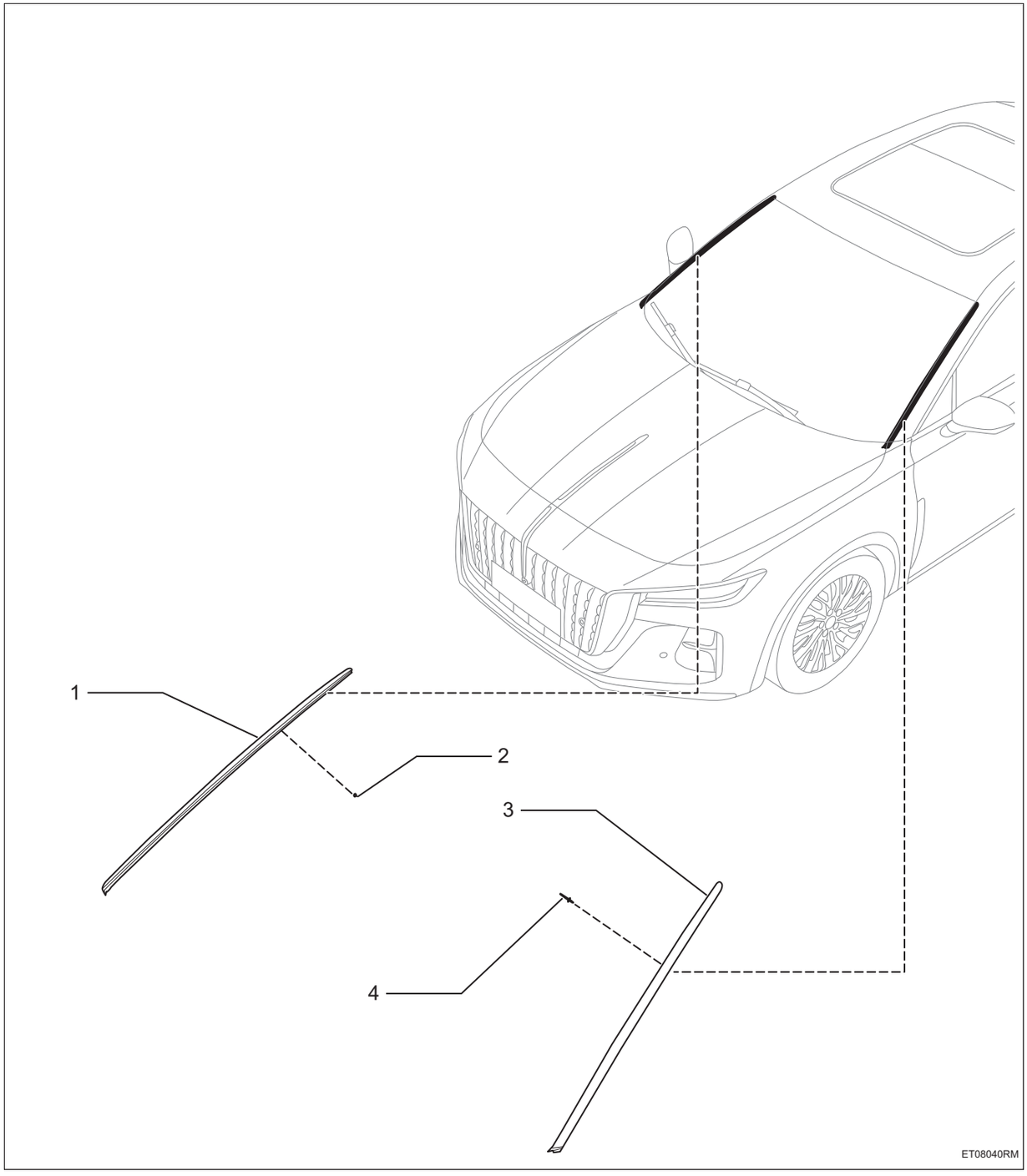
Exterior

A pillar trim strip ET-1
Parts ET-1
Removal ET-3
Installation ET-3
Front bumper cover assembly ET-4
Parts ET-4
Removal ET-7
Installation ET-11
Fuel filler cap assembly ET-12
Parts ET-12
Removal ET-13
Installation ET-13
Engine hood heat insulation pad ET-14
Parts ET-14
Removal ET-15
Installation ET-15
Engine hood latch upper guard plate ET-16
Parts ET-16
Removal ET-17
Installation ET-17
Rear bumper cover assembly ET-18
Parts ET-18
Removal ET-21
Installation ET-24
Driver door trim cover assembly ET-25
Parts ET-25
Removal ET-26
Installation ET-26
Radiator grille assembly ET-27
Parts ET-27
Removal ET-29
Installation ET-30
Body bottom guard plate ET-31
Parts ET-31
Removal ET-34
Installation ET-36
Wheel guard ET-37
Parts ET-37

Removal ET-39
Installation ET-40
Door B pillar trim panel assembly ET-41
Parts ET-41
Removal ET-43
Installation ET-43
Sill trim panel ET-44
Parts ET-44
Removal ET-45
Installation ET-45

A pillar trim strip

Parts



1. **Right A pillar trim strip**
2. **Blind rivet**
   - X5

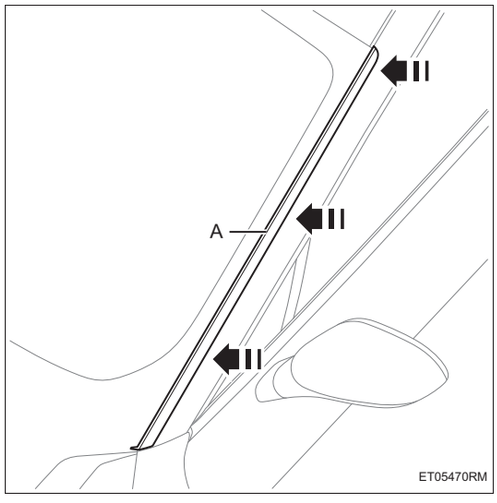
3. **Left A pillar trim strip**
4. **Blind rivet**
   - X5

Removal

1. Remove A pillar trim strip

Hint:

The removal sequence on the right side is the same as that on the left side.



(a) Insert a suitable tool as arrowed to detach the rail.

Caution:

Be careful not to damage the front windshield

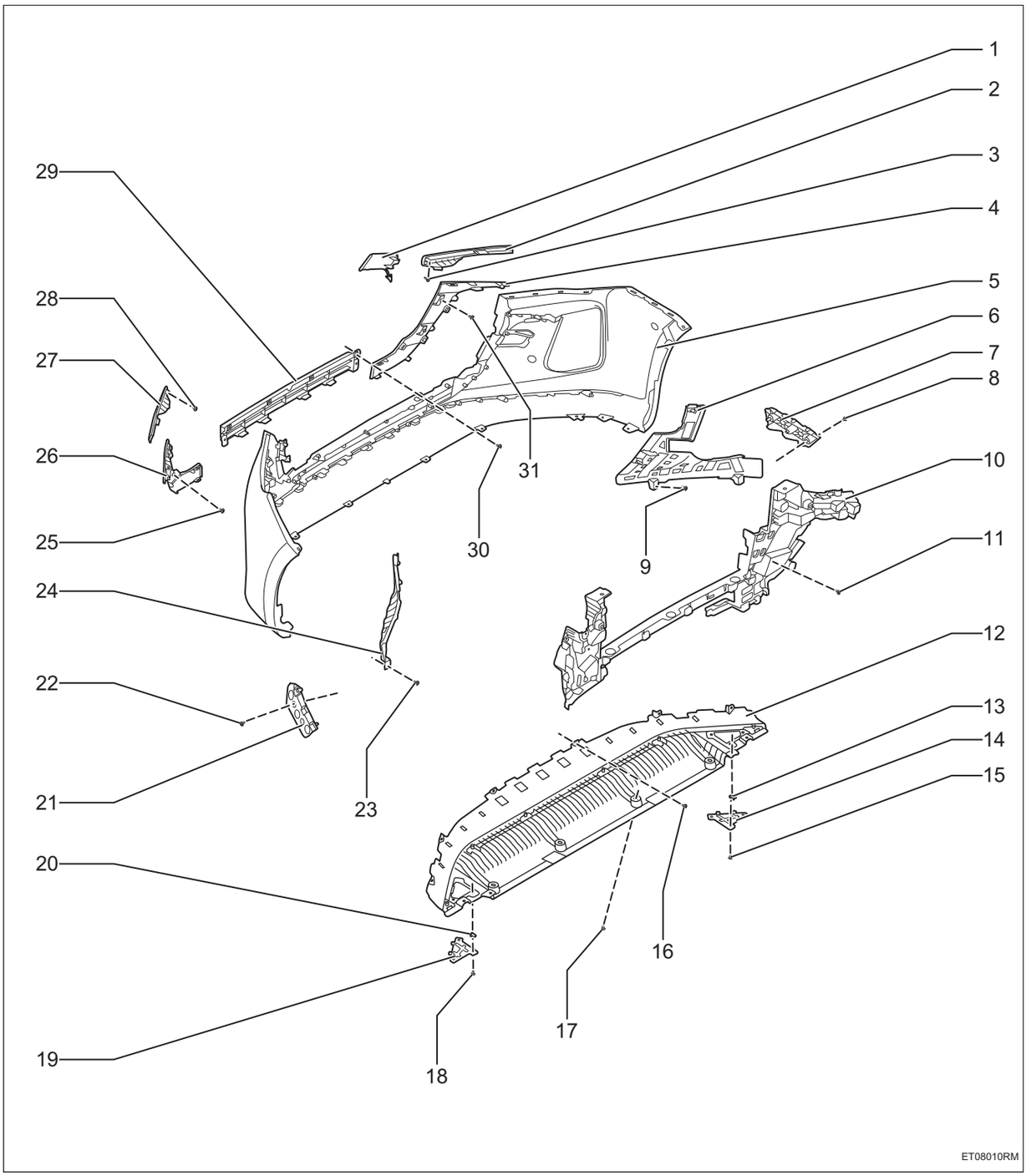
(b) Remove the A pillar trim strip -A-.

Installation

1. The installation procedure is the reverse of removal procedure.

Front bumper cover assembly

Parts



1. **Front bumper towing hook cover**
2. **Front bumper right support plate I**
3. **Screw**
4. **Front bumper right grille**
5. **Front bumper cover**

6. **Front bumper right support plate II**
7. **Front bumper right bracket**
8. **Screw**
   - X3
9. **Screw**
   - X4
10. **Front bumper middle bracket**
11. **Screw**
   - X27
12. **Front bumper pedestrian guard**
13. **Reed nut**
   - X5
14. **Front bumper pedestrian guard right access cover**
15. **Screw**
   - X3
16. **Screw**
   - X6
17. **Screw**
   - X6
18. **Screw**
   - X3
19. **Front bumper pedestrian guard left access cover**
20. **Reed nut**
   - X5
21. **Front bumper left bracket**
22. **Screw**
   - X3
23. **Screw**
   - X4
24. **Front bumper left support plate II**
25. **Screw**
   - X3
26. **Front bumper left grille**
27. **Front bumper left support plate I**
28. **Screw**
29. **Front bumper lower grille**

30. Screw

- X2

31. Screw

- X3

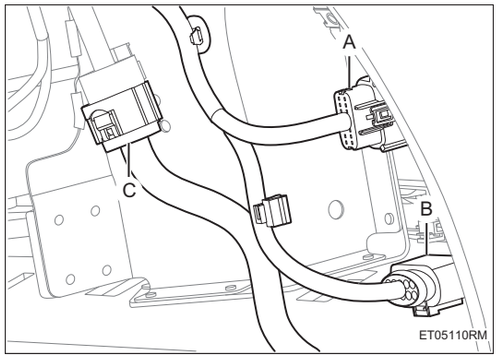
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove engine hood latch upper guard plate (See page ET-17)**
3. **Remove the radiator grille logo assembly (See page ET-29)**
4. **Remove front bumper cover assembly**

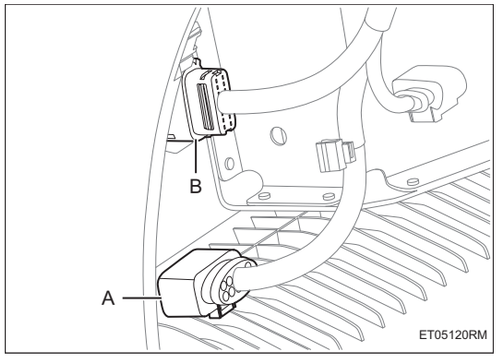
   Hint:

   The removal sequence on the right side is the same as that on the left side.

   (a) Disconnect the front bumper harness connector-C- and the right front combination lamp harness connector-A-B-.



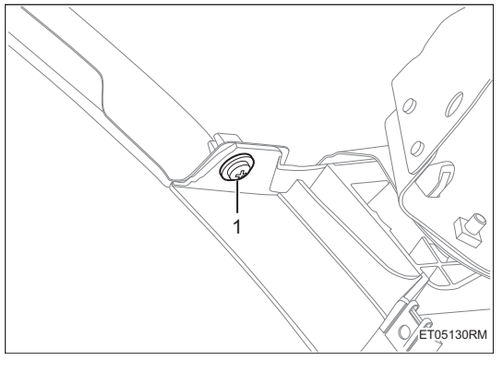
   (b) Disconnect the left front combination lamp harness connectors-A-B-.



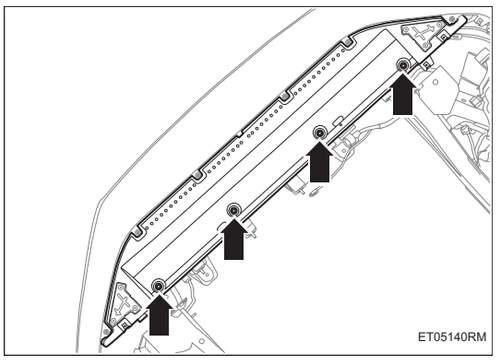
   (c) Remove the connecting screw -1- of front bumper cover assembly and fender.

   Hint:

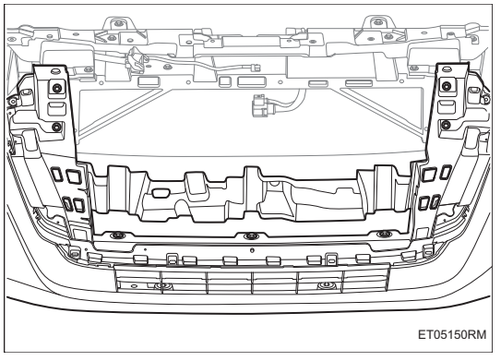
   The removal sequence on the right side is the same as that on the left side.



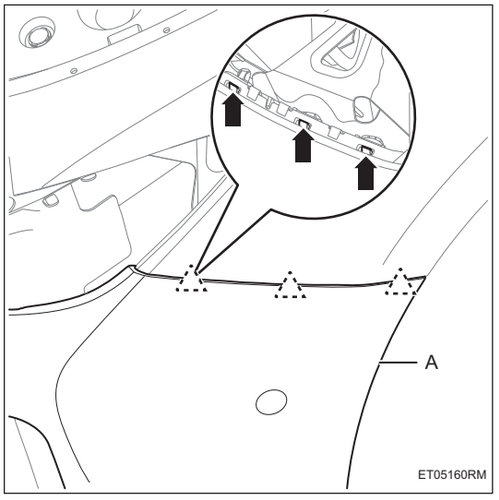
ET



(d) Remove the lower bolt -arrow- of the front bumper cover assembly.



(e) Remove the front bolt -arrow- of the front bumper cover assembly.



(f) Detach claw -arrow- of front bumper cover assembly.

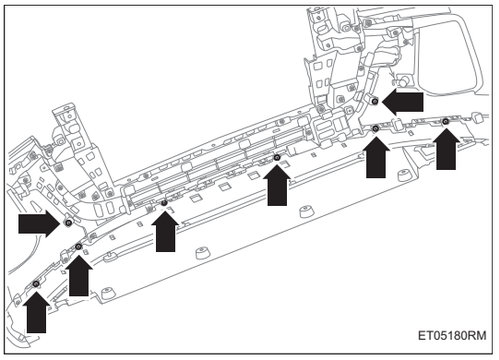
Hint:

The removal sequence on the right side is the same as that on the left side.

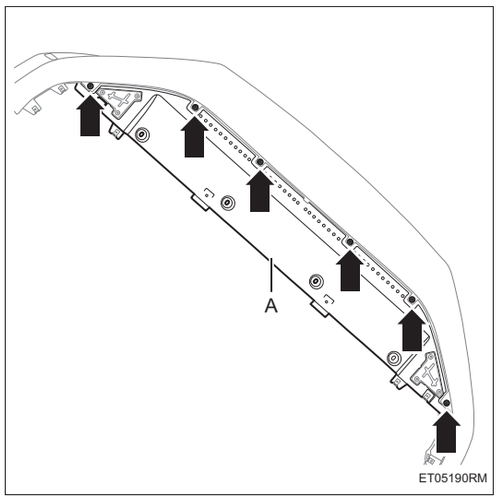
(g) Remove front bumper cover assembly-A-.

5. Remove front bumper pedestrian guard

(a) Remove the screw -arrow-.

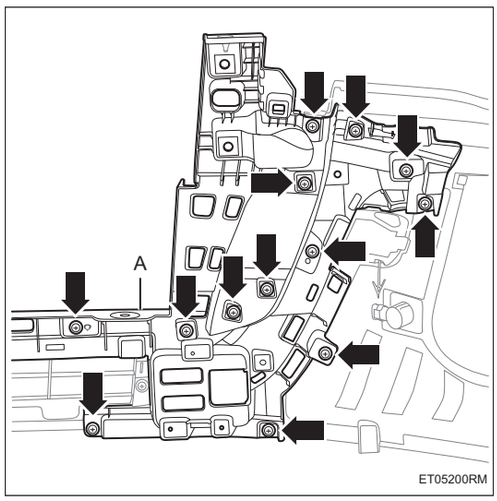


ET

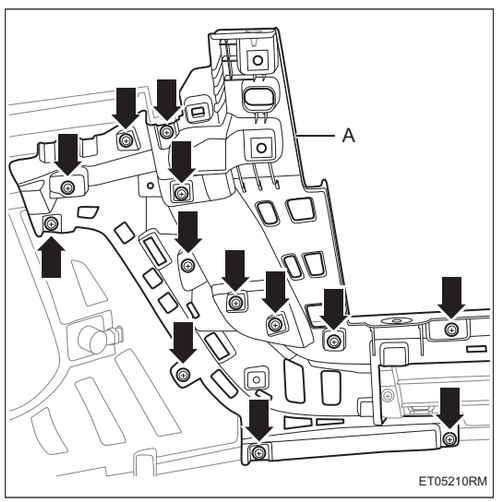


(b) Remove the screw -arrow-, and remove the front bumper pedestrian guard -A-.

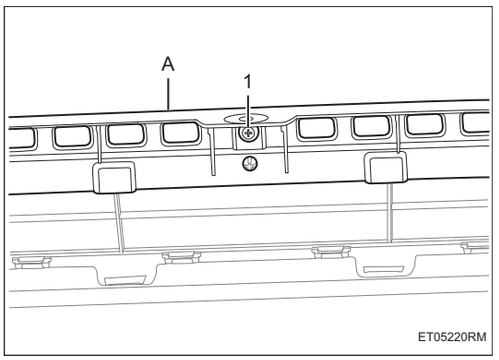
6. Remove front bumper middle bracket



(a) Remove the right fixing screw -arrow- of bumper middle bracket -A-.

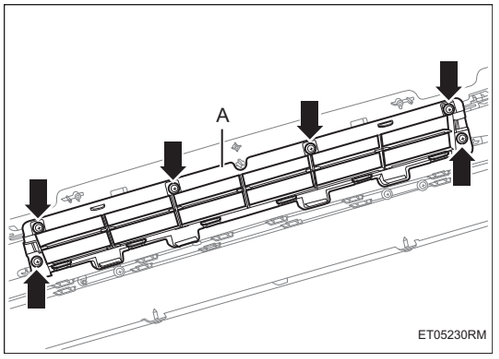


(b) Remove the left fixing screw -arrow- of bumper middle bracket -A-.



(c) Remove screw -1-, and remove front bumper middle bracket-A-.

7. Remove front bumper lower grille

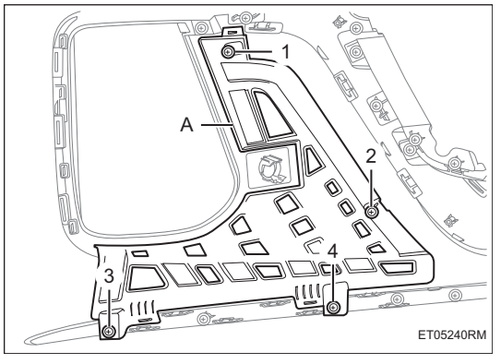


(a) Remove the screw -arrow-, and remove the front bumper lower grille -A-.

8. Remove the front bumper right support plate II

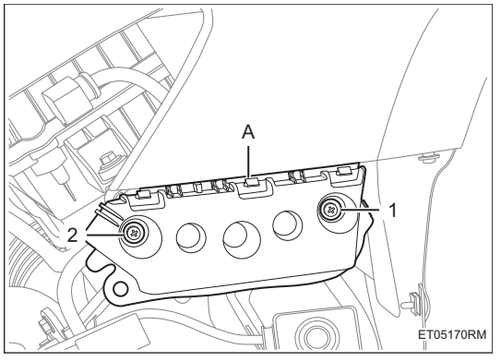
Hint:

The removal sequence on the right side is the same as that on the left side



(a) Remove the screws -1-4-, and remove the front bumper right support plate II-A-.

9. Remove the front bumper left bracket



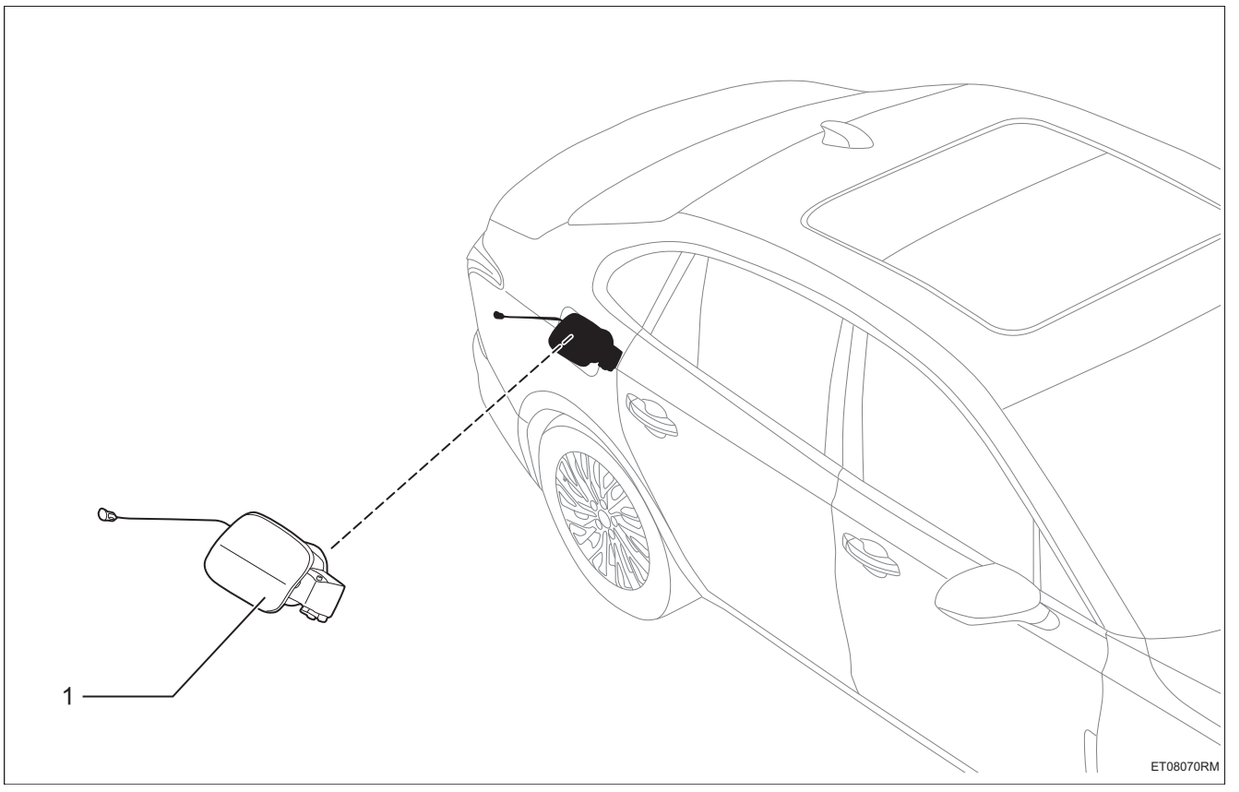
(a) Remove the screws -1-2-, and remove the left bracket-A- of the front bumper.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Fuel filler cap assembly

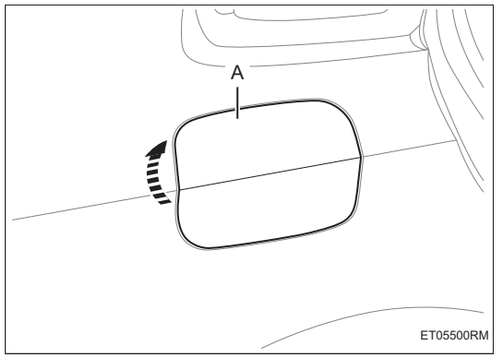
Parts



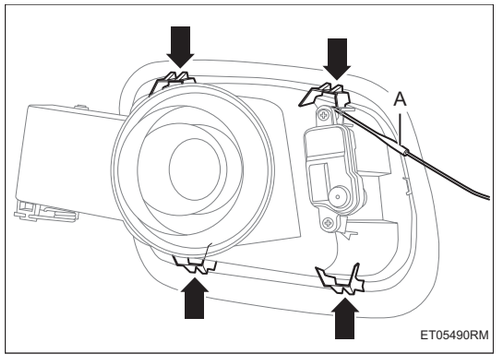
1. Fuel filler cap assembly

Removal

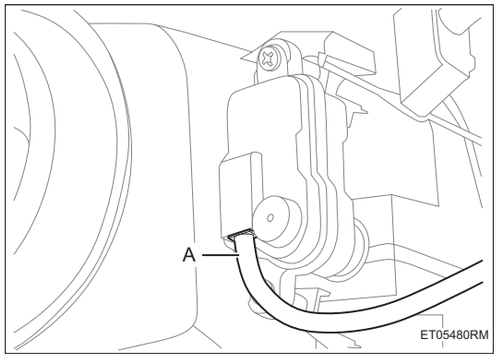
1. **Remove right rear wheel guard (See page ET-39)**
2. **Remove fuel filler cap assembly**



(a) Open the fuel filler cap assembly-A- as arrowed.



(b) Detach claw -arrow- and detach fuel filler cap assembly -A-.



(c) Disconnect the harness connector -A-, and remove the fuel filler cap assembly.

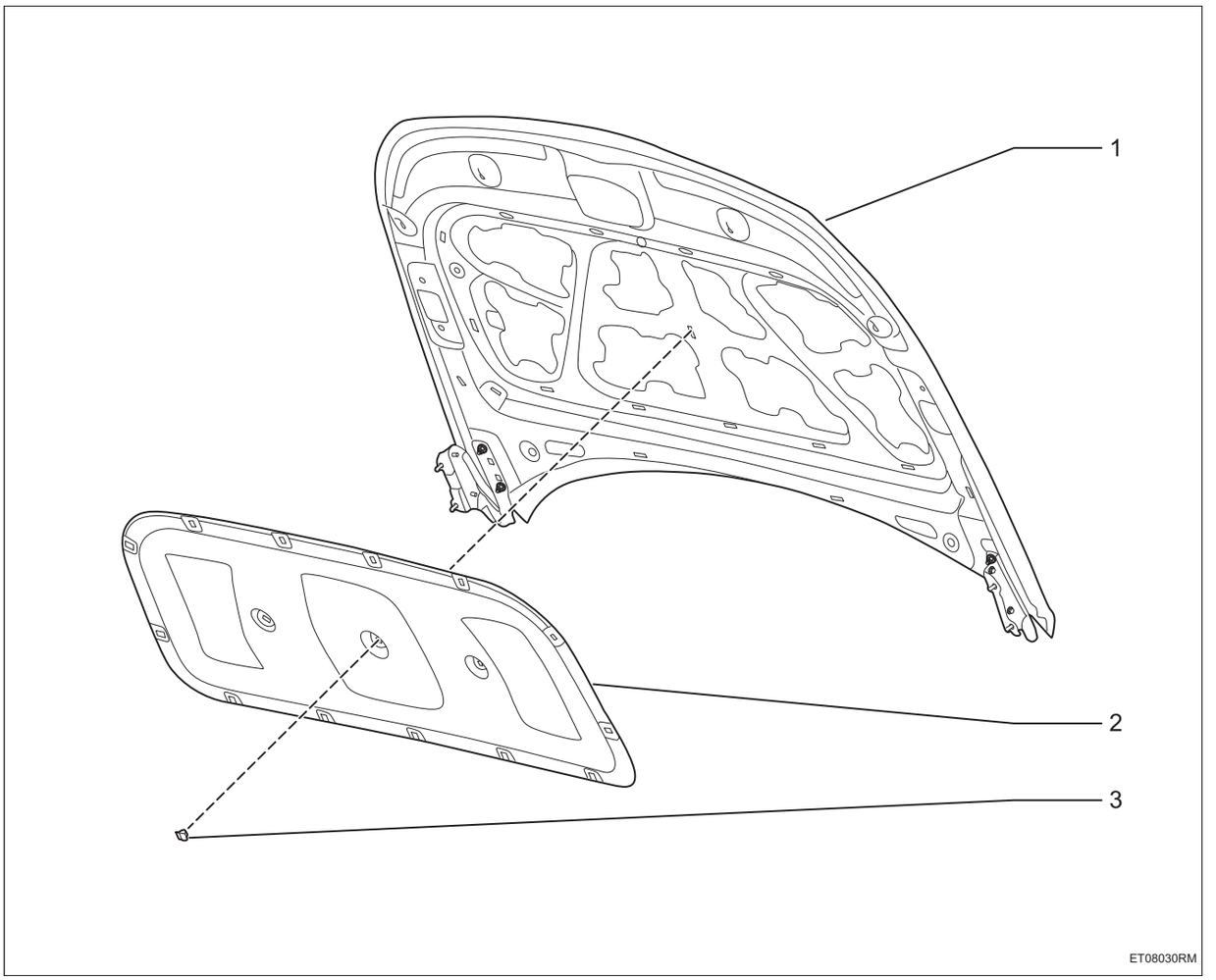
Installation

1. **The installation procedure is the reverse of removal procedure.**

ET

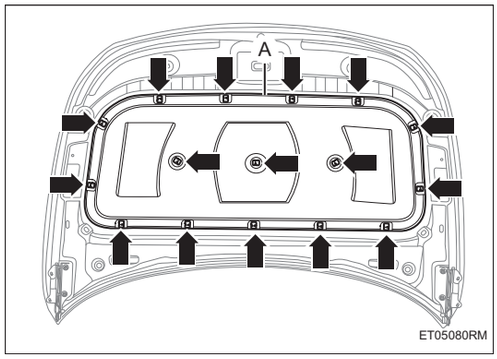
Engine hood heat insulation pad

Parts



1. **Engine hood assembly**
2. **Engine hood heat insulation pad**
3. **Clip**
   - X16

Removal



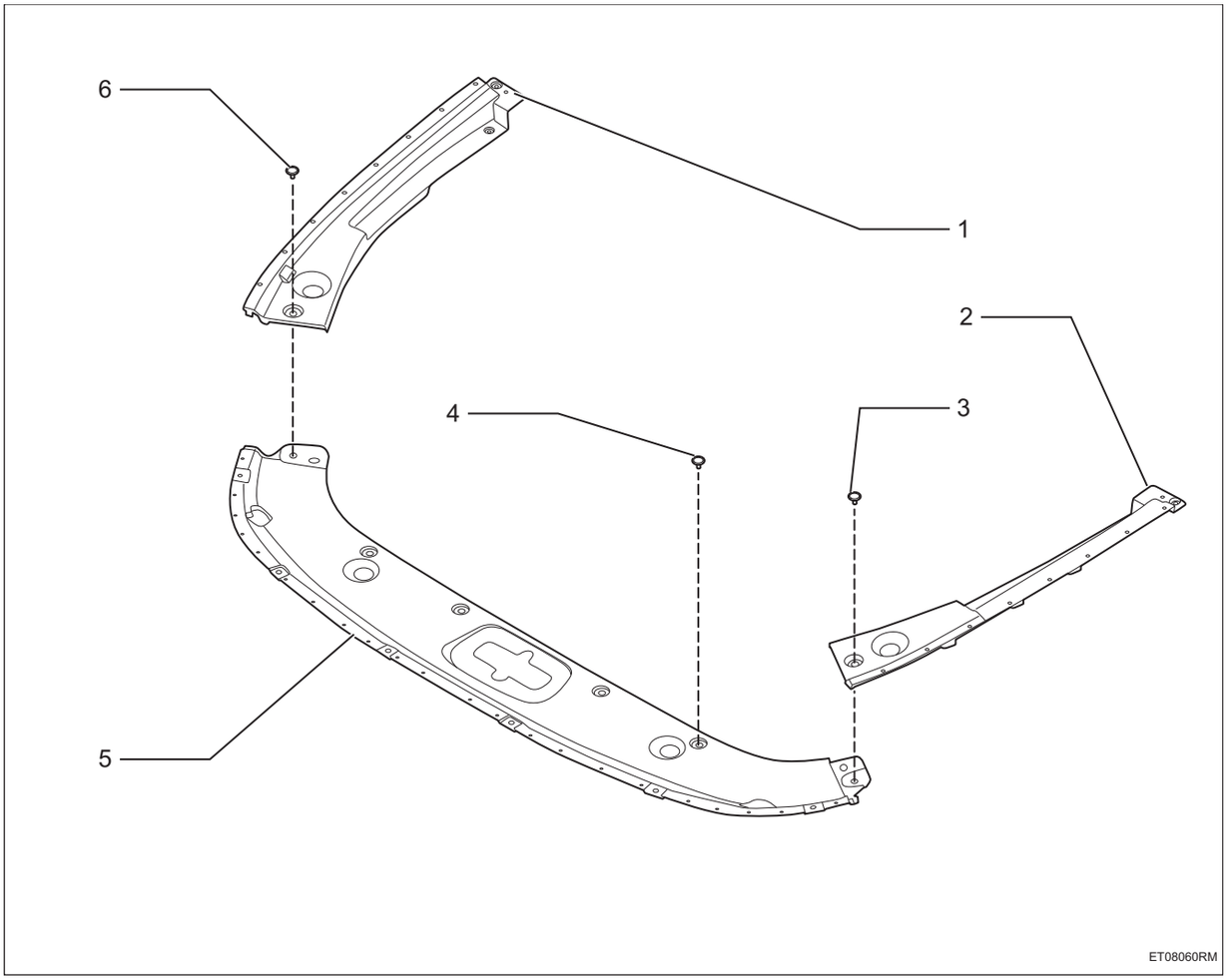
1. **Remove the engine hood heat insulation pad**
   (a) Remove the clip -arrow-, and remove the engine hood heat insulation pad -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Engine hood latch upper guard plate

Parts



1. **Right upper fender upper guard plate**
2. **Left upper fender upper guard plate**
3. **Clip**
   - X3
4. **Clip**
   - X10
5. **Engine hood latch upper guard plate**
6. **Clip**
   - X3

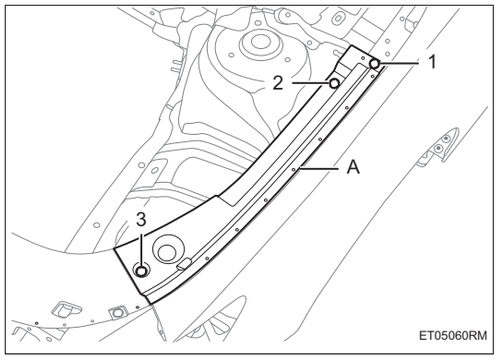
Removal

1. Remove the left fender upper guard plate

Hint:

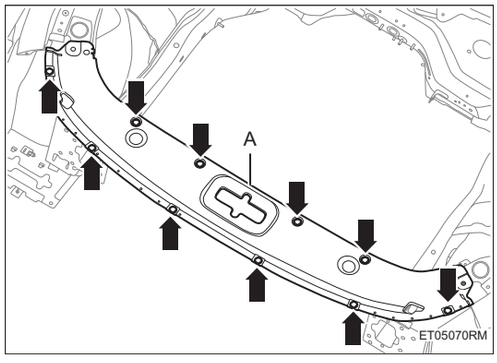
The removal sequence on the right side is the same as that on the left side.

(a) Remove clip -1-3-, and remove left fender upper guard plate -A-.



2. Remove the engine hood latch upper guard plate

(a) Remove the clip -arrow-, and remove the engine hood latch upper guard plate -A-.

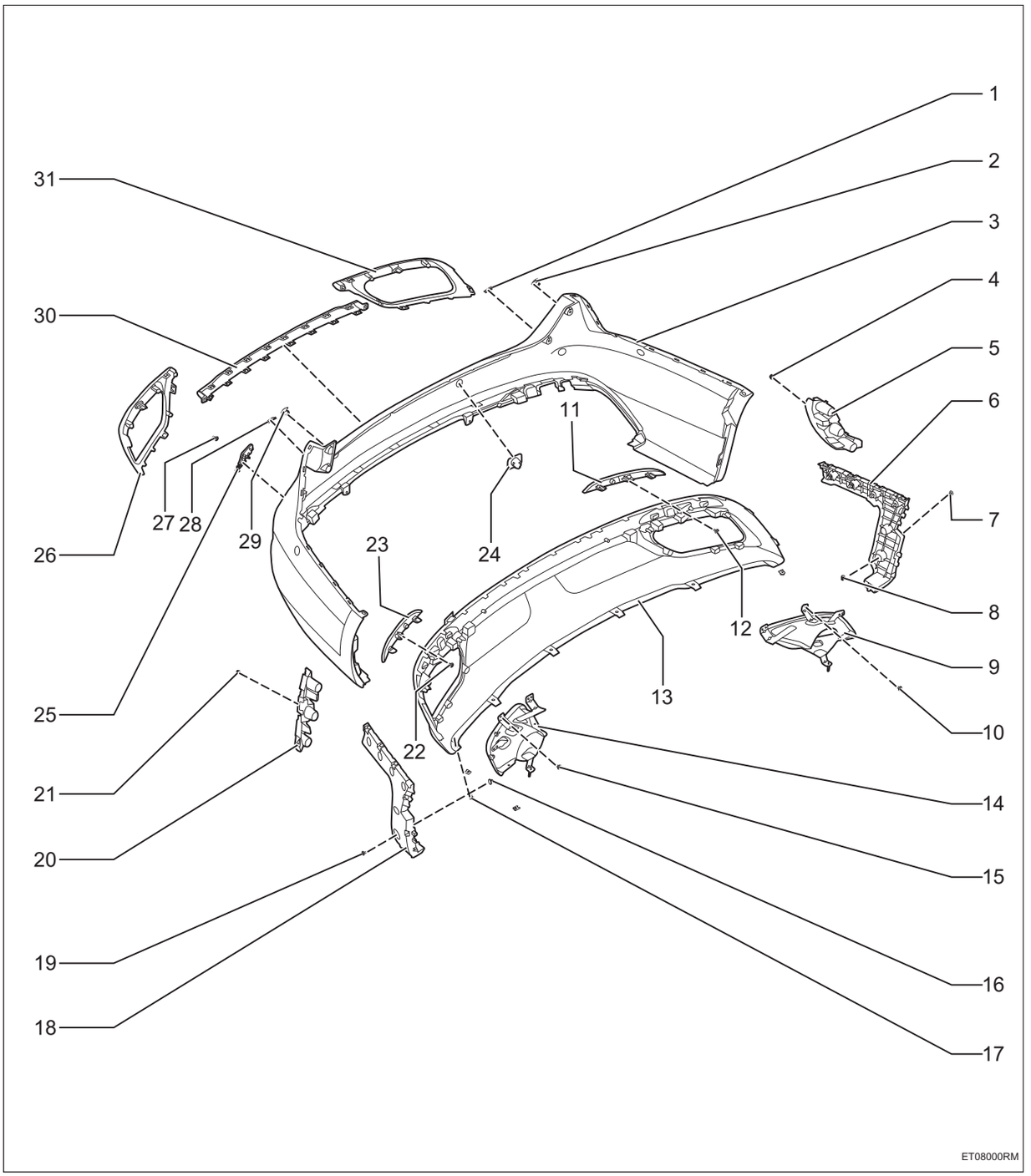


Installation

1. The installation procedure is the reverse of removal procedure.

Rear bumper cover assembly

Parts



1. **Rear bumper trim III**
2. **Rear bumper trim II**
3. **Rear bumper cover**
4. **Hexagon flange nut**
   - X3

- Torque: 8~12 N · m

5. **Rear bumper left bracket II**
6. **Rear bumper left bracket I**
7. **Screw**
   - X4
8. **Insert nut**
   - X4
9. **Left exhaust port trim cover weldment**
10. **Screw**
    - X3
11. **Left rear retro-reflector assembly**
12. **Screw**
13. **Rear bumper lower guard plate**
14. **Right exhaust port trim cover weldment**
15. **Screw**
    - X3
16. **Insert nut**
    - X4
17. **Screw**
    - X6
18. **Rear bumper right bracket I**
19. **Screw**
    - X4
20. **Rear bumper right bracket II**
21. **Hexagon flange nut**
    - X3
    - Torque: 8~12 N · m
22. **Screw**
23. **Right rear retro-reflector assembly**
24. **Left rear middle ultrasonic sensor bracket**
    - X6
25. **Rear bumper towing hook cover**
26. **Rear bumper right trim strip I**
27. **Screw**
    - X2
28. **Rear bumper trim III**

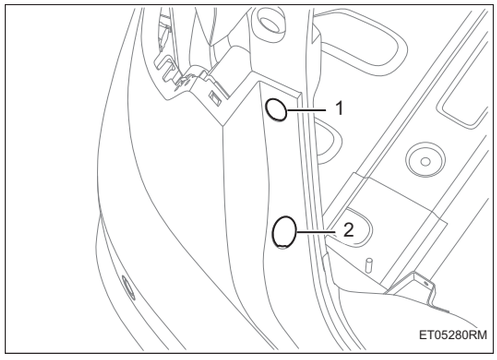
29. **Rear bumper trim II**
30. **Rear bumper middle trim strip I**
31. **Rear bumper left trim strip I**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the rear combination lamp I assembly (See page LI-125)**
3. **Remove rear bumper cover assembly**

Hint:

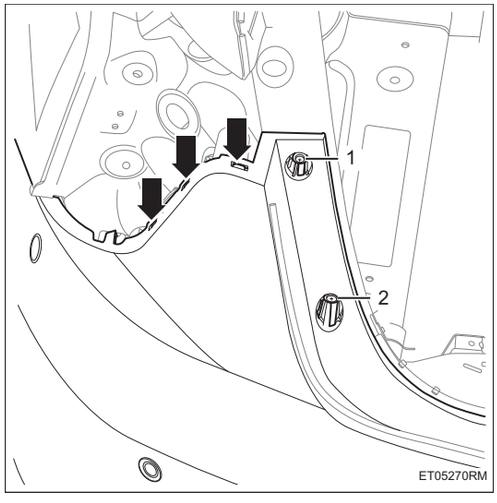
The removal sequence on the right side is the same as that on the left side.



(a) Remove the rear bumper trim II-1-2-.

Hint:

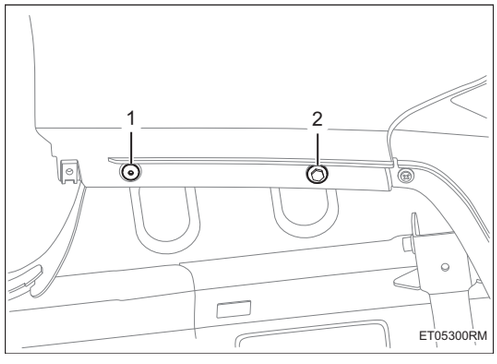
The removal sequence on the right side is the same as that on the left side.



(b) Remove the screws -1-2- and detach the claw -arrow-.

Hint:

The removal sequence on the right side is the same as that on the left side.

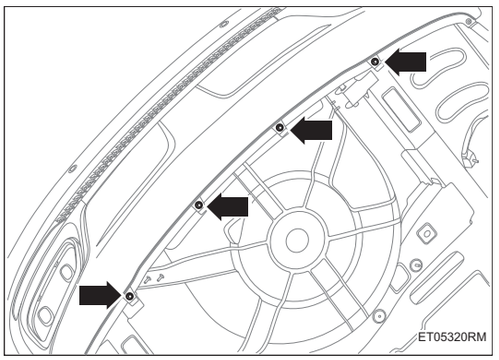


(c) Remove the lower bolt -2- and screw -1- of the rear bumper cover assembly.

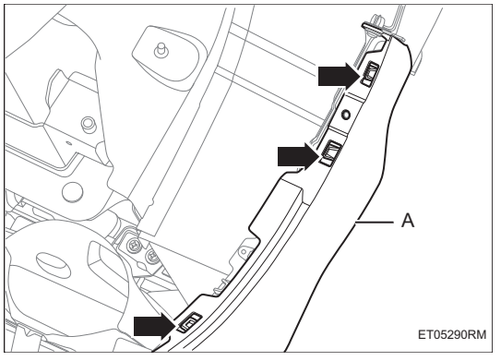
Hint:

The removal sequence on the right side is the same as that on the left side.

ET



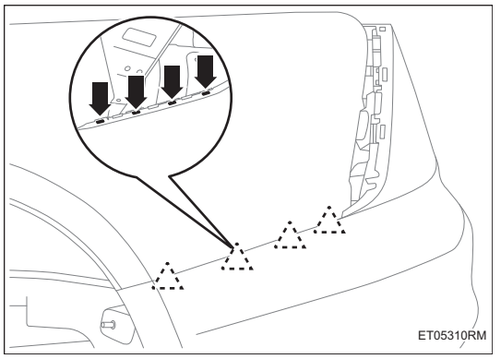
(d) Remove the rear bolt -arrow- of the rear bumper cover assembly.



(e) Detach the claw -arrow- of rear bumper cover assembly -A-.

Hint:

The removal sequence on the right side is the same as that on the left side.



(f) Detach the claw as arrowed of rear bumper cover assembly.

Hint:

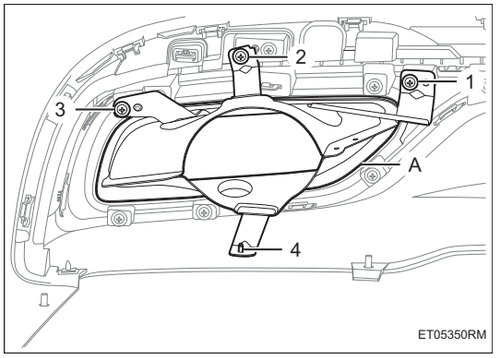
The removal sequence on the right side is the same as that on the left side.

(g) Remove the rear bumper cover assembly.

4. Remove exhaust port trim cover weldment

Hint:

The removal sequence on the right side is the same as that on the left side.



(a) Remove the screw -1-3-.

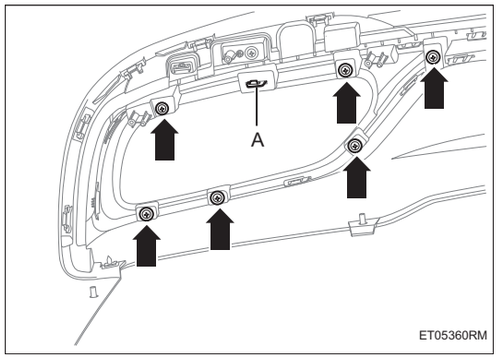
(b) Grind and remove the rivet -4-, and remove the exhaust port trim cover weldment -A-.

5. Remove the rear bumper right trim strip I

Hint:

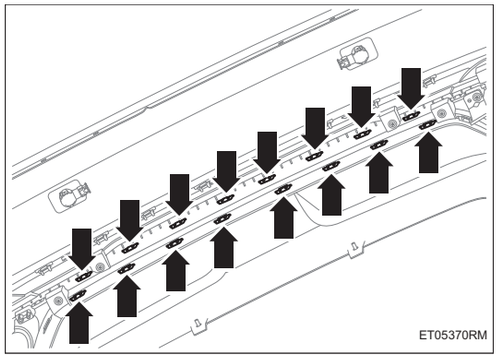
The removal sequence on the right side is the same as that on the left side.

(a) Remove the screw -arrow- and remove the rear bumper right trim strip I -A-.



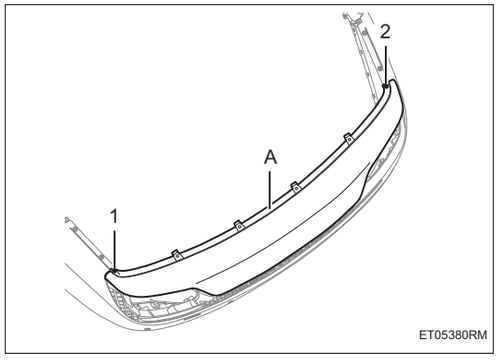
6. Remove the rear bumper trim strip I

(a) Detach the claw-arrow- and remove the rear bumper middle trim strip I.

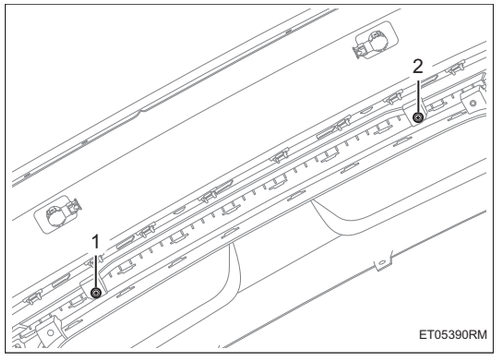


7. Remove the rear bumper lower guard plate

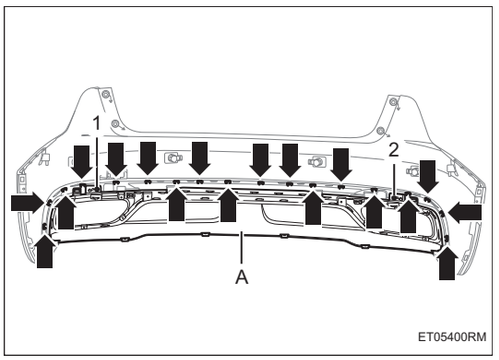
(a) Remove the fixing screws -1-2- of the rear bumper lower guard plate -A-.



(b) Remove the rear bumper lower guard plate internal screws -1-2-.

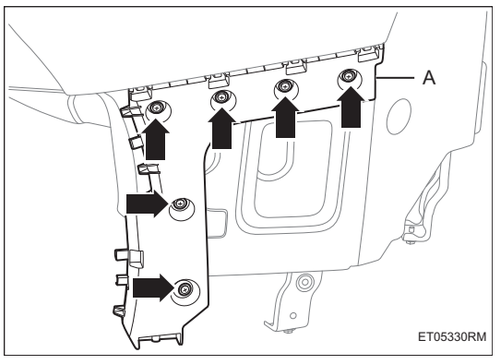


ET



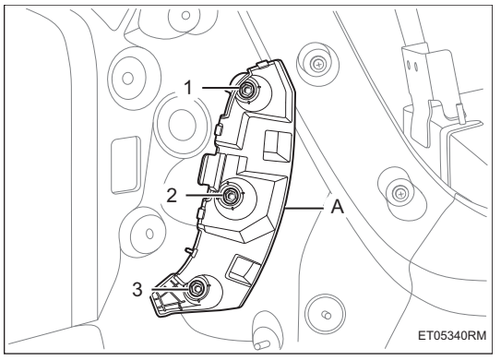
(c) Remove screws -1-2-, and remove rear bumper lower guard plate-A-.

8. Remove the rear bumper left bracket I



(a) Remove the screw -arrow- and remove the rear bumper left bracket I -A-.

9. Remove the rear bumper left bracket II



(a) Remove the nut -1-1-, and remove the rear bumper left bracket II-A-.

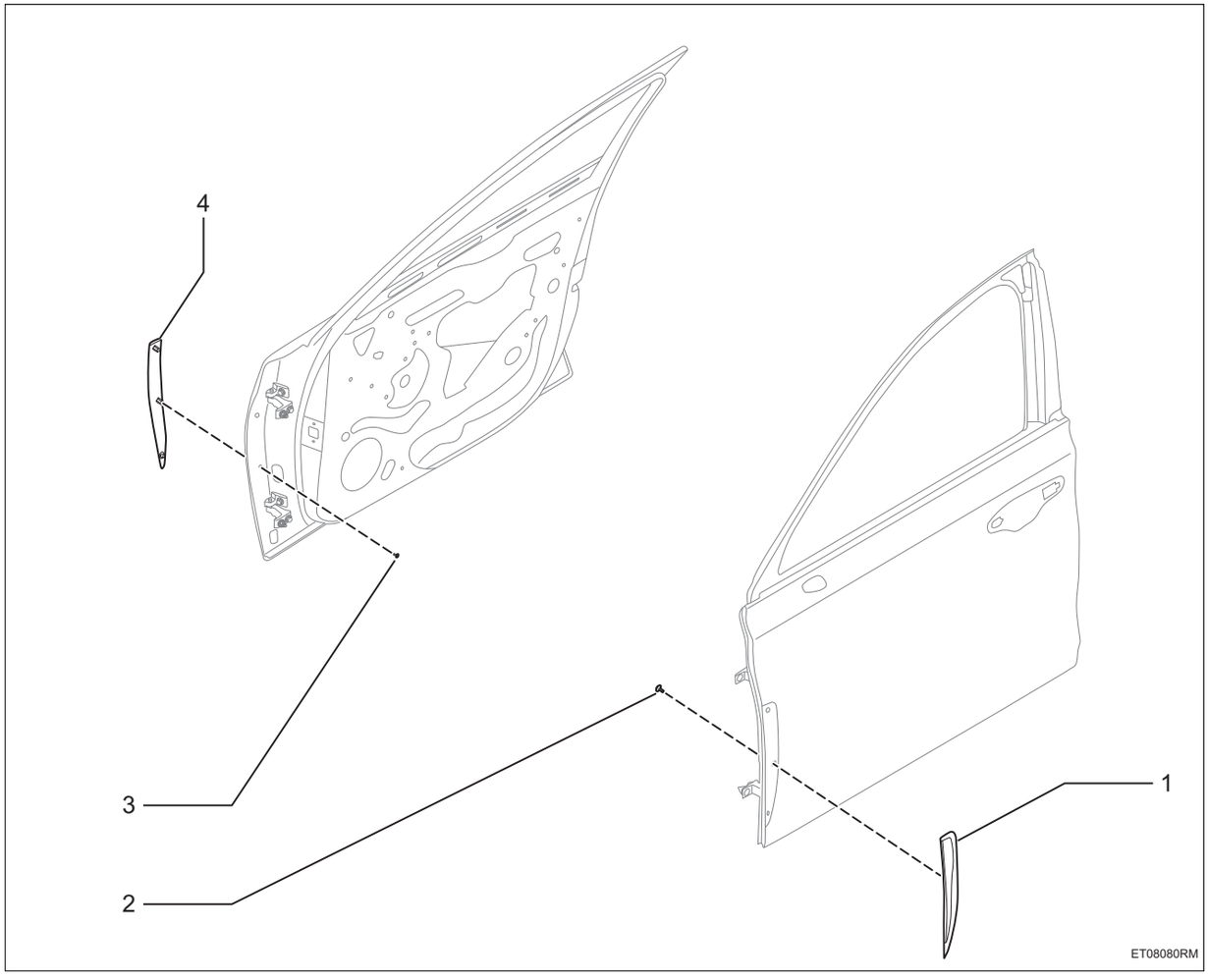
Installation

1. The installation procedure is the reverse of removal procedure.

ET

Driver door trim cover assembly

Parts



1. **Driver door trim cover assembly**
2. **Screw**
   - X3
3. **Screw**
   - X3
4. **Passenger door trim cover assembly**

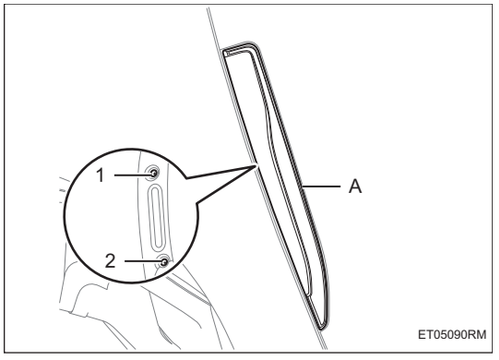
Removal

1. **Open the front door.**
2. **Remove the driver door trim cover assembly**

   Hint:

   The removal sequence on the right side is the same as that on the left side.

   (a) Remove screw -1-2-, and remove driver door trim cover assembly -A-.

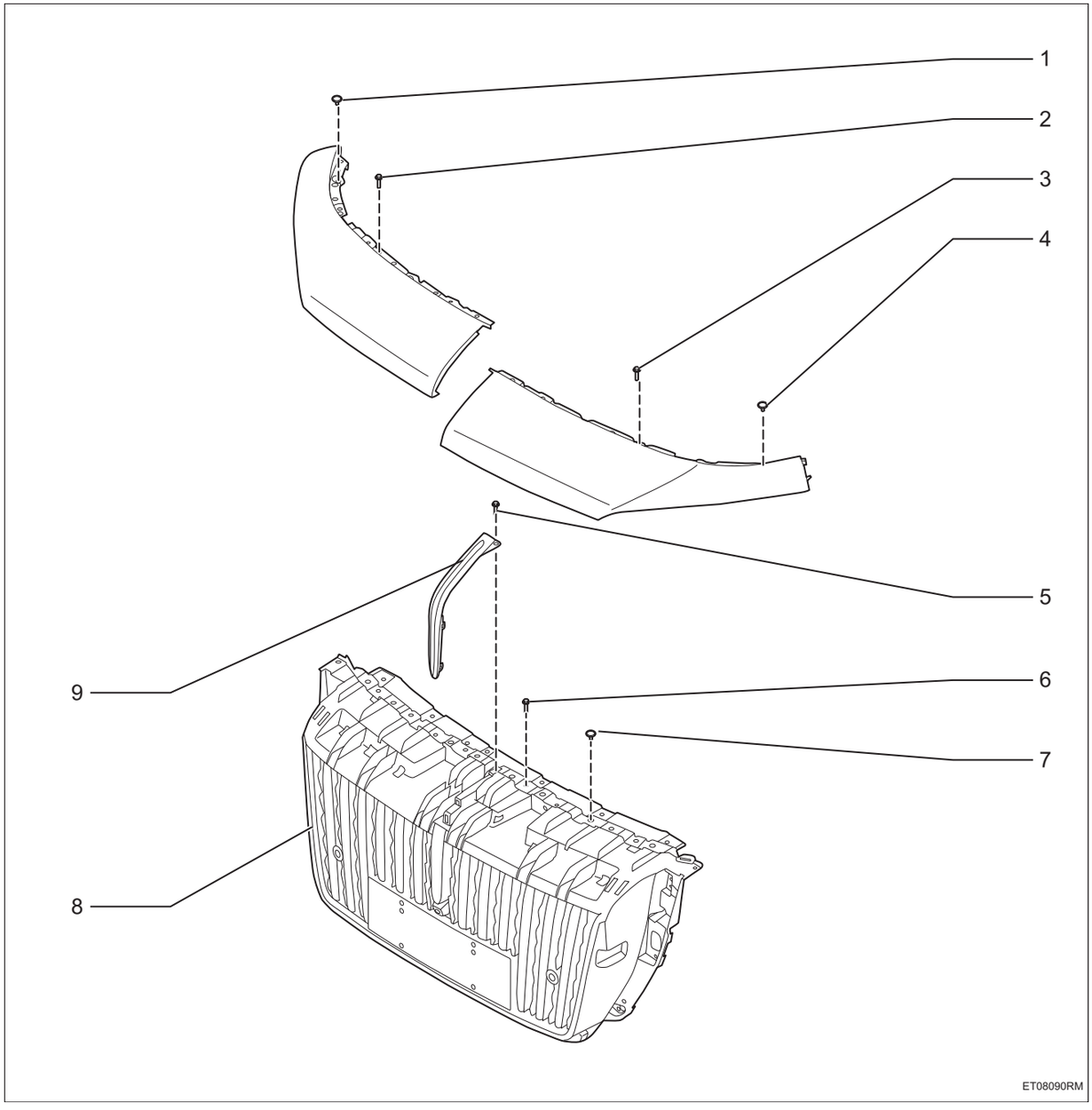


Installation

1. **The installation procedure is the reverse of removal procedure.**

Radiator grille assembly

Parts



1. Clip

- X3

2. Hexagon flange bolt

- X2
- Torque: 7~9 N · m

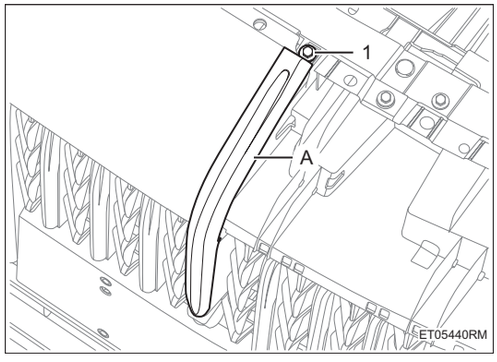
3. Hexagon flange bolt

- X2
- Torque: 7~9 N · m

4. **Clip**
   - X3
5. **Hexagon flange bolt**
   - Torque: 7~9 N · m
6. **Hexagon flange bolt**
   - X6
   - Torque: 7~9 N · m
7. **Clip**
   - X2
8. **Radiator grille assembly**
9. **Radiator grille logo assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Engine hood latch upper guard plate (See page ET-17)**
3. **Remove radiator grille logo assembly**

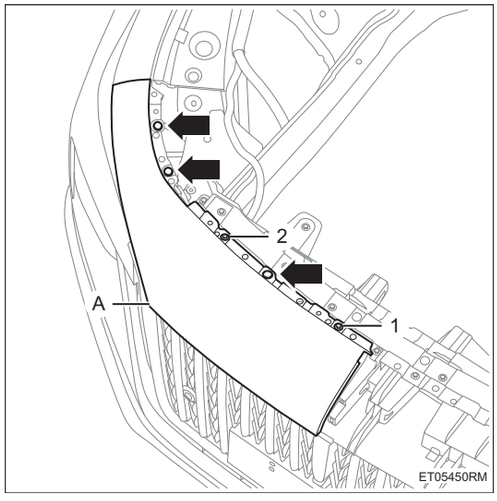


(a) Remove bolt -1-, and remove radiator grille logo assembly-A-.

4. **Remove radiator grille upp on radiator grille**

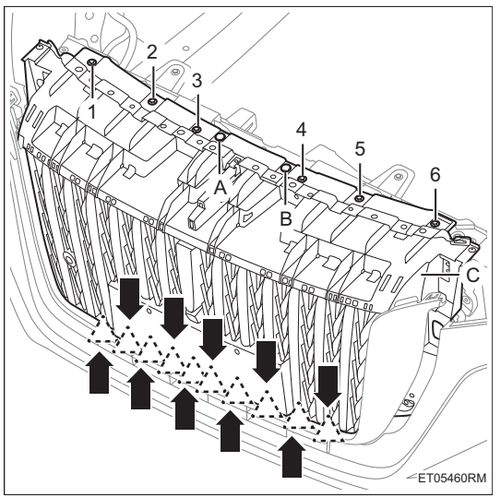
Hint:

The removal sequence on the right side is the same as that on the left side.



(a) Remove the bolts -1-2- and clip -arrow-, and remove the radiator grille upper trim panel -A-.

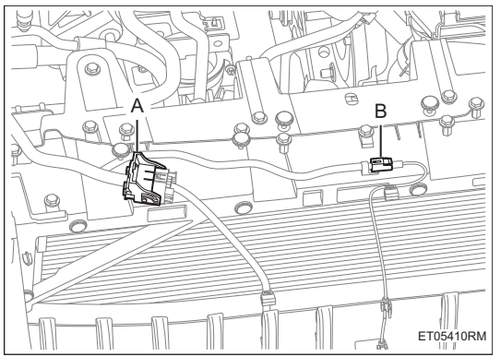
5. **Remove radiator grille assembly**



(a) Remove the bolt -1-6- and clip -A-B-.

(b) Detach claw -arrow- and detach radiator grille assembly -C-.

(c) Disconnect the harness connectors -A-B- and remove the radiator grille assembly.

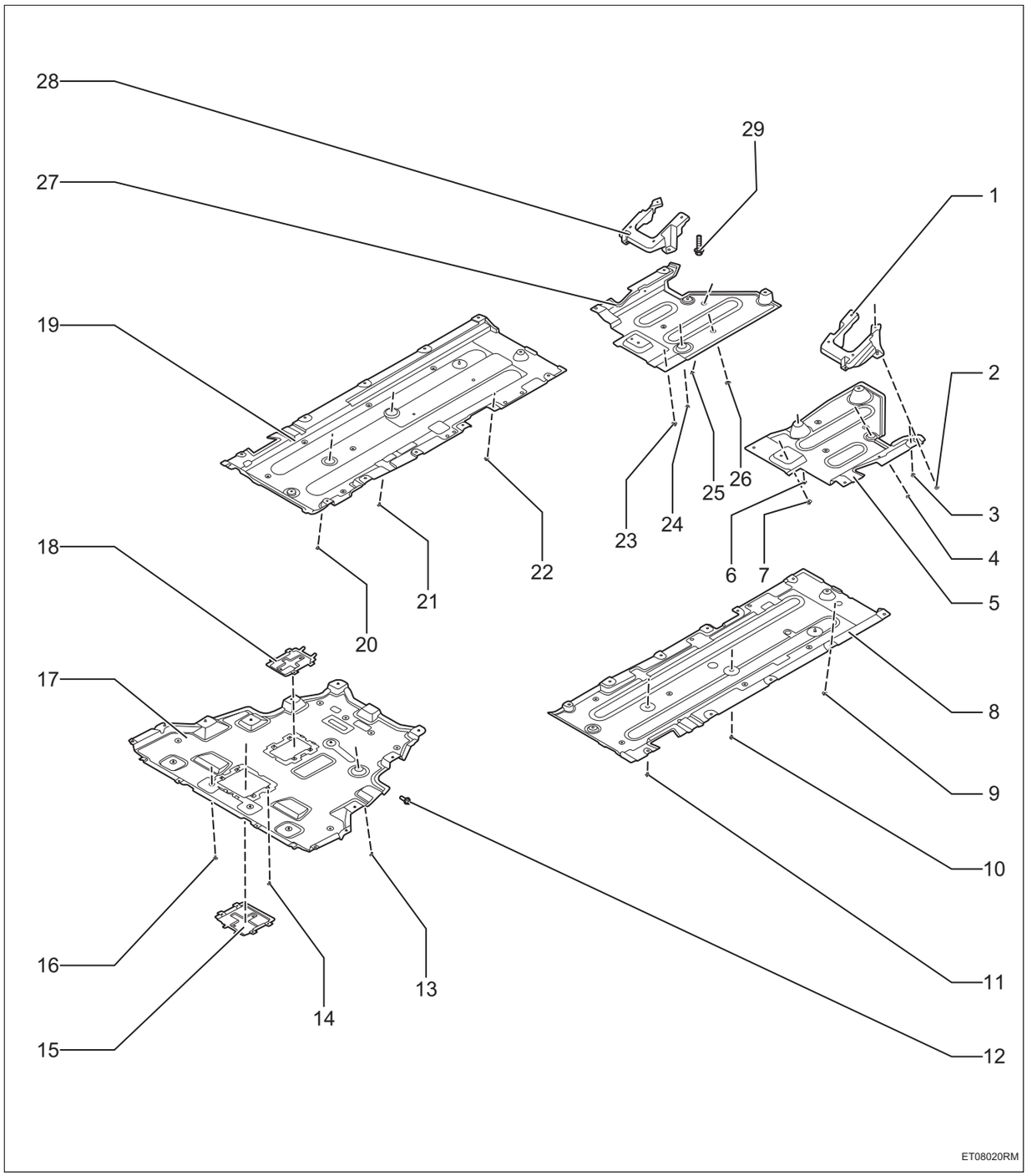


Installation

1. **The installation procedure is the reverse of removal procedure.**

Body bottom guard plate

Parts



1. **Bottom guard plate bracket assembly l**
2. **Hexagon flange bolt**
   - Torque: 3~5 N · m
3. **Hexagon flange bolt**
   - Torque: 3~5 N · m

4. **Clip**
5. **Floor left bottom guard plate II**
6. **Hexagon flange nut**
   - X5
   - Torque: 3~5 N · m
7. **Hexagon flange nut**
   - Torque: 3~5 N · m
8. **Floor left bottom guard plate I**
9. **Hexagon flange nut**
   - X13
   - Torque: 3~5 N · m
10. **Hexagon flange bolt**
    - Torque: 3~5 N · m
11. **Clip**
    - X2
12. **Hexagon flange bolt**
    - X8
    - Torque: 3~5 N · m

13. **Clip**
14. **Hexagon flange bolt**
    - X17
    - Torque: 2~2.9 N · m
15. **Handhole cover**
16. **Hexagon flange bolt**
    - X6
    - Torque: 3~5 N · m
17. **Engine bottom guard plate**
18. **Handhole cover II**
19. **Floor right bottom guard plate I**
20. **Clip**
    - X2
21. **Hexagon flange bolt**
    - Torque: 3~5 N · m
22. **Hexagon flange nut**
    - X13
    - Torque: 3~5 N · m
23. **Hexagon flange nut**
    - Torque: 3~5 N · m

24. Clip

25. Hexagon flange bolt

- Torque: 3~5 N · m

26. Hexagon flange nut

- X5
- Torque: 3~5 N · m

27. Floor right bottom guard plate II

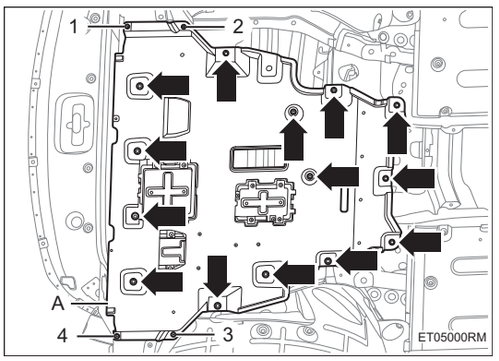
28. Bottom guard plate bracket assembly II

29. Hexagon flange bolt

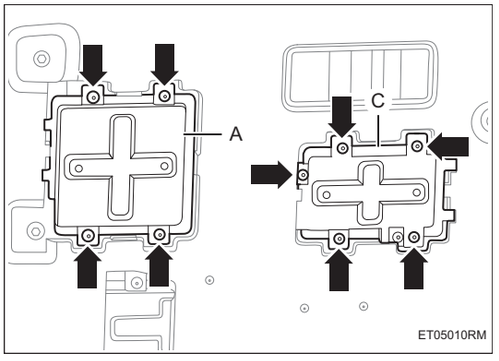
- Torque: 3~5 N · m

Removal

1. Remove the engine bottom guard plate



(a) Remove the screws -1-4- and bolt -arrow-, and remove the engine bottom guard -A-.



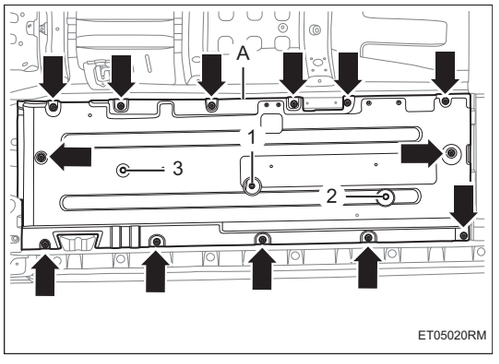
(b) Remove the screw -arrow-, and remove the handhole cover -A-.

(c) Remove the screw -arrow- and remove the handhole cover Ⅱ -C-.

2. Remove floor right bottom guard plate I

Hint:

The removal sequence on the right side is the same as that on the left side.



(a) Remove the nut -arrow- and the bolt -1-.

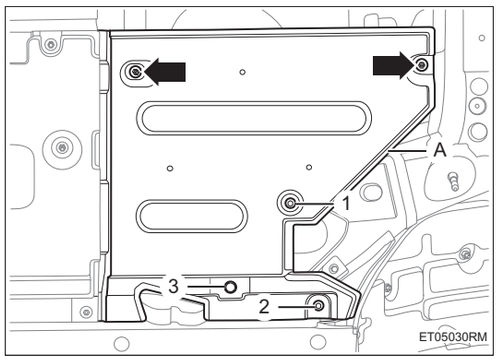
(b) Remove clip -2-3-, and remove right bottom guard plate I-A-.

3. Remove floor right bottom guard plate II

Hint:

The removal sequence on the right side is the same as that on the left side.

ET



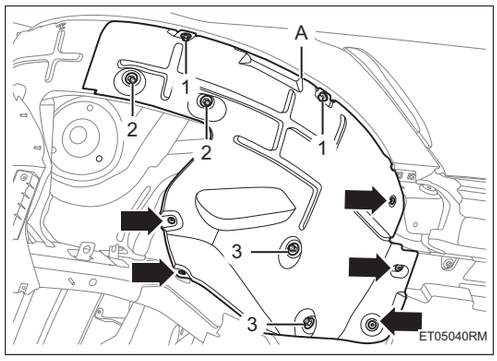
(a) Remove the nut -arrow- and the bolt -1-2-.

(b) Remove clip -3-, and remove right bottom guard plate II-A- of the floor.

4. Remove the left front wheel guard II

Hint:

The removal sequence on the right side is the same as that on the left side.



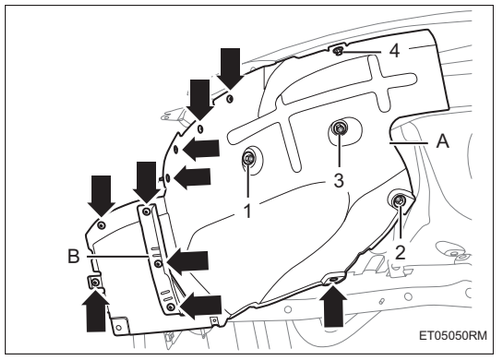
(a) Remove the nut -2-3- and screw -arrow-.

(b) Remove the clip -1- and left front wheel guard II-A-.

5. Remove the left front wheel guard I

Hint:

The removal sequence on the right side is the same as that on the left side.



(a) Remove the nut -1-3- and screw -arrow-.

(b) Left front lower spoiler -B-.

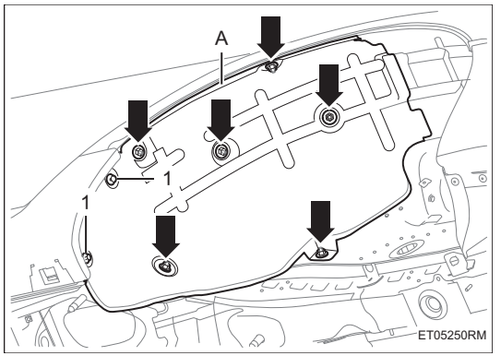
(c) Remove the clip -4- and left front wheel guard I-A-.

6. Remove the left rear wheel guard

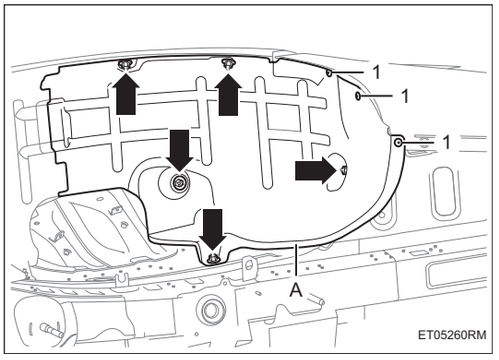
ET

Hint:

The removal sequence on the right side is the same as that on the left side.



(a) Remove the fixing nut -arrow- and clip -1- of rear wheel guard -A-.



(b) Remove nut -arrow- and screw -1-, and remove left rear wheel guard -A-.

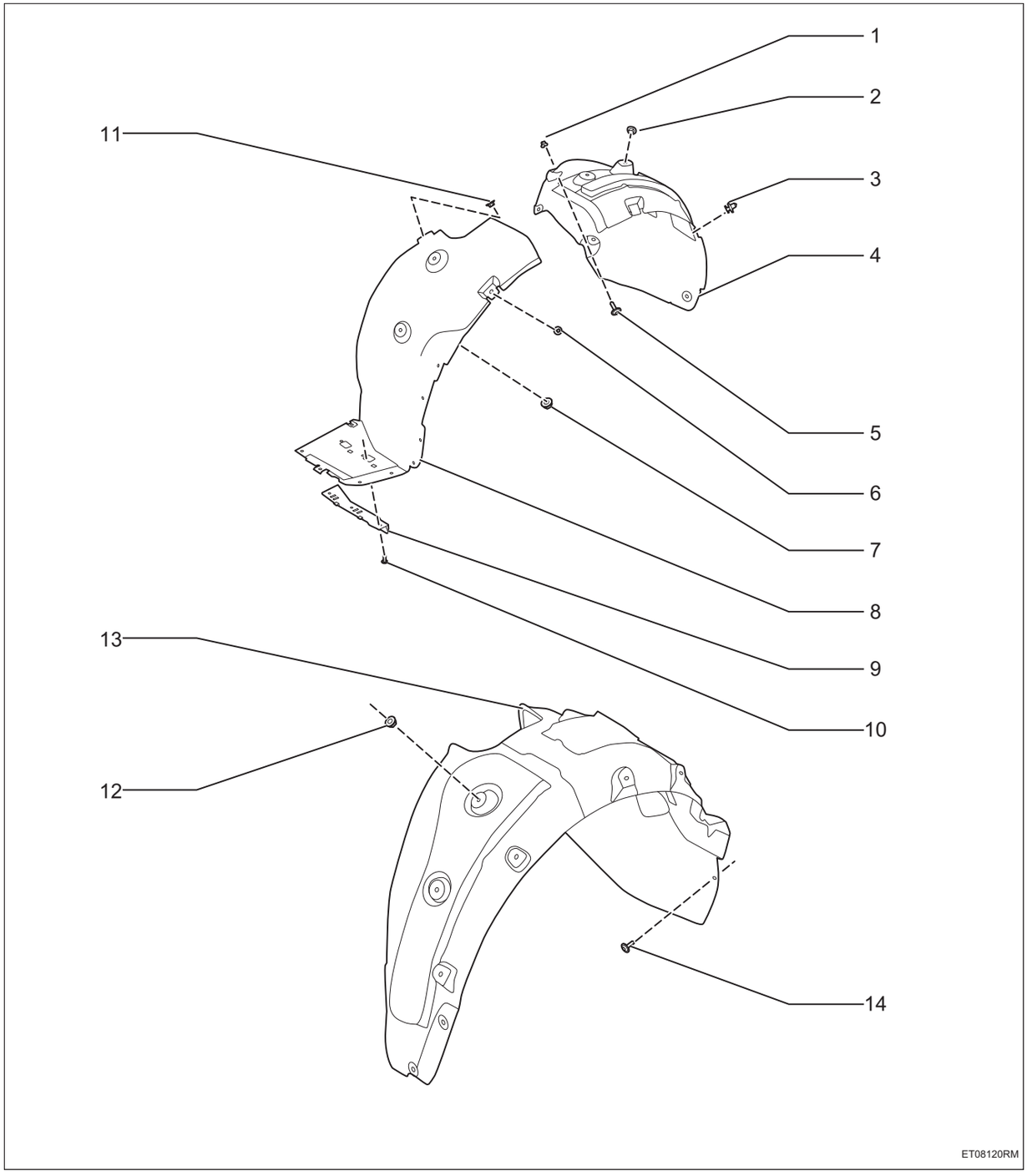
ET

Installation

1. **The installation procedure is the reverse of removal procedure.**

Wheel guard

Parts



1. **Insert nut**
   - X9
2. **Gland nut**
   - X4
3. **Clip**

- X4

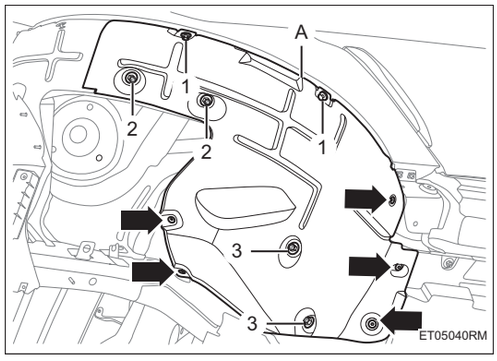
4. **Left front wheel guard II**
5. **Tapping screw**
   - X4
6. **Tapping screw**
   - X5
7. **Gland nut**
   - X2
8. **Left front wheel guard I**
9. **Left front lower spoiler**
10. **Tapping screw**
    - X5
11. **Gland nut**
12. **Gland nut**
    - X11
13. **Left rear wheel guard**
14. **Tapping screw**
    - X3

Removal

1. Remove the left front wheel guard II

Hint:

The removal sequence on the right side is the same as that on the left side.



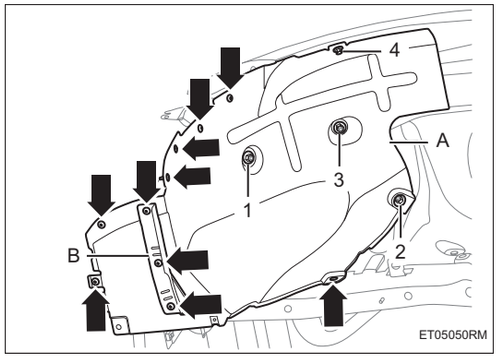
(a) Remove the nut -2-3- and screw -arrow-.

(b) Remove the clip -1- and left front wheel guard II -A-.

2. Remove the left front wheel guard I

Hint:

The removal sequence on the right side is the same as that on the left side.



(a) Remove the nut -1-3- and screw -arrow-.

(b) Left front lower spoiler -B-.

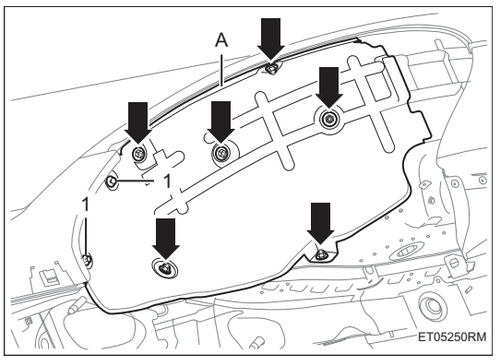
(c) Remove the clip -4- and left front wheel guard I -A-.

3. Remove left rear wheel guard

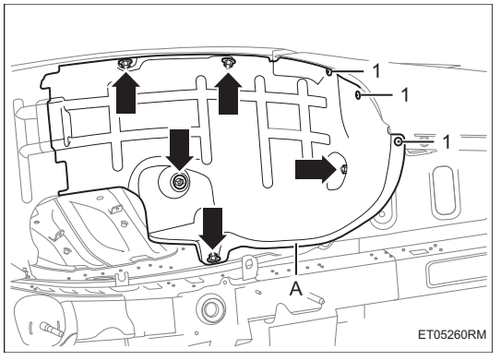
Hint:

The removal sequence on the right side is the same as that on the left side.

ET



(a) Remove the fixing nut -arrow- and clip -1- of rear wheel guard -A-.



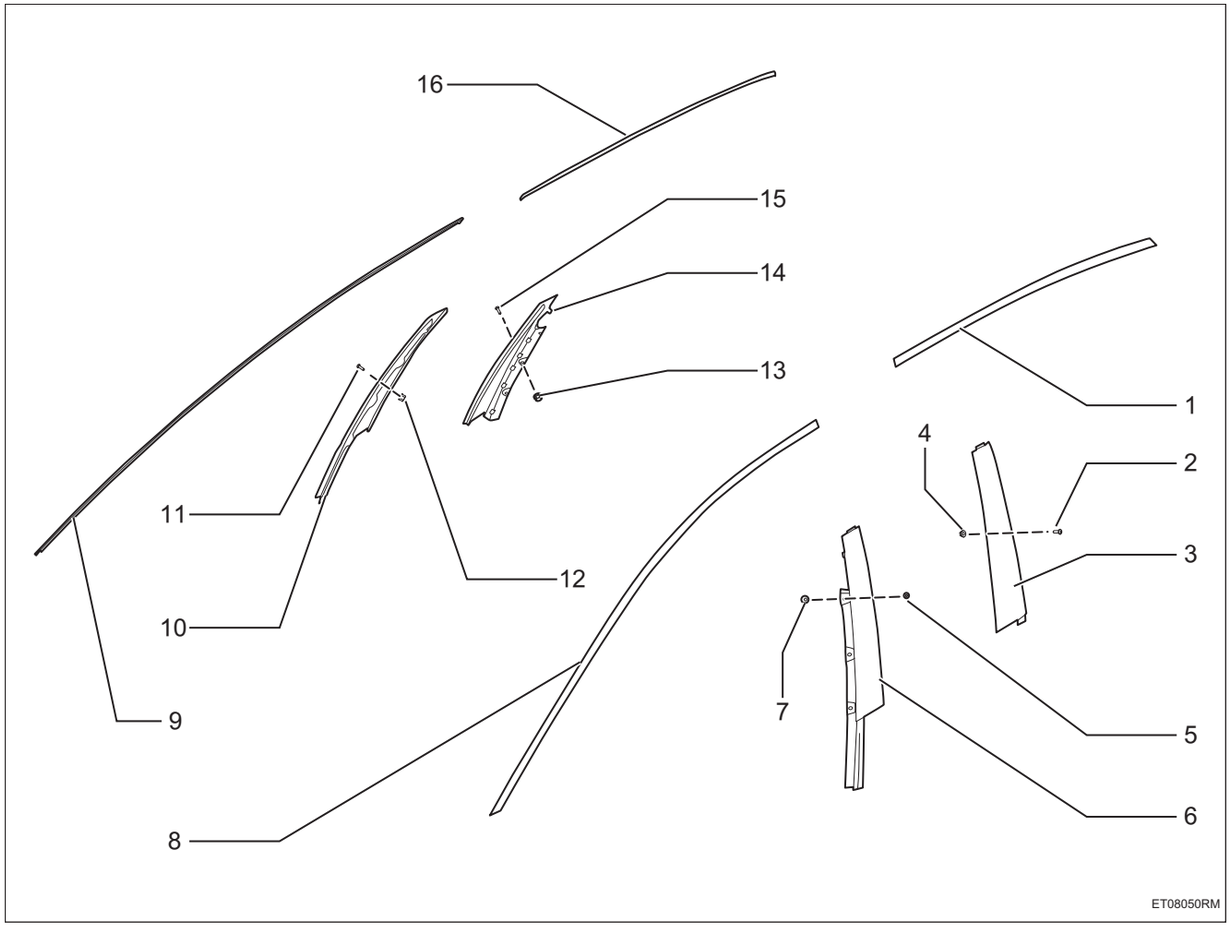
(b) Remove nut -arrow- and screw -1-, and remove left rear wheel guard -A-.

Installation

1. The installation procedure is the reverse of removal procedure.

Door B pillar trim panel assembly

Parts



1. **Rear left door upper frame molding assembly**
2. **Screw**
   - X3
3. **Rear left door B pillar trim cover assembly**
4. **Insert nut**
   - X3
5. **Screw**
   - X3
6. **Driver door B pillar trim panel assembly**
7. **Insert nut**
   - X3
8. **Driver door upper frame molding assembly**
9. **Passenger door upper frame molding assembly**
10. **Driver door B pillar trim panel assembly**
11. **Screw**

- X3

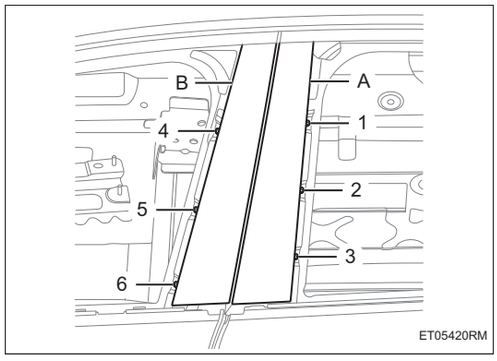
12. **Insert nut**
    - X3
13. **Insert nut**
    - X3
14. **Rear left door B pillar trim cover assembly**
15. **Screw**
    - X3
16. **Right rear door upper frame molding assembly**

Removal

1. Remove the door B pillar trim panel assembly

Hint:

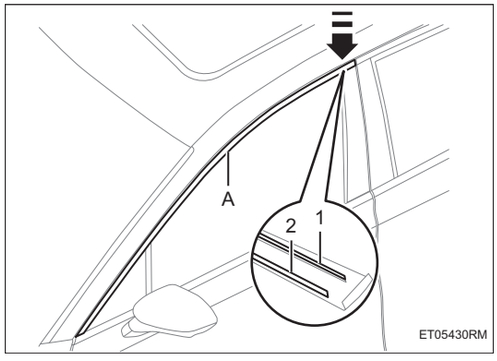
The removal sequence on the right side is the same as that on the left side.



(a) Remove the screw -1-3-, and remove the rear door B pillar trim panel assembly-A-.

(b) Remove the screw -4-3-, and remove the front door B pillar trim panel assembly-B-.

2. Remove door upper frame molding assembly



(a) Insert the appropriate tool as arrowed to detach rail -1-2-.

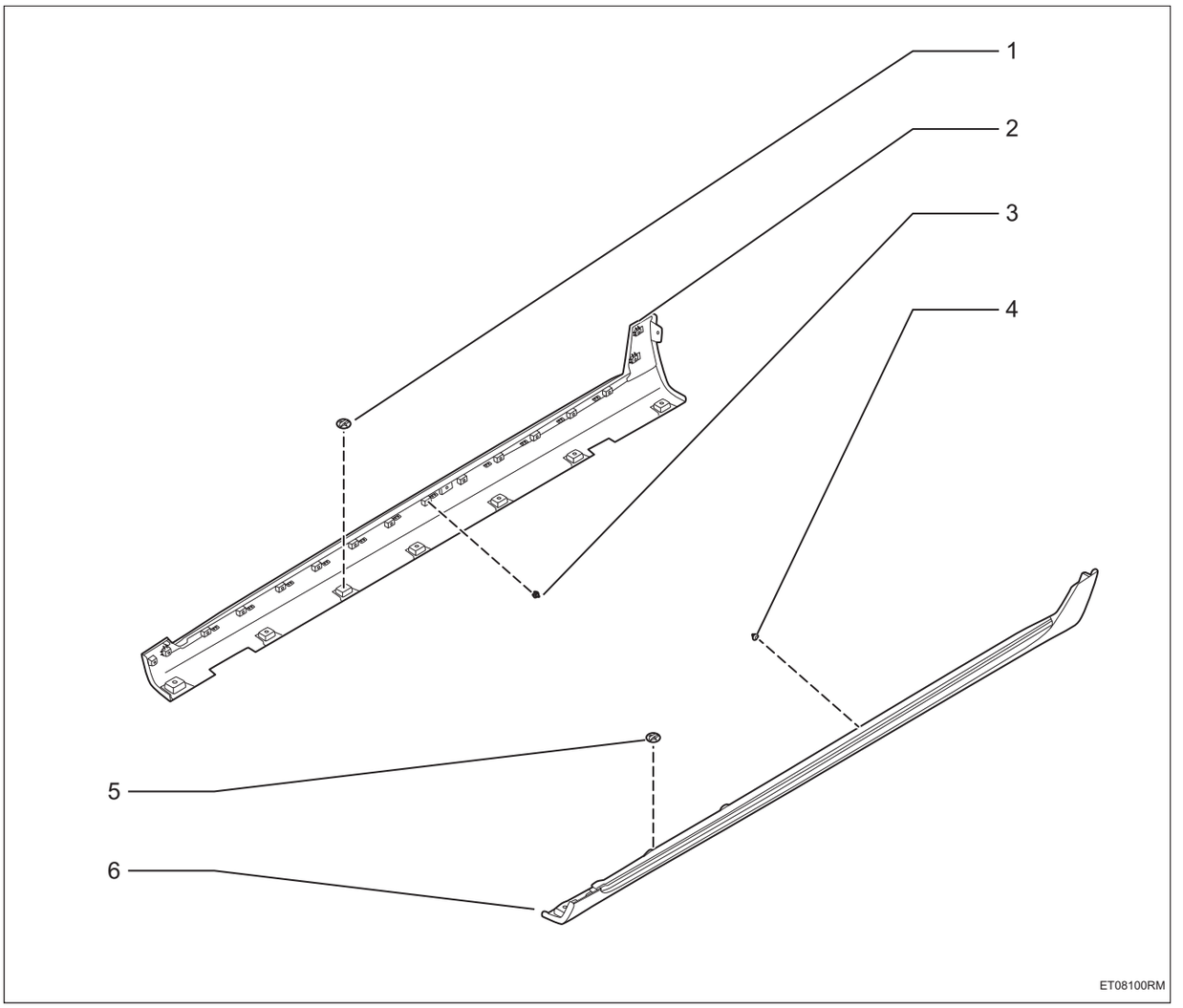
(b) Remove door upper frame molding assembly -A-.

Installation

1. The installation procedure is the reverse of removal procedure.

Sill trim panel

Parts



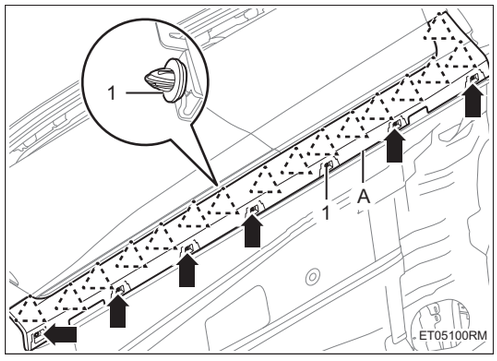
1. **Clip**
   - X6
2. **Right door sill trim panel**
3. **Clip**
   - X15
4. **Clip**
   - X15
5. **Clip**
   - X6
6. **Left door sill trim panel**

Removal

1. Remove the sill trim panel

Hint:

The removal sequence on the right side is the same as that on the left side.



(a) Detach the lower clip as arrowed.

(b) As shown in the figure, detach the clip -2- and remove the screw -1-.

(c) Remove the sill trim panel-A-.

Installation

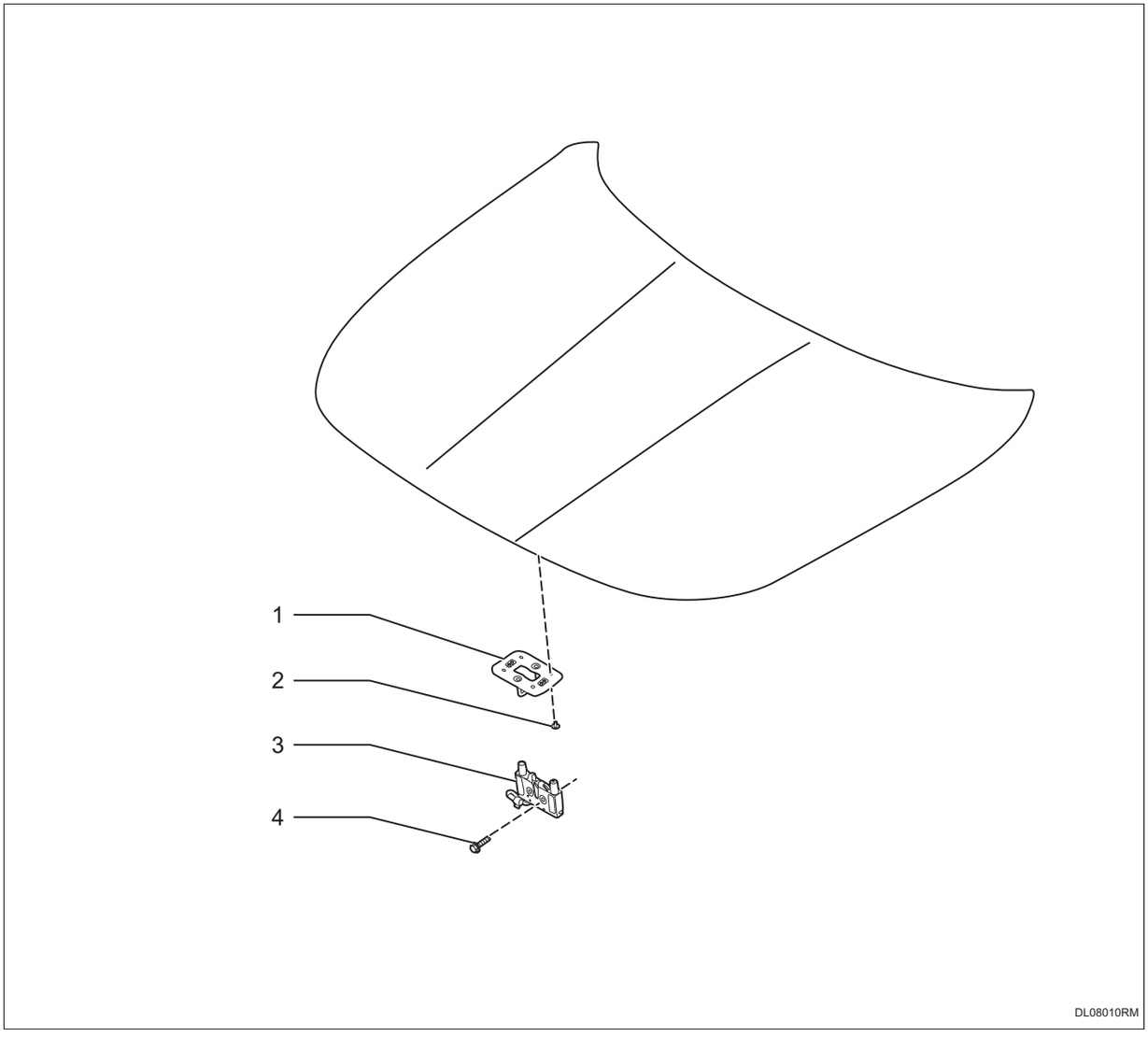
1. The installation procedure is the reverse of removal procedure.

Door lock

Engine hood latch assembly DL-1
Parts DL-1
Removal DL-2
Installation DL-2
Trunk lid latch body assembly DL-3
Parts DL-3
Removal DL-5
Installation DL-5
Door handle assembly DL-6
Parts DL-6
Removal DL-8
Installation DL-11
Door lock assembly DL-12
Parts DL-12
Removal DL-14
Check DL-15
Check DL-17
Installation DL-18

Engine hood latch assembly

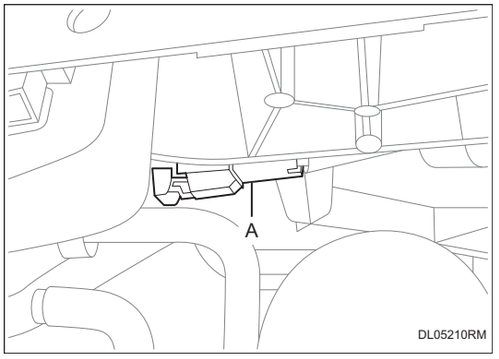
Parts



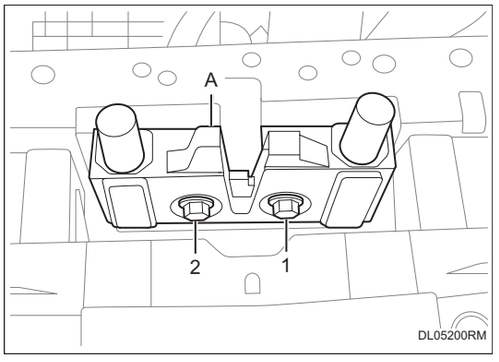
1. **Engine hood lock ring assembly**
2. **Hexagon flange bolt**
   - X4
   - Torque: 6 ~ 8 N · m
3. **Engine hood latch assembly**
4. **Hexagon flange bolt**
   - X2
   - Torque: 19 ~ 24 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Engine hood latch upper guard plate (See page ET-17)**
3. **Remove the engine hood latch assembly**



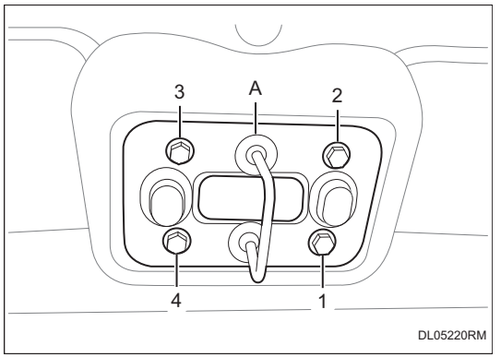
(a) Disconnect the harness connector-A-.



(b) Remove the bolt -1-2-.

(c) Remove the engine hood latch assembly-A-.

4. **Remove engine hood lock ring assembly**



(a) Remove the bolt -1-4-.

(b) Remove the engine hood lock ring assembly-A-.

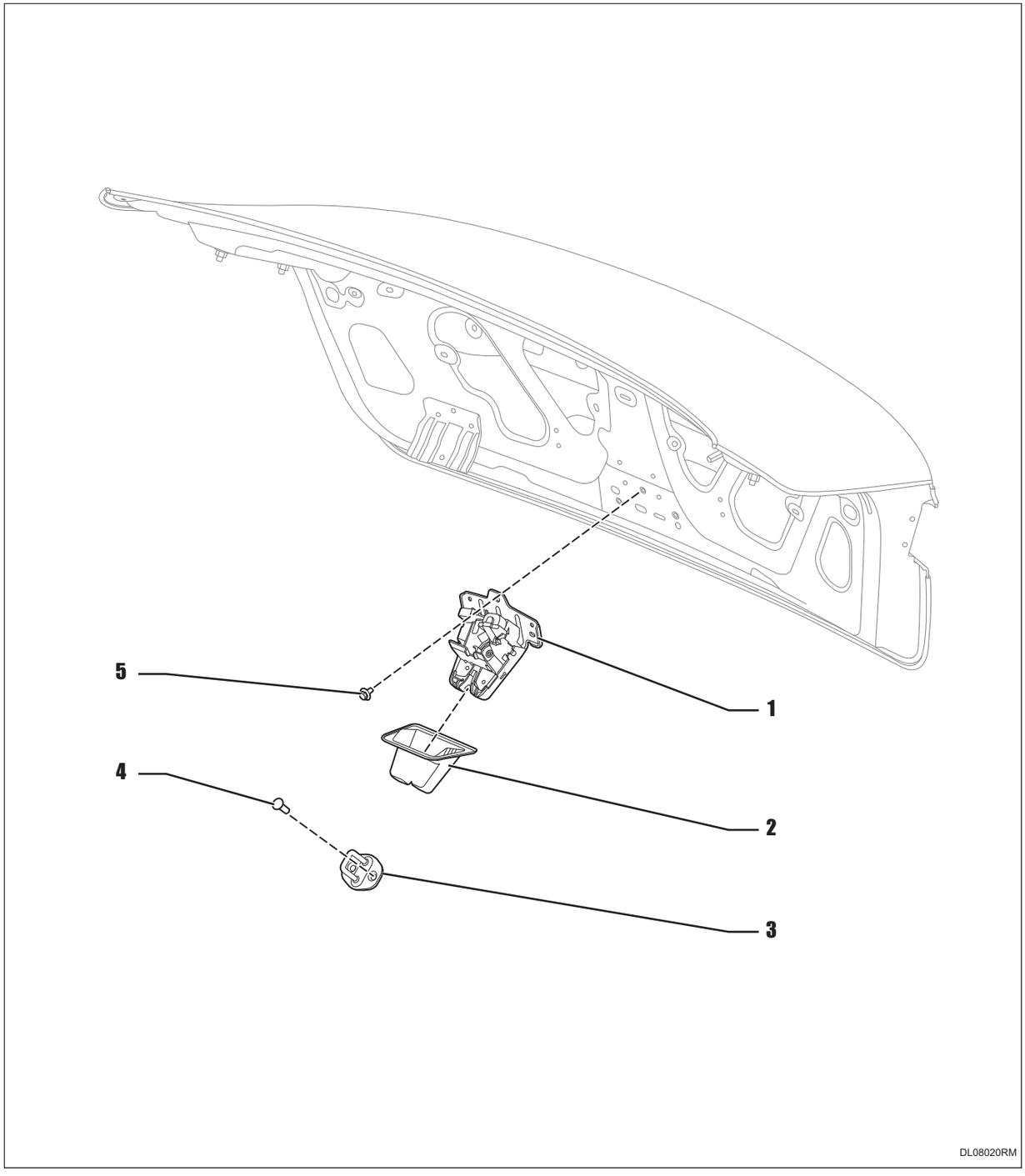
Installation

1. **The installation procedure is the reverse of removal procedure.**

DL

Trunk lid latch body assembly

Parts



1. **Trunk lid latch body assembly**
2. **Trunk lid latch protective cover**
3. **Trunk lid lock ring assembly**
4. **Hexagon lobular socket pan head bolt**
   - X2

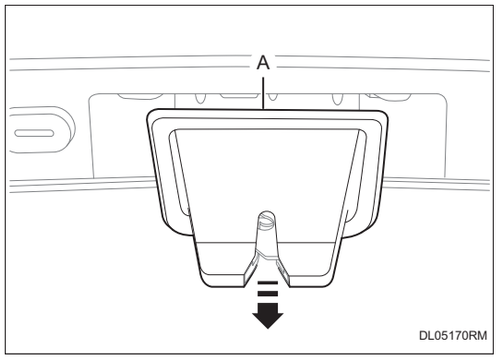
- Torque: 16~24 N · m

5. Hexagon flange bolt

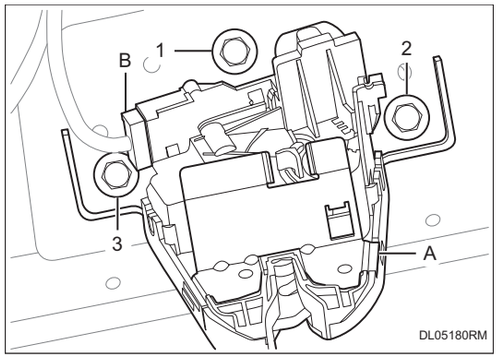
- X3
- Torque: 8~12 N · m

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove trunk lid guard plate (See page IR-33)**
3. **Remove the trunk lid latch body assembly**



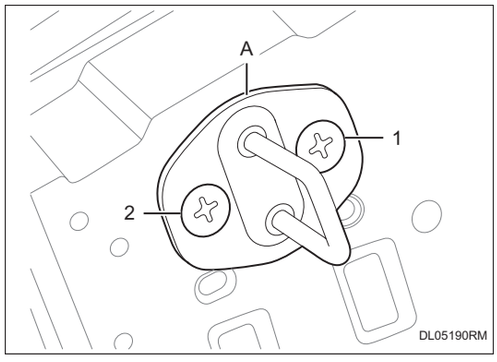
(a) Trunk lid latch protective cover -A-.



(b) Disconnect the harness connector-B-.

(c) Remove the fixing bolts -1-3- of trunk lid latch body assembly -A-.

4. **Remove trunk rear wall guard plate (See page IR-33)**
5. **Remove the trunk lid lock ring assembly**



(a) Remove bolts -1-2-, and remove trunk lid lock ring assembly-A-.

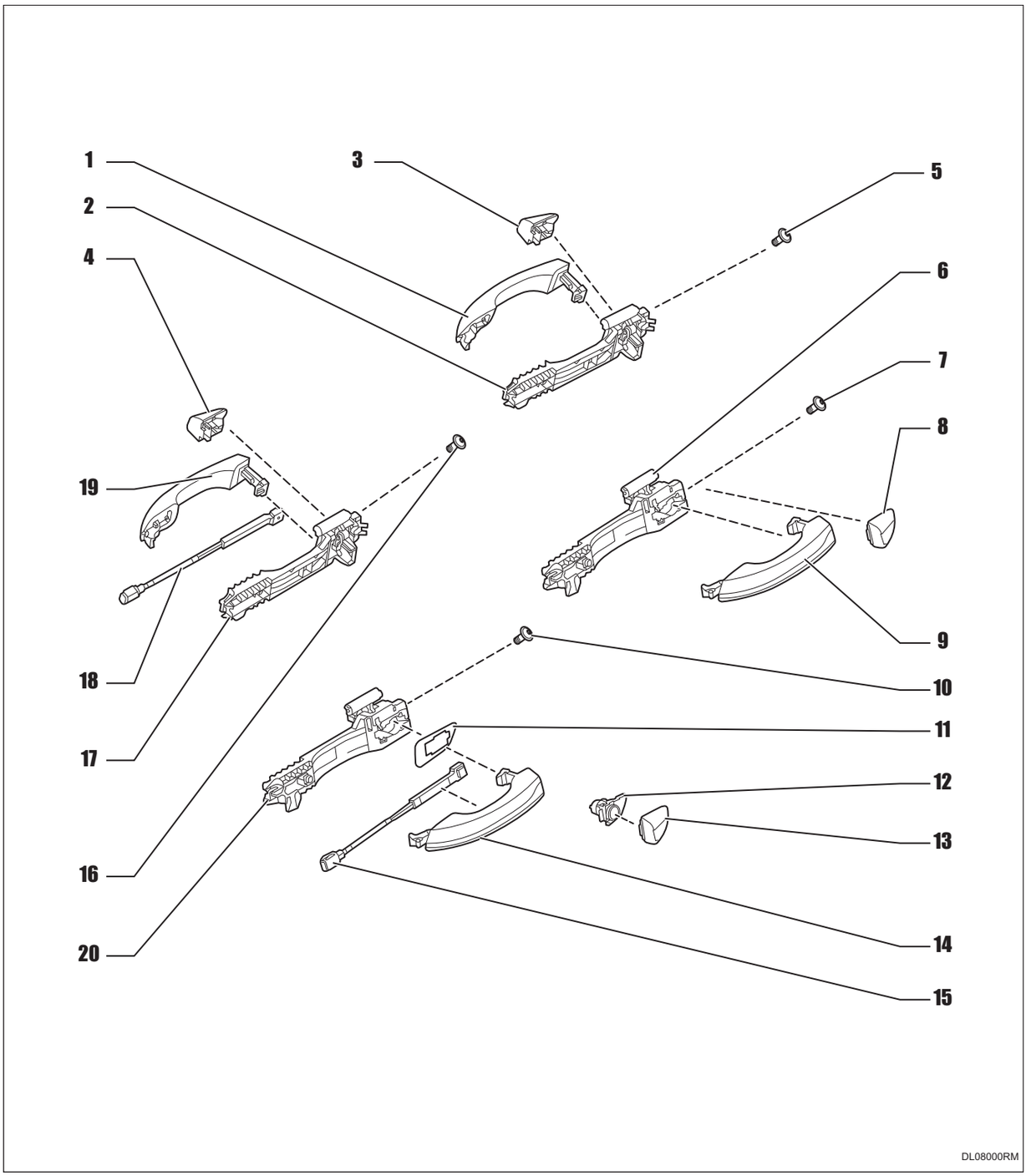
Installation

1. **The installation procedure is the reverse of removal procedure.**

DL

Door handle assembly

Parts



1. **Rear right door handle assembly**
2. **Rear right door outer handle seat assembly**
3. **Rear right door cover assembly**
4. **Passenger door cover assembly**
5. **Screw**

6. **Rear left door outer handle seat assembly**
7. **Screw**
8. **Rear left door cover assembly**
9. **Rear left door handle assembly**
10. **Screw**
11. **Rear gasket of door outer handle**
    - X4
12. **Lock cylinder assembly**
13. **Driver door cover assembly**
14. **Drive door handle assembly**
15. **Left front handle inner PEPS low frequency antenna**
16. **Screw**
17. **Passenger door outer handle seat assembly**
18. **Right front handle inner PEPS low frequency antenna**
19. **Passenger door handle assembly**
20. **Left rear front door outer handle seat assembly**

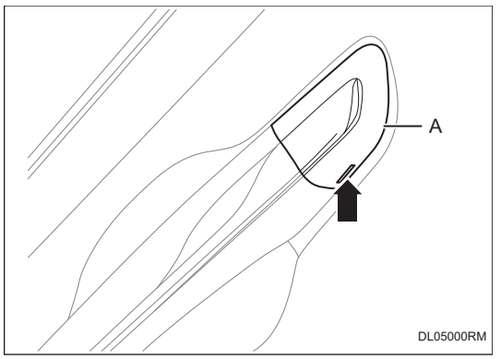
Removal

1. Remove lock cylinder assembly

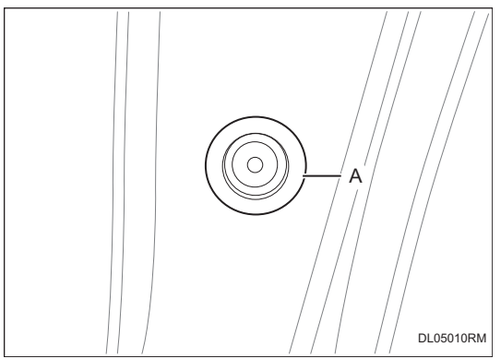
Hint:

Only for driver door.

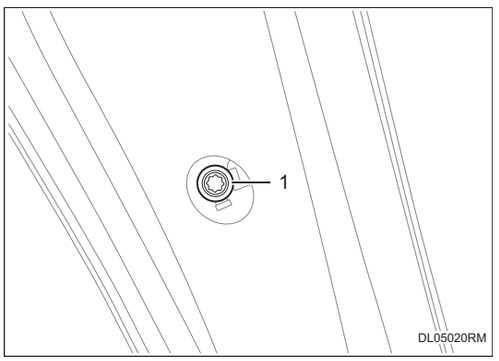
(a) Insert a mechanical key to the position indicated by the -arrow- to pry and remove the left front door cover assembly -A-.



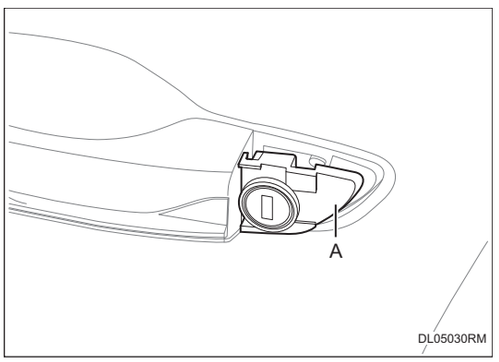
(b) Detach the plug-A-.

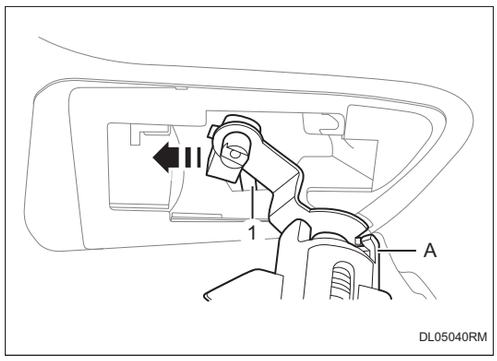


(c) Remove the screw -1-.



(d) Pull out the lock cylinder assembly-A-.





(e) Detach the tie bar locking device-1- as arrowed, and remove the lock cylinder assembly-A-.

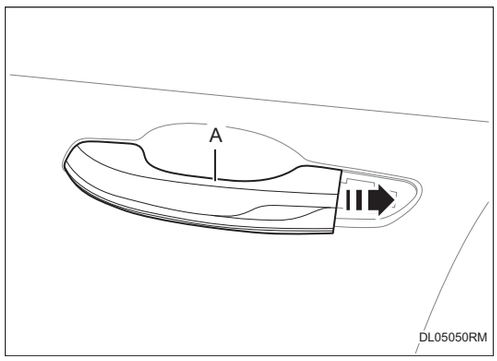
2. Disconnect the battery negative terminal (See page CH-20)

3. Remove door guard plate (See page IR-8)

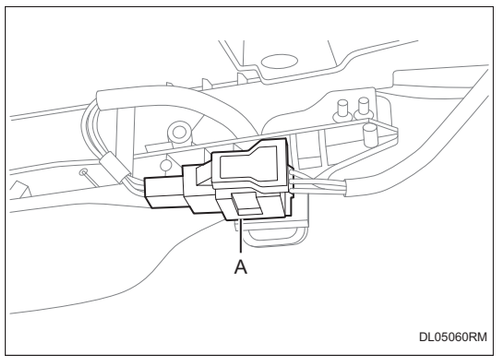
4. Remove door handle assembly

Hint:

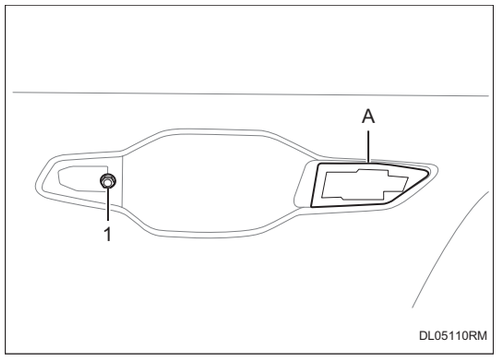
Suitable for all doors.



(a) Pull door handle assembly -A- along the direction of -arrow-.



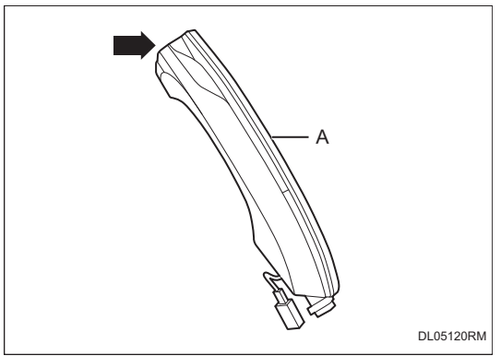
(b) Disconnect the harness connector -A-, and remove the door handle assembly.



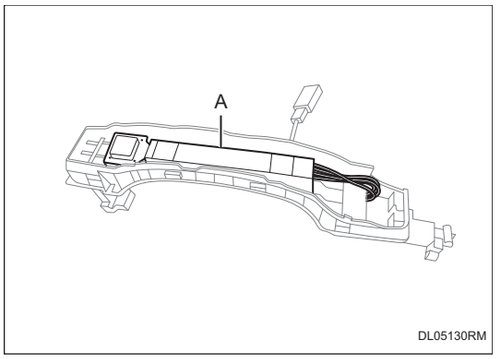
(c) Remove the bolt -1-, and remove the front door outer handle seat assembly-A-.

DL

5. Remove handle inner PEPS low frequency antenna

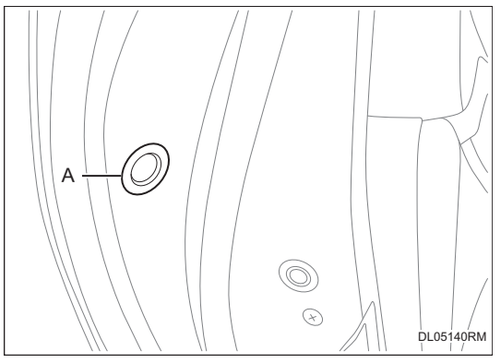


(a) Pry the upper cover-A- of door handle assembly as arrowed.

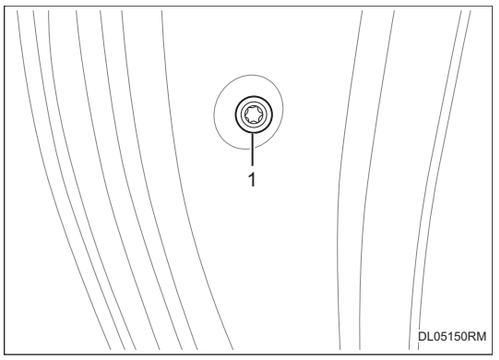


(b) Remove the door handle PEPS low frequency antenna -A-.

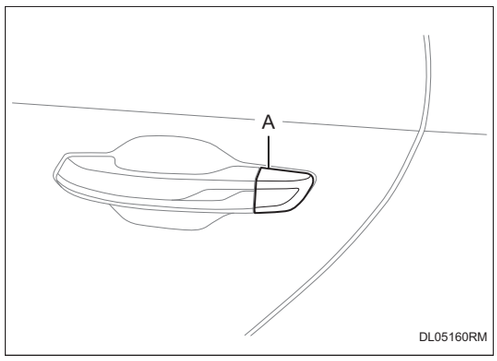
6. Remove rear door protective cover assembly



(a) Detach plug -A-.



(b) Remove the screw -1-.



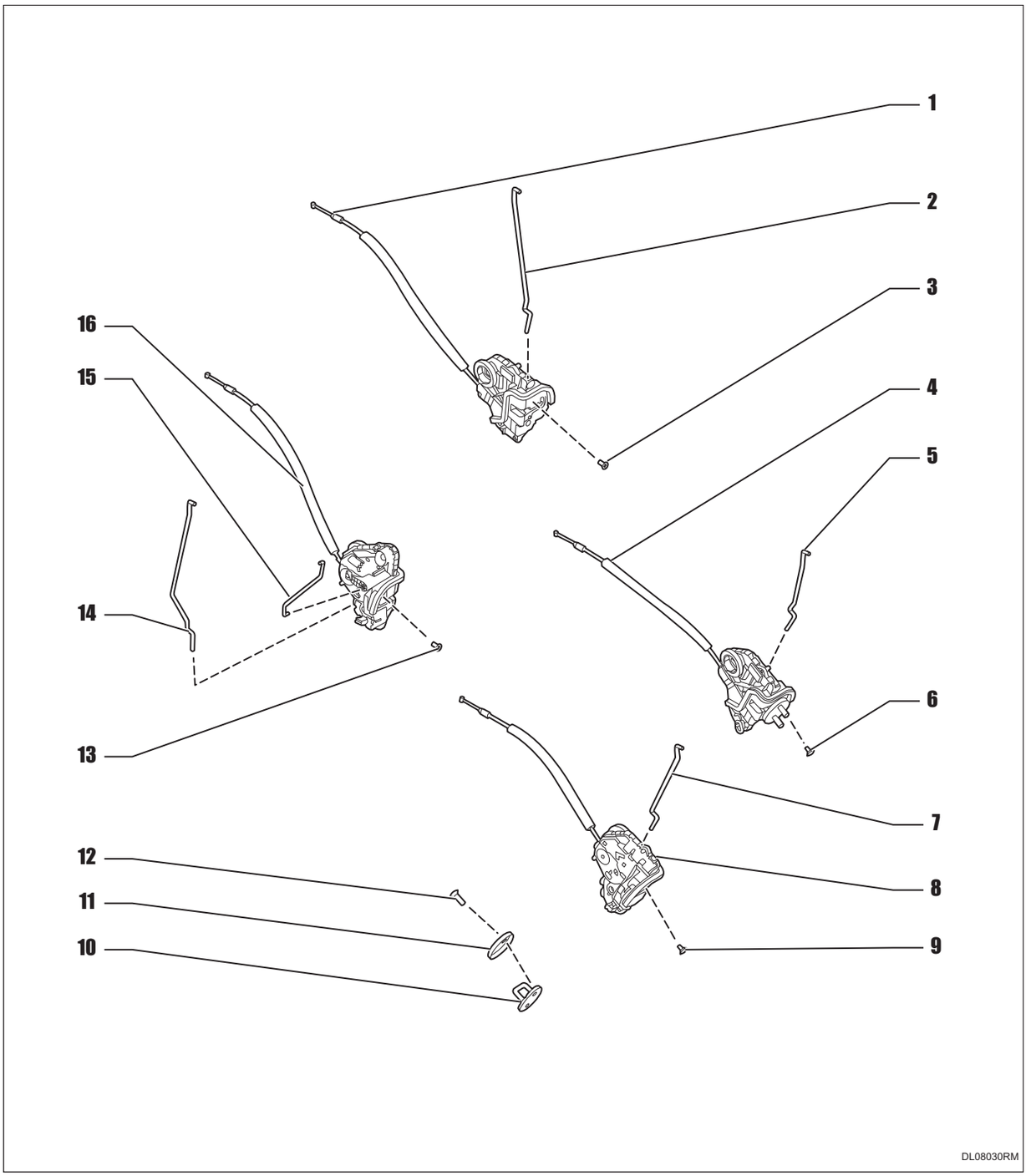
(c) Pull out rear door protective cover assembly-A-.

Installation

1. The installation procedure is the reverse of removal procedure.

Door lock assembly

Parts



1. **Passenger door lock assembly**
2. **Passenger door unlocking link**
3. **Tapping screw**
   - X3
4. **Rear right door lock body assembly**

5. **Rear right door unlocking link**
6. **Tapping screw**
   - X3
7. **Rear left door unlocking link**
8. **Rear left door lock body assembly**
9. **Tapping screw**
   - X3
10. **Lock pin**
    - X4
11. **Door lock pin trim cover**
    - X4
12. **Screw**
    - X8
13. **Tapping screw**
    - X3
14. **Driver door unlocking link**
15. **Driver door lock cylinder link**
16. **Driver door lock assembly**

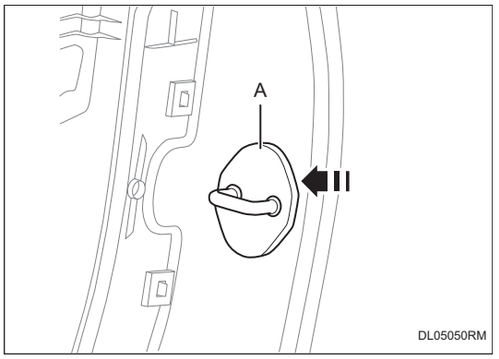
Removal

1. Remove door lock ring assembly

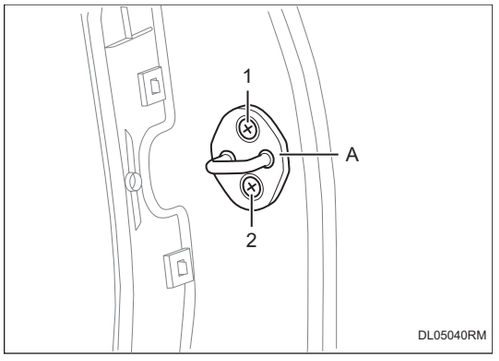
Hint:

All door lock ring assemblies are removed in the same order.

(a) Insert a suitable tool to the position indicated by the -arrow- to pry and remove the lock pin trim cover.



(b) Remove the bolts -1-2-, and remove the back door lock ring assembly-A-.



2. Disconnect the battery negative terminal (See page CH-20)

3. Remove door guard plate (See page IR-8)

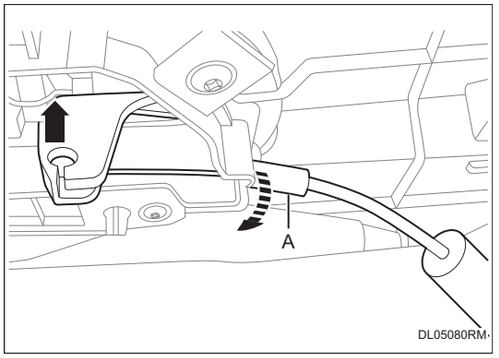
4. Remove lock cylinder assembly of left front door (See page DL-8)

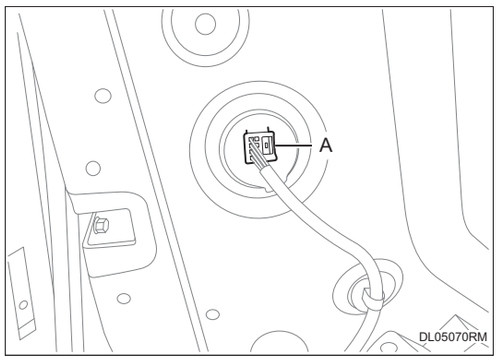
5. Remove the driver door lock assembly

Hint:

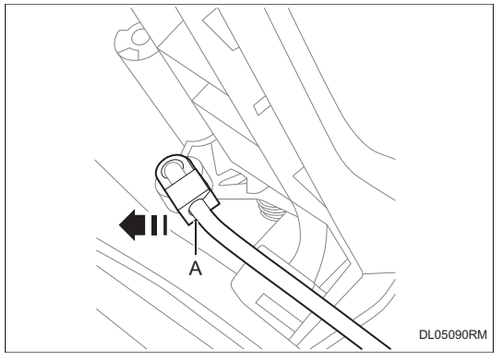
All doors are removed in the same order.

(a) Remove the door inside handle cable-A- as arrowed.

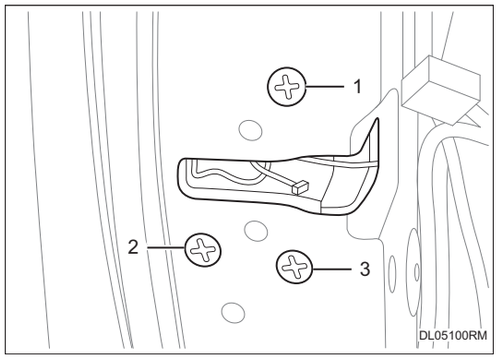




(b) Disconnect the harness connector-A-.



(c) Detach tie bar locking device -A- in the direction of -arrow-.



(d) Remove the bolt -1-3-.

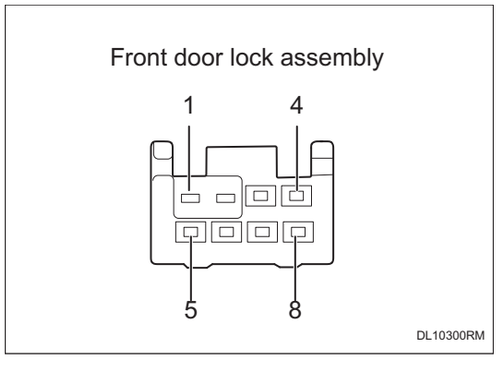
(e) Remove the driver door lock assembly.

Check

1. Check driver door lock assembly

(a) Check the working conditions of the driver door lock assembly motor.

(1) Apply the battery voltage to the driver door lock assembly and check the working condition of the driver door lock motor.



Normal:

Measuring conditions	Specified state
Battery + — front door lock assembly 2# Battery - — front door lock assembly 1#	Locking
Battery + — front door lock assembly 1# Battery - — front door lock assembly 2#	Unlocked

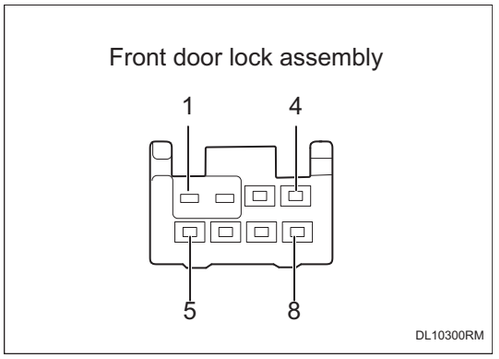
DL

If the results do not meet the requirements, replace the driver door lock assembly.

(b) Check the working conditions of driver door lock assembly mechanical key switch.

(1) Measure the resistance according to the values in the table below.

Before measuring the following resistance, please disconnect the front door lock assembly harness connector and use the mechanical key to operate the locking state of the front door lock assembly.



Normal:

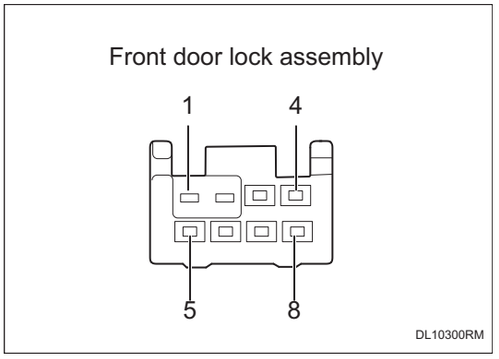
Detector connection	Locking state	Specified state
Driver door lock assembly 8# - Driver door lock assembly 5#	Locking	Less than 1Ω
	Unlocked	10 kΩ or greater
Driver door lock assembly 8# - Driver door lock assembly 6#	Locking	10 kΩ or greater
	Unlocked	Less than 1Ω

If the results do not meet the requirements, replace the driver door lock assembly.

2. Check the working condition of the latch switch of driver door lock assembly.

(a) Measure the resistance according to the values in the table below.

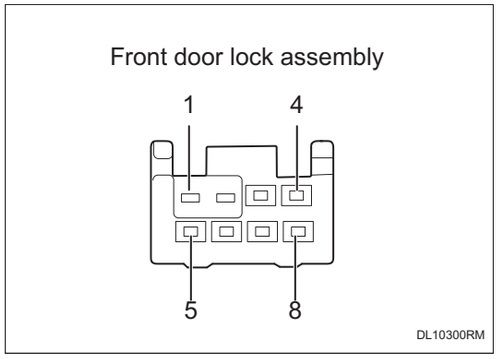
Before measuring the following resistance, please disconnect the driver door lock assembly harness connector and use a suitable tool to operate the locking state of the front door lock assembly.



Detector connection	Locking state	Specified state
Driver door lock assembly 8 # -front door lock assembly 4#	Completely locked	Less than 1Ω
	Unlocked	Less than 1Ω
Driver door lock assembly 8 # -front door lock assembly 7#	Completely locked	10 kΩ or greater
	Unlocked	Less than 1Ω

If the results do not meet the requirements, replace the driver door lock assembly.

3. Check passenger door lock assembly



(a) Check the working conditions of the passenger door lock assembly motor.

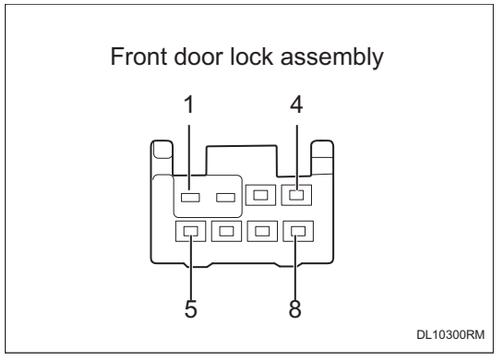
(1) Apply the battery voltage to the passenger door lock assembly and check the working condition of the passenger door lock motor.

Normal:

Measuring conditions	Specified state
Battery + — front door lock assembly 7# Battery - — front door lock assembly 8#	Locking
Battery + — front door lock assembly 8# Battery - — front door lock assembly 7#	Unlocked

If the results do not meet the requirements, replace the passenger door lock assembly.

4. Check the working condition of the latch switch of passenger door lock assembly.



(a) Measure the resistance according to the values in the table below.

Before measuring the following resistance, please disconnect the passenger door lock assembly harness connector and use a suitable tool to operate the locking state of the front door lock assembly.

Detector connection	Locking state	Specified state
Passenger door lock assembly 5 # - front door lock assembly 1#	Completely locked	Less than 1Ω
	Unlocked	Less than 1Ω
Passenger door lock assembly 5 # - front door lock assembly 6#	Completely locked	10 kΩ or greater
	Unlocked	Less than 1Ω

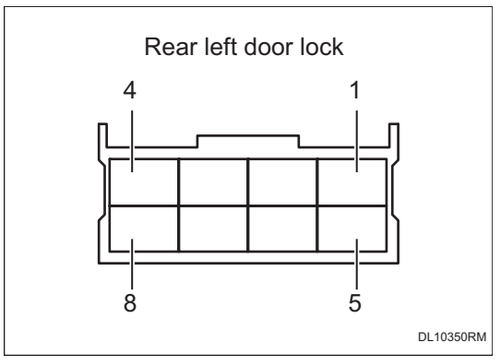
If the results do not meet the requirements, replace the passenger door lock assembly.

Check

1. Check rear door lock assembly

Hint:

The check sequence on the right side is the same as that on the left side.



(a) Check the working conditions of the rear door lock assembly motor.

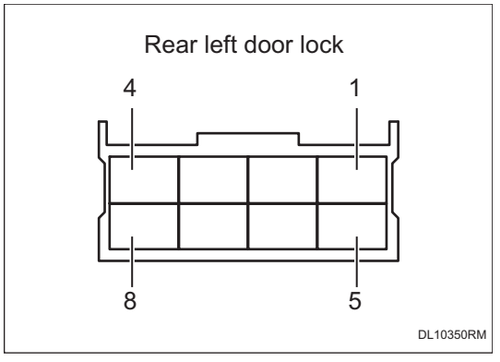
(1) Apply the battery voltage to the door lock assembly and check the working condition of the rear door lock motor.

Normal:

Measuring conditions	Specified state
Battery + — rear door lock assembly 6# Battery - — rear door lock assembly 5#	Door lock locking
Battery + — rear door lock assembly 5# Battery - — rear door lock assembly 6#	Door unlocked

If the results do not meet the requirements, replace the rear door lock assembly.

2. Check the working condition of the latch switch of rear door lock assembly.



(a) Measure the resistance according to the values in the table below.

After measuring the following resistance, disconnect the rear door lock assembly harness connector and use a suitable tool to operate the locking state of the the rear door lock assembly.

Detector connection	Locking state	Specified state
Rear door lock assembly 11 # -rear door lock assembly 4#	Completely locked	Less than 1Ω
	Unlocked	10 kΩ or greater
Rear door lock assembly 11 # -rear door lock assembly 7#	Completely locked	10 kΩ or greater
	Unlocked	Less than 1Ω

If the results do not meet the requirements, replace the rear door lock assembly.

Installation

1. The installation procedure is the reverse of removal procedure.

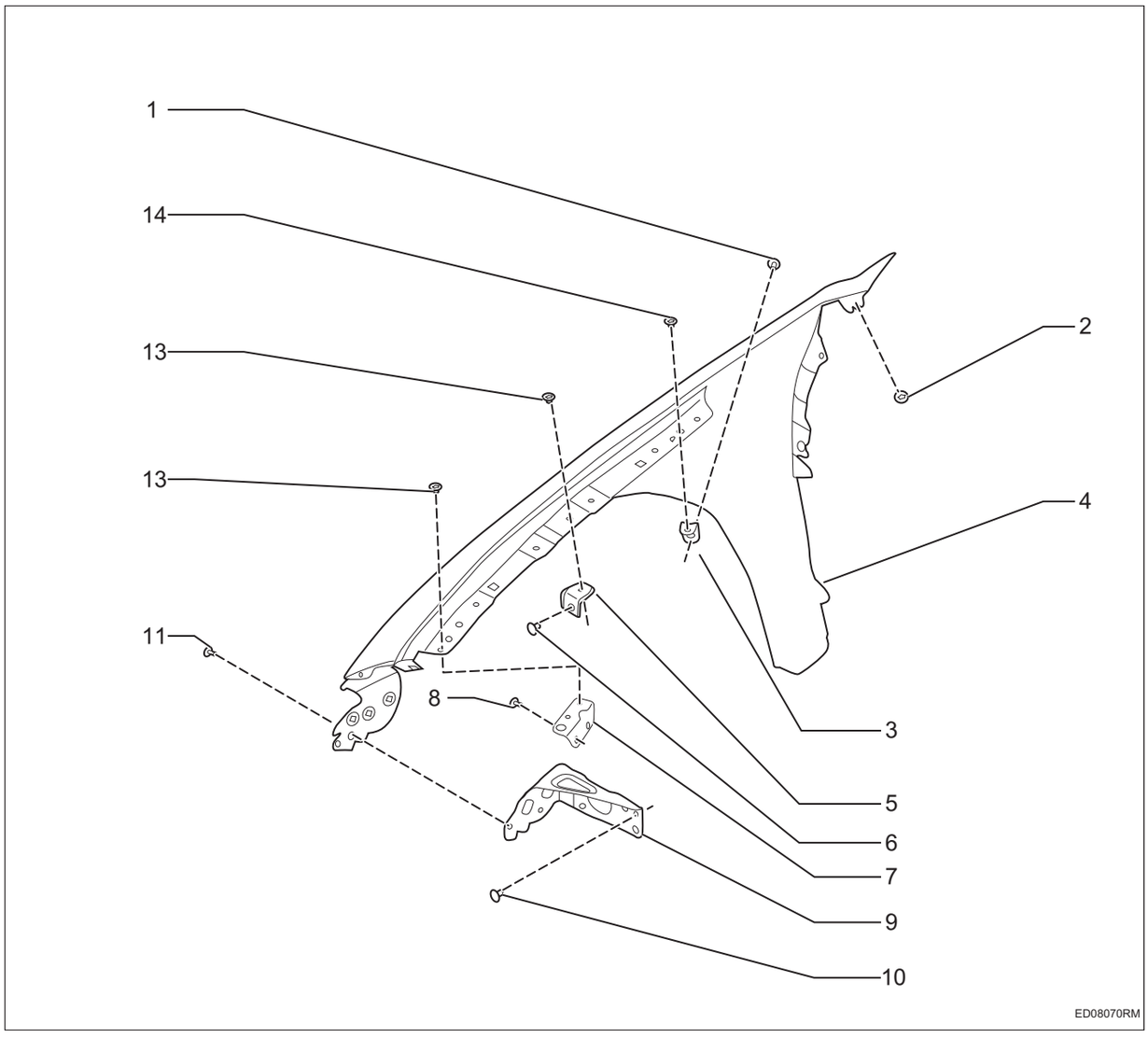
Closure system

Front fender ED-1
Parts ED-1
Removal ED-3
Installation ED-4
Front door assembly ED-5
Parts ED-5
Removal ED-7
Installation ED-8
Front power window regulator assembly ED-9
Parts ED-9
Removal ED-11
Installation ED-12
Engine hood assembly ED-13
Parts ED-13
Removal ED-15
Installation ED-16
Rear door assembly ED-17
Parts ED-17
Removal ED-19
Installation ED-19
Rear power window regulator assembly ED-20
Parts ED-20
Removal ED-22
Installation ED-23
Trunk switch assembly ED-24
Parts ED-24
Removal ED-25
Installation ED-25
Trunk lid unlocking switch ED-26
Parts ED-26
Removal ED-27
Installation ED-27
Trunk lid ED-28
Parts ED-28
Remova ED-30
Installation ED-31
Door control system ED-32
Parts ED-32

Removal ED-34
Installation ED-34

Front fender

Parts



1. **Hexagon flange bolt**
2. **hexagon lobular socket screw**
3. **Front fender bracket III assembly**
4. **Left front fender**
5. **Front fender bracket II assembly**
6. **Hexagon flange bolt**
7. **Right front fender bracket I assembly**
8. **Hexagon flange bolt**
9. **Left front fender connecting plate assembly**
10. **Hexagon flange bolt**
    - X2

11. **Hexagon flange bolt**
    - X2
12. **Hexagon flange bolt**
13. **Hexagon flange bolt**
14. **Hexagon flange bolt**

Removal

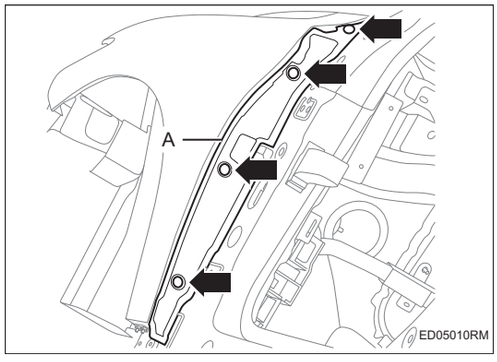
Hint:

The removal sequence on the right side is the same as that on the left side.

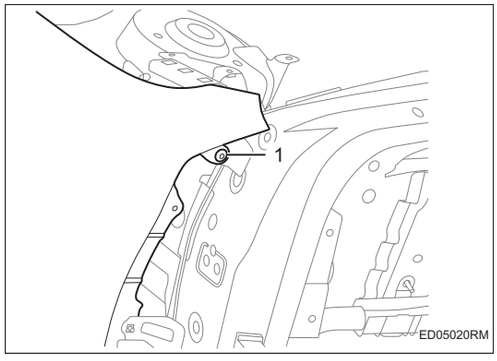
The order listed below applies to the left side.

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Engine hood latch upper guard plate (See page ET-17)**
3. **Remove front bumper assembly (See page ET-7)**
4. **Remove front fender**

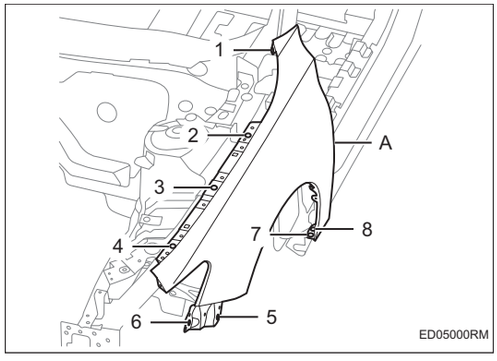
(a) Remove the clip -arrow-, and remove the baffle plate -A-.

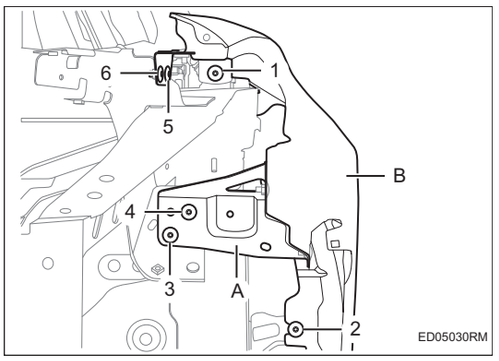


(b) Remove the front fender fixing screw -1-.



(c) Remove the fixing screws -1-8- of the fender -A-.





(d) Remove screw -1-, and remove front fender-B-.

(e) Remove screws -4-5-, and remove front fender bracket-C-.

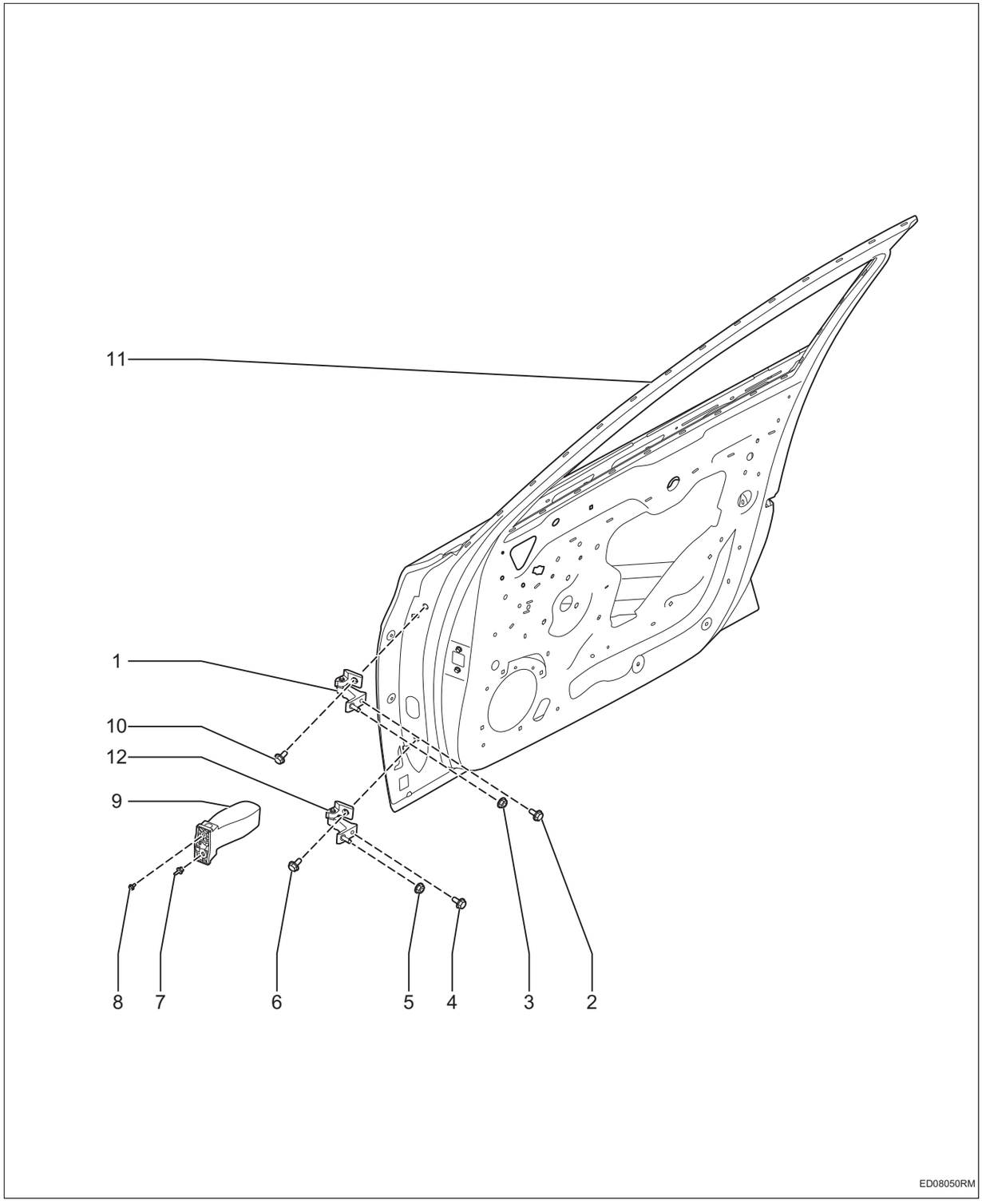
(f) Remove screws -2-3-, and remove front fender bracket-A-.

Installation

1. The installation procedure is the reverse of removal procedure.

Front door assembly

Parts



1. **Door upper hinge**
2. **Hexagon flange bolt**

- Torque: 36 ~ 40 N · m

3. **Hexagon flange nut**
   - Torque: 19.6~25.4 N · m
4. **Hexagon flange bolt**
   - Torque: 36 ~ 40 N · m
5. **Hexagon flange nut**
   - Torque: 19.6~25.4 N · m
6. **Hexagon flange bolt**
   - Torque: 36 ~ 54 N · m
7. **Hexagon flange bolt**
   - Torque: 21.3~31.9 N · m
8. **Hexagon flange bolt**
   - X2
   - Torque: 7.9~12.7 N · m
9. **Door check assembly**
10. **Hexagon flange bolt**
    - Torque: 36 ~ 54 N · m
11. **Passenger door assembly**
12. **Door lower hinge**

Removal

Hint:

The removal sequence on the right side is the same as that on the left side.

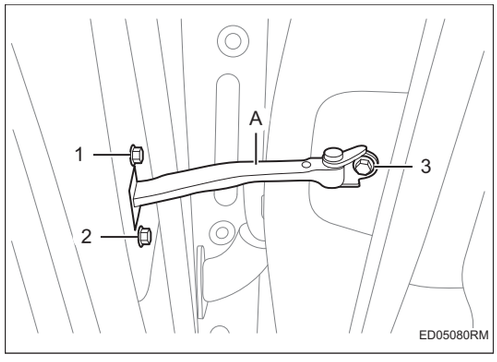
The order listed below applies to the left side.

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove door guard plate (See page IR-8)**
3. **Remove front door check assembly**

   Hint:

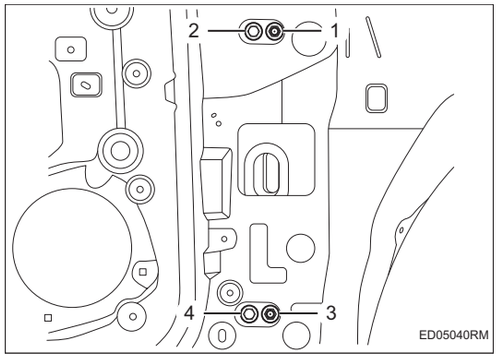
   All doors are removed in the same order.

   (a) Remove bolts -1-3-, and remove door check assembly-A-.

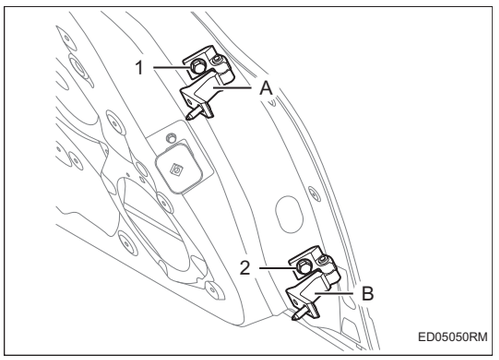


4. **Remove instrument panel body (See page IP-5)**
5. **Remove door hinge**

   (a) Remove the nut -3- and bolt -4-, and detach the connection between the door lower hinge and the body.



   (b) Remove the nut -1- and bolt -2-, and detach the connection between the door upper hinge and the body.

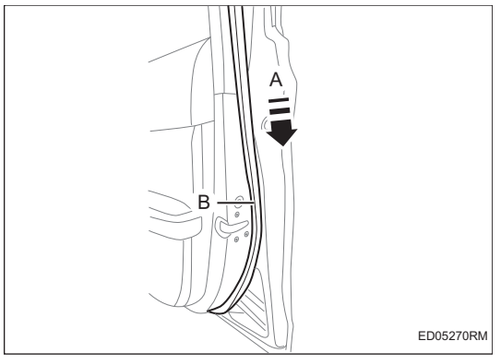


(c) Remove the bolts -1-2-, and remove the door hinges-A-B-.

6. Remove front door sealing strip assembly

Hint:

All doors are removed in the same order.



(a) Find the front door sealing strip assembly -B- interface and pull off the sealing strip along the direction of the arrow A.

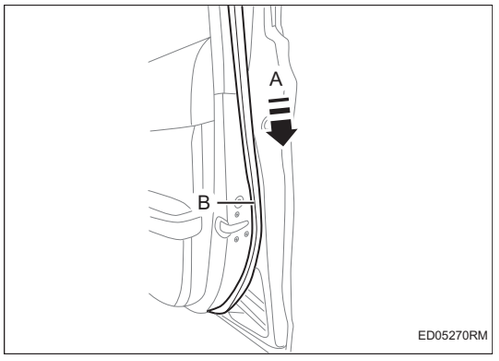
Installation

1. The installation procedure is the reverse of removal procedure, and the following points apply:

2. Install front door sealing strip assembly

Hint:

All doors are installed in the same sequence.

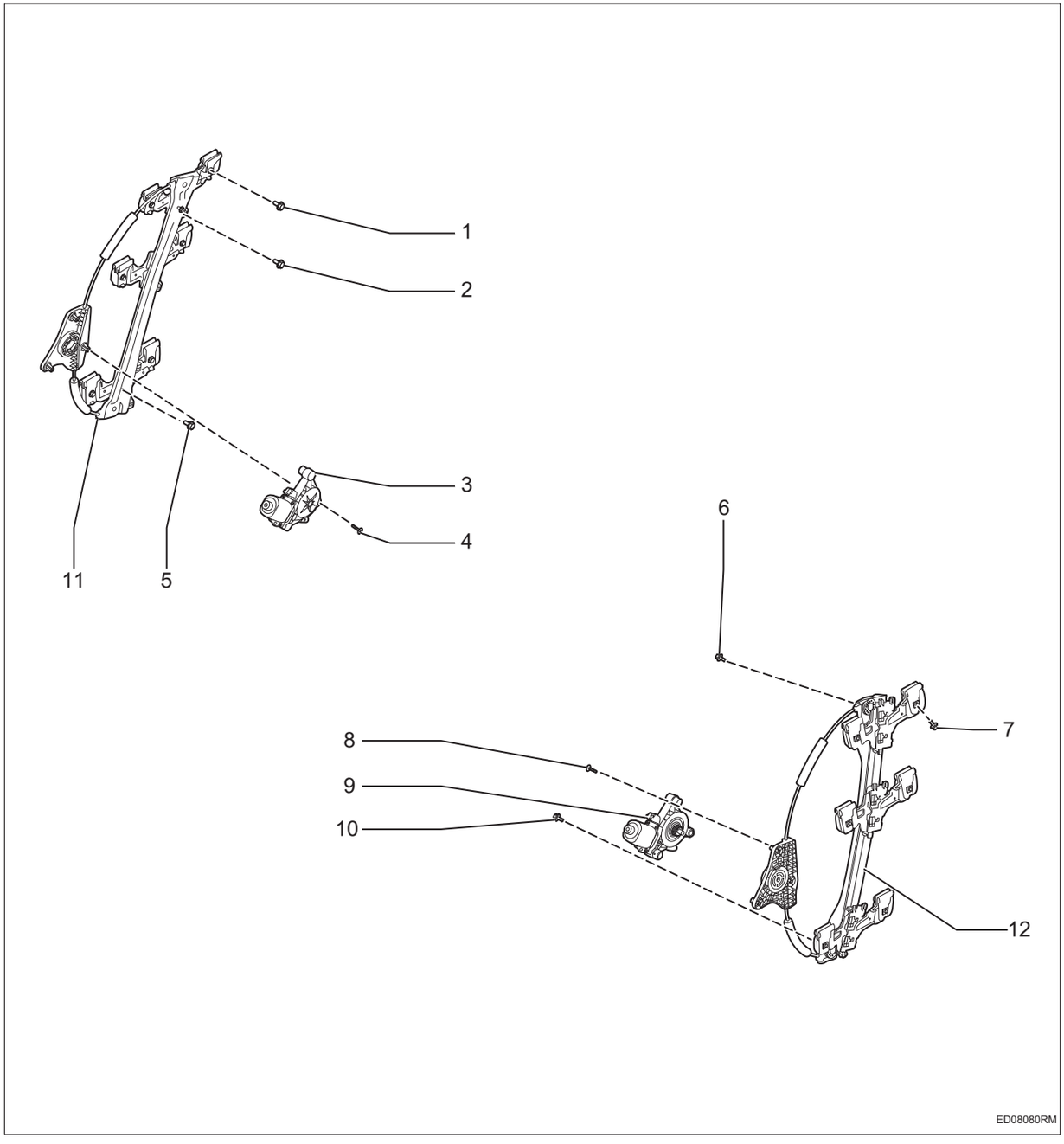


(a) Before installation, please compare the new front door sealing strip assembly to ensure that the length is appropriate.

(b) If the length of the sealing strip does not match the length of the door, pull the door sealing strip assembly -B- towards -arrow A- in sequence during installation.

Front power window regulator assembly

Parts



1. Hexagon flange bolt

- X2
- Torque: 7.8~10.8 N · m

2. Hexagon flange bolt

- Torque: 7.8~10.8 N · m

3. **Passenger door power window regulator motor**
4. **Hexagon flange bolt**
   - X3
   - Torque: 2.5~3.5 N · m
5. **Hexagon flange bolt**
   - Torque: 7.8~10.8 N · m
6. **Hexagon flange bolt**
   - Torque: 7.8~10.8 N · m
7. **Hexagon flange bolt**
   - X2
   - Torque: 7.8~10.8 N · m
8. **Hexagon flange bolt**
   - X3
   - Torque: 2.5~3.5 N · m
9. **Driver door power window regulator motor**
10. **Hexagon flange bolt**
    - Torque: 7.8~10.8 N · m
11. **Right front power window regulator assembly**
12. **Driver door power window regulator assembly**

Removal

Hint:

The removal sequence on the right side is the same as that on the left side.

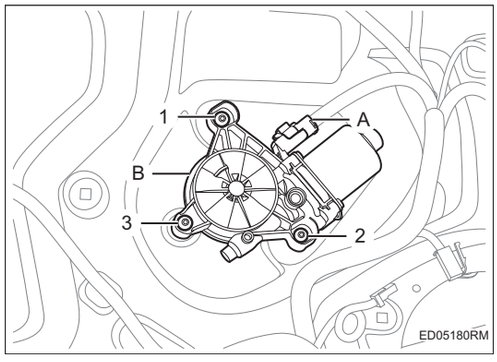
The order listed below applies to the left side.

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove door guard plate (See page IR-8)**
3. **Remove the front power window regulator assembly**

   Hint:

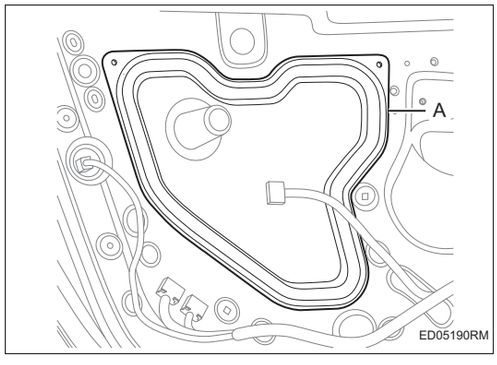
   Please lower the window to the middle position before removal.

   (a) Disconnect the harness connector-A-.

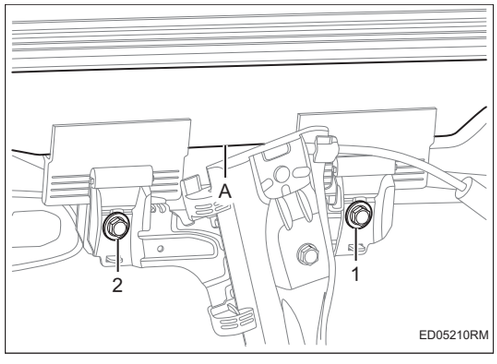


   (b) Remove the screws -1-3-, and remove the front door power window regulator motor -B-.

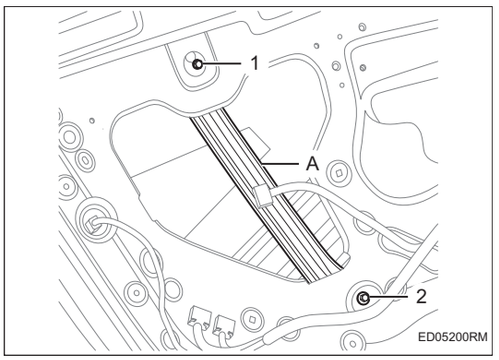
   (c) Remove door sealing strip-A-.



   (d) Remove the bolts -1-2-, and remove the front door glass-A-.



ED



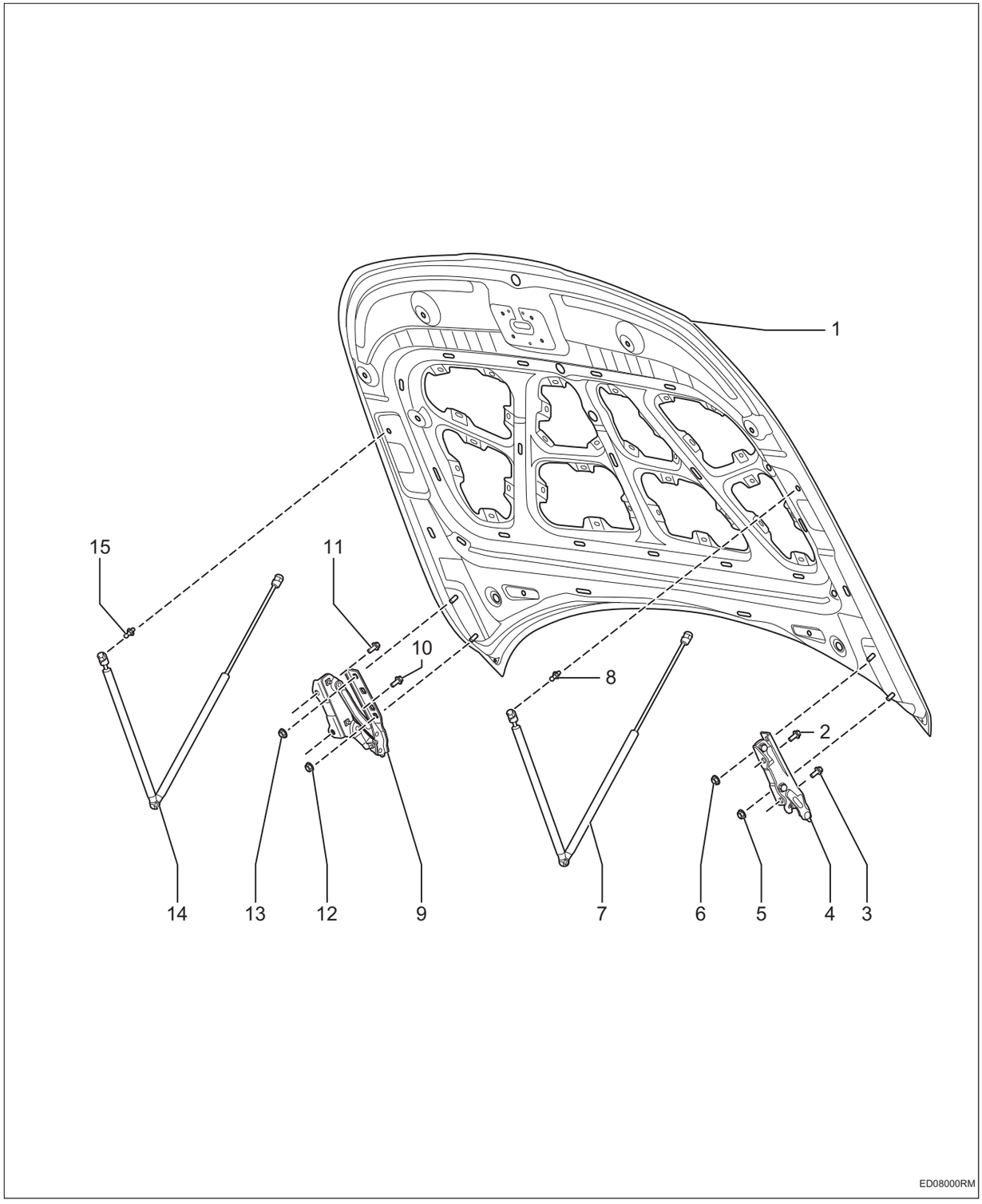
(e) Remove the bolts -1-2-, and remove the front door window regulator-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Engine hood assembly

Parts



1. **Engine hood assembly**
2. **Hexagon flange bolt**

- Torque: 19 ~ 24 N · m

3. **Hexagon flange bolt**
   - Torque: 19 ~ 24 N · m
4. **Engine hood left hinge assembly**
5. **Hexagon flange nut**
   - Torque: 19 ~ 24 N · m
6. **Hexagon flange nut**
   - Torque: 19 ~ 24 N · m
7. **Left air spring assembly**
8. **Ball head bolt**
   - Torque: 19 ~ 24 N · m
9. **Engine hood right hinge assembly**
10. **Hexagon flange bolt**
    - Torque: 19 ~ 24 N · m
11. **Hexagon flange bolt**
    - Torque: 19 ~ 24 N · m
12. **Hexagon flange nut**
    - Torque: 19 ~ 24 N · m
13. **Hexagon flange nut**
    - Torque: 19 ~ 24 N · m
14. **Right air spring assembly**
15. **Ball head bolt**
    - Torque: 19 ~ 24 N · m

Removal

Hint:

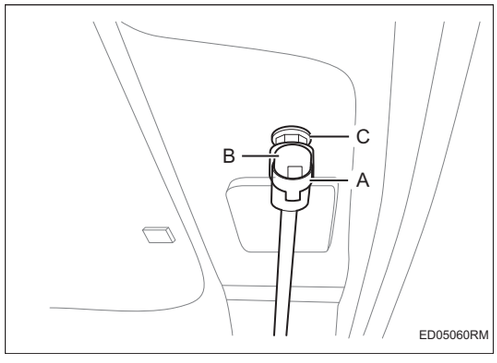
The removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

1. Remove engine hood assembly

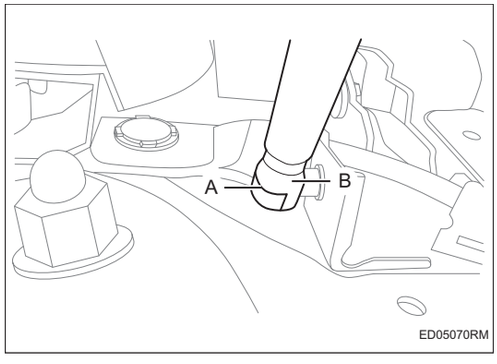
Caution:

Removal of the engine hood assembly requires two people.

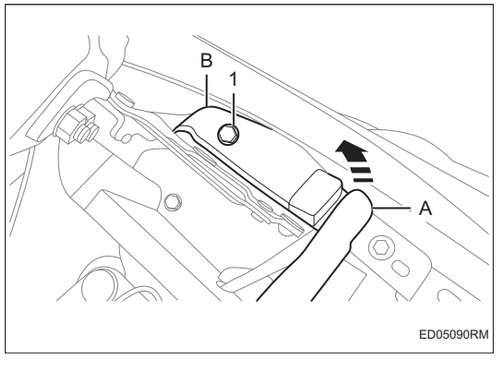


(a) Detach the clip-A-, and remove the engine compartment air spring-A-.

(b) Remove the ball head bolt -C-.



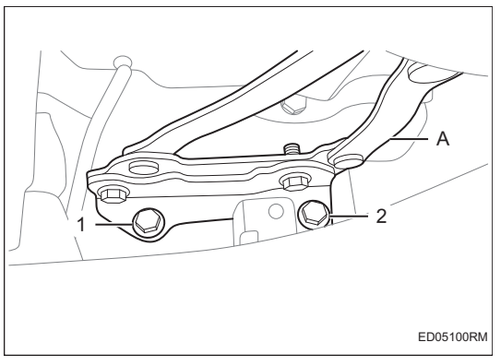
(c) Detach the clip-A-, and remove the engine compartment air spring-B-.



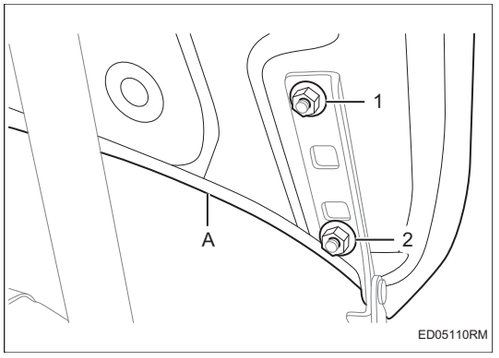
(d) As shown in the figure, lift the engine hood drip channel sealing strip assembly-A-.

(e) Remove clip -1- and remove front fender baffle plate -B-.

ED



(f) Remove the bolts -1-2-, and remove the engine hood hinge-A-.



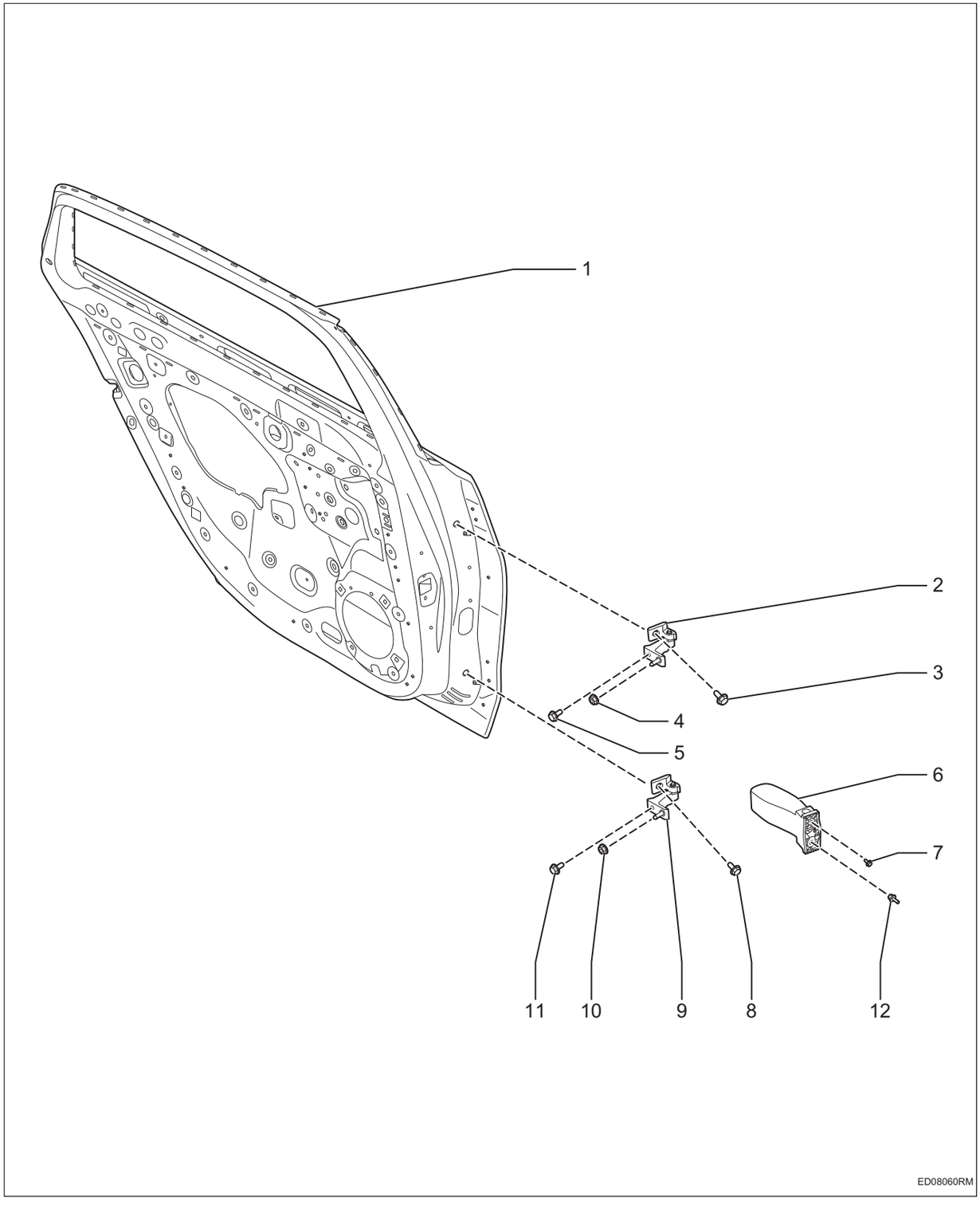
(g) Remove nuts -1-2-, and remove engine hood assembly-A-.

Installation

1. The installation procedure is the reverse of removal procedure.

Rear door assembly

Parts



1. **Rear left door assembly**
2. **Door upper hinge**

3. **Hexagon flange bolt**
   - Torque: 36 ~ 54 N · m
4. **Hexagon flange nut**
   - Torque: 19.6~25.4 N · m
5. **Hexagon flange bolt**
   - Torque: 36 ~ 40 N · m
6. **Door check assembly**
7. **Hexagon flange bolt**
   - X2
   - Torque: 7.9~12.7 N · m
8. **Hexagon flange bolt**
   - Torque: 36 ~ 54 N · m
9. **Door lower hinge**
10. **Hexagon flange nut**
    - Torque: 19.6~25.4 N · m
11. **Hexagon flange bolt**
    - Torque: 36 ~ 40 N · m
12. **Hexagon flange bolt**
    - Torque: 21.3~31.9 N · m

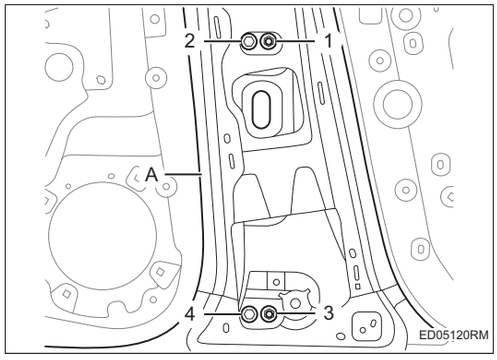
Removal

Hint:

The removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove rear door guard plate (See page IR-20)**
3. **Remove B-pillar lower guard plate (See page IR-3)**
4. **Remove rear door assembly**

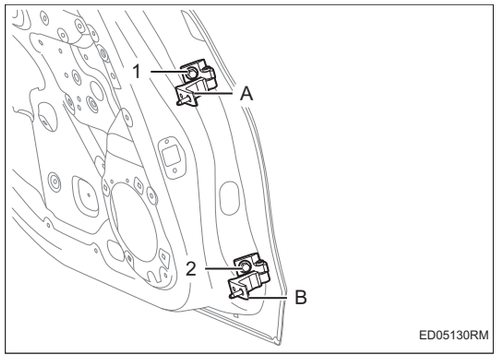


(a) Remove the nut -3- and bolt -4-, and detach the connection between the door lower hinge and the body.

(b) Remove the nut -1- and bolt -2-, and detach the connection between the door upper hinge and the body.

(c) Remove the door and hinge-A-.

(d) Remove the bolts -1-2-, and remove the door hinges-A-B-.

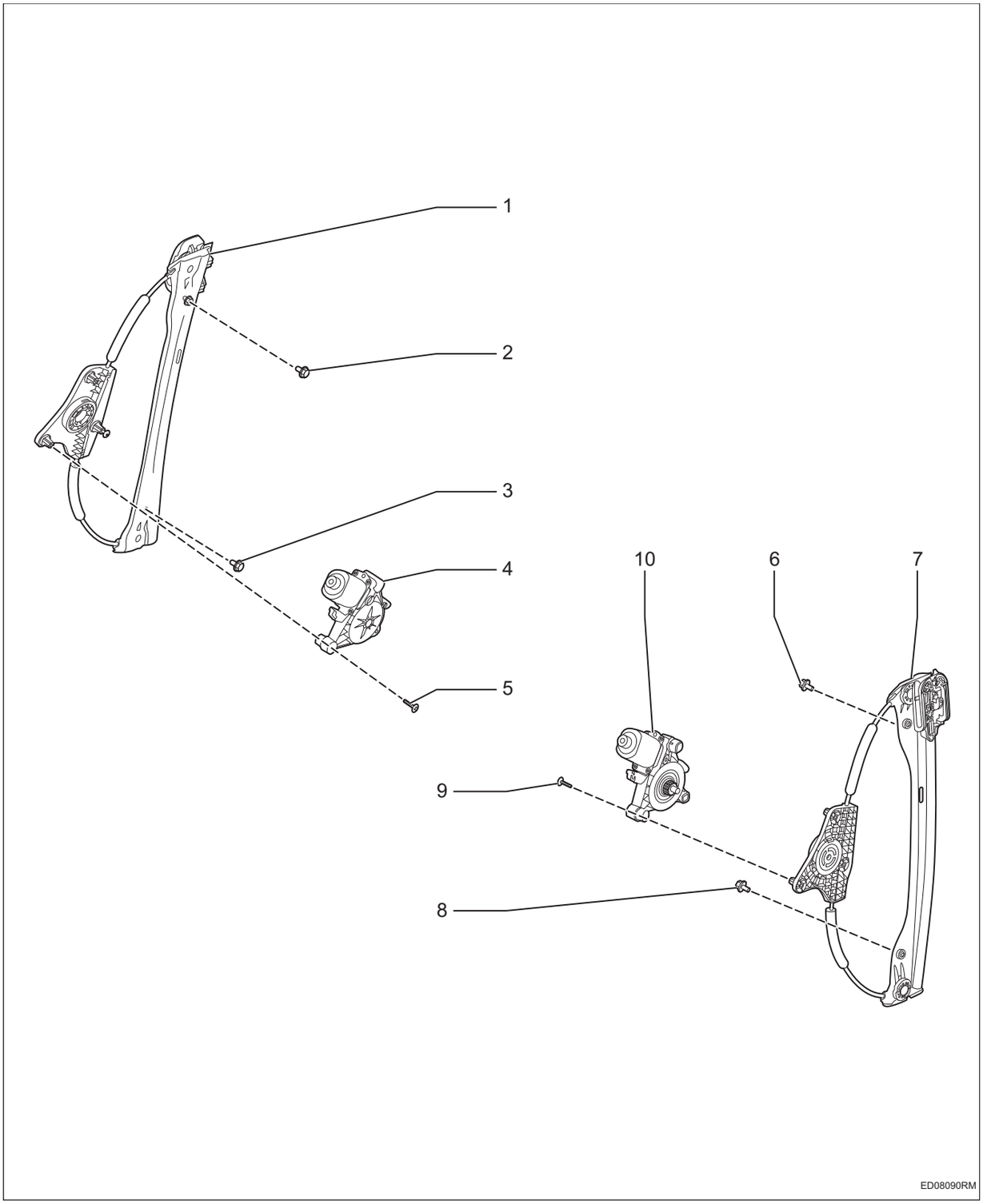


Installation

1. **The installation procedure is the reverse of removal procedure.**

Rear power window regulator assembly

Parts



1. Rear right door power window regulator assembly

2. **Hexagon flange bolt**
   - Torque: 7.8~10.8 N · m
3. **Hexagon flange bolt**
   - Torque: 7.8~10.8 N · m
4. **Rear right door power window regulator motor**
5. **Hexagon flange bolt**
   - X3
   - Torque: 2.5~3.5 N · m
6. **Hexagon flange bolt**
   - Torque: 7.8~10.8 N · m
7. **Rear left door power window regulator assembly**
8. **Hexagon flange bolt**
   - Torque: 7.8~10.8 N · m
9. **Hexagon flange bolt**
   - X3
   - Torque: 2.5~3.5 N · m
10. **Rear left door power window regulator motor**

Removal

Hint:

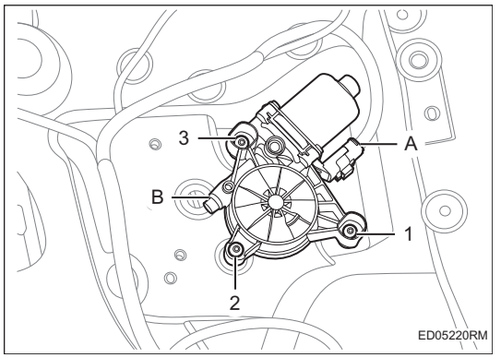
The removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove rear door guard plate (See page IR-20)**
3. **Remove the rear power window regulator assembly**

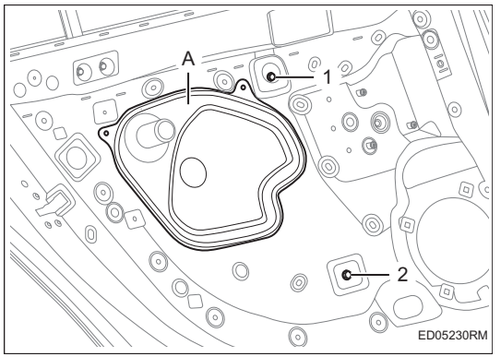
   Hint:

   Please lower the window to the middle position after removal.



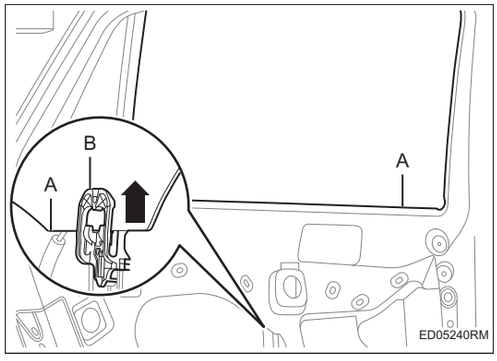
(a) Disconnect the harness connector-A-.

(b) Remove the screws -1-3-, and remove the rear door power window regulator motor -B-.



(c) Remove door sealing strip-A-.

(d) Remove the fixing bolt -1-2- of the door window regulator.



(e) Detach the window regulator mount -B- as arrowed.

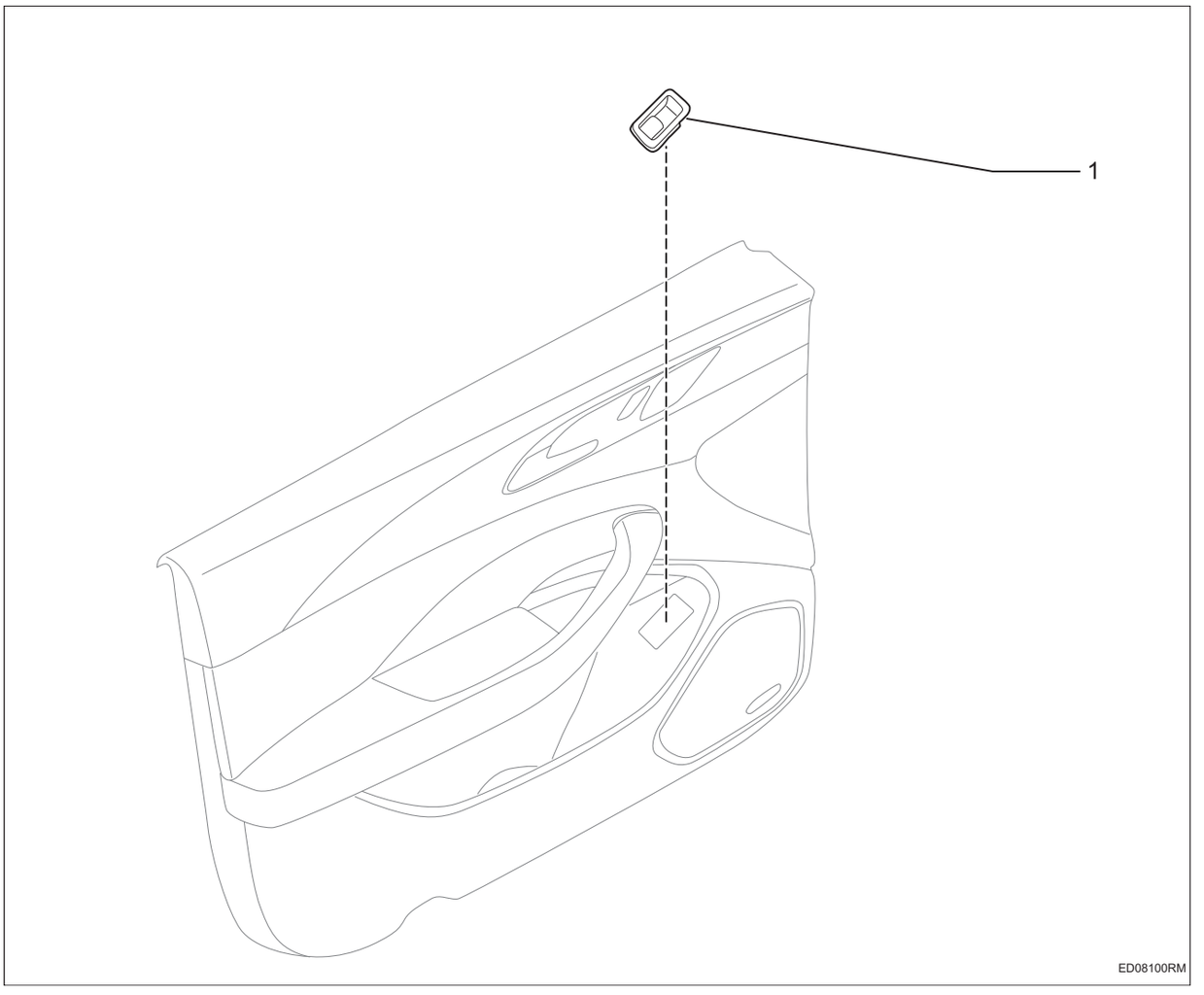
(f) Detach the door rear glass -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Trunk switch assembly

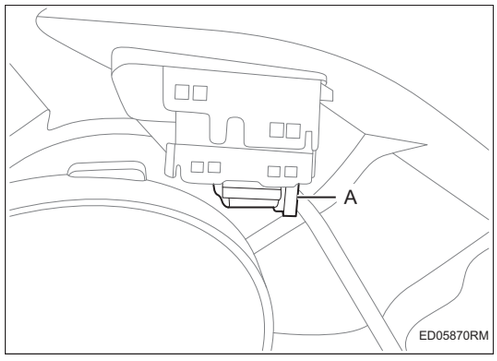
Parts



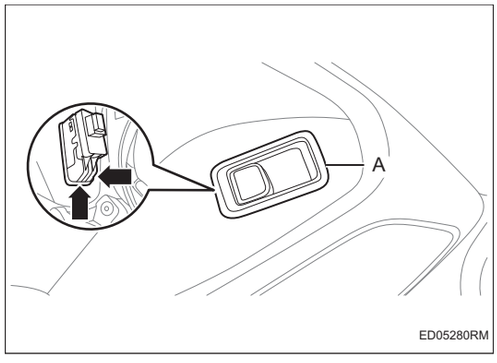
1. Trunk switch assembly

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove door guard plate (See page IR-8)**
3. **Remove the trunk switch assembly**



(a) Disconnect the harness connector-A-.



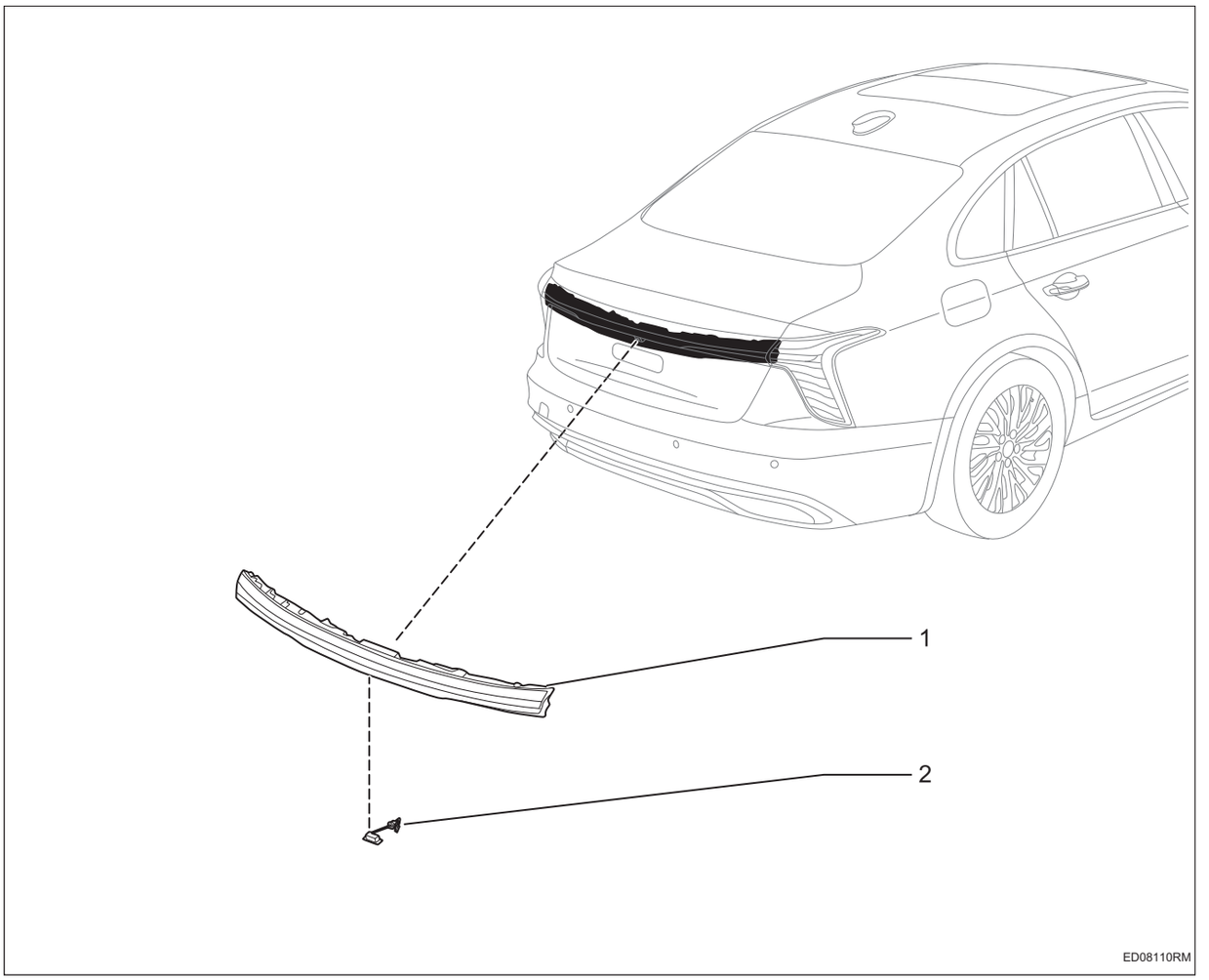
(b) Detach the claw -arrow- of the trunk switch assembly.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Trunk lid unlocking switch

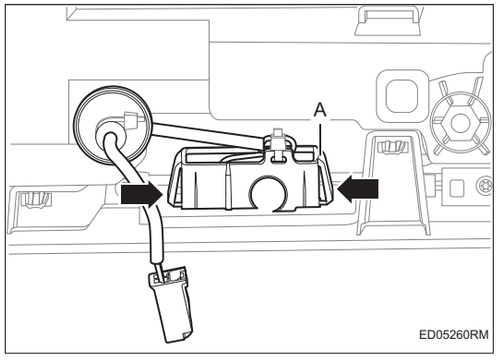
Parts



1. **Rear combination lamp II assembly**
2. **Trunk lid unlocking switch**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the rear combination lamp II assembly (See page LI-127)**
3. **Removal trunk lid unlocking switch**
   (a) Pry claw as arrowed, to take out trunk lid unlocking switch -A-.

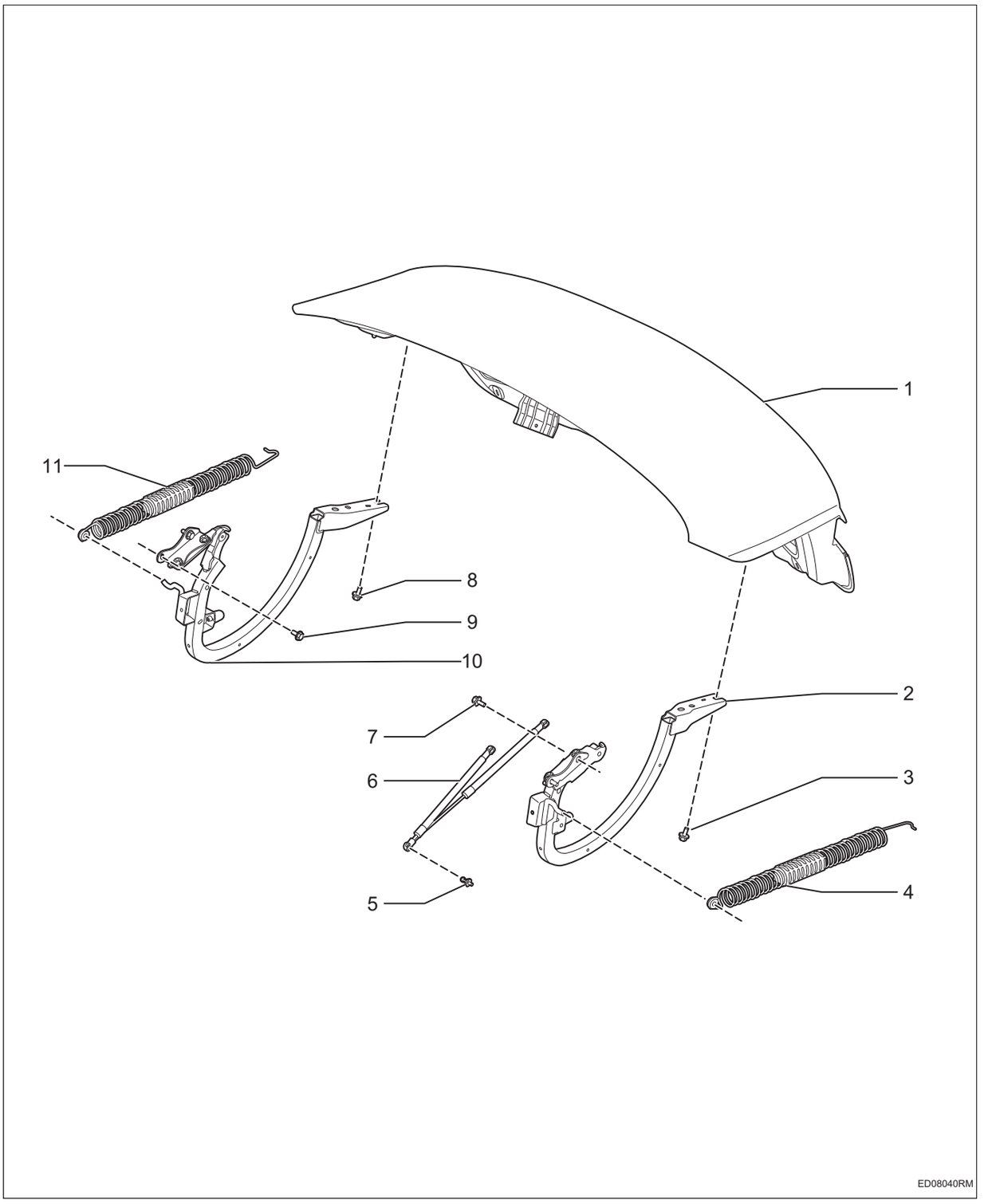


Installation

1. **The installation procedure is the reverse of removal procedure.**

Trunk lid

Parts



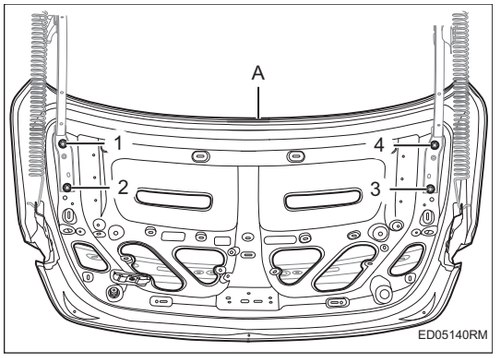
1. **Trunk lid outer plate subassembly**
2. **Trunk lid left hinge assembly**

3. **Hexagon flange bolt**
   - X2
   - Torque: 19~24 N · m
4. **Trunk lid left tension spring assembly**
5. **Ball head bolt**
   - Torque: 16~24 N · m
6. **Damping rod**
7. **Hexagon flange bolt**
   - X2
   - Torque: 19~24 N · m
8. **Hexagon flange bolt**
   - X2
   - Torque: 19~24 N · m
9. **Hexagon flange bolt**
   - X2
   - Torque: 19~24 N · m
10. **Trunk lid right hinge assembly**
11. **Trunk lid right tension spring assembly**

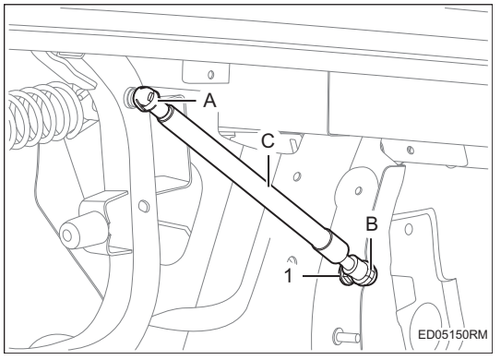
Remova

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove trunk lid guard plate (See page IR-33)**
3. **Remove the rear combination lamp II assembly (See page LI-127)**
4. **Remove trunk lid latch (See page DL-5)**
5. **Remove the trunk lid**

(a) Remove the bolt -1-4- and the trunk lid-A-.



(b) Detach the clips-A-B-, and remove the trunk lid air spring-C-.

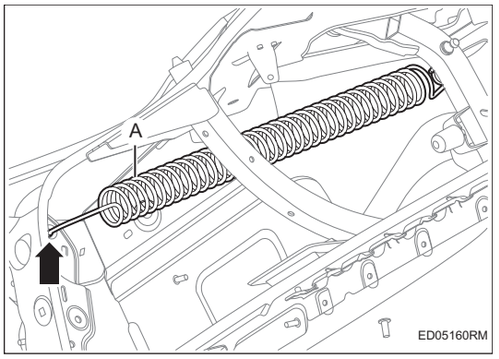


(c) Remove the ball head bolt -1-.

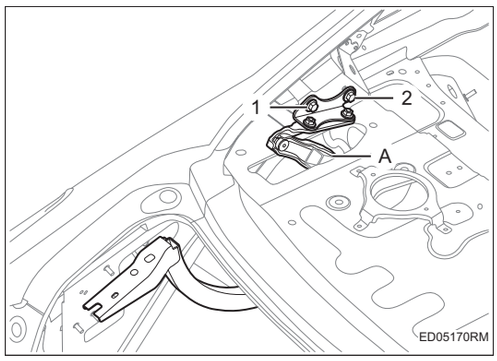
(d) Detach tension spring -A- hook as arrowed.

Hint:

The removal sequence on the right side is the same as that on the left side.



ED



(e) Remove the bolt -1-2- and the trunk lid hinge-A-.

Hint:

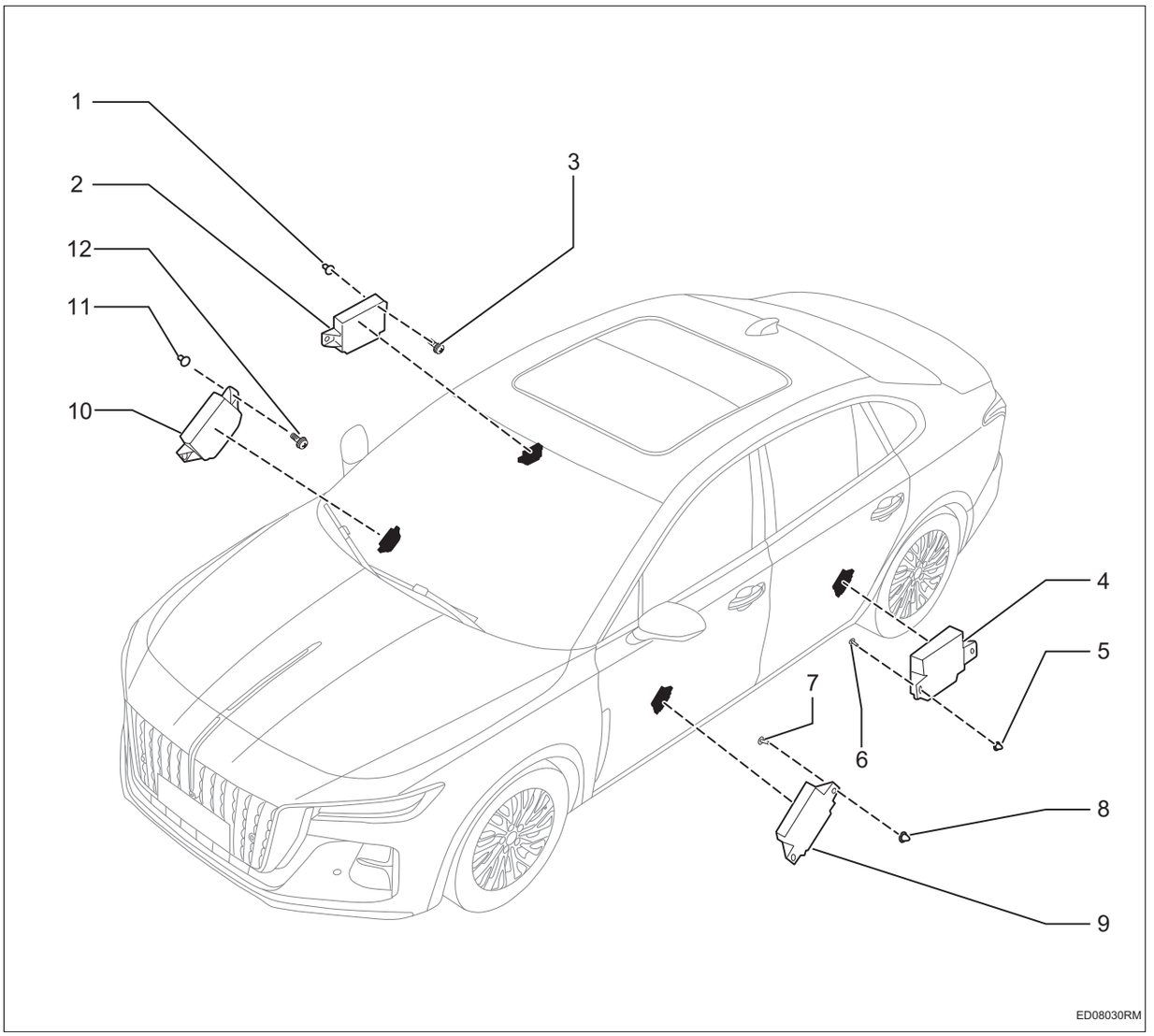
The removal sequence on the right side is the same as that on the left side.

Installation

1. The installation procedure is the reverse of removal procedure.

Door control system

Parts



1. **Insert nut**
   - X2
2. **RRDCU**
3. **Screw**
   - X2
4. **RLDCU**
5. **Screw**
   - X2
6. **Insert nut**
   - X2
7. **Screw**

- X2

8. **Insert nut**
   - X2
9. **DDCU**
10. **PDCU**
11. **Insert nut**
    - X2
12. **Screw**
    - X2

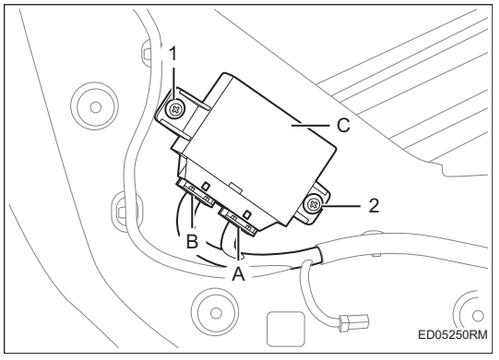
Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove door guard plate (See page IR-8)**
3. **Remove DCU**

   Hint:

   All doors are removed in the same order.

   (a) Disconnect the harness connector-A-B-.



   (b) Remove the screw -1-2- and the DCU-C-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

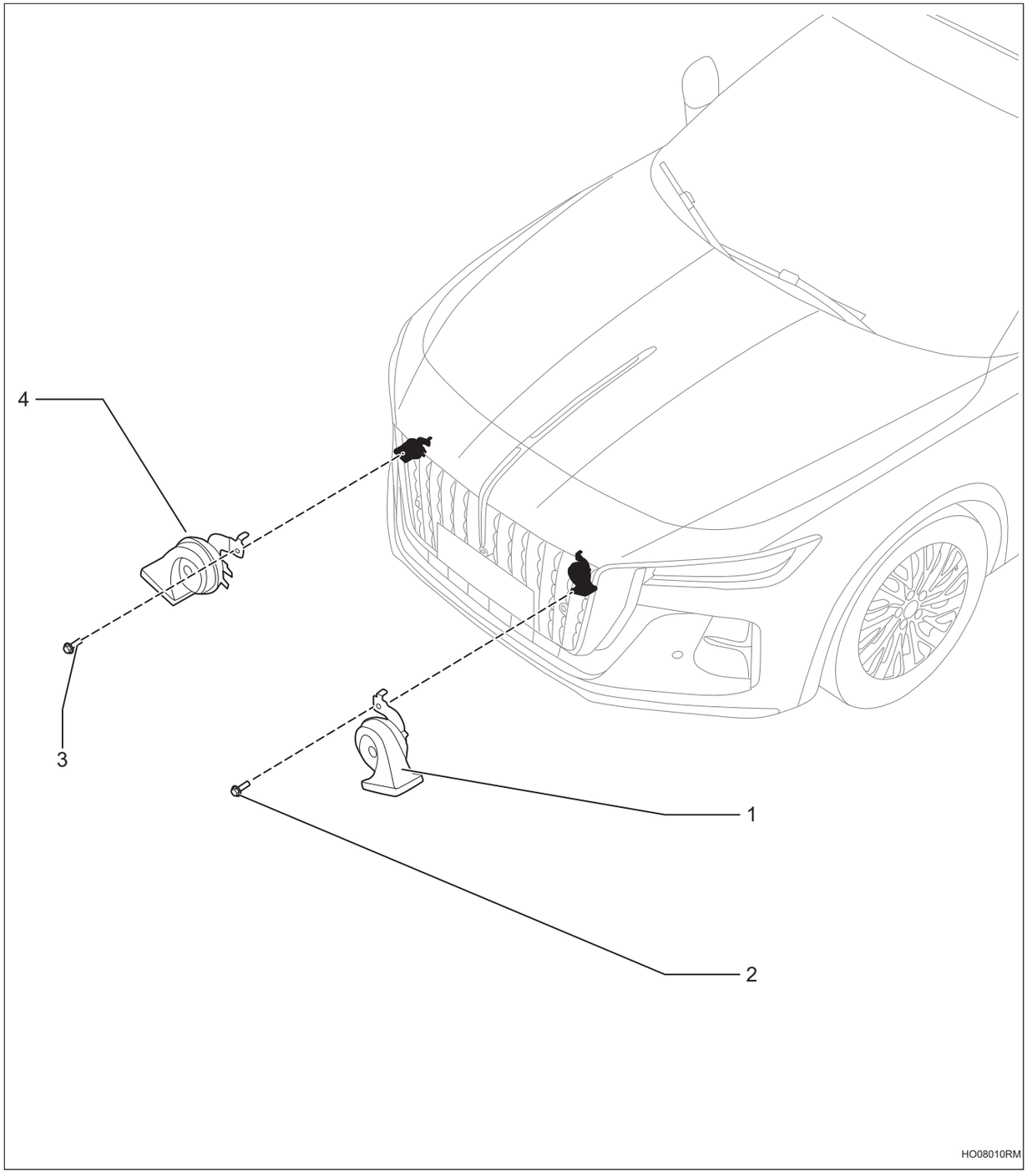
Horn

Horn HO-1
Parts HO-1
Removal HO-3
Check HO-3
Installation HO-4

HO

Horn

Parts

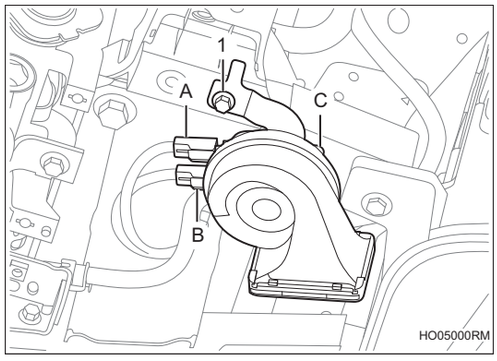


1. **Tweeter & bracket assembly**
2. **Hexagon flange bolt**
   - Torque: 8~12 N · m

3. **Hexagon flange bolt**
   - Torque: 8~12 N · m
4. **Woofer & bracket assembly**

Removal

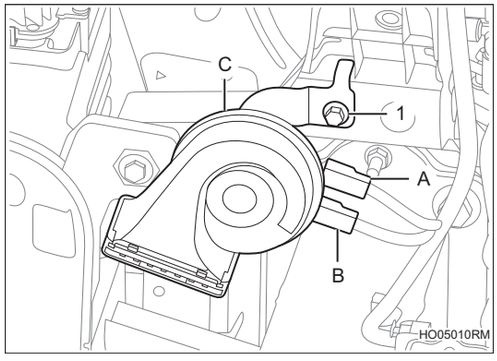
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove front bumper assembly (See page ET-7)**
3. **Remove tweeter & bracket assembly**



(a) Disconnect the harness connector-A-B-.

(b) Remove the bolt -1- and the tweeter & bracket assembly-C-.

4. **Remove the woofer & bracket assembly**



(a) Disconnect the harness connector-A-B-.

(b) Remove the bolt -1- and the woofer & bracket assembly-C-.

Check

1. **Check the woofer assembly**

Hint:

The tweeter check sequence is the same as the woofer check sequence.

(a) Apply battery voltage according to the table below and check the operation of the woofer.

Normal:

Measuring conditions	Specified state
Battery (+) → woofer connector 1# battery (-) → horn body	Woofer assembly working sound

If the results do not meet the requirements, replace the woofer.

Installation

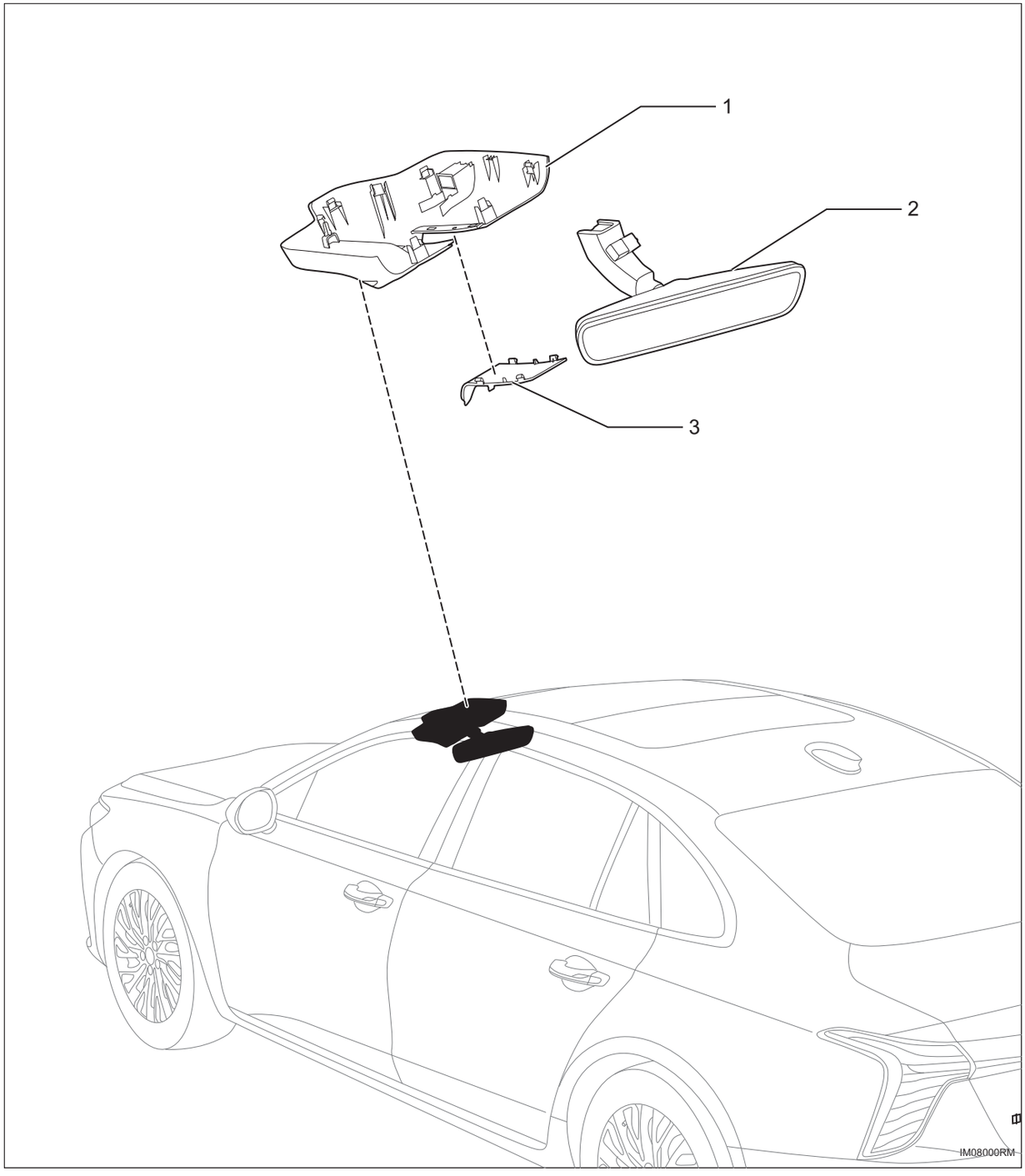
1. **The installation procedure is the reverse of removal procedure.**

Rearview mirror

Interior rearview mirror IM-1
Parts IM-1
Removal IM-2
Installation IM-2
Exterior rearview mirror IM-3
Parts IM-3
Removal IM-5
Installation IM-5

Interior rearview mirror

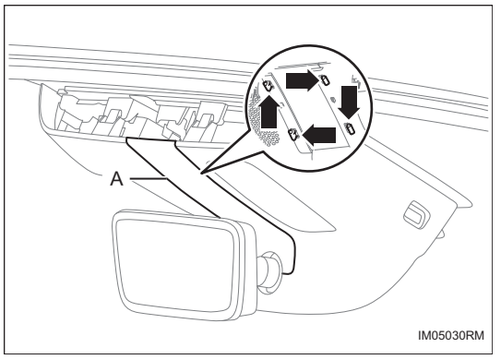
Parts



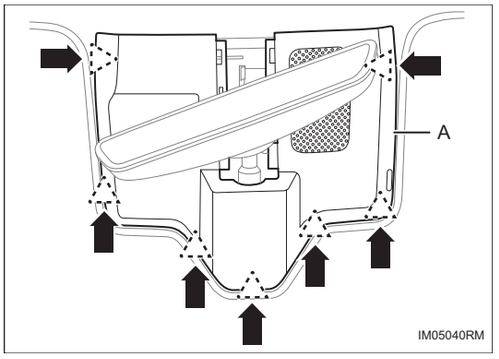
1. **Remove the interior rearview mirror trim cover I**
2. **Interior rearview mirror assembly**
3. **Interior rearview mirror trim cover II**

Removal

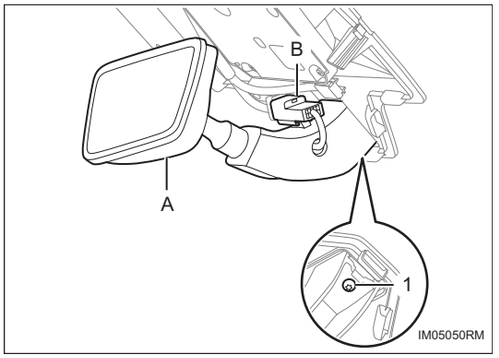
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove interior rearview mirror trim cover II**
   (a) Detach the claw-arrow- and remove the interior rearview mirror trim cover II-A-.



3. **Remove the interior rearview mirror trim cover I**
   (a) Detach the claw-arrow- and remove the interior rearview mirror trim cover I-A-.



4. **Remove the interior rearview mirror assembly**
   (a) Disconnect the harness connector-B-.



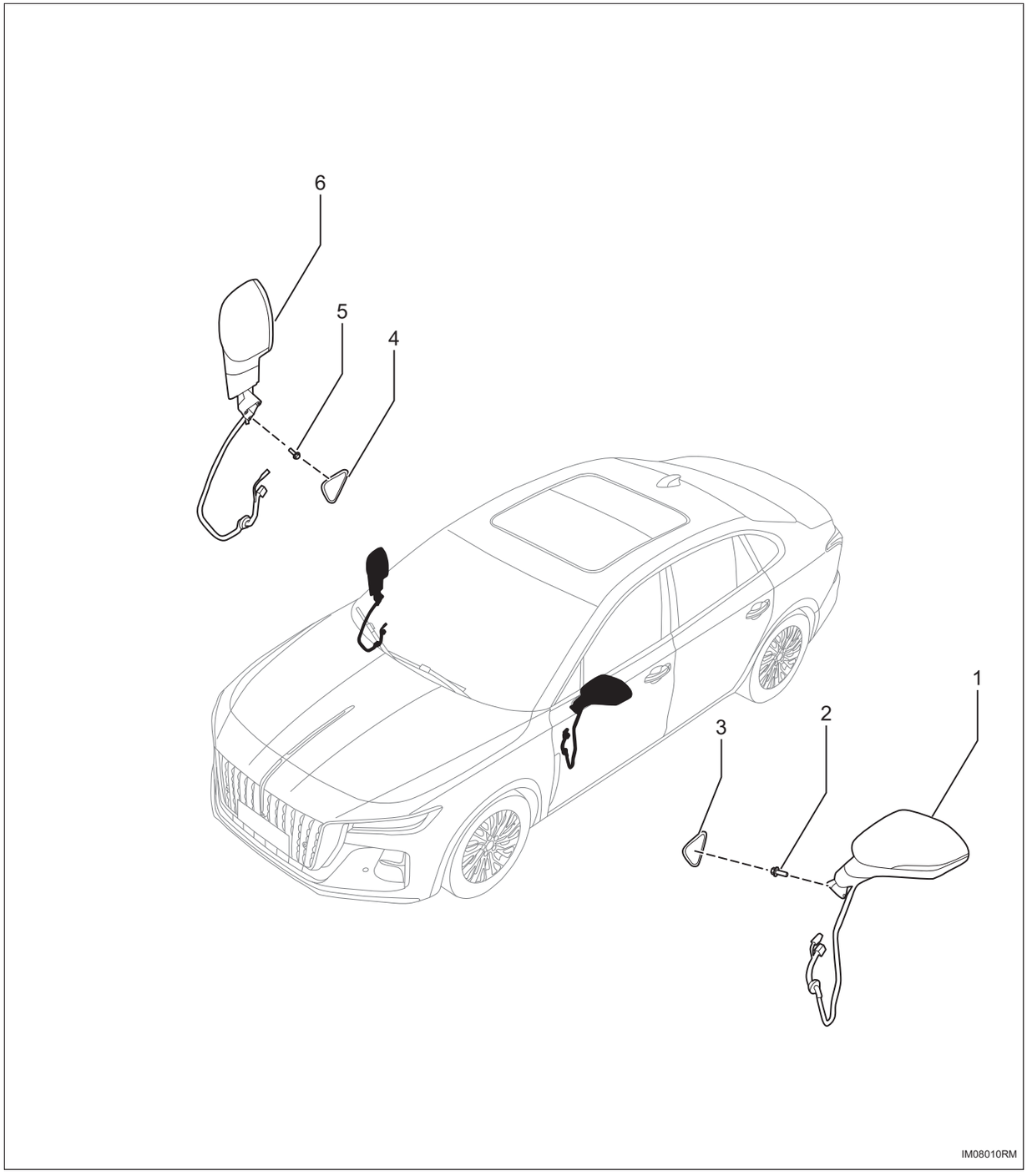
   (b) Remove the bolt -1- and the interior rearview mirror assembly-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Exterior rearview mirror

Parts



1. **Left exterior rearview mirror assembly**
2. **Hexagon head flange bolt**
   - X3
   - Torque: 8~12 N · m
3. **Driver door quarter window sealing plug cap**

4. **Passenger door triangle sealing plug**
5. **Hexagon head flange bolt**
   - X3
   - Torque: 8~12 N · m
6. **Right exterior rearview mirror assembly**

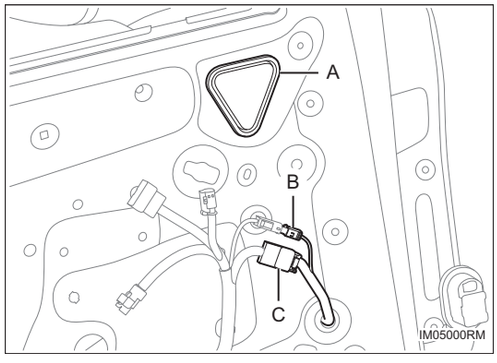
Removal

Hint:

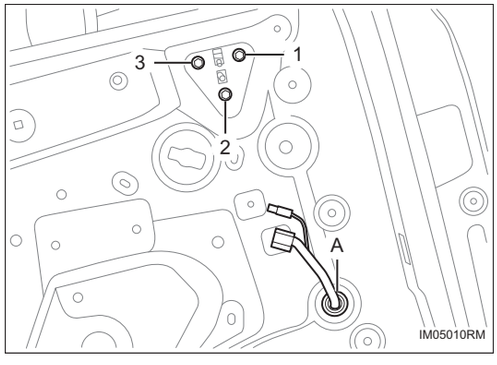
The removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

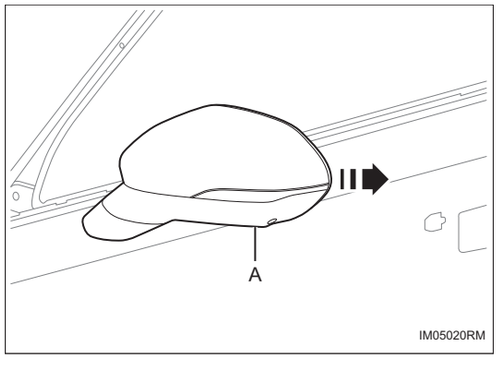
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove door guard plate (See page IR-8)**
3. **Remove left exterior rearview mirror assembly**



(a) Remove the front door triangle sealing plug -A-, and disconnect the harness connector -B-C-.



(b) Detach the harness protective sleeve-A-, and remove bolts -1-3-.



(c) Remove the exterior rearview mirror assembly-A- as arrowed.

Installation

1. **The installation procedure is the reverse of removal procedure.**

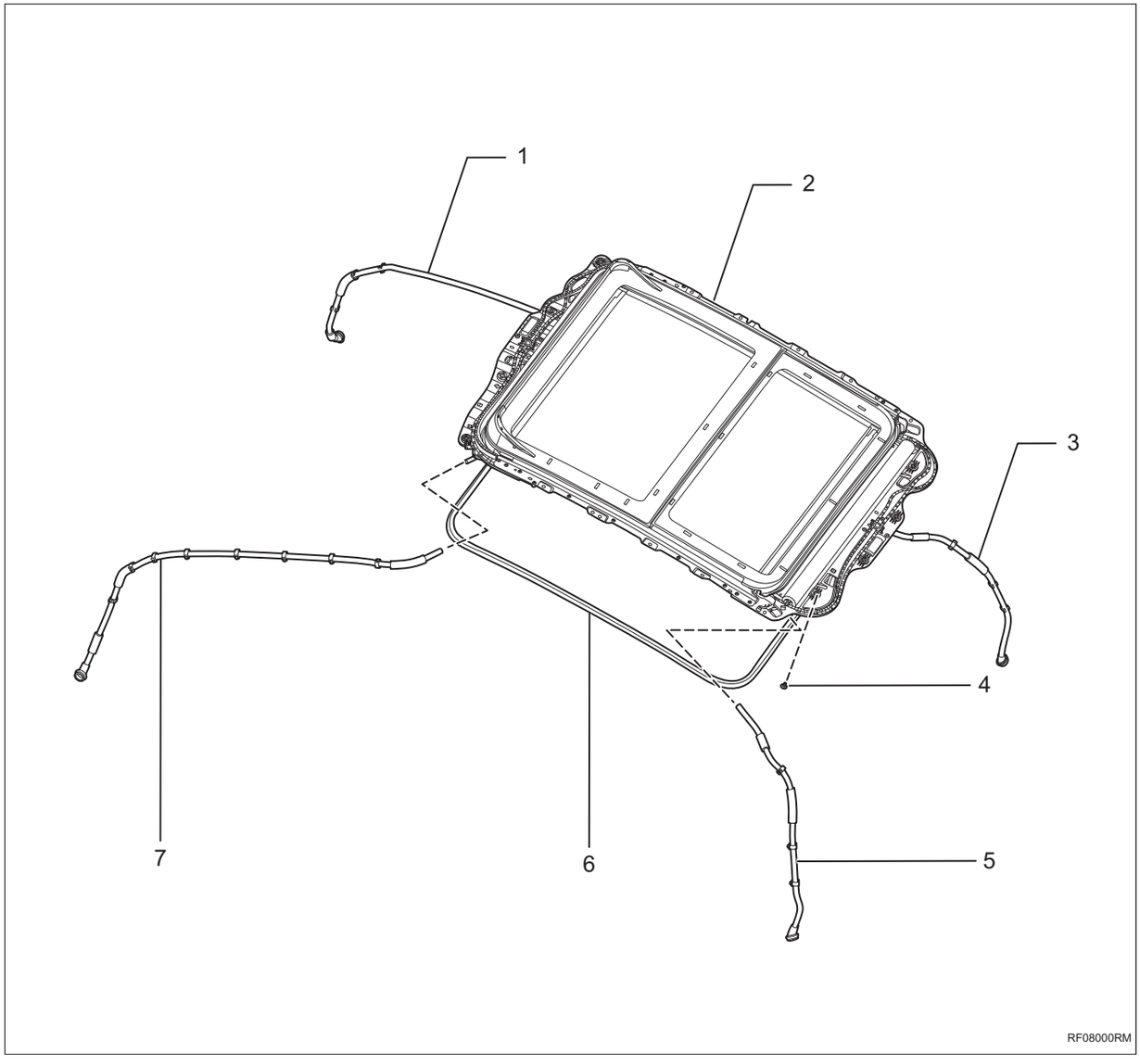
IM

Sunroof

Sunroof RF-1
Parts RF-1
Removal RF-2
Installation RF-5

Sunroof

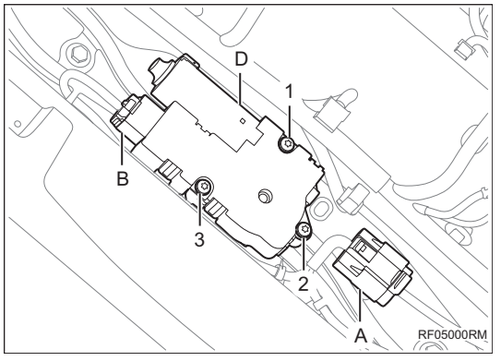
Parts



1. **Right front overflow pipe**
2. **Sunroof assembly**
3. **Right rear overflow pipe**
4. **Hexagon flange bolt**
   - X16
   - Torque: 8 ~ 10 N · m
5. **Left rear overflow pipe**
6. **Window sealing strip**
7. **Left front overflow pipe**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the interior lamp assembly (See page LI-112)**
3. **Remove sunroof motor assembly**



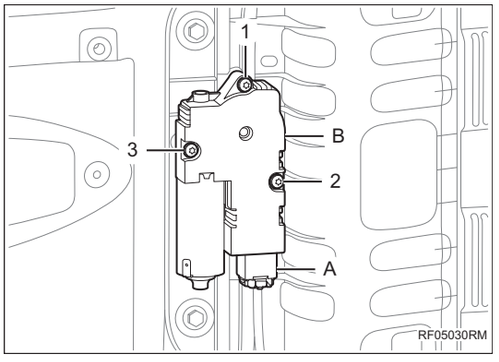
(a) Disconnect the harness connector-A-B-.

(b) Remove the bolt -1-3- and the sunroof assembly motor-D-.

4. **Remove the roof assembly (See page IR-44)**
5. **Remove sunroof assembly**

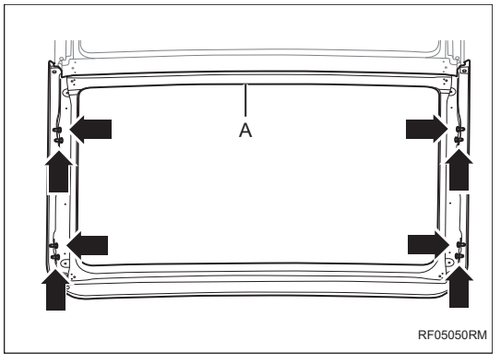
Hint:

Removal of the sunroof assembly requires two people.



(a) Disconnect the harness connector-A-.

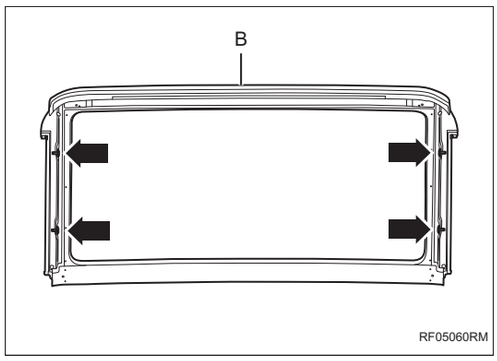
(b) Remove the bolt -1-3- and the sunshade motor-B-.



(c) Remove the screw -arrow-, and remove the sunroof front glass -A-.

Hint:

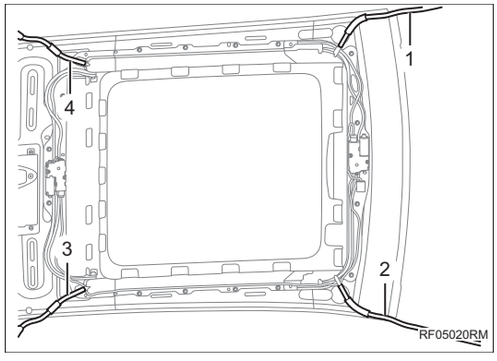
Manually adjust the sunroof to a proper angle before removal.



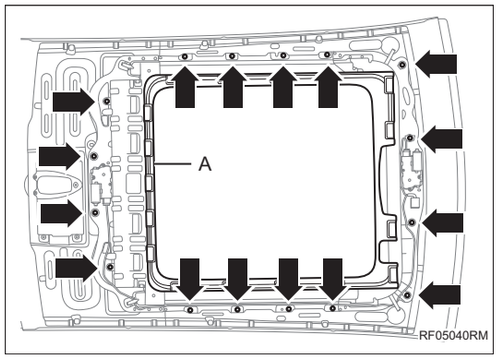
(d) Remove the screw -arrow- and remove the sunroof rear glass assembly -B-.

Hint:

Please pry open the sunroof rear window sealing strip before removal, and be careful not to damage the sealing strip.

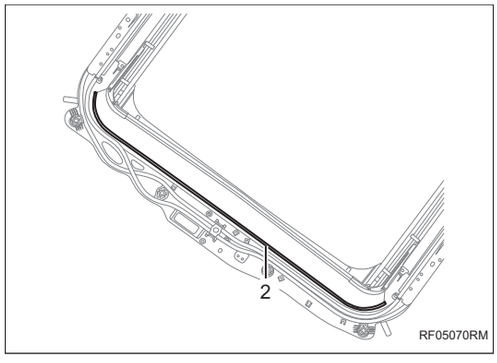


(e) Detach sunroof assembly drains -1-4-.

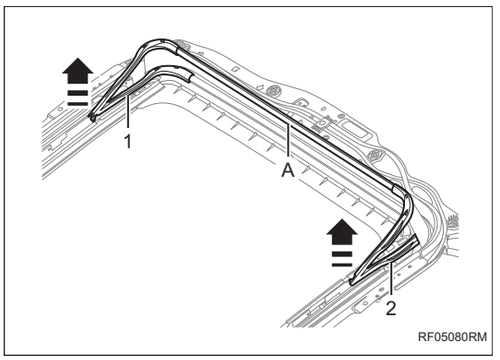


(f) Remove the bolt -arrow- and remove the sunroof assembly -A-.

6. Remove sunroof dust gauze



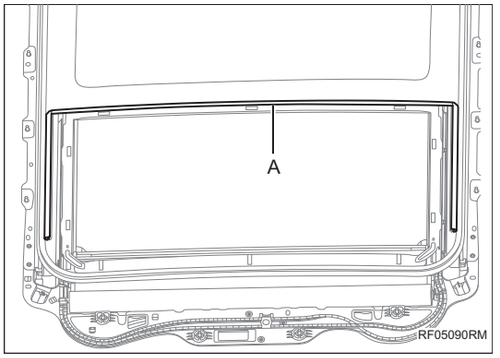
(a) Detach the lower fixing strip -2- of the sunroof dust gauze.



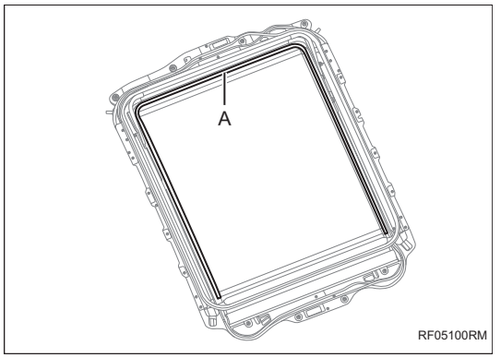
(b) Detach the dust screen support spring -1-2-.

(c) Remove sunroof dust gauze-A- as arrowed.

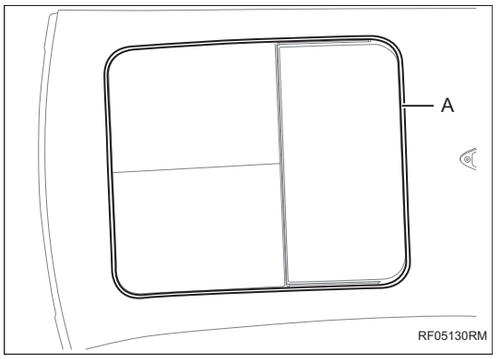
7. Remove rear window sealing strip -A-.



8. Remove inner sealing strip-A-.

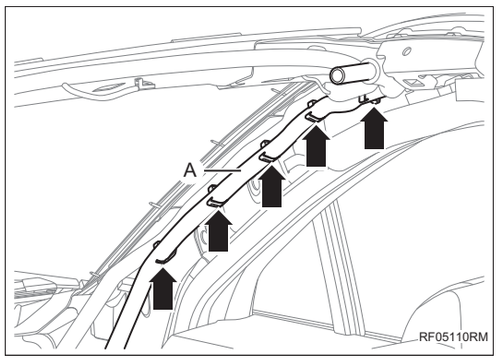


9. Remove outer sealing strip-A-.

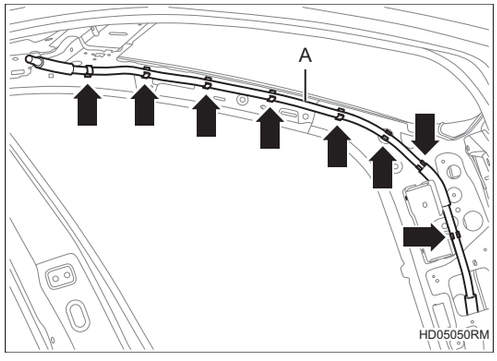


10. Remove the instrument panel assembly (See page IP-5)

11. Remove front overflow pipe



(a) Detach claw -arrow- and remove right front overflow pipe -A-.



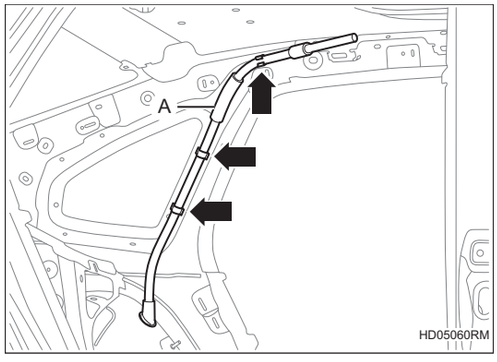
(b) Detach the claw -arrow-, and remove the left front overflow pipe -A-.

12. Remove the rear seat back wing assembly (See page SE-98)

13. Remove rear overflow pipe

Hint:

The removal sequence on the right side is the same as that on the left side.



(a) Detach claw -arrow- and remove left rear overflow pipe -A-.

RF

Installation

1. The installation procedure is the reverse of removal procedure, and the following points apply:

(a) Check the gap between the sunroof panel and the sunroof.

Hint:

The gap must be uniform all around.

(b) After the gap is uniform all around, tighten the sunroof screw.

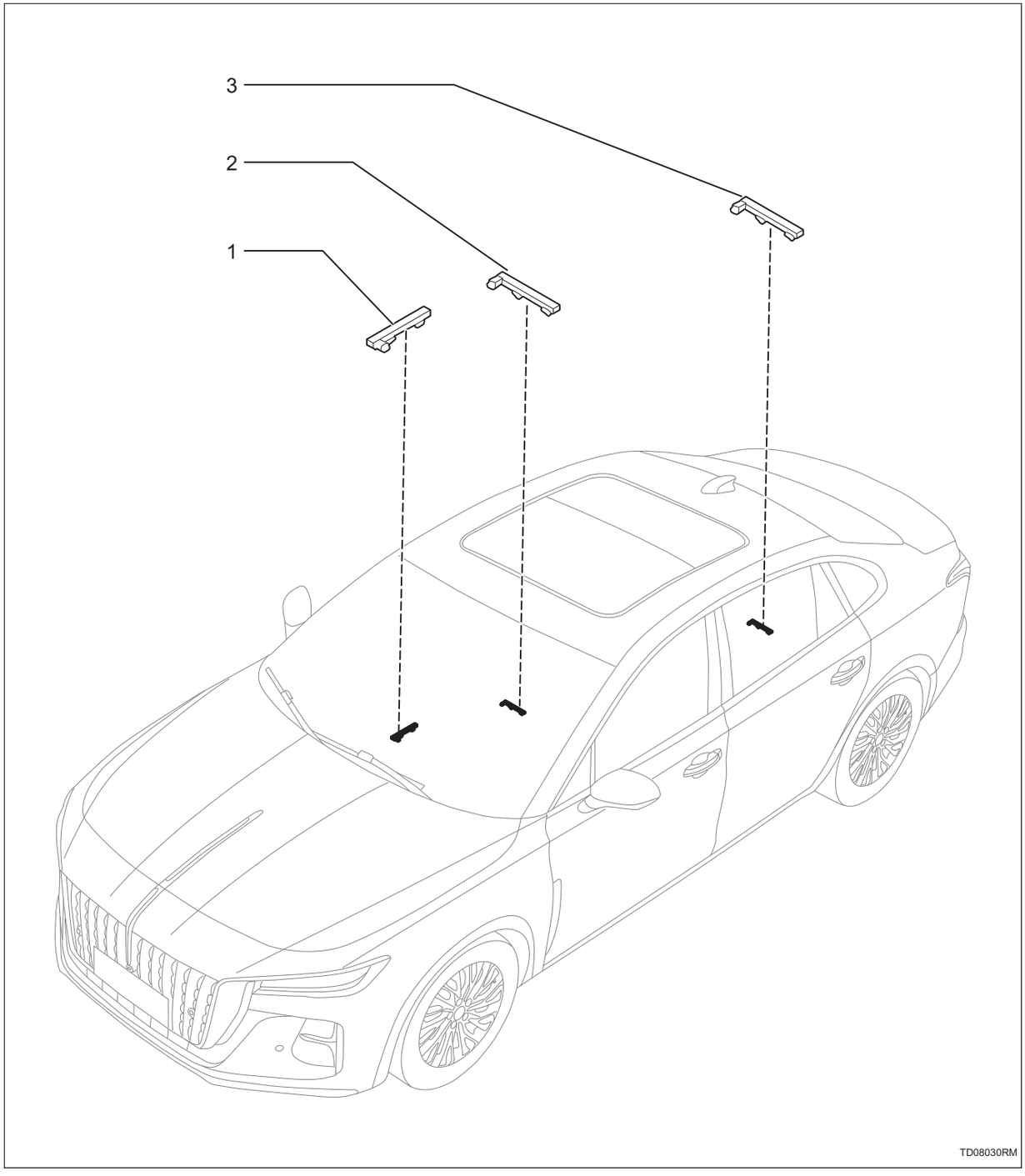
Anti-theft system

Interior antenna assembly TD-1
Parts TD-1
Removal TD-2
Installation TD-3
Exterior low frequency antenna TD-4
Parts TD-4
Removal TD-5
Installation TD-5
RF transmitter TD-6
Parts TD-6
Removal TD-7
Installation TD-7
PEPS low frequency antenna TD-8
Parts TD-8
Removal TD-9
Installation TD-9
ENGINE START/STOP button assembly TD-10
Parts TD-10
Removal TD-11
Installation TD-11
Smart key TD-12
Parts TD-12
Removal TD-13
Check TD-14
Installation TD-15

TD

Interior antenna assembly

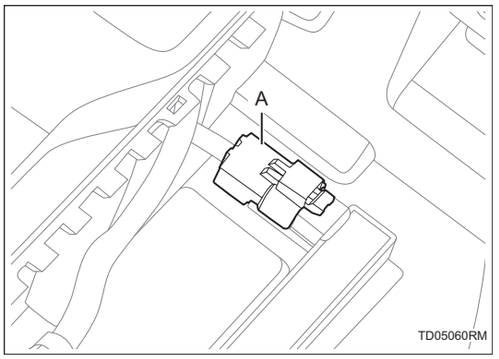
Parts



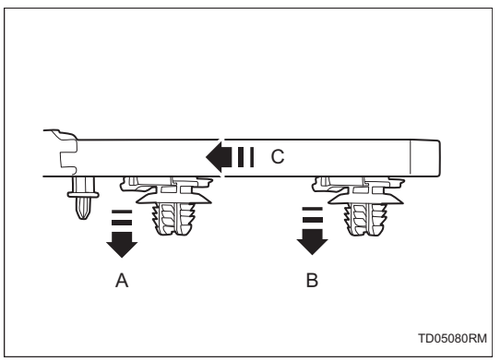
1. **Front interior low-frequency antenna**
2. **Middle interior low-frequency antenna**
3. **Rear interior low-frequency antenna**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the upper cover plate assembly (See page IP-17)**
3. **Remove front interior low-frequency antenna**

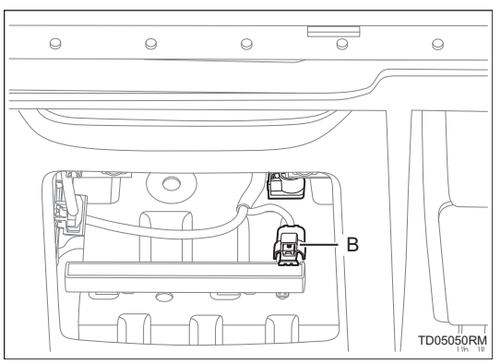


(a) Disconnect the harness connector-A-.



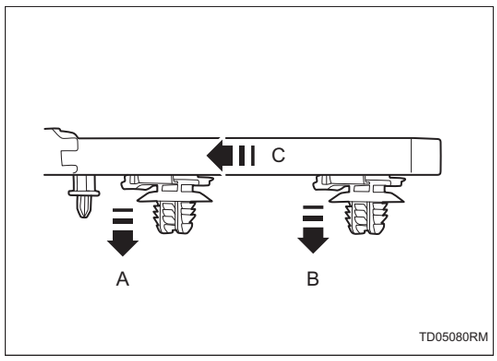
(b) Detach the claw -A-B- downwards and push out the front interior low-frequency antenna in the direction of arrow -C-.

4. **Remove the rear end plate assembly (See page IP-17)**
5. **Remove middle interior low-frequency antenna**



(a) Disconnect the harness connector-B-.

TD

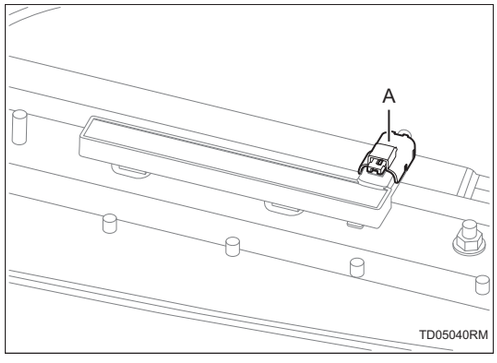


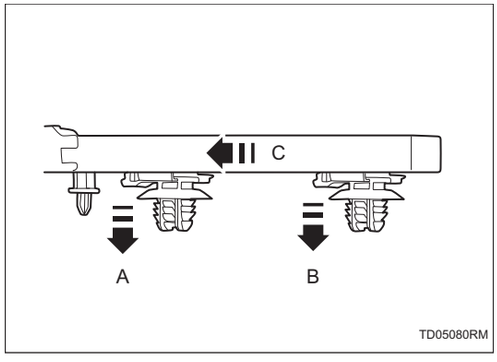
(b) Detach the claw -A-B- downwards and push out the middle interior low-frequency antenna in the direction of arrow -C-.

6. Remove the trunk carpet assembly.

7. Remove rear interior low-frequency antenna

(a) Disconnect the harness connector-A-.





(b) Detach the claw -A-B- downwards and push out the rear interior low-frequency antenna in the direction of arrow -C-.

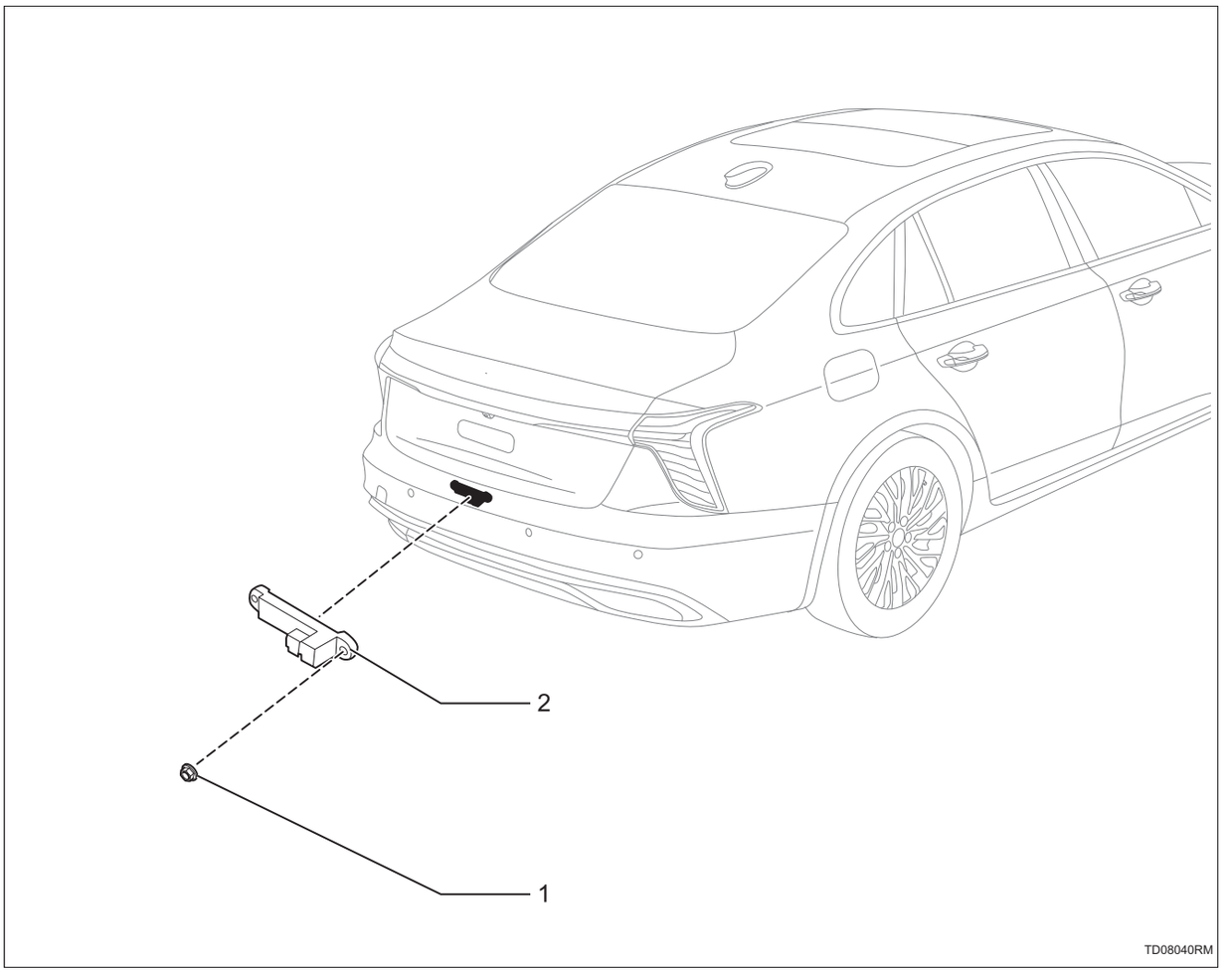
TD

Installation

1. The installation procedure is the reverse of removal procedure.

Exterior low frequency antenna

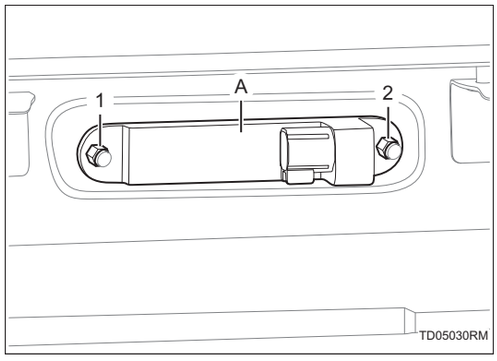
Parts



1. **Hexagon flange nut**
   - X2
   - Torque: 4~6 N · m
2. **Rear exterior low frequency antenna**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the rear bumper (See page ET-21)**
3. **Remove rear exterior low frequency antenna**



(a) Disconnect the harness connector.

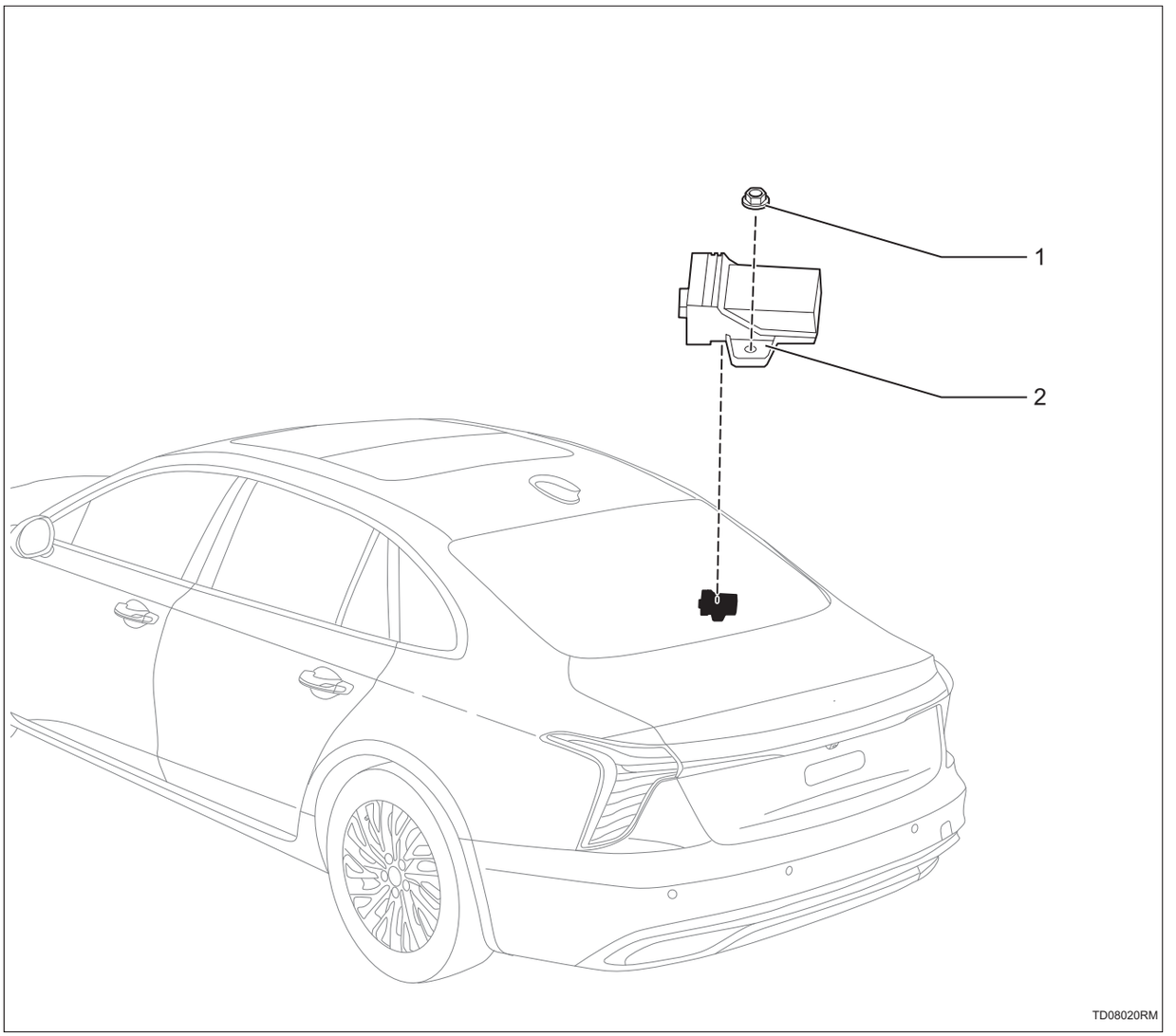
(b) Remove the nut -1-2- and the rear exterior low frequency antenna-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

RF transmitter

Parts



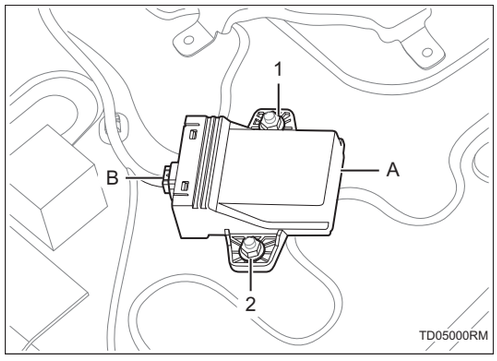
1. Hexagon flange nut

- X2
- Torque: 8~12 N · m

2. RF transmitter

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove parcel shelf guard plate (See page IR-16)**
3. **Remove RF transmitter**



(a) Disconnect the harness connector-B-.

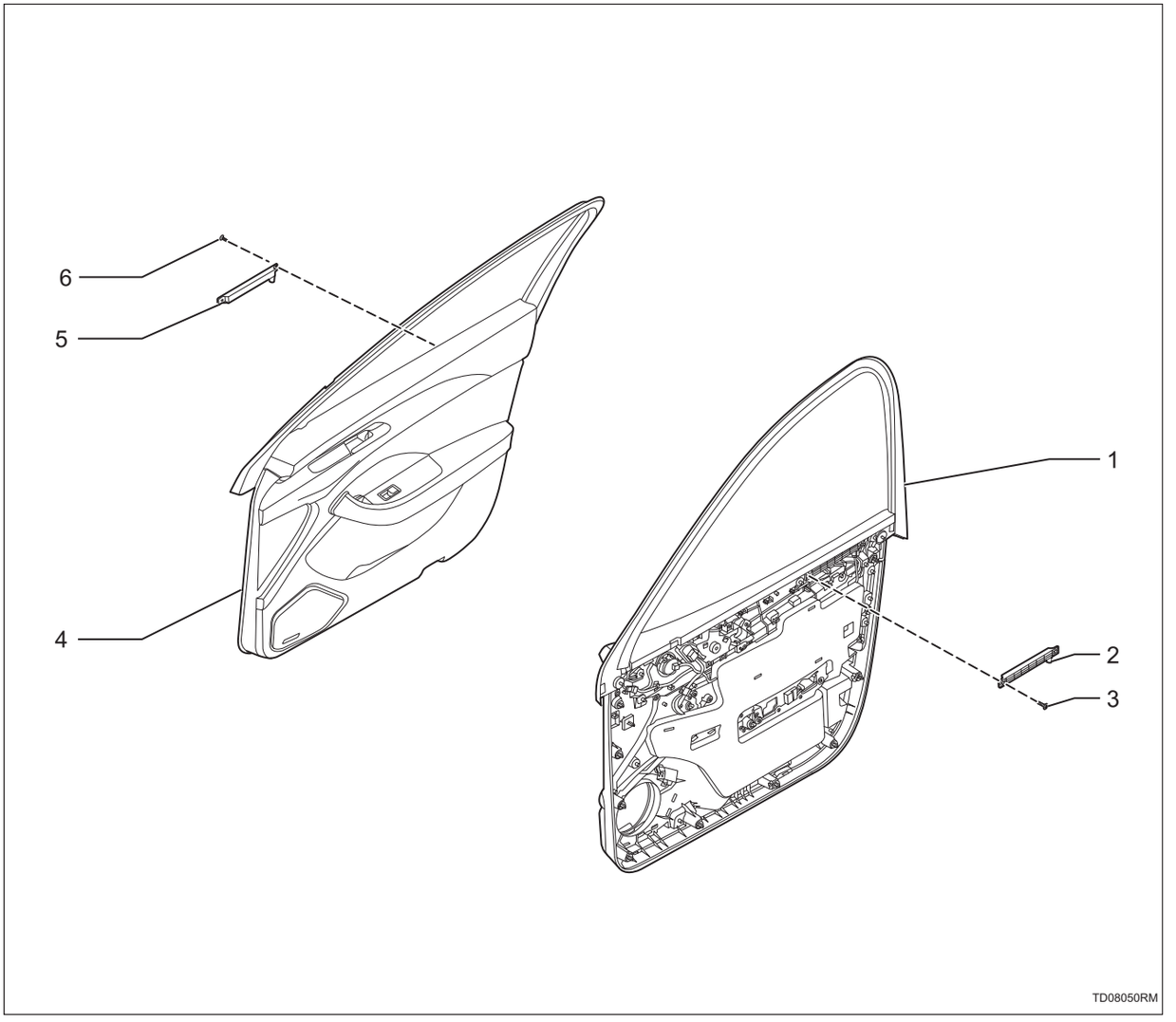
(b) Remove the nut -1-2- and the RF transmitter-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

PEPS low frequency antenna

Parts



1. **Driver door guard plate**
2. **Left PEPS low frequency antenna**
3. **Screw**
   - X2
4. **Passenger door guard plate**
5. **Right PEPS low frequency antenna**
6. **Screw**
   - X2

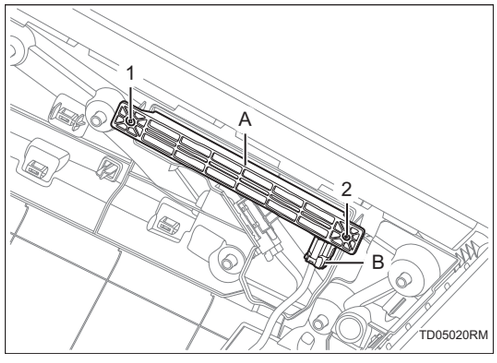
Removal

Hint:

The removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove door guard plate (See page IR-8)**
3. **Remove PEPS low frequency antenna**



(a) Disconnect the harness connector-B-.

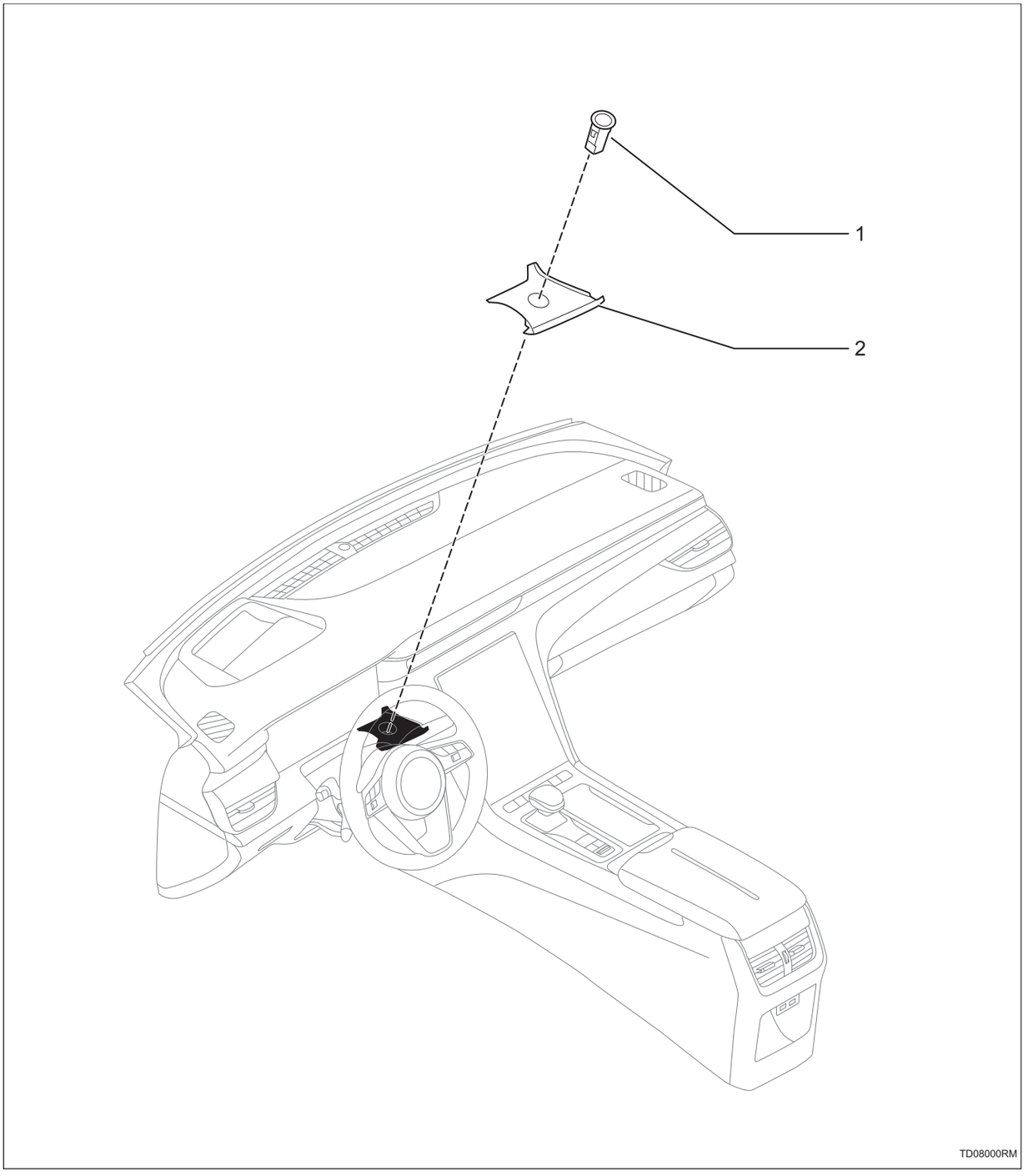
(b) Remove the screw -1-2- and the PEPS low frequency antenna-A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

ENGINE START/STOP button assembly

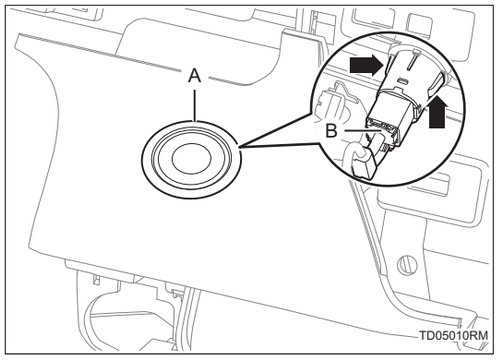
Parts



1. **Engine START/STOP button assembly**
2. **Instrument panel middle trim strip**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the left lower guard plate (See page IP-5)**
3. **Remove ignition switch assembly**



(a) Detach claw -arrow- and take out ENGINE START/STOP button assembly -A- outward.

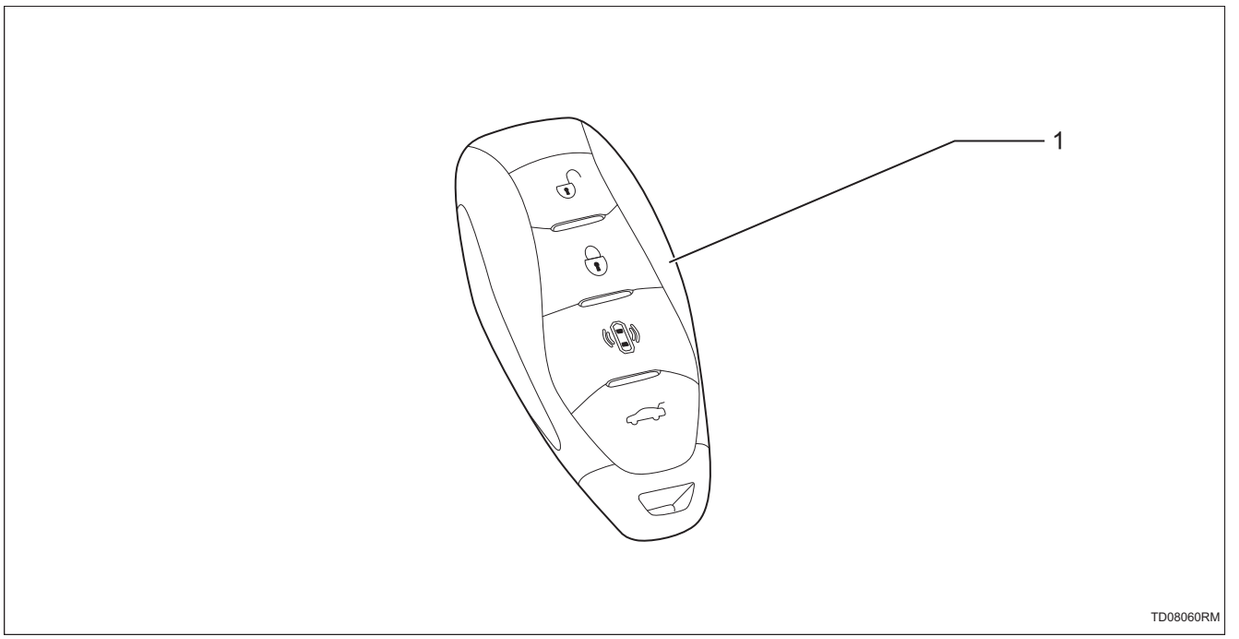
(b) Disconnect the harness connector -B-, and remove the ENGINE START/STOP button assembly -A-.

Installation

1. **The installation procedure is the reverse of removal procedure.**

Smart key

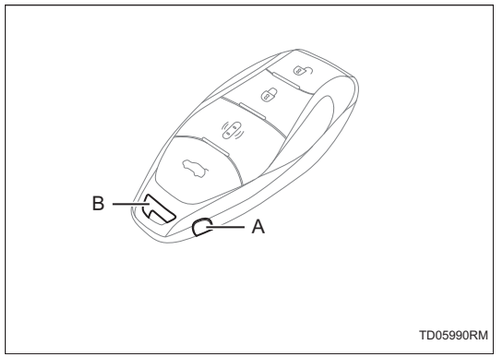
Parts



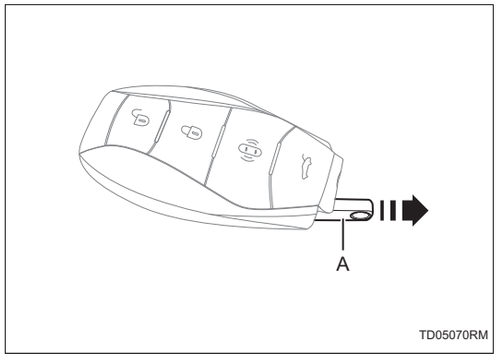
1. Smart key

Removal

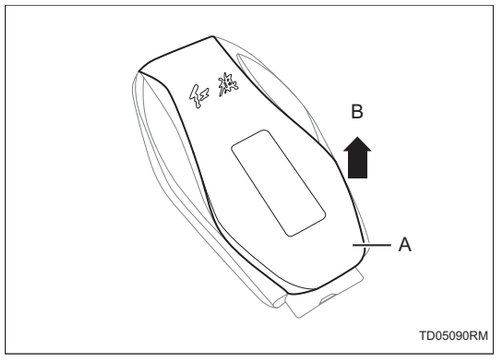
1. Remove smart key



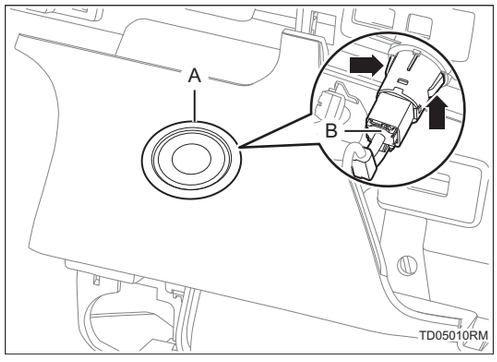
(a) Press the lock button-A- to remove the smart key upper cover-B-.



(b) Pull out mechanical key-A- as arrowed.



(c) Open the rear cover of the battery compartment -A- with force in the direction of -arrow B- .



(d) Pull battery-A- as arrowed.

(e) Gently remove the smart key battery.

Notice:

- Do not press the terminal with your fingers.

TD

- Do not pry the smart key battery forcibly, otherwise the terminal may be damaged.
- Do not touch the smart key battery with wet hands, otherwise water may cause rust.
- Do not touch or move any part in the smart key housing; otherwise it may interfere with normal operation.
- When replacing the smart key battery, remove the static electricity on the body by touching the vehicle before starting the operation to prevent the electronic transmitter housing from being damaged.

Check

1. Check smart key

(a) Check the working conditions of the smart key housing.

(1) Remove the smart key battery from the smart key housing.

(2) Install a new or functioning smart key battery.

Notice:

When replacing the smart key battery, remove the static electricity on the body by touching the vehicle before starting the operation to prevent the smart key housing from being damaged.

Hint:

If there is no new or functioning battery, connect 2 new 1.5V batteries in series. Then, as shown in the figure, connect the lead to the dry battery and apply a 3V voltage to the transmitter housing

(3) Test the smart key housing by aligning the key plate with the vehicle and pressing the smart key housing switch about 1 m away from the driver's door handle.

Normal: The door lock can be operated through the transmitter housing, and the LED lights up more than once.

Hint:

- The working range varies according to the user, the way of holding the smart key housing and the position.

- If there is strong radio wave or electrical noise interference in the area, the weak radio wave of the smart key housing may be affected. The working area of the smart key housing may be reduced or the smart key housing may not work.

(b) Check the capacity of smart key battery

(1) Remove the smart key battery from the faulty smart key housing.

(2) Connect a lead to the negative terminal with adhesive tape or equivalents.

Notice:

Do not wrap the lead around the terminal, or wedge or weld the lead between terminals. Otherwise, the terminal may be deformed or damaged, and the smart key battery may not be installed correctly.

(3) Carefully pull the lead out of the position shown in the figure and install the smart key battery that was previously removed.

Notice:

When replacing the transmitter battery, remove the static electricity on the body by touching the vehicle, etc. before starting the operation to prevent damage to the smart key housing.

(4) Check smart key battery voltage.

Hint:

When measuring the battery voltage, operate the lock sensor of the door handle and at the same time bring the smart key housing within the operating range for measurement.

TD

Standard voltage:

Detector connection	Conditions	Specified state
Transmitter battery positive (+) -Transmitter battery negative (-)	Engine switch OFF, all doors closed and lock sensor touched	2.5 V to 3.2 V

If the results do not meet the requirements, replace the smart key battery.

Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**
2. **Install smart key**

(a) Install a new smart key battery with the positive (+) side facing up.

- Battery model CR 2032

Notice:

- Be careful not to bend the transmitter battery electrode during insertion.
- Keep the interior of the smart key housing cover free of dust and oil.
- When replacing the smart key battery, remove the static electricity on the body by touching the vehicle before starting the operation to prevent the electronic transmitter housing from being damaged.

(b) Press a switch of the smart key and check that the LED is lit.

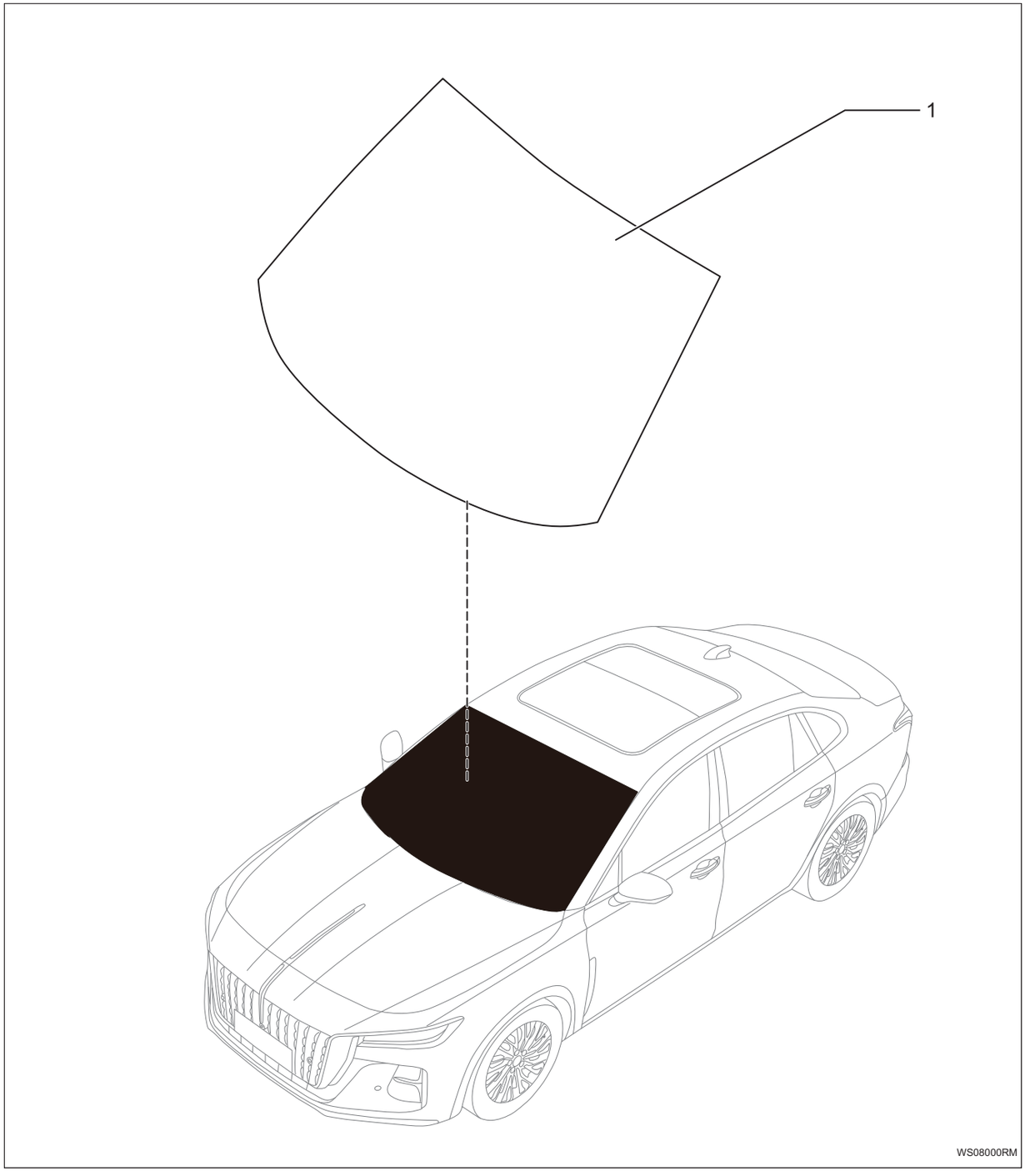
Normal: The transmitter LED lights up when the switch is pressed.

Windshield and window

Front windshield assembly WS-1
Parts WS-1
Removal WS-2
Installation WS-3
Rear windshield assembly WS-5
Parts WS-5
Removal WS-6
Installation WS-7
Quarter window assembly WS-9
Parts WS-9
Removal WS-11
Installation WS-12

Front windshield assembly

Parts



1. Front windshield assembly

Removal

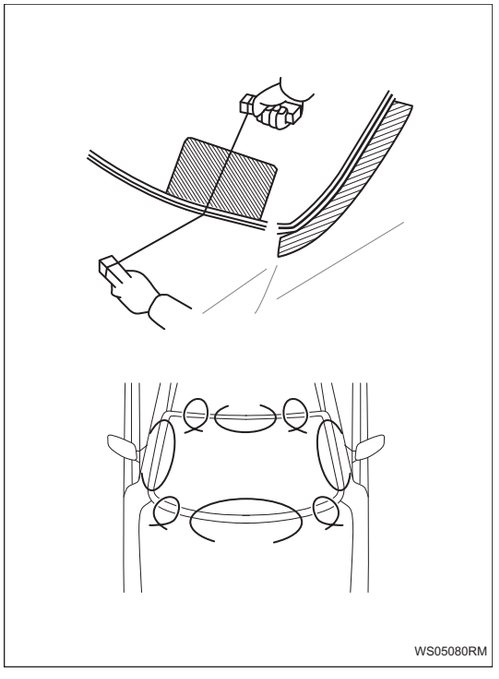
1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the wiper motor assembly (See page WW-5)**
3. **Remove interior rearview mirror assembly (See page IM-2)**
4. **Remove front windshield assembly**

   Hint:

   According to the cut-off position and condition, use windshield sealant scraper and steel wire respectively for the operation.

   Caution:

   When using the scraper, keep a right angle between the handle and the top of the glass, make the scraper blade parallel to the glass surface and the top of the glass, and move the scraper to cut the adhesive.



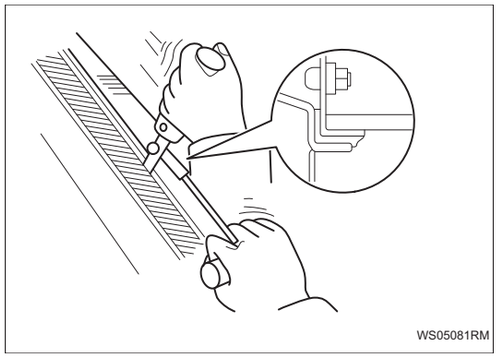
(a) Apply protective tape to the body surface around the front windshield assembly.

(b) Pull the steel wire from the inside through the gap between the body and the front windshield assembly.

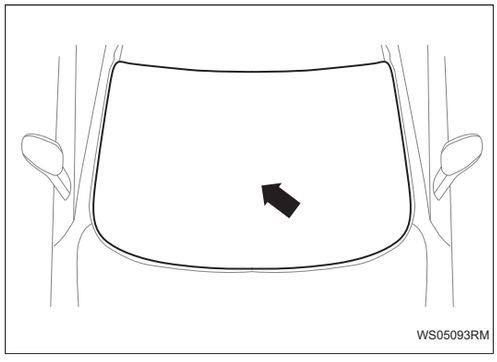
(c) Tie wooden blocks and similar articles at both ends of the steel wire.

(d) Pull the steel wire around the front windshield assembly to cut open the adhesive.

(e) When removing the front windshield assembly, place a plastic guard plate between the steel wire and the instrument panel to prevent scratching the instrument panel.



(f) As shown in the figure, if the front windshield assembly continues to be used, make an assembly mark on the front windshield assembly and the vehicle body.



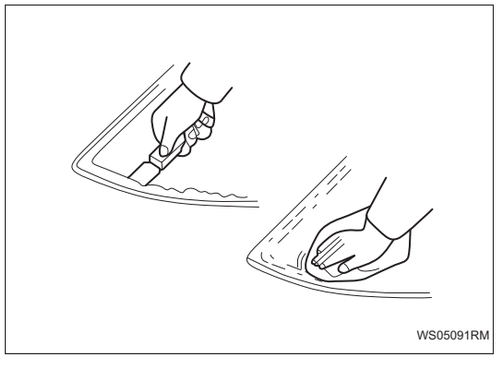
(g) Remove the front windshield assembly with a suction cup.

Installation

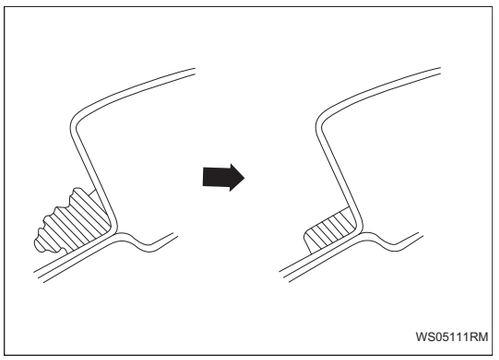
1. Clean front windshield assembly

(a) Scrape off the adhesive on the front windshield assembly.

(b) Clean the glass with a non-residual solvent.



2. Clean the body



(a) Scrape off the residual adhesive on the body of the car.

Caution:

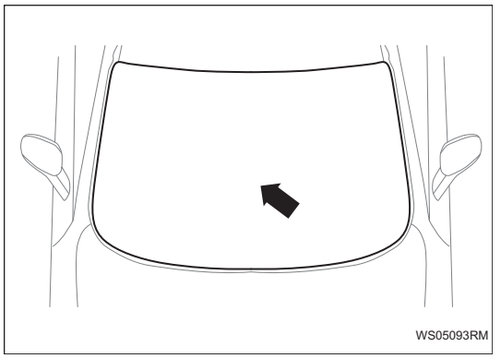
The residual adhesive thickness shall not exceed 2 mm.

3. Install front windshield assembly

(a) Install the front windshield assembly with adhesive.

(b) Apply primer to the adhesive application position (body and glass).

(c) Apply the adhesive to the windshield assembly according to the △ section.



(d) Operation before installing the glass:

(e) Move the glass to the vehicle body with a suction cup, and fix it to an appropriate position to ensure equal gap at the upper part and both sides of the glass.

(f) Confirm that the installation of trim strip is not hindered.

(g) Apply rubber tape to the glass and body, and use a pen to make assembly mark. (When installing new glass)

(h) When reusing the glass, confirm and correct the position of the assembly mark.

(i) Check the front windshield assembly pin-clip fitting from inside the vehicle.

(j) After the assembly mark and gap are aligned, gently pat the sealant application position of the edge of the glass to ensure that it is firmly adhered.

Caution:

It takes 24 hours for the glass adhesive to fully cure.

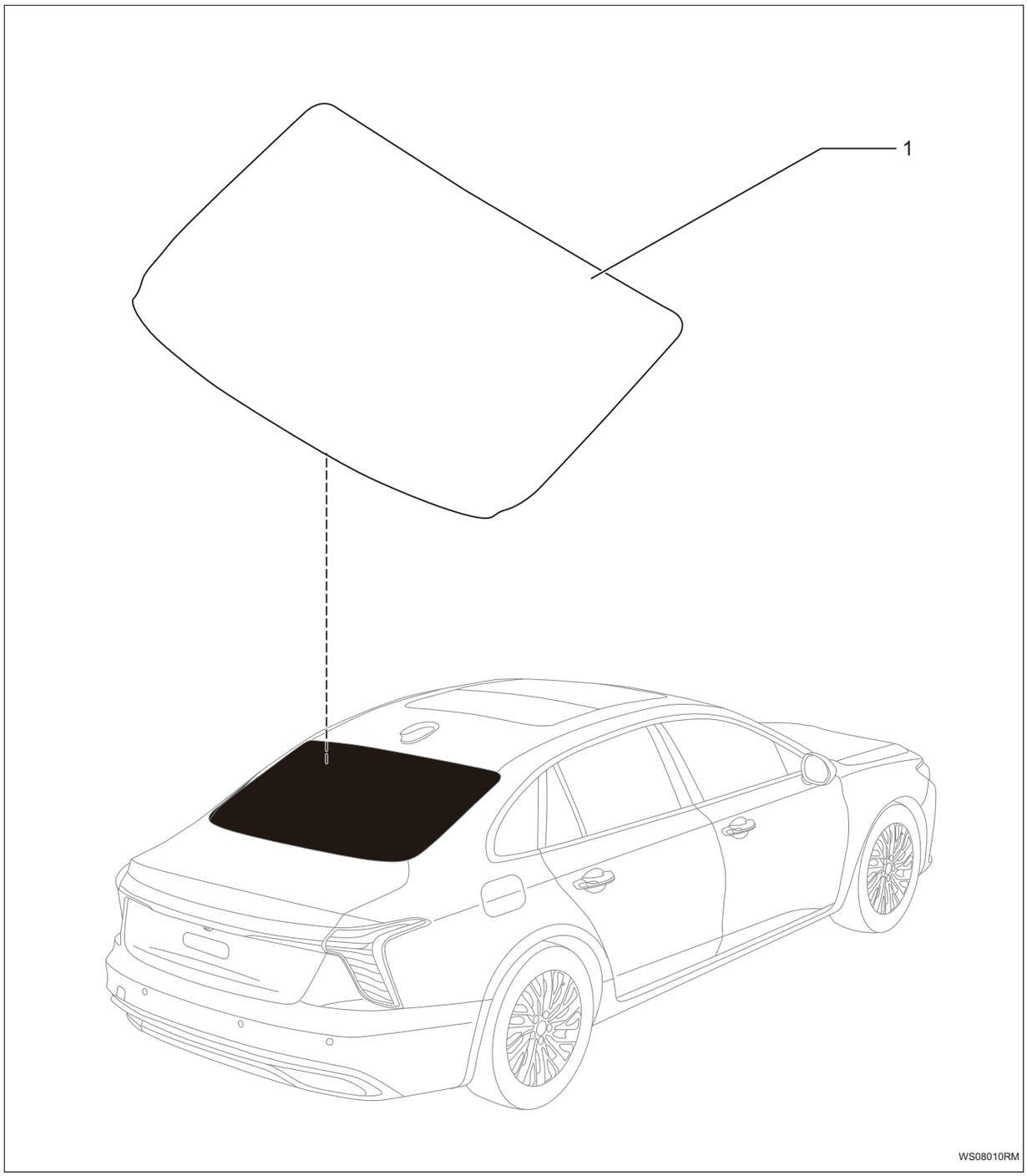
4. Check for leakage and repair

(a) Do leakage test after the adhesive has hardened completely.

(b) Seal the leaking position with automatic glass sealant.

Rear windshield assembly

Parts



1. Rear windshield assembly-

Removal

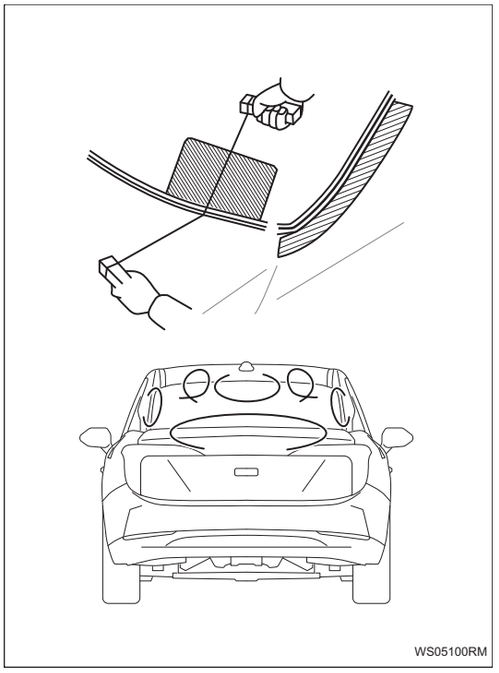
1. Remove rear windshield assembly

Hint:

According to the cut-off position and condition, use windshield sealant scraper and steel wire respectively for the operation.

Caution:

When using the scraper, keep a right angle between the handle and the top of the glass, make the scraper blade parallel to the glass surface and the top of the glass, and move the scraper to cut the adhesive.



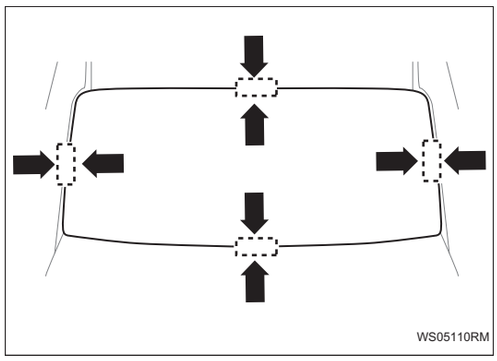
(a) Apply protective tape to the body surface around the rear windshield assembly.

(b) Pull the steel wire from the inside through the gap between the body and the rear windshield assembly.

(c) Tie wooden blocks and similar articles at both ends of the steel wire.

(d) Pull the steel wire around the rear windshield assembly to cut open the adhesive.

(e) When removing the rear windshield assembly, place a plastic guard plate guard plate between the steel wire and the parcel shelf guard plate to prevent scratching the instrument panel.



(f) As shown in the figure, if the rear windshield assembly continues to be used, make an assembly mark on the rear windshield assembly and the vehicle body.

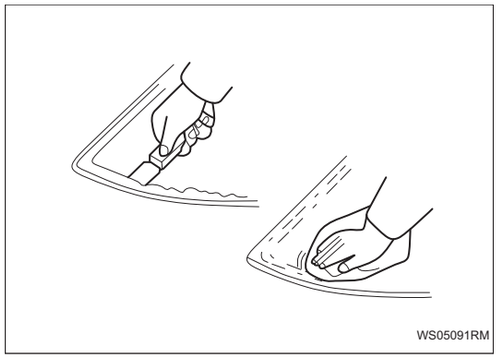
(g) Remove the rear windshield assembly with a suction cup.

Installation

1. Clean rear windshield assembly

(a) Scrape off the adhesive on the rear windshield assembly.

(b) Clean the glass with a non-residual solvent.

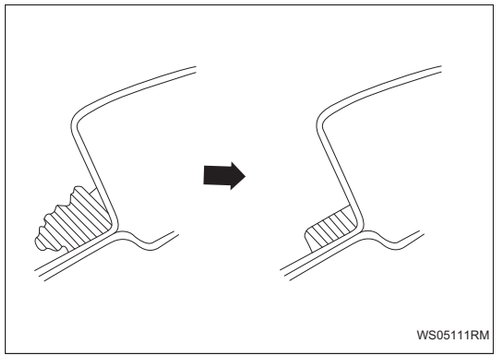


2. Clean the body

(a) Scrape off the residual adhesive on the body of the car.

Caution:

The residual adhesive thickness shall not exceed 2 mm.

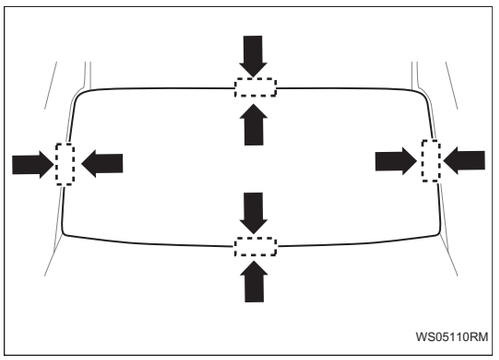


3. Install rear windshield assembly

(a) Install the rear windshield assembly with adhesive.

(b) Apply primer to the adhesive application position (body and glass).

(c) Apply the adhesive to the windshield assembly according to the △ section.



(d) Operation before installing the glass:

(e) Move the glass to the vehicle body with a suction cup, and fix it to an appropriate position to ensure equal gap at the upper part and both sides of the glass.

(f) Confirm that the installation of trim strip is not hindered.

(g) Apply rubber tape to the glass and body, and use a pen to make assembly mark. (When installing new glass)

(h) When reusing the glass, confirm and correct the position of the assembly mark.

(i) Check the connection of rear windshield assembly pin-clip from inside the vehicle.

(j) After the assembly mark and gap are aligned, gently pat the sealant application position of the edge of the glass to ensure that it is firmly adhered.

Caution:

It takes 24 hours for the glass adhesive to fully cure.

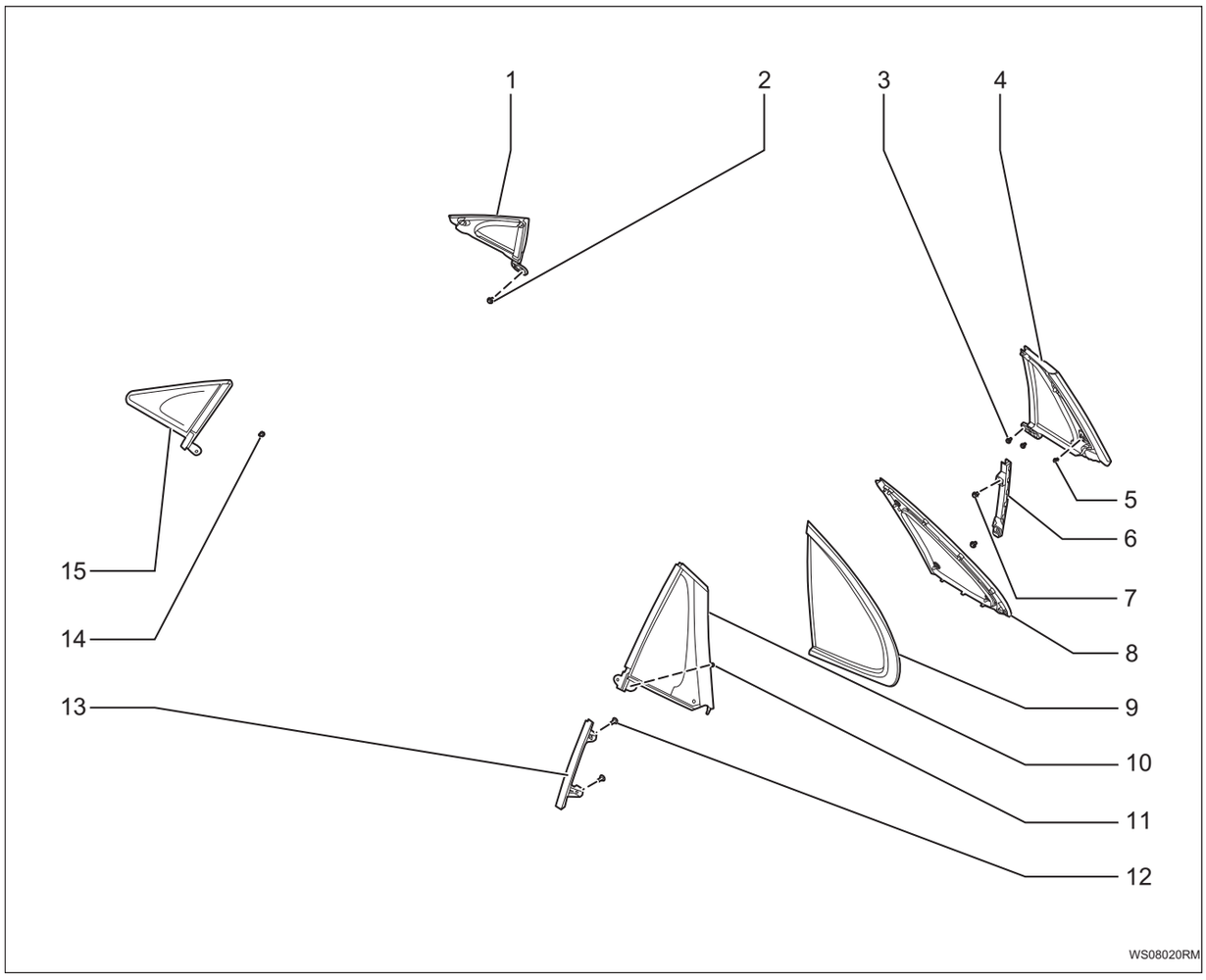
4. Check for leakage and repair

(a) Do leakage test after the adhesive has hardened completely.

(b) Seal the leaking position with automatic glass sealant.

Quarter window assembly

Parts



1. **Passenger door quarter window assembly**
2. **Hexagon flange bolt**
   - Torque: 6~8 N · m
3. **Hexagon flange bolt**
   - X2
   - Torque: 6~8 N · m
4. **Rear right door quarter window assembly**
5. **Hexagon flange bolt**
   - Torque: 6~8 N · m
6. **Rear right door rear lower guide rail assembly**
7. **Hexagon flange bolt**
   - X2
   - Torque: 6~8 N · m

8. **Right side wall quarter window assembly**
9. **Left quarter window assembly**
10. **Rear left door quarter window assembly**
11. **Hexagon flange bolt**
    - X3
    - Torque: 4.6~6.6 N · m
12. **Hexagon flange bolt**
    - X2
    - Torque: 6~8 N · m
13. **Rear left door rear lower guide rail assembly**
14. **Hexagon flange bolt**
    - Torque: 6~8 N · m
15. **Driver door quarter window assembly**

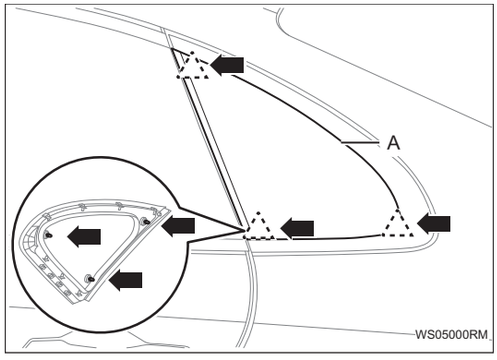
Removal

1. **C-pillar left upper guard plate (See page IR-3)**
2. **Remove the left quarter window assembly**

   Hint:

   The removal sequence on the right side is the same as that on the left side.

   (a) Detach the clip -arrow-, and remove the left quarter window assembly -A-.

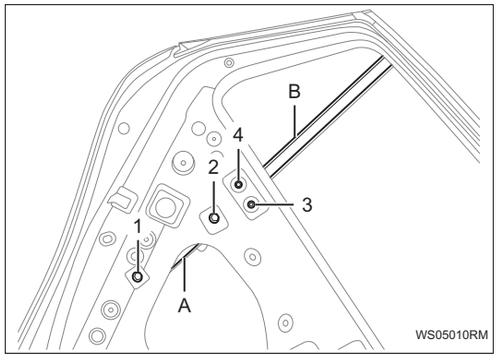


3. **Front door inner weatherstrip assembly.**
4. **Front door outer weatherstrip assembly.**
5. **Remove rear door quarter window assembly**

   Hint:

   The removal sequence on the right side is the same as that on the left side.

   (a) Remove the bolt -1-2- and the rear left door rear lower guide assembly-A-.

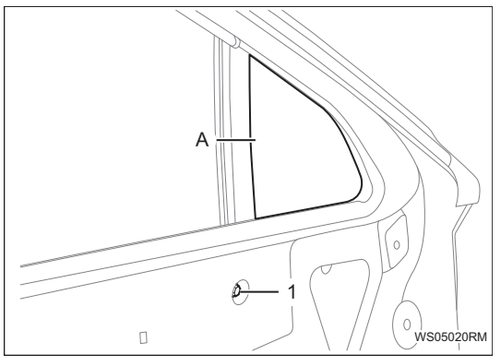


   (b) Remove the bolt -3-4- and the rear door quarter assembly -B-.

6. **Rear door inner weatherstrip assembly.**
7. **Rear door outer weatherstrip assembly.**
8. **Remove front door quarter window assembly**

   Hint:

   The removal sequence on the right side is the same as that on the left side.



(a) Remove the bolt -1- and the front door quarter assembly -B-.

Installation

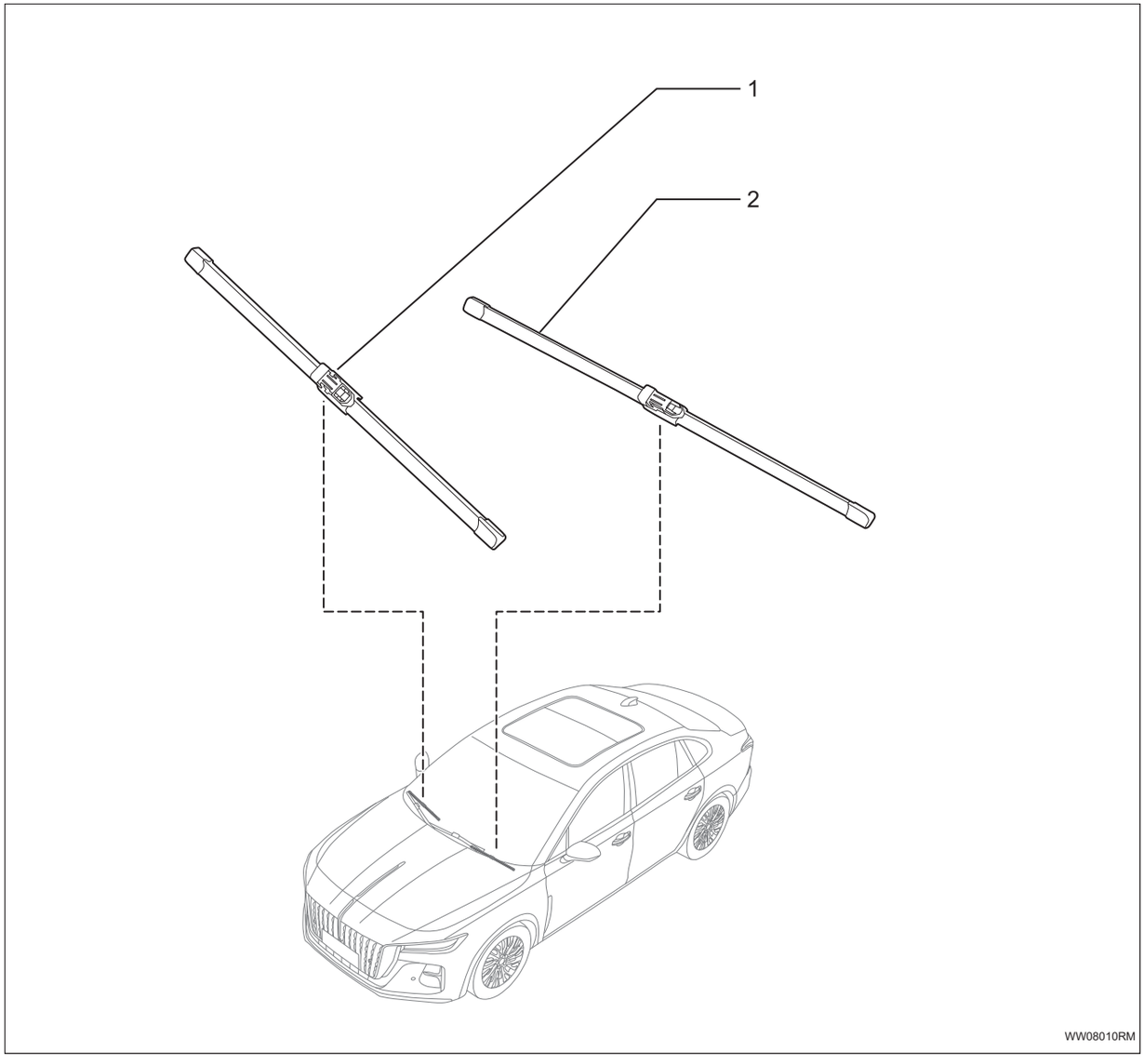
1. **The installation procedure is the reverse of removal procedure.**

Wiper and washer

Front wiper blade WW-1
Parts WW-1
Removal WW-2
Installation WW-2
Front wiper arm WW-3
Parts WW-3
Removal WW-5
Installation WW-5
Front wiper motor linkage assembly WW-6
Parts WW-6
Removal WW-8
Installation WW-9
Washer fluid reservoir assembly WW-10
Parts WW-10
Removal WW-12
Installation WW-12
Washer fluid level sensor WW-13
Parts WW-13
Removal WW-14
Installation WW-14
Washer pump WW-15
Parts WW-15
Removal WW-16
Check WW-16
Installation WW-16

Front wiper blade

Parts



1. **Main wiper blade**
2. **Auxiliary wiper blade**

Removal

Hint:

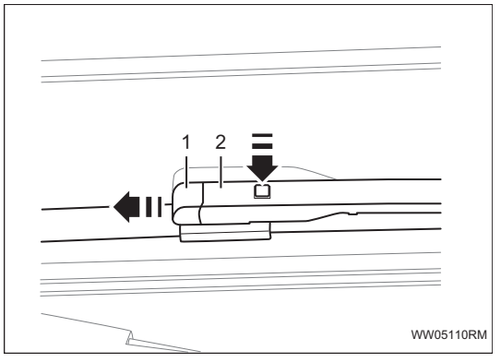
The removal sequence on the right side is the same as that on the left side.

The order listed below applies to the left side.

1. Remove the front wiper blade

Hint:

Adjust the front wiper arm to service mode.



(a) Press the fixed end -arrow A- and push the windshield front wiper blade -1- out of the windshield wiper swing arm -2- -arrow B-.

(b) Remove the windshield front wiper blade.

Installation

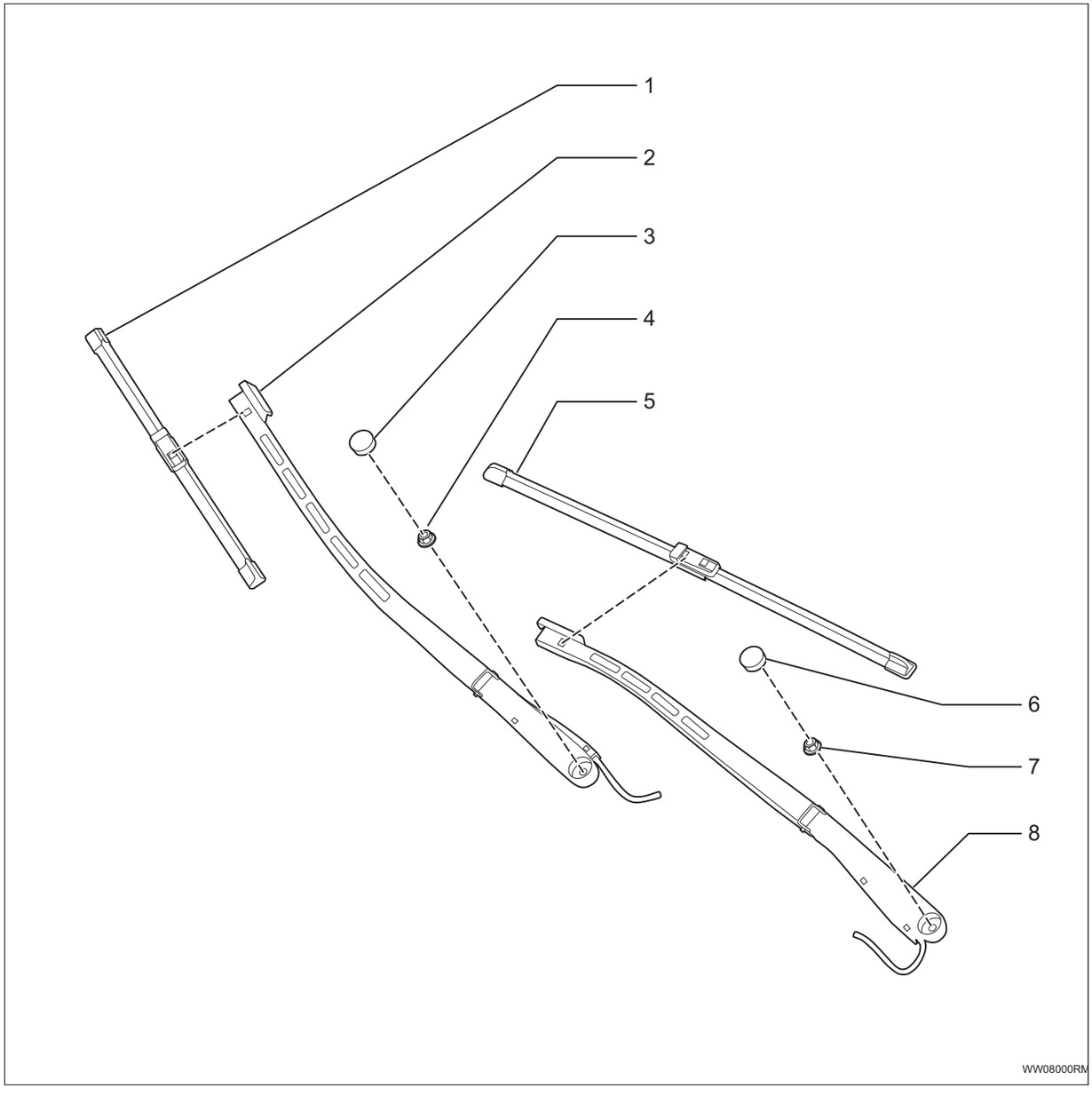
1. The installation procedure is the reverse of removal procedure, and the following points apply:

Caution:

The wiper blades on the driver side and front passenger side are of different lengths, and there is a risk of damage to the vehicle body if they are installed incorrectly.

Front wiper arm

Parts



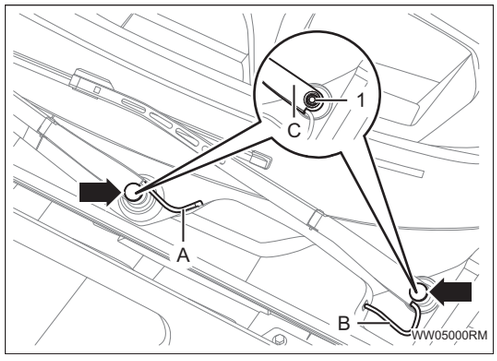
1. **Auxiliary wiper blade**
2. **Auxiliary wiper arm**
3. **Nut trim cover**
4. **Hexagon flange nut**
   - Torque: 23~27 N · m
5. **Main wiper blade**
6. **Nut trim cover**
7. **Hexagon flange nut**

- Torque: 23~27 N · m

8. Main wiper arm

Removal

1. Remove the front wiper arm



(a) Remove the trim cover as arrowed from the front wiper arm-C- with a screwdriver.

(b) Detach washer fluid pipes -A-B-.

(c) Remove the nut -1-, and remove the front wiper arm-C- with SST(9503510HF01).

Installation

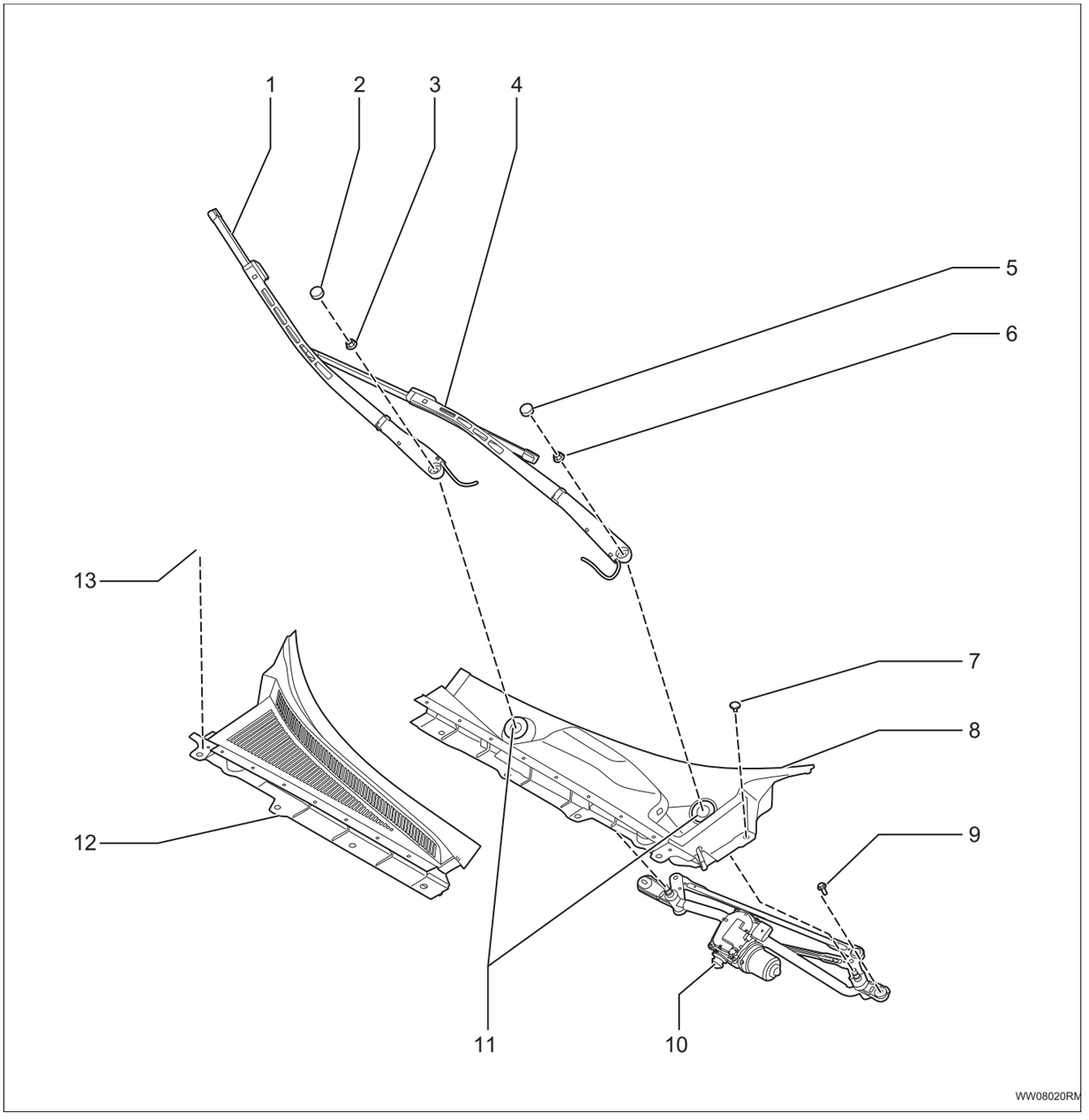
1. The installation procedure is the reverse of removal procedure, and the following points apply:

Caution:

The wiper arms on the driver side and front passenger side are of different lengths, and there is a risk of damage to the vehicle body if they are installed incorrectly.

Front wiper motor linkage assembly

Parts

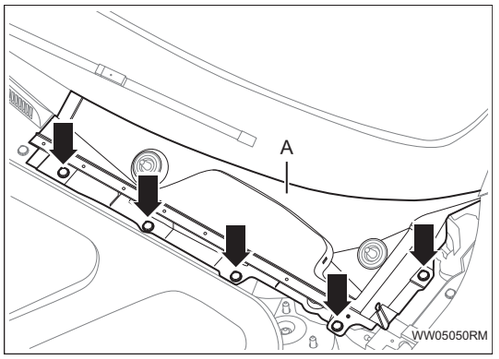


1. **Auxiliary wiper arm and wiper blade assembly**
2. **Nut trim cover**
3. **Hexagon flange nut**
   - Torque: 23~27 N · m
4. **Main wiper arm and wiper blade assembly**
5. **Nut trim cover**

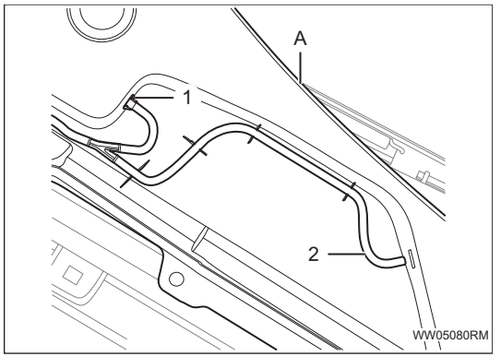
6. **Hexagon flange nut**
   - Torque: 23~27 N · m
7. **Clip**
   - X5
8. **Left drip channel cover assembly**
9. **Hexagon flange bolt**
   - X2
   - Torque: 8~12 N · m
10. **Front wiper motor linkage assembly**
11. **Sealing rubber plug**
   - X2
12. **Right drip channel cover assembly**
13. **Clip**
   - X5

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Front wiper arm (See page WW-5)**
3. **Remove left drip channel cover assembly**

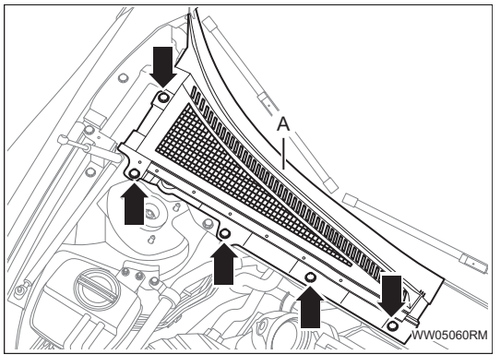


(a) Remove the clip -arrow- and detach the left drip channel cover assembly -A-.

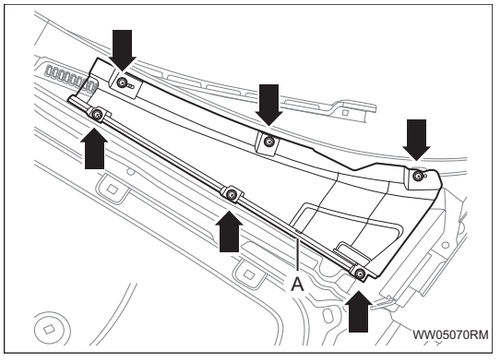


(b) Disconnect the lower water pipes -1-2- of the left drip channel cover assembly and remove the left drip channel cover assembly -A-.

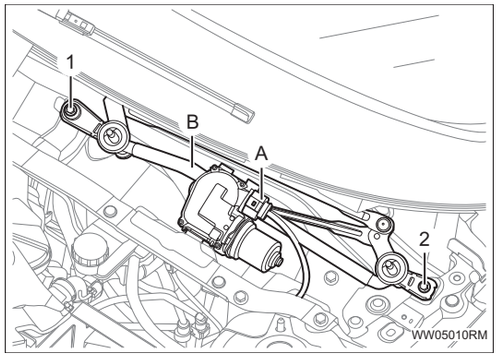
4. **Remove the right drip channel cover assembly**



(a) Remove the clip-arrow-, and remove the right drip channel cover assembly-A-.



(b) Remove the screw-arrow-, and remove the water baffle I-A-.



5. Remove the front wiper motor linkage assembly

(a) Disconnect the harness connector-A-.

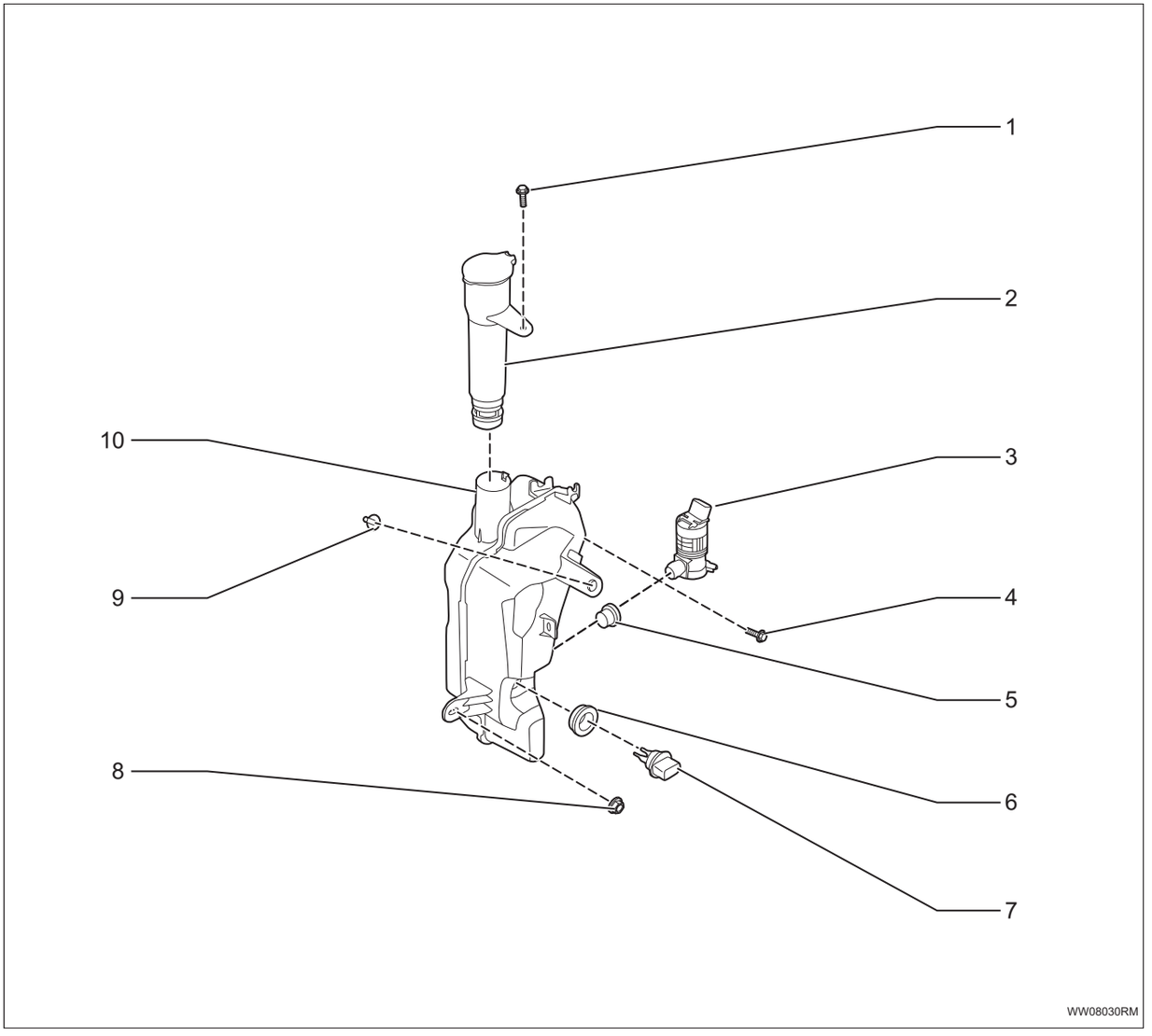
(b) Remove the bolts -1-2- and take the front wiper motor linkage assembly-B- out of the body.

Installation

1. The installation procedure is the reverse of removal procedure.

Washer fluid reservoir assembly

Parts



WW

1. **Hexagon flange bolt**
   - Torque: 8~12 N · m
2. **Guide pipe**
3. **Washer pump**
4. **Hexagon flange bolt**
   - Torque: 8~12 N · m
5. **Washer pump seal ring**
6. **Level sensor seal ring**
7. **Level sensor**
8. **Hexagon flange nut**
   - Torque: 8~12 N · m

9. Hexagon flange bolt

- Torque: 8~12 N · m

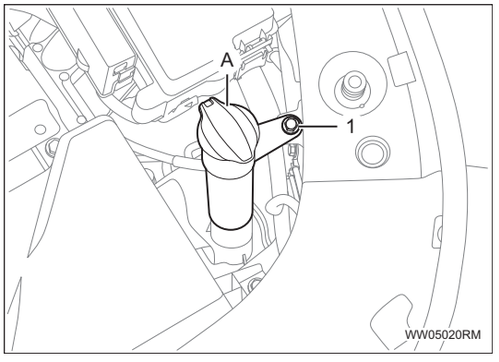
10. Washer fluid reservoir assembly

Removal

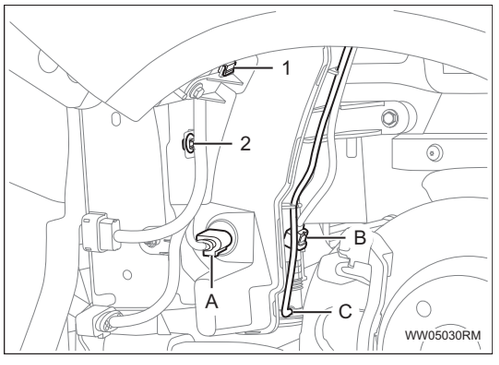
Hint:

Drain washer fluid before removal.

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove left front wheel guard I (See page ET-39)**
3. **Remove washer fluid reservoir assembly**



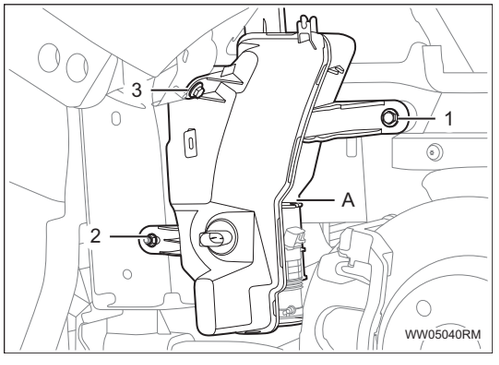
(a) Remove the bolt -1- and the washer fluid reservoir guide pipe -A-.



(b) Detach the harness retaining clip -1- and clip -2-.

(c) Disconnect the harness connector-A-B-.

(d) Remove the washer fluid pipe -C- from the washer pump.



(e) Remove the bolt -1-and -3-, nut -2- and washer fluid reservoir assembly-A-.

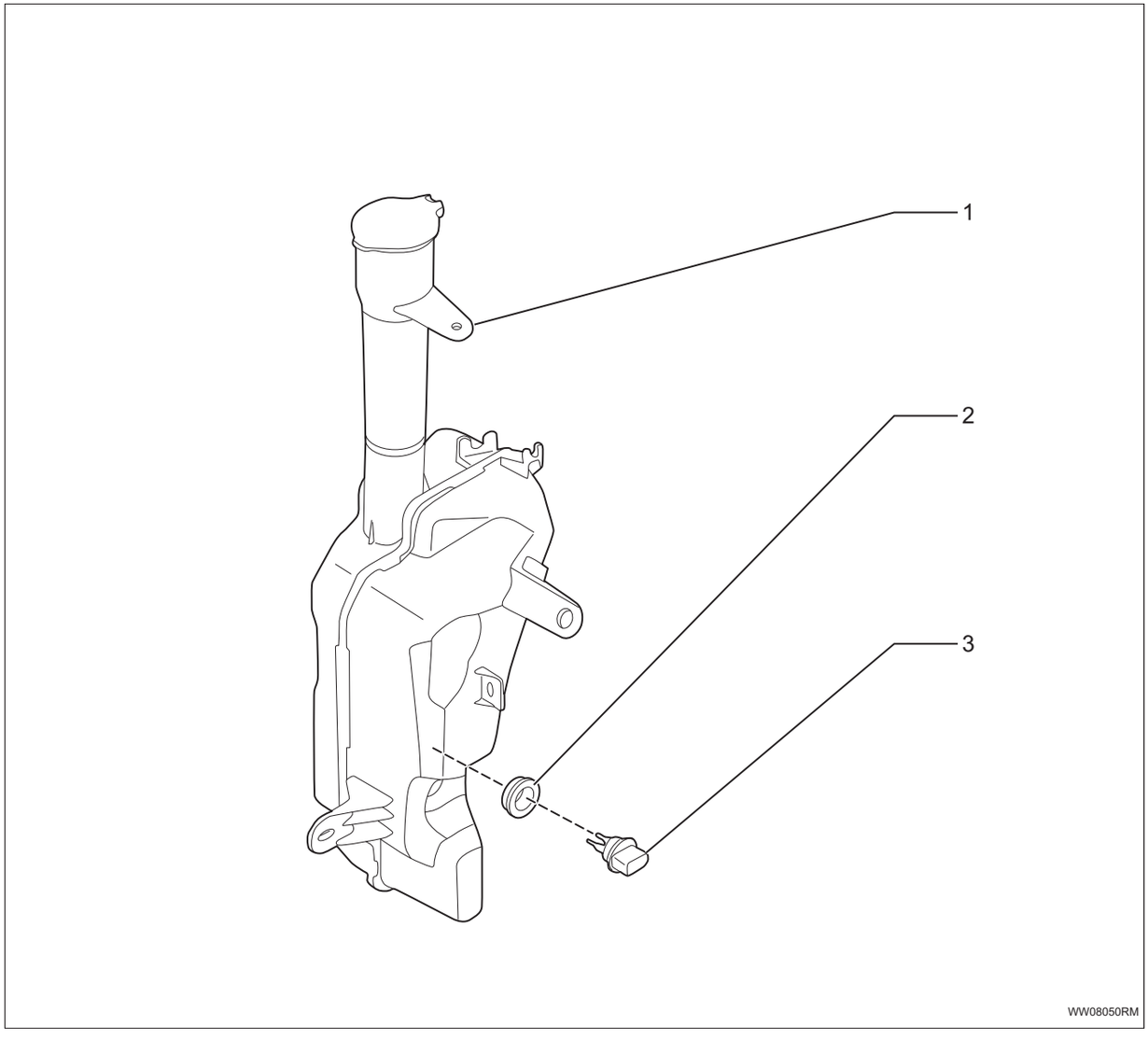
WW

Installation

1. **The installation procedure is the reverse of removal procedure.**

Washer fluid level sensor

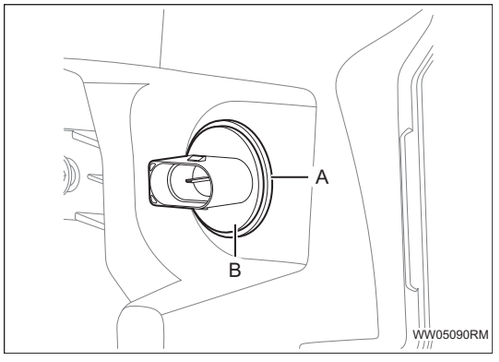
Parts



1. **Washer fluid reservoir assembly**
2. **Level sensor seal ring**
3. **Level sensor**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the washer fluid reservoir assembly (See page WW-12)**
3. **Remove washer fluid level sensor**



(a) Pull the washer fluid level sensor-B- outward from the washer fluid reservoir assembly.

(b) Remove the washer fluid level sensor seal ring -A-.

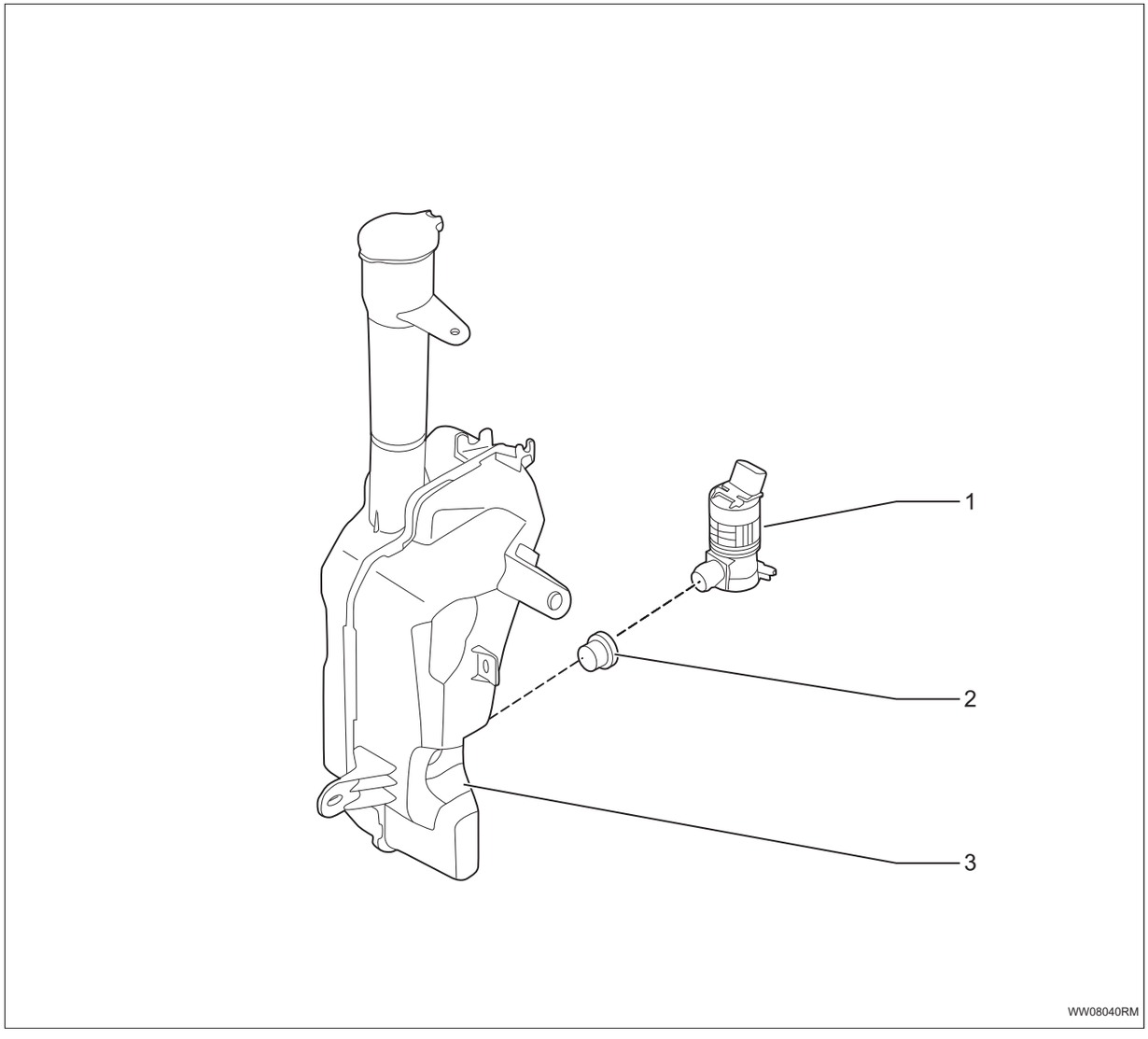
Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

(a) Check whether the washer liquid level sensor sealing ring - 1 - is damaged during installation.

Washer pump

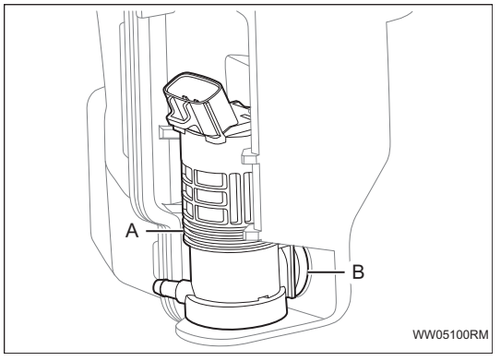
Parts



1. **Washer pump**
2. **Washer pump seal ring**
3. **Washer fluid reservoir assembly**

Removal

1. **Disconnect the battery negative terminal (See page CH-20)**
2. **Remove the washer fluid reservoir assembly (See page WW-12)**
3. **Remove washer pump**



(a) Pull the washer pump-A- outward from the washer fluid reservoir assembly.

(b) Remove washer pump seal ring-B-.

Check

1. **Check washer pump.**

(a) Check and confirm the outflow of washer fluid from the washer fluid reservoir assembly.

Normal:

Measuring conditions	Specified state
Battery (+)-washer pump connector 2# Battery - — washer pump connector 1#	Washer fluid flows out of the washer fluid reservoir assembly

If the results do not meet the requirements, replace the washer pump.

Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

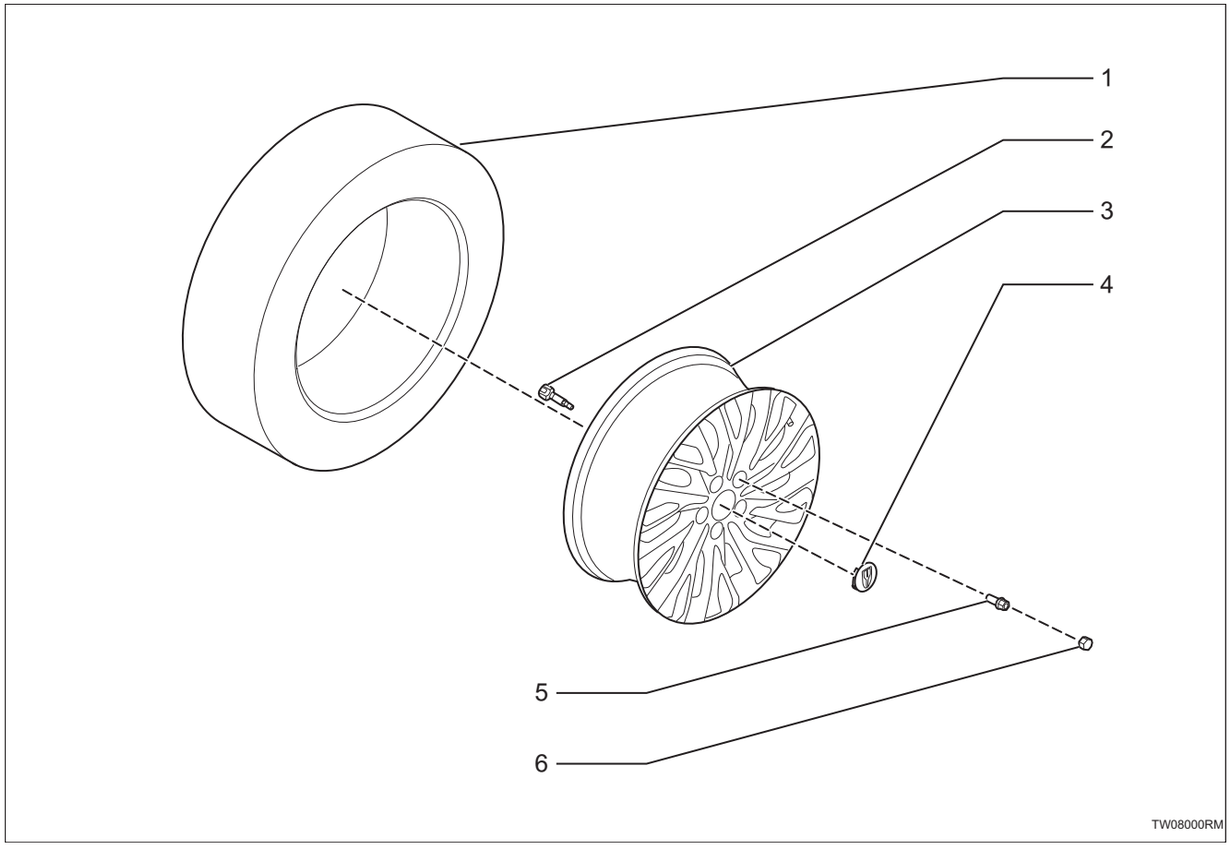
(a) Check whether the washer pump seal ring -A- is damaged during installation.

Wheel

Wheel and tire TW-1
Parts TW-1
On-board inspection TW-2
Removal TW-3
Installation TW-3
Tire pressure monitoring sensor TW-5
Parts TW-5
Removal TW-6
Installation TW-6

Wheel and tire

Parts



1. **Tire**
2. **Tire pressure sensor assembly**
3. **Aluminum alloy wheel**
4. **Aluminum wheel trim cover assembly**
5. **Wheel bolt**
   - X5
   - Torque: 110~130 N · m
6. **Wheel bolt trim cover**

On-board inspection

1. Check tire

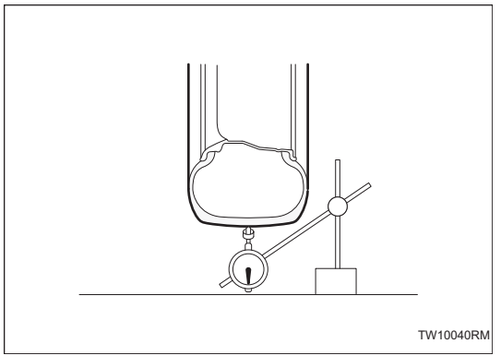
(a) Check whether the tires are worn and whether the inflation pressure is normal.

	Front wheel	Rear wheel
Three people	230 （2.3）	230 （2.3）
ECO	270 （2.3）	270 （2.7）
Full load	260 （2.6）	320 （3.2）

(b) Test the radial runout of the tire with a dial indicator.

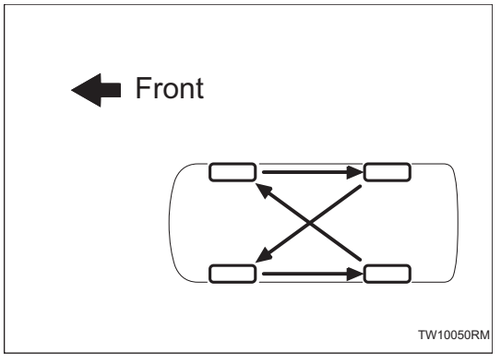
Hint:

Tire radial runout: 1.5 mm or less



2. Tire rotation

(a) Carry out tire rotation as shown.



3. Check wheel balance

(a) Wheel dynamic balance requirements.

Hint:

Inner residual unbalance ⩽ 8 g; Outer residual unbalance ⩽ 8 g

Warning:

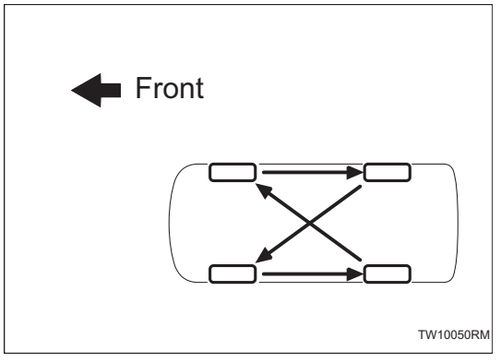
Remove dirt, oil and water from the sticking surface of the balance weight with detergent.

Do not touch the sticking surface of the tape.

Stick the adhesive-type balance weight in the flat position shown in the figure.

Push the balance weight hard with your fingers to stick it in place.

Do not reuse the balance weight.



Hint:

The inner balance weight shall be mounted to the rim with the clip.

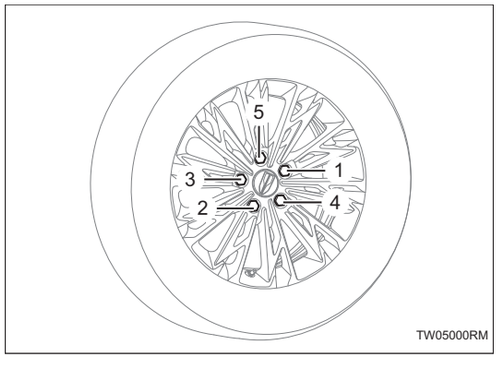
If necessary, check and adjust the balance of the wheels on the vehicle.

4. **Check the bearing tightness of hub and bearing assembly**
5. **Check radial runout of the hub and bearing assembly**
6. **Check the end face runout of the hub and bearing assembly**

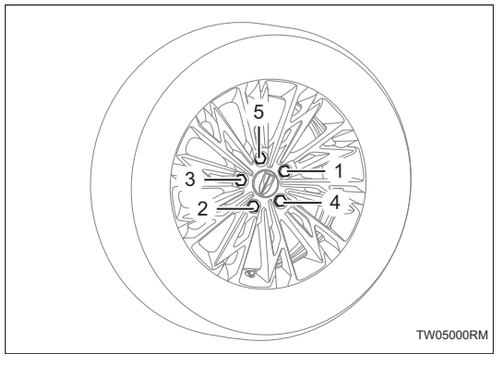
Removal

1. **Remove the wheel**

(a) Remove the wheel bolt trim cover -1-5-.



(b) Remove the bolt -1-5-.



2. **Use a special tool to remove the tire.**

Hint:

When removing the tire, avoid damaging the tire pressure sensor.

Installation

1. **The installation procedure is the reverse of removal procedure, and the following points apply:**

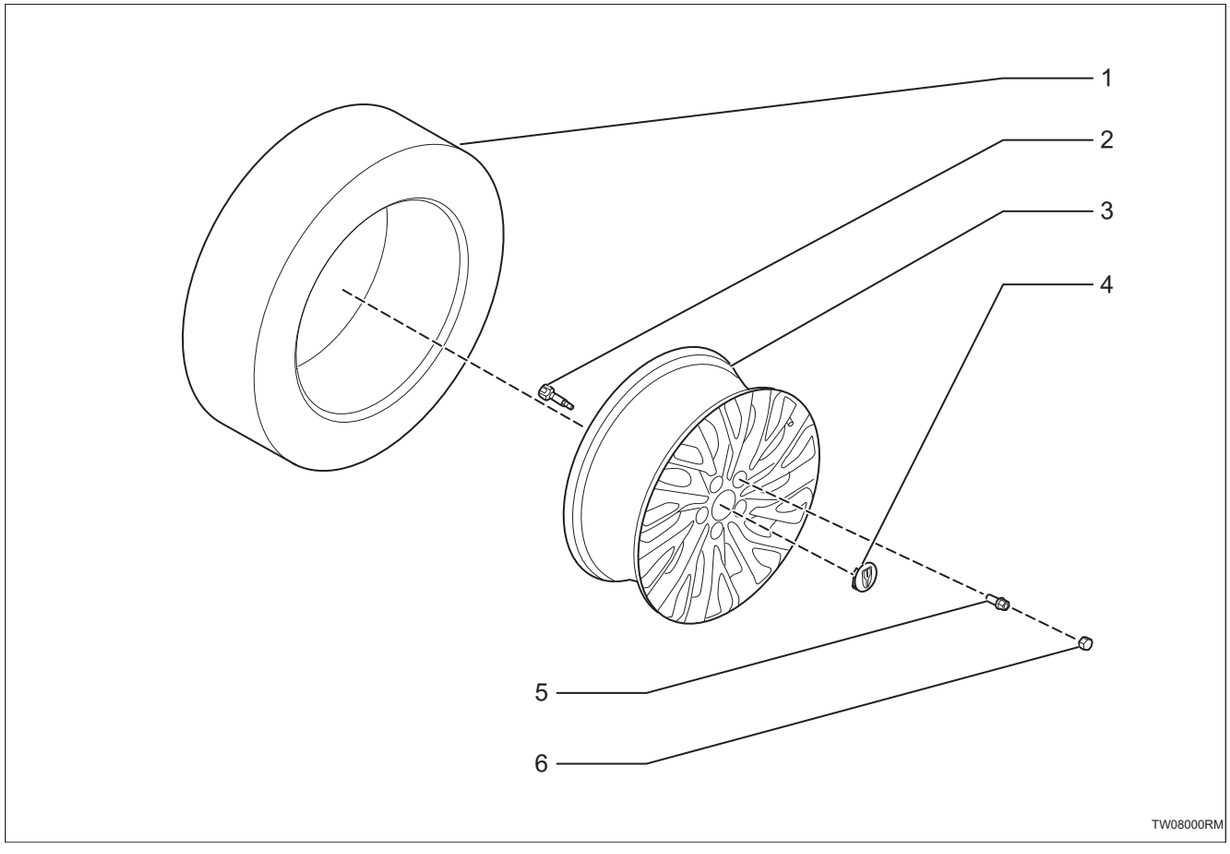
(a) Install the tire with special tools.

2. Tire model

Applicable vehicle	Tire specifications	Tire specifications
1.5T	225/55R17	17×7J
1.5T HEV	225/50R18	18×7J
2.0T	225/55R17 225/50R18	17×7J 18×7J
1.8T	225/50R18	18×7J
Spare tire specification	T125/70R17	Spare tire pressure 420 (bar)

Tire pressure monitoring sensor

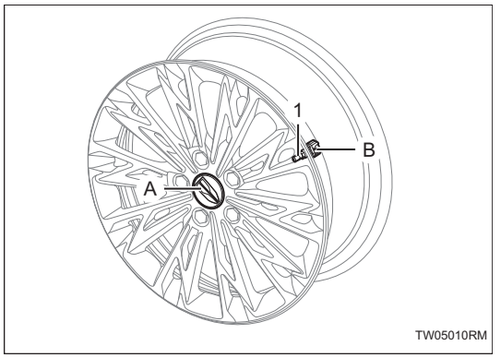
Parts



1. **Tire**
2. **Tire pressure sensor assembly**
3. **Aluminum alloy wheel**
4. **Aluminum wheel trim cover assembly**
5. **Wheel bolt**
   - X5
   - Torque: 110~130 N · m
6. **Wheel bolt trim cover**

Removal

1. **Remove the wheel (See page TW-3)**
2. **Remove the tire pressure monitoring sensor**



(a) Remove the nut -1- and the tire pressure monitoring sensor -B-.

(b) Remove the aluminum wheel trim cover assembly-A-.

Installation

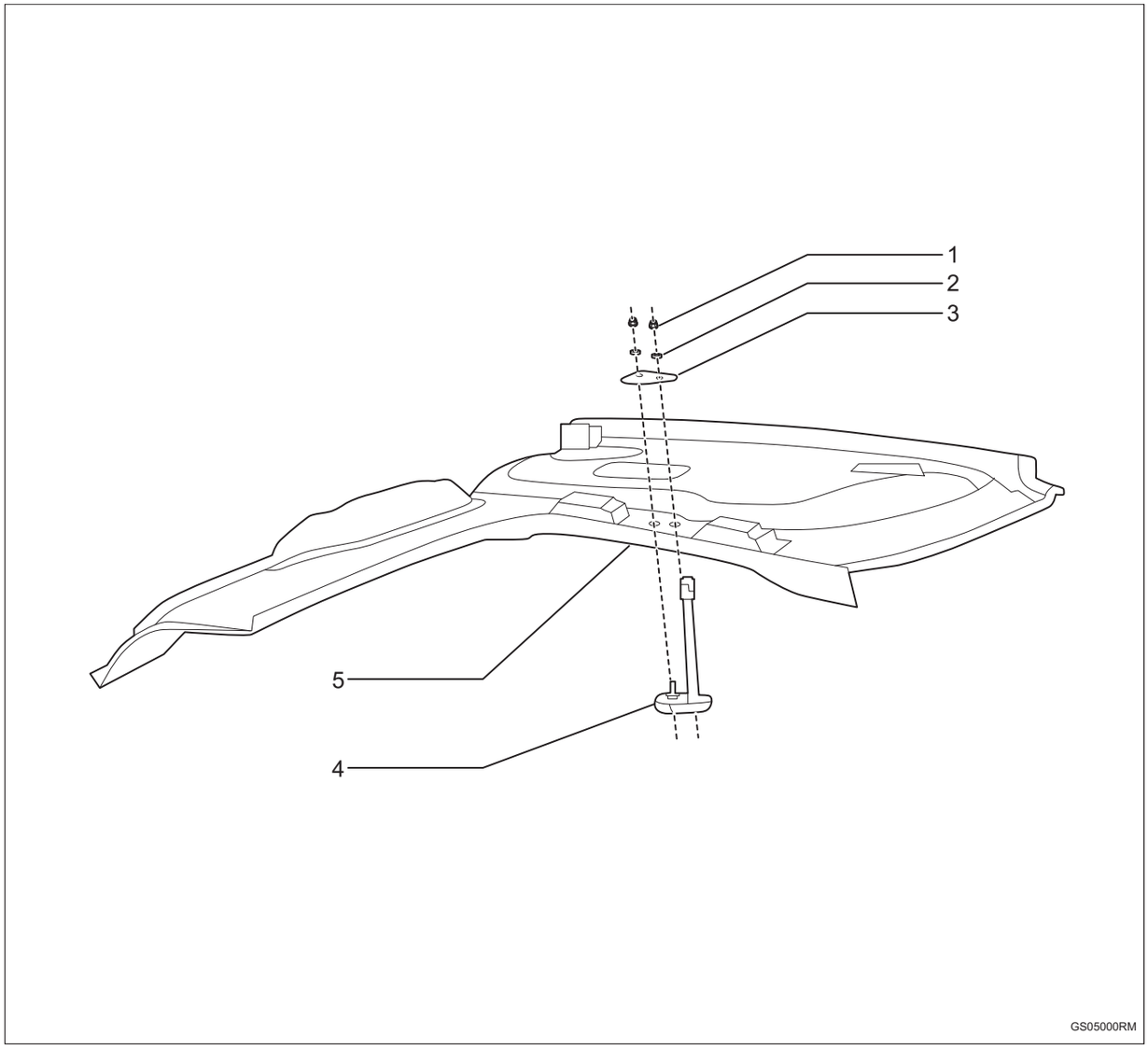
1. **The installation procedure is the reverse of removal procedure.**

Glonass system

GLonass system switch assembly GS-1
Components GS-1
Removal GS-2
Installation GS-2
Glonass system speaker assembly GS-3
Components GS-3
Removal GS-4
Installation GS-4
Glonass system controller assembly GS-5
Components GS-5
Removal GS-6
Installation GS-6

GLonass system switch assembly

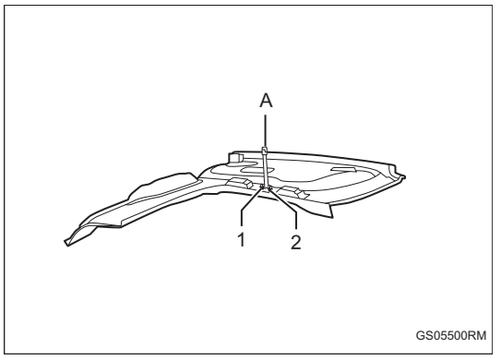
Components



1. **M3 nylon locking nut**
   - X2
2. **Flat washer**
   - X2
3. **Galvanized mounting board**
4. **Glonass system switch assembly**
5. **Roof**

Removal

1. **Disconnect negative battery terminal (See page CH-20)**
2. **Remove roof assembly (See page IR-44)**
3. **Remove Glonass system switch assembly**
   (a) Disconnect the wire harness connector.
   (b) Remove M3 nylon locking nuts -1-2- and Glonass system switch assembly -A-.

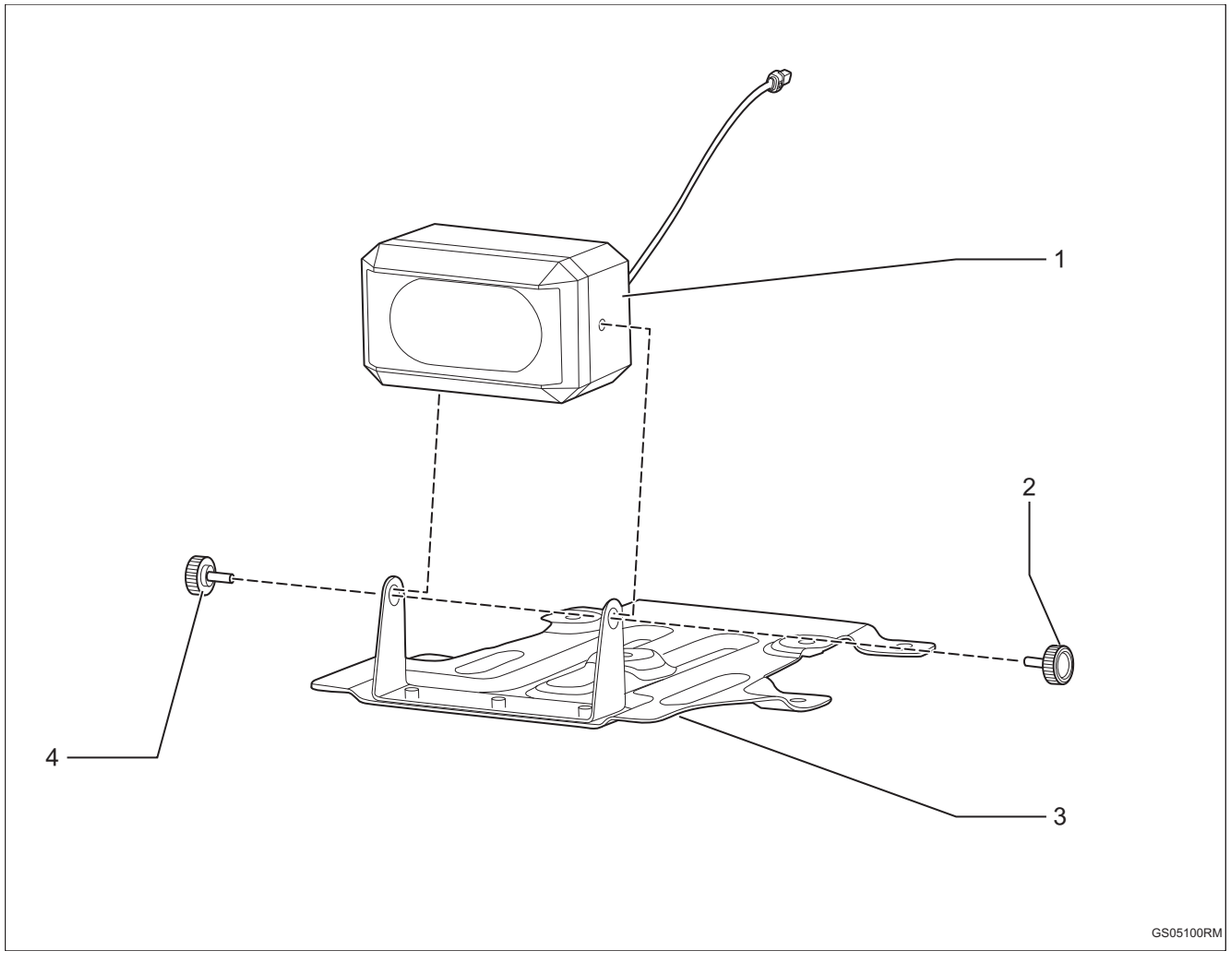


Installation

1. **Installation is in the reverse order of removal.**

Glonass system speaker assembly

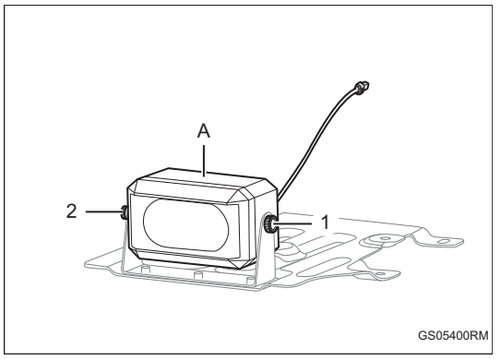
Components



1. **Glonass system speaker assembly**
2. **Speaker assembly comes with its own bolt**
   - Tighten by hand
3. **Glonass system mounting bracket**
4. **Speaker assembly comes with its own bolt**
   - Tighten by hand

Removal

1. **Disconnect negative battery terminal (See page CH-20)**
2. **Remove driver seat (See page SE-93)**
3. **Remove Glonass system speaker assembly**
   (a) Disconnect the Glonass system speaker assembly wire harness connector.
   (b) Unscrew speaker assembly comes with its own bolts -1-2- by hand, and remove Glonass system speaker assembly -A-.

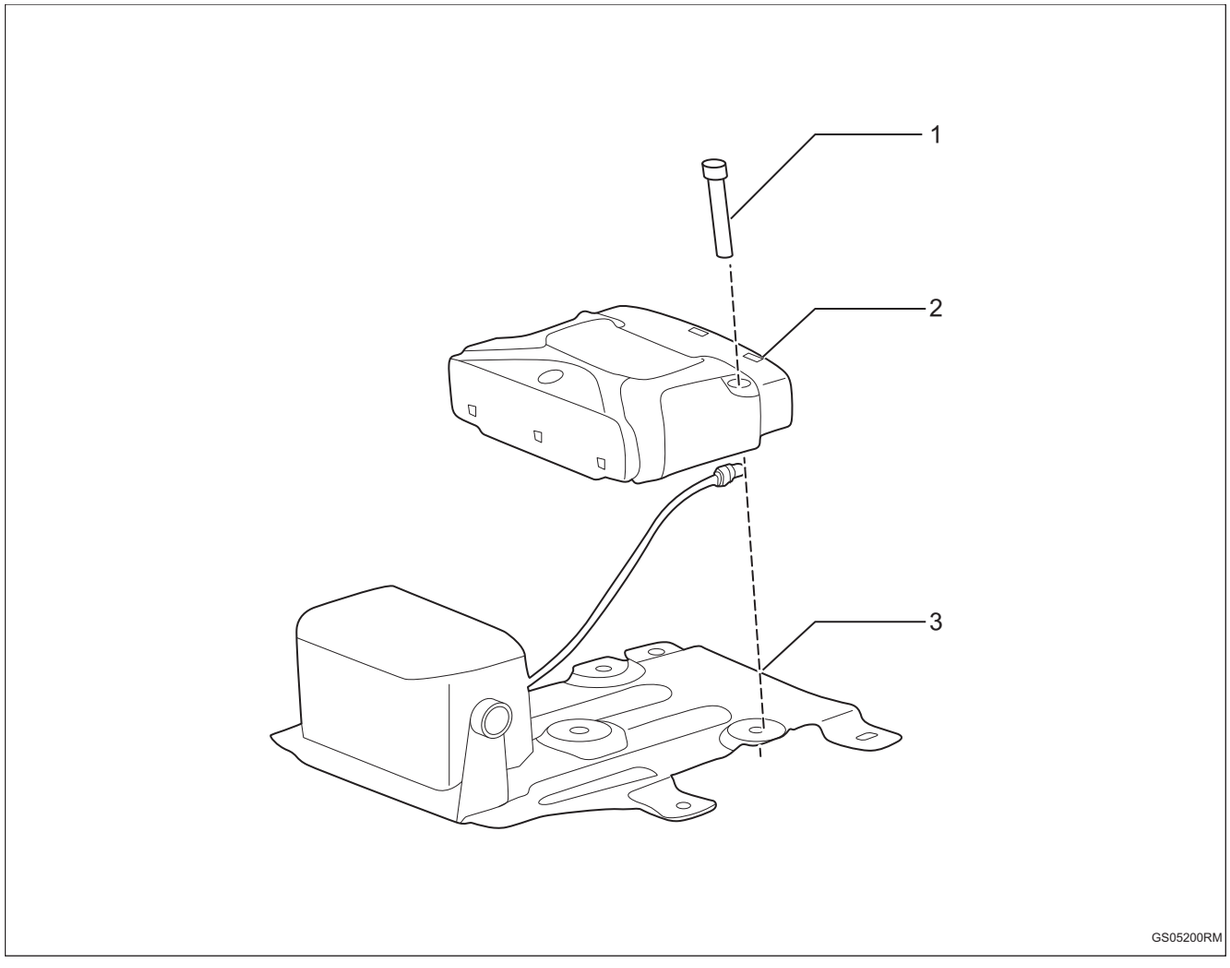


Installation

1. **Installation is in the reverse order of removal.**

Glonass system controller assembly

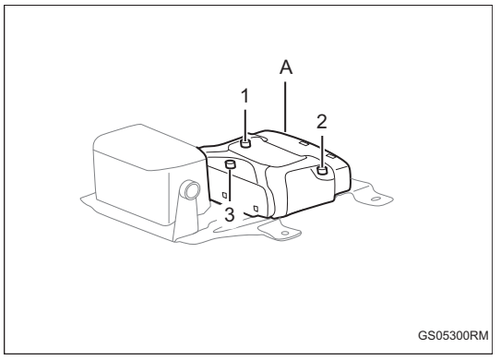
Components



1. **Inner hexagon socket cap screw**
   - X3
   - Torque: 6 ~ 8 N•m
2. **Glonass system controller assembly**
3. **Glonass system speaker bracket assembly**

Removal

1. **Disconnect negative battery terminal (See page CH-20)**
2. **Remove driver seat (See page SE-93)**
3. **Remove Glonass system controller assembly**
   (a) Disconnect the Glonass system controller assembly wire harness connector.
   (b) Remove inner hexagon socket cap screws -1-3- and Glonass system controller assembly -A-.



Installation

1. **Installation is in the reverse order of removal.**

Appendix

Revision record table FL-1

Revision record table

Revision record table			
Version	**Revision date**	**Revision content**	**Note**
V1.1	20230110	Fuel level sensor float center height and resistance value setting change	(See page ES-232) (See page FU-8)